

Study on User Charges to Meet Public Expenditure on Services

**Submitted to the Expenditure Reforms Commission,
Government of Karnataka**



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Centre for Budget & Policy Studies
<http://www.cbps.in> | info@cbps.in
Phone +918065907402
Fax +918026560734

Executive Summary

In this report we explain the principal rationale behind the levy of user charges, list out some factors to be taken into consideration for framing a user charge policy, review user charge practice in the departments of Urban Water Supply, Irrigation and Roads in Karnataka, and offer the State some recommendations based on what literature on the topic advises and inefficiencies seen in the services/departments studied.

User charges can be levied for several purposes: to charge for goods and services at economically efficient prices (i.e. the marginal cost of production), to ensure partial or total cost recovery, to ensure cost-conscious consumption behaviour in users, to plan for the financial sustainability of the service providers, to attract financing from private concessionaires (for whom the user charge may ensure desired return on capital). When designing a user charge to meet any or all of the above objectives, it is also essential to ensure that the user charge is not a regressive tax, and that low-income households continue to have access to essential services like water, education, public transport etc. In our review of literature we also find that user charges have worked well in countries like Canada, when treated as both supplementary and complementary to general taxation measures. User charges are most suited to fund public expenditures on goods which are not pure public goods, not services distributed according to right, need, or merit, or redistributive expenditures aimed at restoring justice.

In our study of urban water supply, in Bangalore we find significant under-pricing of water in the current tariff. Only the highest consumption category is charged at the current approximate average cost of producing a kilolitre of water. This runs against the recommended norm of charging the middle consumption category the average cost, charging the higher consumption categories a mark-up over average cost, and providing the lifeline tariff group maximum welfare through a mark-down. Political pressure is identified as the main reason for the low tariffs. The BWSSB however scores well on the mechanisms of billing and collection. It claims 100% metering and 99% collection efficiency, and has piloted innovative bill payment methods. In our study of urban water supply in Mysore, we find that while the current tariff structure is not far removed from the average costs of producing

water, the water department is losing a large portion of its revenue because of 60% non-functioning meters and poor collection rates. Our main recommendations from the study of water supply are as follows:

- An autonomous state water regulatory authority. States like Maharashtra have set up such authorities to follow an 'integrated multi-sector approach', and determine entitlements amongst the various categories of water users – irrigation water, urban and rural drinking water. The authority would also serve as a link between the State government water resources department, city level water service providers, municipal corporations/councils and the citizens.
- Comprehensive state policy detailing tariff setting principles, cost recovery goals, service delivery standards, which the city-level service providers will have to adhere to.
- Continuing with a 2-part tariff consisting of a fixed charge and a variable Increasing Block Tariff because it ensures equity, cost recovery and water conservation. Details on the tariff model provided in Section 5.0.
- Scientific and econometric methods of calculating cross-subsidies to ensure that such subsidies are more effective and accurate. One model that can be used for this, which is based on the price elasticity of demand displayed by customers in different price categories, is the Ramsey-Wilson (1993) model (details of the model provided in Section 5.4 and Annexure 3).

Our study of the Irrigation sector in Karnataka showed that despite legislation to organize farmers in the State into Water User Co-operative Societies a decade ago, only about 40% of the land irrigated under Major and Medium projects are covered by WUCS. Therefore the 3 Nigams in the State along with the Revenue department continue to play a large role in levy and collection of water rates. Some of the main problems affecting this sector with respect to user charge collections are: very nominal water rates, reluctance of farmers to form WUCS, slow formation of WUCS, insufficient area under each WUCS to ensure viability of operations of the WUCS, very poor recovery rates of water demand raised (from 2001 to 2007, the

average collection rate, in all Major and Medium Irrigation projects was only 17.48%). The main recommendations for the Government to consider are:

- Urgent attention must be paid to organizing farmers to form WUCS, ensuring that they also have the capacity to perform their functions of levy and collection of user rates, and can remain financially sustainable.
- As the basis of water rates, continue with volumetric rates as a variable charge, but also consider the feasibility of an additional fixed membership charge to obtain water from the WUCS for all farmers.
- Increase water rates to reflect economic value, and ensure higher cost recovery. Water rates were last set in 2002, and require urgent revision. Revision can be set for every alternate agricultural year and can also be linked to agricultural produce prices. Detailed tariff reports of the Maharashtra Water Resources Regulatory Authority merit review for procedures adopted.
- Adopt the twelfth Finance Commission norms for recommended O&M charges (Rs.600/ha of utilized area).
- Broaden revenue base by removing subsidies in irrigation water provided to urban water supply departments and electricity departments. For this, an independent regulatory authority/commission to determine guidelines for economic pricing water across different uses will be very beneficial.
- Reduce implicit subsidies attributable to costs of inefficiency in producing and distributing irrigation services on account of defective design, costs and time overruns in project implementation, overstaffing, high administrative costs.
- Improve political will in recovering economic value of water: officials met stated that they are aware of the paying capacities of the farmers, especially those who grow cash crops, but the lack of political will to enforce payment and collections at economic rates has done great harm to the systems.

Our study of the Roads sector revealed the following commonly identified problems with road user charges in the country: absence of a national/state road user charge policy, roads are financed from general revenue with little connection between the costs of road provision and the taxes or charges paid by road users, poor earmarking of road taxes for road related

revenues. Given the sufficient technical and professional expertise required to arrive at the possible rates of levy, our study was primarily a theoretical discussion of best practices in benefit taxation and road user charges. Some of the main recommendations are:

- The optimal design of road benefit taxes and user fees should be a fixed charge plus variable charges to reflect maintenance costs, opportunity costs of underlying land, negative externalities in the form of environmental and accident costs, congestion costs associated with travel on peak routes and at peak times.
- Karnataka toll policy: reconsider the methodology to revise toll rates as they are completely dependent on movements in the Wholesale Price Index.

Some of the main recommendations to the Government are:

- **Formation of a Government level and department level policy on the recovery of user charges:** including costing methods, targeted recovery rates in each sector for the next 5 years, cross subsidization policies, tariff revision mandates, recommended institutional mechanisms for user-fee collection etc.
- **Economic pricing of services and cost recovery:** Departments must in the short run, aim to recover the average or break-even cost of services – such cost must include O&M costs, and debt servicing costs. In the long-run, utility providers must aim to recover capital costs and a return on equity as well. Departments should regularly collect and analyze the cost data to see if the tariffs are sufficient to recover costs. Formats for these should be prepared by the Department and handed over to all other city-specific agencies, ULBs, city corporations/council departments involved in the user charge collection.
- **Subsidies:** Econometric and scientific calculations of subsidies to ensure they are well targeted at the poor, and do not derail cost recovery roadmaps.
- **Tariff setting authority:** A decision between a uniform state wide tariff or a ULB tariff should be made according to whether ULBs have good costing, accounting and information systems.
- **Tariff revision:** Tariff revisions should consider inflation effects on the cost of inputs, increases in fixed costs, changes in the paying ability of different customer groups etc. Tariffs should not be just arbitrarily increased by x%, for the sake of a revision.
- **Improve political will in recovering economic value of services:** Tariff setting should be freed of political interference; one way of doing this could be setting up independent regulatory authorities like in the electricity and telecom sectors, where possible.

Acknowledgement

We are grateful to the Chairman of the Expenditure Reforms Commission, Shri B.K.Bhattacharya, for giving us this opportunity to contribute to the discussion in the State on the quality of public expenditure. We would like to thank all the members of the Expenditure Reforms Commission for their feedback and comments, which have helped us improve earlier drafts of this report. Special thanks are due to Mr. Srinivas Kumar of the Fiscal Policy Institute, for discussions with us on framing a user charge policy. We would also like to thank the ERC for facilitating and coordinating with the different Department and Consultants whenever required. The time given to us by various officials in different departments is deeply appreciated.

