Water Tariff - A tool for regulatory Authority to improve water use efficiency & water quality

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ABSTRACT:
The Indian state of Maharashtra has adopted the Water Resources Regulatory Act, which notably focuses on water pricing policies. It designs water tariffs so that they enhance water service accessibility and affordability while balancing competing objectives. A holistic approach has been adopted by the state involving policy reforms, legal enactment capacity building and stakeholder participation. In particular, water pricing policies contribute to environmental & economic goals if they integrate the social concept of access & affordability of water service provision. Appropriate water pricing is an important incentive for water conservation and discouragement for water pollution. It remains a complex process and is required to meet diverging financial, economic, environmental & social objectives. After an elaborate public consultation process, the State's Water Resources Regulatory Authority finalised the Criteria to determine Bulk Water Tariff. The Criteria include a set of incentives & disincentives to promote water use efficiency & water quality improvement. The Tariff plan is simple (understandable & straight forward) transparent (through a consultative process) and aims to achieve its multiple objectives. The present bulk water tariff is designed for 3 categories of uses: domestic, agriculture & industry and targets both urban & rural population. The first tariff order is issued in May 2011.

1.0 INTRODUCTION

1.1 The Maharashtra Water Resources Regulatory Authority (MWRRA) was set up in August 2005 under the MWRRA Act. Its main function is to regulate the water resources of the State. It is required to ensure that the management of these resources and the allocation and utilisation of water from them is done in a, judicious, equitable and sustainable manner and to fix the rates for use of water for agriculture, industrial, drinking and other purposes keeping these parameters in mind. Thus fixing bulk water tariffs for the three main user categories is one of the important functions of the Authority.

1.2 The Authority is the first of its kind in the country and criteria based water tariff fixation by a third party regulator has never been attempted anywhere else to date. Thus developing criteria for bulk water tariffs, based on sound economic principles and informed economic choices, was a challenging task before the Authority.

1.3 Bulk tariff is the tariff levied by the service provider viz. Water Resources Department (WRD) for volumetric supply of water to bulk users from its reservoirs, dams and canals. Water drawn by industries and drinking water users is about 15% - 20% of total water use & is volumetrically measured. Water drawn by agricultural users is about 75% - 80% of the total water usage in the State & 90% still get water from area based supplies. Only in about 10% of the irrigated area have water user associations, to whom volumetric supplies are possible, been formed.

1.4 The Authority took up the task of preparing the criteria for bulk water tariff in early 2008. The draft Approach Paper was circulated among NGOs, stake holders, line departments & water supply utilities in October 2008. It was also hosted on the web site of the Authority. Its primary purpose was to serve as a discussion paper during the long drawn public consultation process which

followed. The paper did not reflect the views of the Authority as the statute requires the Authority to consult the beneficiary public before formulating its views.

2.0 LEGAL PROVISIONS IN ACTS & WATER POLICY

In order to develop pricing framework, it is essential to have strong understanding of the legal and regulatory framework governing the sector as this framework defines the boundary within which the Regulator has to operate. It assumes even higher significance in the water sector due to its linkages with day to day survival of all human beings. The objective of this paper is to present legal and regulatory provisions currently applicable to the water sector in Maharashtra so as to develop a strong foundation for bulk water tariff framework proposed. The important provisions in the relevant Acts, i.e., MWRRA Act 2005 and MMISF Act 2005, State Water Policy relating to water tariff are as under.

Provisions in State Water Policy, 2003

A transparent system of water tariffs that recuperates the cumulative cost of providing water services from all water user entities in all categories of water use shall be established by the State. Water charges determined on the basis of the approved water tariff system will be levied on a volumetric basis. Water charges shall be assessed to WUAs and other water user entities on the basis of the volume of water delivered at their respective off takes. WUAs and other water user entities shall be responsible for determining internal water charges and assessing each of its members to obtain funds required for paying water charges, carrying out necessary maintenance and for any other purpose approved by the membership. In order to alleviate the impact of such charge on those who are unable to pay the complete charge, the State may allow cross-subsidies and allocate Government Funds.