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List of Abbreviations

ADB - Asian Development Bank
BWSSB - Bangalore Water Supply and Sewerage Board
CADA - Command Ares Development Authority
CBPS - Centre for Budget and Policy Studies
CSS – Central Sponsored Schemes
CNNL – Cauvery Neeravari Nigam Ltd.
ERC - Expenditure Reforms Commission
GSDP - Gross State Domestic Product
IBT – Increasing Block Tariff
IDeCK - Infrastructure Development Corporation Karnataka Limited
IDPMS - Indo-Dutch Project Management Society
JNNURM – Jawaharlal Nehru National Urban Renewal Mission
JUSCO - Jamshedpur Utilities and Services Company
KBJNL - Karnataka Bhagya Jala Nigam Limited
KL - Kilo Litre
KNNL – Karnataka Neeravari Nigam Ltd.
KRDCL - Karnataka Road Development Corporation Limited
KSHIP - Karnataka State Highways Improvement Project
KUWSDB - Karnataka Urban Water Supply and Drainage Board
MC - Marginal Cost
MLD - Million Litres per Day
O&M - Operations and Maintenance
ONTR - Own Non-Tax Revenue
PIM - Participatory Irrigation Management
PPP - Public Private Partnerships
PRI - Panchayati Raj Institutions
PSU - Public Sector Utility
PWD - Public Works Department
RE - Revised Estimate
SERC – State Electricity Regulatory Commission
TOR - Terms of Reference
TRAI – Telecom Regulatory Authority of India
TUG - Tank User Group
UDD - Urban Development Department
UFW - Unaccounted for Water
ULB - Urban Local Bodies
VVWW - Vani Vilas Water Works
WUCS - Water Users Co-operative Society
WSS – Water Supply and Sewage

Team Members

Arundhuti Gupta

Sriharini Narayanan

Sandeep MS

Advisory group

Chair: Vinod Vyasulu

S. Vardachari

N.V.Krishna

Shashikala Sitaram

1.0 Background

The Expenditure Reforms Commission (ERC) was constituted by the Government of Karnataka with the objective of advising appropriate strategies to reduce expenditure on less productive programmes and utilize the consolidated resources in increasing the efficiency of implementation of more productive programmes. In order to fulfill these objectives, the ERC chose to work in partnership with expert institutions and consultants. The Centre for Budget and Policy Studies (CBPS), one of the Consultants, was entrusted with two studies:¹

- (i) To review the process and institutional mechanisms of programme implementation and service delivery, to improve efficiency and cost effectiveness (Study 1); and
- (ii) To suggest an effective strategy for meeting a reasonable proportion of expenditure on services through user charges (Study 2)

This report deals with the second study on user charges in the delivery of public services.

In this report we first attempt a theoretical understanding of the principal objectives and rationale of user charges, and the issues to be considered in framing a user charge policy. In addition, we review user charge practice in three departments, selected out of those being studied by the ERC: Urban Water Supply, Irrigation and Roads. Our recommendations are based on what literature on the topic advises and inefficiencies seen in the practices of services/departments studied.

The report is structured as follows: in Section 2, we cover the scope, methodology and limitations of the study. In Section 3 we review the main rationale behind user charges and the points to be considered in framing a user charge policy. In Section 4, we discuss Karnataka's non-tax revenue collections and whether these adequately represent user charge collections. In Sections 5, 6 and 7 we present our findings from the review of user charge policy in the Water, Irrigation and Roads departments in Karnataka respectively. In Section 8, we offer our final observations and comments on the issue.

¹ To learn more about CBPS' work, please visit www.cbps.in

2.0 Scope, Methodology and Limitations of Study

2.1 The Scope of the study as defined by the TOR

Terms of reference (TOR)

The Terms of Reference that CBPS received for this study are as follows:

- a) Provide an overview of various services by the Government and its agencies. Classify these schemes as per social and economic consideration (e.g., public, merit, commercial etc.);
- b) Suggest an economic framework to set cost recovery goal for each class of schemes. The framework may include a road map to reach the goal;
- c) Examine feasibility of introducing differential cost recovery depending on income level of the users;
- d) Make recommendations for introducing fiscal incentives to promote higher cost recovery; and
- e) Assess inter-play of service quality and cost recovery, and suggest improvements in delivery mechanism to facilitate better quality and higher cost recovery.

2.2 Methodology of the study

The study is based on both secondary sources of information and collection of primary data.