2.1 Provisions of the MWRRA Act, 2005

The Maharashtra Water Resources Regulatory Authority (MWRRA) has been set up under the provisions of Maharashtra Water Resources Regulatory Authority Act, 2005 (MWRRA Act, 2005'). This Act provides the functions and powers of the Authority with respect to various issues associated with the water sector in Maharashtra.

2.1.1 Tariff Related Provisions

Under Section 11 of the MWRRA Act, 2005, the Authority has been empowered to regulate the water resources within the State of Maharashtra and also fix rates for the Water User Entity. This Section empowers MWRRA to establish a water tariff system at sub-basin, river basin and State level, as reproduced below:

"11.The Authority shall exercise the following powers and perform the following functions, namely:-
(d) to establish a water tariff system, and to fix the criteria for water charges at sub-basin, river basin and State level after ascertaining the views of the beneficiary public, based on the principle that the water charges shall reflect the full recovery of the cost of the irrigation management, administration, operation and maintenance of water resources project ;
(q) to promote efficient use of water and to minimize the wastage of water and to fix reasonable use criteria for each Category of Use;
(r) to determine and ensure that cross-subsidies between Categories of Use, if any, being given by the Government are totally offset by stable funding from such cross-subsidies or Government payments to assure that the sustainable operation and maintenance of the water management and delivery systems within the State are not jeopardized in any way;
(u) the Authority shall review and revise, the water charges after every three years".

Further, Section 12 of the MWRRA Act, 2005 provides that the MWRRA shall work within the framework of State Water Policy & should encourage & implement water conservation & management practices, and also apply principal that "the person who pollutes shall pay" & charge the polluter.

2.2 Provisions of MMISF Act, 2005

Management of Irrigation Systems by Farmers' Act 2005 (MMISF Act, 2005) was enacted in order to provide for management of irrigation systems by farmers and the matters connected therewith.

Section 26 of the MMISF Act, 2005 prescribes the rates for supply of water to a Water Users' Association on the volumetric basis measured at the point of supply. Section 27 of MMISF Act, 2005 prescribes the Water Users' Association shall have powers & responsibility to charge to its members.

2.3 Principles for Bulk Water Tariffs under MWRRA Act 2005

Following principles emerge for bulk water pricing in the State of Maharashtra which are more or less in line with Dublin Principles.

a. Affordability to be prime consideration followed by accessibility & timeliness of supply.
b. Full recovery of O&M Costs
c. Stakeholder consultation process while determining tariffs
d. Efficient use of water
e. Sustainable operations and management of water systems
f. Promotion of water conservation and management processes
g. Polluter to pay in case of polluting consumers

2.4 Bulk Water Tariff Comparison across the States in India

The bulk water pricing principles across the selected States viz. Andhra Pradesh, Gujarat, Haryana, Punjab, Rajasthan, Tamil Nadu and Uttar Pradesh for the three major categories i.e. domestic, industrial and agriculture sector are summarised below:

- Basic principle for levy of tariffs is recovery of Operation & Maintenance costs as observed in the States like Andhra Pradesh, Gujarat, Haryana and Rajasthan
- Paying capacity is a criteria considered by Gujarat, Haryana, and Punjab.
- Haryana and Uttar Pradesh are the two states that consider capacity and assuredness of irrigation water as one of the criteria for levy of water tariffs and the same philosophy is reflected in their tariff structures.

3.0 METHODOLOGY FOR DETERMINING BULK WATER TARIFF

3.1 Background and Objectives

Management of water is an economic, social and political issue encompassing all sectors of an economy. Water resources are increasingly becoming a limiting factor for economic growth and human development. The consequences of population explosion coupled with the demands of unbridled consumerism have converted what was once an abundant resource into what is now a scarce resource. This is the main reason for a worldwide movement pushing governments towards policy reform in the water sector. The focus has to not only sharpen on supply side management but also include demand side management through improving and incentivizing water use efficiency and water conservation. The International Conference on Water and Environment organized by the United Nations at Dublin in Ireland in January 1992 had adopted four guiding principles, known as the Dublin principles, for improving the sustainability of water supply and sanitation services. These principles continue to remain relevant for dealing effectively with the emerging trends of over-consumption and pollution and the rising threats from droughts and floods. The four guiding principles enunciated in the Dublin statement were

Principle No. 1	Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.
Principle No. 2	Water development and management should be based on a participatory approach, involving users, planners and policy makers at all levels
Principle No. 3	Women play a central part in the provision, management & safeguarding of water
Principle No. 4	Water has an economic value in all its competing uses and should be recognized as an economic good.

Efficiency and conditions of water delivery system in most municipal and irrigation water services fall far short of satisfactory levels of performance, financing of these services and recovery of at least the operation & maintenance costs of the delivery system has emerged as a key factor for performance improvement. Water pricing remains a complex process and is required to meet diverging financial, economic, environmental and social objectives. A major challenge therefore is designing tariffs in a way that strikes an appropriate balance among competing objectives. It is especially important that two main objectives flowing from the first and the fourth principle at Dublin are met simultaneously viz. the affordability of water for low income users while ensuring accessibility of water to all and the financial sustainability of the service provider assuring collection of sufficient revenue to meet the operation & maintenance (O & M) costs.

3.2 Tariff Setting Criteria

As per the Maharashtra Water Resources Regulatory Authority Act, bulk water tariffs in the state are required to recover the O&M costs of the irrigation system. The criteria for fixing tariffs for this purpose are to be determined in consultation with the beneficiary public. Thus a tariff designed to recover capital cost and/or cost of environmental damage is outside the pale. Users are, however, not absolved from the responsibility of ensuring efficient use of water and discharging, after use, water of prescribed quality. These objectives are to be enforced thorough a system of penalties and incentives in the tariff structure. Thus the tariff structure for the state as a whole will not only need to recover O & M costs while assuring affordability and accessibility but also promote efficiency of water use and environmental sustainability through such a system. Other characteristics of a successful tariff plan are simplicity (tariff plan should be understandable and straight forward) and transparency (tariff plan should be evolved through a consultative process) and these characteristics will have to inform the tariff structure as it seeks to achieve its multiple objectives.

For fixing bulk tariffs in Maharashtra there are two imperatives which need to be kept in mind. Firstly, water charges in the state have always been uniform both over geography and over time. Basin, sub basin level tariffs, though a goal to be aspired for in the long term, requires much work in terms data collection in the time series mode. MWRRA has already initiated this exercise with the help of WALMI and future tariffs may be expected to make progress in this direction. A dual tariff system is not considered feasible at the present moment and can be appropriately introduced when disaggregated data to enable basin-wise and sub basin wise tariff structures become possible. For the present it is proposed to continue with the prevailing practice of averaging costs incurred by all projects in the state as a whole and fixing uniform charges over the entire state. Secondly, as already mentioned earlier the MWRRA Act itself lays down the clearly that only O & M costs can be collected through water charges Section 11 (d) reads “to establish a water tariff system, and to fix the criteria for water charges at sub-basin, river basin and State level after ascertaining the views of the beneficiary public, based on the principle that the water charges shall reflect the full recovery of the cost of the irrigation management, administration, operation and maintenance of water resources project. For the current tariff revision exercise undertaken once in three years in terms of Section 11 (u) of the MWRRA Act, therefore, it is, proposed to adopt the average cost based pricing model by applying average O & M costs on an annualized basis across the board.