The steps undertaken in the study until this submission are listed below in Table 1:

Table 1: Activities undertaken

Steps	Activities
1	Formulation of user charges questionnaire
2	Selection of 3 departments - Urban Water Supply and Sanitation, Labour and Employment (ITI) and Collegiate Education for preliminary discussions on the topic
3	Initial round of meetings with concerned officials from the departments mentioned above
4	Initial literature review of primary goals of user charges, and costing methods in public services

5	Preparation of preliminary report to the ERC based on questionnaire response from Collegiate Education and literature study
6	Selection of Urban Water Supply and Sanitation in Mysore and Bangalore, Roads and Irrigation Department for more in-depth study in the final report, following discussions with ERC
7	Visit to Mysore to study Mysore City Corporation and the Vani Vilas Water Works
8	Meetings with KSHIP and KRDCL officials
9	Meetings with Major & Medium Irrigation, and Minor Irrigation (JSYS) officials
10	Detailed review of benefit taxation theories and other user charge concepts
11	Meetings with BWSSB officials
12	Submission of draft final report in June 2010
13	Review of draft final report based on comments from Chairman ERC and other departments
14	Consultations with Director, WALMI on comments on draft final report
15	Consultation with FPI advisor on comments on draft final report

Approach taken to prepare the interim report

The study began with the formulation of a user charges questionnaire (Annexure 1), which was handed over to officials from the Department of Collegiate Education, Labour and Employment (for Industrial Training Institutes) and Urban Water Supply, early in December 2009. The selection of these departments was made after consulting with the ERC on potential services and sectors that the Government expected a study on. The initial round of interviews with officials from these departments gave us very little insight into the current practices being followed. Only the Department of Collegiate Education has returned the completed questionnaire (as of January 2011). The response had details of the rates of current user charges, but no information on the rationale or basis of the current levy. The Department also requested for more time to furnish data on the amount of user charges that have been collected. But that has subsequently not been provided.

In the interim report, we decided to focus on the literature backing the goals of user charges, certain costing and pricing principles commonly used and case studies. We concluded in the interim report that to arrive at costing methods for services, tariff design, and affordability and willingness to pay measurements, exercises of sufficient technical difficulty and depth would need to be taken up for each service. In addition, our initial work with the departments

told us that the departments did not have all the relevant data for such a user charge review. Therefore, in the interim report, CBPS asked for an elaboration of the Terms of Reference, to include specific guidance on what should be the scope of this study.

Following a discussion of the interim report with the ERC, it was agreed that CBPS would evaluate the user charge practice and potential in Urban Water Supply, Minor Irrigation and Roads in the final report.

Details of our study in each department are as follows:

1. **Urban Water Supply:** We studied the Mysore City Corporation and Vani Vilas Water Works (VVWW) in great detail through field visits. We also interviewed officials from the Jamshedpur Services Utility Company (JUSCO) and the Karnataka Urban Water Supply and Drainage Board (KUWSDB), members of the tri-partite agreement with VVWW for a 24/7 water project currently being implemented. We studied cost recovery, revenue collection and service delivery through a PPP model. We also met officials from the Bangalore Water Supply and Sewerage Board (BWSSB) to study user charge practices in Bangalore. Finally, we reviewed the main ideas of the Ramsey-Wilson (1993) model of tariff design for an urban water supply system, which considers economic efficiency and equity.
2. **Minor Irrigation:** Using the note prepared by the Minor and Major Irrigation Departments on Water User Co-operative Societies (WUCS) and the collection of water rates through these Societies, we conducted discussions with relevant Minor and Major Irrigation officials. CBPS also studied the collection of water rates and user charges through community organized tank user groups in the Jala Samvardhane Yojana Sangha (JSYS) scheme.
3. **Roads:** We met officials from the Karnataka Road Development Corporation Limited (KRDCL) and the Karnataka State Highways Improvement Project (KSHIP) to discuss issues related to the formation of a Karnataka Road Fund and the Karnataka Tolling Policy. The Public Works Department (PWD) has already commissioned a separate study on the topic of user charges –Price Waterhouse Coopers (PwC) has conducted a study as part of the Technical Assistance provided to KSHIP by the World Bank on the

scope, structure and formation of a Karnataka Road Fund. The outcomes of this study are currently being evaluated by officials of the Department and the World Bank and we did not have access to the report. We received one portion of the PwC report in December 2010 which dealt with financing options in road PPP projects. We did not find anything relevant in that report to reproduce here. Similarly, the Infrastructure Development Corporation Karnataka Limited (IDeCK), has carried out a study on the potential to toll roads in Karnataka for KRDCL. KRDCL facilitated a discussion with their engineers on the procedure to arrive at the toll potential of a road, but again we did not get the actual study report. Hence in this sector, given the sufficient technical and professional expertise required to arrive at the possible rates of levy, our study is primarily an overview of the Government's current stand (vide the Karnataka Toll Policy) and a theoretical discussion on Road Funds and best practices within the sector.