This, of course, does not mean that average cost has to be recovered uniformly across all user groups viz. industry, drinking & agriculture. Such arithmetical averaging would require us to ignore the other parameters mentioned above viz (i) affordability; (ii) accessibility: (iii) quantity & timeliness; and (iv) water use efficiency i.e. the value addition to the water used and/or saved by each user group. In addition is the issue of environmental sustainability which has to be built into the tariff structure after taking into account available technologies and incentivising their use. Hence, cost has to be allocated across different groups through a tariff structure which takes into account these parameters. For this purpose a matrix will essentially have to be constructed by allocating weightages representing the relative importance of each of these parameters to each of our three bulk user categories viz. Irrigation, Drinking water and Industry and then applying them to the basic O & M based arithmetical unit cost to derive a weightage based differential pricing structure with the weightages justifying the difference. While it cannot be denied that a matrix allocating weightages of this type cannot altogether eliminate the subjective element the Authority has gone substantially by the views expressed by stakeholders in the public hearings held at 9 places in the state.

3.3 Affordability

Affordability is related to the consumer's ability to pay. This is distinct from willingness to pay where a consumer's coping cost gets added. For example a drinking water user may spend additional money on booster pumps, overhead tanks or tanker supply to tide over shortage in supplies by incurring coping costs. Similarly, in irrigation, informal trading is practiced where one farmer buys water from another at a price higher than the state levied tariff. This is an indication of his willingness to pay and not affordability. Willingness to pay can be considered as an upper limit of water tariff in a differential structure and will be relevant if sectoral cross subsidization is required to be resorted to for meeting costs. Hence, when we allocate weightages to ability to pay as a factor affecting pricing the highest weightage has to be allocated to industry, a lesser weightage to agriculture and nil or close to nil for drinking water.

3.4 Accessibility

Like affordability water accessibility is a significant factor which directly impacts pricing. Accessibility is defined here as "Reach' rather than as mere availability. Hence, Accessibility is also influenced by the means of delivery, storage facility and timeliness of supply because of the differential marginal utility of water to each user category. Thus, the delivery process, volumetric supply i.e. quantity of water supplied and timing of supply to each user category becomes important when allocating weightages for accessibility. Drinking water is accessed from storages or from a point in the distribution system through Lift using power and then transported through pipes. At the receiving point it is required to be stored in small or large quantities (in tanks of various sizes) depending on the number of persons serviced by the bulk user. All these costs i.e. of lift, transport, storage and redistribution have to be borne by the bulk user who is usually a service provider like a Municipality or gram panchayat. The weightage for accessibility for drinking water has, therefore, to be very low.

Water for irrigation is normally accessed from the canal distributaries which are run and maintained by the project or system. This delivery is a relatively easy for the farmer. Where a water user association exists as a bulk user the actual or capital cost of laying the minors has already been incurred by the project and only the maintenance is to be borne by the WUA. Hence the weightage for accessibility for irrigation has to be higher than for drinking water although the issue of timeliness is important here and is dealt with later. Water is accessed by industry mostly via industrial estates of the Maharashtra Industries Development Corporation (MIDC). Some industries like sugar factories or large to very large scale units located outside industrial estates access water directly from the water head if the same is available within a reasonable distance. Unlike drinking water and irrigation industry has a choice in selecting location prior to the unit being set up. Water is a vital infrastructure need and an industry is not likely to be set up unless access to water is viably established at the planning stage. The same is true of industrial estates and SEZs. MIDC establishes locations only after dams are set up and water allocation from the reservoir or canal is assured. Hence water accessibility for industry might not get influenced by the tariff structure and this parameter will naturally carry a higher weightage for industry.

Thus from the accessibility view point the intra se allocation of weightage for drinking water has to be the lowest, for irrigation moderate and for industry the highest. Hence in distribution of O&M cost, drinking water will carry the lowest weightage, agriculture moderate weightage and industry the highest weightage.

3.5 Quantity and Timeliness (Q&T)

Despite being offshoots of Accessibility in its original context of availability the two parameters of adequacy of supply and timeliness of supply deserve independent treatment. This is because these two parameters affect each of the three bulk user categories differently. Thus quantity of supply (or adequacy) and timeliness of supply carry different types of significance for the three categories of use. The weightage for quantity understood as adequacy is lowest for drinking water and though there may be some flexibility in timeliness the weightage for both taken together has still to be considered the lowest for this category of users. Since the opportunity loss of both quantity (in terms of perceived demand) and timeliness of incremental income is substantial for irrigation the weightage for irrigation will be higher than the relative weightage for industry drinking water but lower than that for industry where both quantity of supply and timeliness carry significant implications, especially where water is

used as raw material. Hence in distribution of O&M cost, drinking water will carry the lowest weightage, agriculture moderate weightage and industry the highest weightage.

3.6 Subsidy & Cross Subsidy

The Regulator has a delicate task of ensuring on the one hand that the tariff structure does not give a tariff shock to any user group by exceeding its paying capacity and on the other hand the Government is not burdened with a large subsidy if the user groups are not appropriately charged.If ability to pay is expressed as affordability as defined earlier above then an inter sectoral cross subsidy can be said to come into play if one sector, say the industrial sector, is charged more than its ability to pay and another sector, say the agriculture sector, is charged less than its ability to pay. In this approach as long as each sector is charged as per its ability to pay, no cross subsidy is said to exist. Hence, if all user groups are charged strictly as per their ability to pay and there is still a short fall in revenue collection to meet O & M costs then it is required to be made good by the State government and becomes a direct subsidy to the system as mentioned earlier. In this situation there is subsidy but no cross subsidy. In an ideal tariff structure, cross subsidy should be absent and subsidy should be minimal.

3.7 Present Tariff Profile

Data for Maharashtra state for 6 years viz. 2002-03 to 2007-08, furnished by the Water Resources Department on tariff levied for each of the three bulk water user sectors viz. agriculture, drinking water and industries shows the following profile.

Year	Total Tariff levied (Rs. in crore)	Percentage of total levy on		
		Irrigation	Drinking Water	Industry
2002-03	361.40	25.0	27.0	48.0
2003-04	410.10	22.0	24.0	54.0
2004-05	465.90	17.0	25.0	58.0
2005-06	397.10	18.0	31.0	51.0
2006-07	484.10	20.0	24.0	56.0
2007-08	612.90	19.5	28.0	53.0
	Average	20.2	26.5	53.3

For 2007-08, out of the total water used of 22499 Mm^3, 80.4% was used for irrigation including all types of losses and pilferages, 16.5% for drinking (and other domestic uses) and 3.1% by industry. The average cost of water supplied in the State (total tariff levied divided by total water use) works out to 27 p/m^3. The water rate for each sector (sectoral tariff levied divided by sectoral water use), works out to 6 p/m^3 for agriculture, 46 p/m^3 for drinking and Rs. 4.81/m^3 for industries. This is the simple arithmetical picture. It is necessary to apply to these the weightages as translated into figures for each user group, then adjust them to the limits of cross subsidy as per the affordability criteria and thereafter arrive at a tentative tariff structure.

3.8 Setting Tariff for Agriculture

The presence of 72% of small and marginal farmers in the farming sector has already been noted earlier in the context of ability to pay.. Added to these are the following factors which contribute to low and uncertain incomes in a larger or smaller measure, namely,

i. the linkage of irrigation to storage positions in reservoirs which in turn depend on the vagaries of the monsoon;
ii. the absence of assured volumetric supplies (50% to 75% dependability for irrigation as compared to 95% for drinking water & industry); and

Various Committees set up by State and Central governments to study the issue of agriculture tariff have suggested that water rates should be linked to a certain percentage of gross income of crops viz upto 6% for cereals and upto10% for cash crops. It is therefore, assumed that in the allocation of O & M costs between the three user categories affordability would carry a lower burden relative to Accessibility and Q&T in the agriculture sector.

3.9 Setting of Drinking Water Tariff

The drinking water and domestic water user group has a range of sub groups from Gram Panchayats (GP) (40 lpcd) to Municipal Councils/urban local bodies (70 lpcd to 125 lpcd) to Municipal Corporations (135 lpcd). Studies show an urban rural divide in respect of all parameters. In the background of the fact that 43% of the population in the state resides in urban areas it is necessary to examine whether this divide significant for a tariff setting exercise.