In-depth review of literature

In writing this report, we have undertaken an in-depth study of many theoretical aspects of user charges: goals, applicability, rationale, costing methods etc. We have referred frequently to the rich literature on the topic of user charges and benefit taxation to finance public expenditure. The literature provides a very strong rationale for a combination of general and benefit taxation in a federal system. Since this study points to a poor state of setting, collection and review of user charges in Karnataka, we feel that championing the idea in theory and highlighting the many nuances of the topic that have been dealt with so exhaustively for a range of services, by authors worldwide, will play an important role in beginning the discussion within the Government to look at user charges afresh. Not only must the Government strengthen institutional mechanisms within the departments for tariff setting and collection, but also display political will to enforce economically efficient prices which have been set to achieve cost recovery goals.

2.3 Limitations of the study

The study remains primarily a discussion report because of data constraints and a lack of maturation of user charges policy in various Departments. The only questionnaire response

we received, which was from the Department of Collegiate Education, reflects the paucity of information on the topic (See Box 1 for the response).

In our study of the Urban Water Supply sector, we could not perform the tariff setting exercise suggested by the theoretical model, in either Bangalore or Mysore because customer data required in the model, like the household strength or house income was not maintained by the Water Supply Boards. We are unable to perform any comprehensive economic and accounting reviews of current tariffs, to set roadmaps for cost recoveries, in the absence of such information.

Box 1: Response from the Department of Collegiate Education

Department of Collegiate Education: As per the questionnaire returned to CBPS, the Department of Collegiate Education collects user charges from students who study Computer Science in B.Sc. (Rs.3000 per annum) BA, B.Com & BBM (Rs.1000 pa) and BCA (Rs.6000 pa). The charges are used to meet operation and maintenance expenditures of the Computer laboratory and expenditures on Hardware and Software. The charges have been levied on a yearly basis via a Government Order, from the year 2003 – 2004. No other basis has been provided for how these charges were arrived at. Revision of fees was done once since the year of inception. With effect from 2005 – 2006, the user fee for students of BA, BCom, BBM was reduced from Rs.2000 to Rs.1000. The Government Order states that requests from Rural College principals were the basis for the change, on the grounds that the current charges are not affordable for their students. The user fees are deposited by individual colleges into their nationalized Bank accounts. The department has requested for more time to furnish data on how much user fee has been collected every year. The Department's own view is that the user fee is decreasing affordability of the courses offered by the Government colleges. They hold that the students in such colleges are mostly poor students from backward districts and taluks, whose regular college fees are reimbursed by the Social Welfare Department and the Department of Backward and Minority Classes. The user fee has to be paid by all the students because Universities have introduced computer courses in each discipline, and students cannot afford this. Student Unions, College Principals and College Development Committees (CDCs) are asking the Department of Collegiate Education to withdraw these fees.

3.0 User charge rationale and considerations in framing a user charge policy

General taxation measures use broad indicators of economic capacity (like income, consumption and wealth) while deciding a tax-payers' liability to the Government. The theory of benefit taxation and user charges, on the other hand, looks to measure accurately the beneficiaries of government expenditure and the amount of benefit they receive, to determine an appropriate benefit tax or user fee that can be levied. While there is benefit rationale in all taxation², this notion of charging according to the benefits received by an individual is highly debated. Seligman (1969) says that it is a 'principle away from which all modern science and progress have been working,'³ According to Bird (1976), however, 'it is only through the application of benefit taxes that an appropriate level and structure of government activity can, at least in theory, be determined simultaneously with the means of financing it'⁴

Box 2: Distinction between General Taxes, Benefit Taxes and User Charges

General taxes: Mandatory levies that are not related to any specific benefit or government service

E.g.: Taxes on personal income

Benefit taxes: Compulsory levies applied to individuals (or institutions such as corporations) who are taken to benefit as a group from certain government services

E.g.: Taxes on fuel sales

User charges: Amounts levied on consumption of government goods or services in relation to their consumption

² Hobbes in *Leviathan* ed. by Oakshott (1962) argues that the benefit of protection citizens receive from the sovereign justifies taxes in proportion to the amount consumed by each person

³ Edwin R.A. Seligman, *Essays in Taxation*, 10th ed. (1931) (NewYork: Augustus M. Kelly Publishers, 1969)