A study of the average billing rate (ABR) and average revenue realization rate (ARR) for the period 2002-03 to 2006-07 for the various sub categories of users shows that for GPs the ARR per 10 kilolitre (kl) is on an average 60% of ABR. However in the case of urban local bodies, it improves to 67% and in case of Municipal Corporation to 69%. Another study shows that domestic annual water charge as percentage of per capita annual income is only 0.2% in the case of urban consumers but increases to 0.76% in case of consumers in rural areas. The questions that arise are

(i) Does this indicate that the affordability rises with the level of urbanization; and
(ii) Are GPs less able to generate revenues than MCs because urban consumers are economically better off?

House hold level surveys done in cities show those urban consumers are willing to pay more for reliable water supply of required quality. However, although 43% of the population resides in urban areas more than 50% of this urban population resides in slums. These habitations are generally unauthorized makeshift structures on encroached land and hence outside the organized water supply systems which can only cover legitimate housing. For political and humanistic reasons water is supplied to these spaces at low or nil rates but it is supplied invariably in very small quantities and never at the household level. Also, since drinking water carries the highest priority in the water policy of the state and dependability in terms of quantity and timeliness is as high as 95% the weight for accessibility and Q&T need not be less than 50% in the O&M cost allocation vis-à-vis agriculture and industry.

3.10 Setting of Tariff for Industry

Setting of water tariff for industry has always been difficult as water is used by industries in many ways viz. cleaning, heating, cooling, generating steam, and transporting dissolved substances and as raw material for beverages. The amount of water actually consumed is only 10 – 15% while 85 – 90% is returned to the water bodies. A study to assess industrial water charge as a percentage of maximum retail price (MRP) for some typical industries shows that for 2006-07, for soft drinks this was 0-12% to 0.18% and for soybean based de-oil cake industry, it was 0.02%. For a paper unit it was 0.36% and for a food processing industry 1.01 to 2%. Thus for most industries, water charges do not constitute a significant component of total production cost.

During stake holder hearings industrial water users pleaded for reduction in bulk tariff not on the grounds of any adverse impact on viability but on their perceived notion of a disproportionate share of the cost being recovered from industry vis-à-vis agriculture. A study of the industrial tariff pattern in the state shows that the average industrial tariff was about 80 p/m^3 in 1997-98 which increased to Rs. 2.25/m^3 in 2002-03 with a provision of 15% increase every year. The present tariff is about Rs. 4.80/m^3. As a bulk consumer industry uses only 5% of the total volume supplied and since industry carries a higher priority than agriculture the quantitative aspect of supplies is not a constraint.

Thus in the allocation of O&M cost water is much more affordable to industry than to farmers and domestic users. Similarly neither accessibility nor assured Q & T for the industrial sector require the system to incur heavy costs. While it is not necessary either reduce the burden on account of affordability it may not be advisable to further burden industry or increase tariff on account of accessibility or Q&T. These factors have to take into account in the apportionment matrix.

3.11 Apportionment of O&M Cost

An exercise has been done to develop a matrix considering three parametres viz. affordability, acessibility and Q&T for the three categories of bulk user viz. irrigation, drinking water and industry on the basis of the above analysis. It is necessary to repeat that a subjective element in the allocation exercise cannot be eliminated completely and the effort has been go by the general trends which emerged in the public hearings. It is expected that in the discussions to follow with stakeholders and

other interest groups it will be possible to further refine the matrix. The matrix is presented in 2 tables. First, Percentage allocation of O&M costs to each of the three parameters in respect of each of the three user categories; and secondly, application of the multipliers of 0.6 and 0.2 each for the three categories of users viz. irrigation, drinking water and industry in that order.. The matrices are given below.
Allocable O&M cost out of Rs. 100 to each category based on affordability, accessibility and Q&T.