⁴ Richard M. Bird, *Charging for Public Services: A New Look at an Old Idea* (Toronto: Canadian Tax Foundation, 1976)

Source: Adapted from Richard M. Bird & Thomas Tsiopoulos (1997), 'User Charges for Public Services: Potentials and Problems'

3.1 Rational for user charges

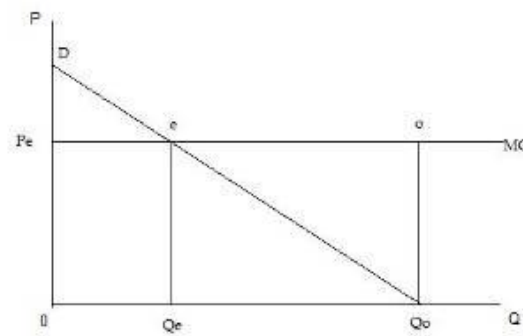
User charges are generally advocated on four grounds: a) they promote economic efficiency in the use of scarce resources; b) they make the public sector more accountable to changing consumer preferences and demand; c) they embody a basic principle of fairness in ensuring consumers pay for only those goods and services that they consume; and d) they assist in keeping public utilities financially sustainable through (at least) partial, recurring-cost recovery.

a. **Economic Efficiency:** The normative ideal of economic efficiency states that scarce resources should be allocated to their most valued uses so that aggregate welfare can be maximized. The normative ideal runs into many problems and debates however, beginning with how to measure the most valued uses of resources. Should measures of individual happiness and utility be used or objective measures like the willingness to pay?

The more practical and common understanding of economic efficiency is that goods and services should be provided at their marginal cost of production (i.e. the cost of producing an additional unit of output). Most public utilities face decreasing average costs and decreasing marginal costs due to the economies of scale; however, assuming a constant marginal cost, the following diagram can be used to discuss the merits of user charges and benefit taxes versus general taxation.⁵

⁵ The assumption of constant Marginal Cost is for simplicity only and does not alter the efficiency argument.

Figure 1: Marginal Cost pricing



Assuming a constant MC, and a downward sloping demand curve (D), economic efficiency is achieved at the quantity demanded (Q_e), when price (P) is set to marginal cost (MC). At a price (P) which is less than marginal cost (MC), the price individuals are willing to pay for the service is less than the marginal cost of production, indicating that scarce resources used to produce this service can be more efficiently employed elsewhere. Where price (P) is greater than MC, the price individuals are willing to pay exceeds the marginal cost of production, suggesting that additional resources can be put into increasing the production and supply of this service. As Duff (2004) discusses, if the cost of providing the service is financed from general taxes, then usage is not linked to any specific levies paid by individuals to access that public good or service. The effective charge for purchasing an additional unit of the good/service is zero. This will cause individuals to demand more of the good or service (like Q_o), than they would be prepared to pay for if they were charged at the marginal cost of production. The resulting inefficiency (area denoted by efQo) denotes resources which could be employed more efficiently elsewhere.

Some further arguments on the efficiency grounds against general taxation are:

- The government will probably move towards over-investment in the physical infrastructure required to provide public goods and services, as general taxes induce over-consumption as discussed above.
- Rationing by queues, which comes with its own set of costs.

b. Accountability: As Bird and Tsiopoulos (1997) mention, imposing user charges shows the real value of public services. When users are made to pay for the cost of a service, they

will let the service providers and the appropriate levels of government know, implicitly through their demand function for the service/product and explicitly through protests and actions, if they are dissatisfied with the service delivery and cost-effectiveness. Information on shifts in user preferences and demand also get communicated quickly to the Government via user charges; the Government is informed if they should invest more resources in a particular service or shift those resources to more highly valued uses. Linking the supply of publicly provided goods and services to the costs associated with producing them may also facilitate rational decision-making by voters and their elected representatives, and Governments may have to adhere to these decisions that voters take.

- c. **Financial Sustainability:** The government often has implicit responsibility to sustain the operations of public utilities. However, self-sustainability of operations through user charges not only reduces the fiscal burden on the Government, but also improves the utility's performance. Studies like Bierhanzl and Downing (1998) and Bierhanzl (1999) have shown that public utilities that depend on user charges for funding are better managed. On the topic of cost recovery, one important decision that a public utility needs to make is the kinds of expenditures that is to be recovered from user charge revenue: only costs of operation and maintenance (i.e. recurring costs), or also some amount of sunken costs in capital expenditures, or perhaps if financing requirements have been met by loans – the payment of interest charges. Cost recovery as per the Asian Development Bank (ADB) for instance, involves revenue generation for current operations and future investments. According to the World Panel on Financing Water Infrastructure, revenue generations should only be for recurring costs. After deciding what expenditures to recover and considering the shortfall between the funds required to sustain a utility and the funds available from other sources (like general revenue from the government, subsidies etc), the utility can determine the financial obligations to be met through a tariff.
- d. **Fairness:** Olson (1969) states that for every collective good with a unique boundary, there should be a governmental institution charging appropriately for such a good/service. This match between those who receive the benefits of a collective good and those who pay for

it, is called fiscal equivalence. Authors who support user charges on the fairness principle point out, however, that the fairness argument does not preclude general taxation, and should be considered in those cases of public expenditure where the aim is not to redistribute economic resources.

3.2 Framing a user charge policy

In framing a user charge policy, there are several considerations and questions that must be answered.

a. What type of goods and services should be charged for? A department can start by listing the goods and services it provides. As a general rule, user charges are not recommended for pure public goods, or goods which have to be distributed according to right, need or merit.

⇒ **Public goods, private goods and merit goods:** Pure public goods are characterized by their non-excludability and non-rivalry of consumption. Such goods or services offer general benefits which cannot be limited to specific individuals; also, for any given output, consumption by additional consumers does not reduce the quantity consumed by existing consumers. As the marginal cost of supplying a public good is zero, economic efficiency requires that such products are supplied at zero cost. This entails public provision by the Government, financed out of general taxation. Non-market mechanisms are essential because if left to private provision, there will always be under-supply because of free-riders who do not pay for the cost of such products/services. Commonly used examples of pure public goods are national defense, law enforcement, street lights, etc.

Merit Goods: Some goods may not be pure public goods, but are placed in the public domain by public choice, because individuals in society do not adequately weigh the benefits of such goods and need to be induced to consume more than they otherwise would. The characteristics of such goods or services mandate that it should be provided based on need, right and merit instead of ability and willingness to pay. Such goods are called merit goods.

Merit goods are provided by the free market systems but are almost always under-provided, because private players look at only private costs and benefits and not at externalities. Common examples are primary and secondary education and healthcare.

Revisiting public goods to identify user charge potential: Though pure public goods are characterised by non-excludability and joint-ness of consumption, many of them confer some distinct benefits on specific beneficiaries, who can be identified and charged using user fees. Public parks, for instance, provide general benefits to citizens in the form of space to congregate as equals, and personal benefits through recreational facilities for which there can be admission charges. Roads and highways provide general benefits in the form of economic and social integration, and private benefits through amenities like hotels, restaurants and bathrooms. Police services offer public benefits of public order and safety and private benefits through protection for special events etc. Therefore theoretically, there is the possibility of charging according to benefits received even for public goods.

The idea of benefit taxation and user fees can also be consistent with goods that are distributed according to right, need or merit like education, by allocating the costs of these services to individuals and groups who can pay. E.g. an income contingent loan repayment scheme for higher education.⁶

Applying this discussion, the department must arrive at whether a particular service can be charged for or not.

- b. At what level of Government should user charges be levied?:** It is felt by authors [see Duff (2004)], that in contrast to expenditures in the Central and State spheres (large shares of which are devoted to redistributive expenditures, pure public goods, and services distributed according to right, need, or merit), a substantial percentage of municipal (local) government expenditures is devoted to goods and services with

⁶ For a discussion on this, see Douglas Albrecht & Adrian Zideman, 'Student Loans: An Effective Instrument for Cost Recovery in Higher Education?' (1993) World Bank Res.Observer 71

more private characteristics, such as public roads and bridges, water, sewage, solid waste disposal (the primary purpose of which is not to redistribute resources). It is felt that benefit taxes and user fees can play a large role in municipal public finance. We have seen that top down requests to levy user charges, like the case of the Department of Collegiate Education mandating that Government colleges levy computer laboratory fees, is met with resistance since the service delivery institutions have not been involved in design or rationale behind such fees.