	Agriculture	Drinking Water	Industry	Total
Affordability	15	10	75	100
Accessibility	30	25	45	100
Q & T	30	25	45	100

Allocation of O&M with weightage of 0.6 to affordability and 0.2 each to accessibility and timeliness of supply

	Agriculture	Drinking Water	Industry
Affordability	15x0.6 = 9	10x0.6 = 6	75x0.6 = 45
Accessibility	30x0.2 = 6	25x0.2 = 5	45x0.2 = 9
Q & T	30x0.2 = 6	25x0.2 = 5	45x0.2 = 9
	21	16	63

Assuming 15% of drinking water drawal is used for industry and 15% of industrial demand used for drinking water

Effective drinking water allocation = 0.16 x 0.85 + 0.63 x 0.15
= 0.136 + 0.095 = 0.231

Effective industrial allocation = 0.63 x 0.85 + 0.16 x 0.15
= 0.536 + 0.024 = 0.560

3.12 Water Use Efficiency

Water use efficiency can be defined in two ways. Firstly, in terms of savings where the consumer uses lesser amount of water for the same purpose; and secondly, where the consumer's output from the same amount of water is greater than before. From the bulk use point of water use efficiency could also mean improvements in delivery systems which enable one or both of the above.

The issue of water use efficiency is also complicated by the issue of how to measure efficiency. On one hand certain efficiency practices lead to increase in productivity from the same quantity of water. On the other hand some practices can lead to saving of water for the same quantity of output. The former is concerned with technology in the production process which uses lesser water. The latter is concerned with delivery and reducing leakages and losses.

Due to variations in technologies available and due to flexibility in their applications – no user can be forced to adopt improved methods without a statute in place – it is not possible to allocate costs between different user categories for water use efficiency. Hence, the parameter cannot be built into the .matrix and the issue of promoting water use efficiency through the tariff system can at better be addressed via a system of incentives and disincentives rather than through weightages.

The following incentives are proposed in respect of the three bulk use categories;

i) In irrigation – incentives for using micro irrigation techniques such as drip and sprinkler systems: 50% of the basic tariff.
ii) In drinking water – if the Local Body (LB) reduces its demand by recycling, tariff may be lowered to 70% of basic rate for reduced demand.
iii) In Industry – if service providers like MIDC reduce their demand by recycling or promoting recycling in their units the tariff may be lowered to 70% of basic tariff on reduced demand.

Similar incentives may be considered for users introducing innovative techniques to improve water use efficiency. For example, Water User Associations/Lift Irrigation Societies can look at the new method propagated by the International Rice Research Institute in China and Sri Lanka of irrigation for rice based on alternate wetting and drying of soils instead of continuous flooding (System of Rice Intensification). The results of such works are that less water is used but high yields are maintained.

One-and-a-half million hectares of land in China is under this" wetting-drying" technique, and now this approach is being tried out in the Philippines and in Tamil Nadu in our country.

3.13 Study on Water Conservation Technologies

3.13.1 Rapid industrialization and urbanization coupled with continuous decline in per capita water availability is putting a lot of pressure on the available water resources in India. As per the Central Water Commission (India) estimates, the future water requirements for meeting the demands of various sections in India would be about 1093 BCM for the year 2025 and 1447 BCM for the year 2050. The increasing gap between water availability and demand highlights the need for conservation of water. To meet the increasing demand, the efficiency of utilization in all the diverse uses of water should be optimized and an awareness of water as a scarce resources should be fostered. Water conservation means putting the available water resources for the best beneficial use with all the technologies at our command. Water conservation is needed, not only to restore the fast deteriorating eco-system but also to meet the inevitable emergency of shortage even for drinking and domestic water in the near future. Water conservation basically aims at matching demand and supply. The strategies for water conservation may be either demand oriented or supply oriented. Water resources are theoretically "renewable" through hydrological cycle. However, what is renewable is only the quantity, but pollution, contamination, climate change, temporal and seasonal variations have affected the water quality and reduced the amount of usable water. The water conservation practices especially in urban areas by industries, municipal uses and domestic uses can reduce the demand as much as by one third, in addition to minimizing pollution of surface and groundwater resources.

3.13.2. Efficient Water Use and Conservation

Efficient water use means reducing the demand by improving personal habits; reducing wastes; creating an adequate rate schedule; deriving benefits from technical developments as well as from water management techniques, coordinating the management of hydraulic resources with that of the land and economical and social aspects; promoting norms and regulations. In short, efficient water use consists of optimizing water usage.

- Due to lack of proper operation and maintenance in irrigation, industry and domestic water distribution system, there is huge loss of water. Hence it is emphasized to improve the operation and maintenance.
- For developing the water resources, age-old traditional water conservation methods need to be judiciously adopted in conjunction with the latest modern conservation technology. Rain water harvesting, revival of traditional water storages, check dams and other similar structures need to be adopted.
- In order to conserve water, recycling of wastewater may be incorporated wherever feasible.
- Timely & need based volumetric drip & sprinkler irrigation should be done to minimize loss of water.
- Strategic mass awareness campaign should be conducted regularly to cover all stakeholders, including service providers and consumers, for water conservation in irrigation, domestic and industrial sectors.

3.14 Concessions/Incentives/Disincentives

<u>Agriculture</u> (for area based tariff)

(a) Instead of uniform agricultural tariff to all categories of farmers in area-based supply, marginal and small farmers will enjoy concessional tariff as under

Marginal farmer (< 1 ha)	- 50% of basic rate
Small farmer (1 – 2 ha)	- 75% of basic rage
Medium & large farmer	- basic rate
For projects implemented under tribal sub plan	- No tariff will be levied for all tribal farmers

The gap in revenue generation due to the above concession will be government subsidy.

(b) Incentive for adoption of micro irrigation for each crop - 50% of basic rate

(c)	Upper tariff limit for area based tariff	- shall not exceed 3% to 5% of gross value of produce in case of cereals and 8% to 10%in case of cash crops.
(d)	For horticulture crops	- since horticulture crops take 3-5 years to yield, area based tariff for this period may be 50% of base tariff.
Drinking water		
(e)	Additional requirement by municipalities	- will be considered only after review of norms of supply and water audit. If justified, to be met by recycling.
(f)	Rebate for effluent treatment	- if municipality makes available treated sewage effluent for irrigation/gardening tariff for the volume of such treated effluent will be 50% of water supply tariff and also the municipality will be allowed to retain the revenue earned from sale of treated effluent.
(g)	Polluter pays principle	- Higher rate of water tariff by way of penalty may be considered for Municipal Corporations/ Municipalities who do not show adequate progress in setting up STPs.
(h)	Stepped tariff	i) GP using upto 40 lpcd ….75% of basic rate. ii) ULB using upto 70 lpcd … 90% of basic rate iii) Municipalities using 130 lpcd or more … 1.25 times basic rate
(i)	Commercial rate	- while entering into bulk water supply agreement with municipalities, commercial use will be separately identified and charged appropriate industrial rate.
	Industry	
(j)	Polluter pays principle for all types of industries	- If effluent is not treated to required MPCB standard, rate will be twice basic rate.
(k)	Agro industries (canning, poultry, sugarcane)	- 75% of basic rate will be charged.
(l)	Rebate for recycling provided utilization is reduced by 25%.	- If industry reduces its demand by 75% by recycling, tariff will be 80% of basic rate for reduced demand.
	General	
(m)	Timely/advance payment	- 10% rebate for advance payment (within 15 days of sanction of water demand) 10% penalty for late payment.
(n)	Future agreements	- all future agreements for non irrigation use will include justification for demand with norms (lpcd for drinking water depending on rural/urban use and m^3/unit production depending on type of industry).

Note : Any withdrawal for drinking and industrial use beyond +10% of quantity prescribed in agreement will be charged penal rate of 1.5 times the basic rate.