If services are rendered to the ultimate consumers by agencies of the State department, parastatal bodies or Urban Local Bodies (ULBs), then the task of setting the charge should be entrusted to such organizations. In case these organizations do not have good costing and accounting systems to set the charge, the State departments can fix the level of user charge.

c. **Goal of the user charge policy:** After deciding what services to charge for, and who will levy the user charge, the goal of the user charge policy should be decided. Some common goals of user charge policy and their implications are as follows:

⇒ Economic efficiency: As explained in the detailed note earlier, to achieve economic efficiency in the provision of goods/services, the user charge set should cover the marginal cost of providing the goods/services.

⇒ Distributive Justice: In the setting of user charges, public utilities need to ensure that poor households can still afford to meet their basic needs. For instance, it is generally recognized that in the setting of water and sanitation tariffs it should be ensured that poor households spend no more than 5% of their household income. A tariff can have two impacts, relevant to the discussion of distributive justice: one, it can impact income redistribution amongst the utility's customers, and two, it can impact the level of consumption, either negatively or positively.

Income redistribution can be achieved by means of a lump-sum transfer of a fixed rebate from a utility to its customers. For example, a Water Supply Board may give a rebate of Rs. X/month to the total charge incurred by below-the-

poverty line households. The right pricing policy will be based on the correct determination of the amount of rebate (or charge if the public utility plans to cross-subsidize) and correct identification of households who should be entitled to the rebate (or charge).

If user charges are to influence the level of consumption, a public utility must ascertain the socially desired level of consumption of a service, and the public demand as a function of user charges. The goal is to ensure that the users consume the targeted level at the charge set. The targeted consumption could be the minimum level to satisfy basic needs or the maximum level to curtail excessive consumption

- ⇒ Financial sustainability : As explained in the note earlier, if the goal of user charges is to ensure financial sustainability, then charges should ensure that some portion of the costs of the utility (generally the operating or recurring costs are taken for this) are met through revenues raised from user charges.
- ⇒ Good Governance: The goal in setting a user charges to achieve good governance is that the tariffs should be transparent, simple and predictable. The tariff setting procedure needs to be transparent and verifiable, every component of the tariff should be essential in meeting the goals and changes in the tariff must not disturb the rational, long-term (private) investment decisions of individuals (so tariff changes must be gradual).
- ⇒ Fair Price: The goal of fair price is to ensure that after considering any cross-subsidies that users may have to provide (in the interests of distributive justice) or any external subsidies that other members of society provide, users pay the net social costs of their use of a service. This also implies that a public utility earns only a 'normal' profit or revenue from the tariffs.

Dole and Bartlett (2004) argue that the common goals of user charges: distributive justice, economic efficiency, good governance financial sustainability and fair pricing, can be achieved jointly, without many conflicts, by following a certain order of importance for the goals. According to them, there are three steps to set a user

charge: first, set user charges to achieve distributive justice and economic efficiency, then if financial sustainability is also a goal the public service provider can levy some fixed charges for revenue generation and fairness, finally in order to ensure governance, adjustments to the rates of user charges are made in a simple, transparent and predictable manner.

⇒ **Costing: Efficient pricing and Approximations to Efficient Pricing:** In determining the quantum of user charge to be levied, the goals of the user charge policy must be considered. To meet economic efficiency, cost recovery and financial sustainability goals, economic theory suggests that the most economically efficient price for public services is the marginal cost, which is the cost of producing and supplying an extra unit of the output/service. The problems that arise in the practical implementation of this marginal costing theory are that costs are difficult to define and measure in the public utility sector. The public utility sector usually measures costs only in an accounting sense, but to measure the total marginal social cost of production, one needs to measure not just accounting costs, but also economic opportunity costs and costs of externalities (impacts which a utility may have beyond its boundaries, on the society as a whole). Even after identifying what kind of costs will be considered, there may be problems in measuring these costs. For instance, if it is decided to levy user fees in public parks for certain private benefits individuals may derive, then relevant market price (like the price of the land if it had to be built on/bought) will have to be ascertained. This price can be used to measure marginal costs only on the assumption that market prices are good approximations of marginal cost pricing. This assumption will hold only if the market from which the information is obtained is close to perfectly competitive.

⇒ **Marginal Social Cost Pricing:** As discussed in Dole and Barrett (2004), when demand is below a utility's capacity, the marginal costing theory calls for user charges to be set according to the marginal social cost of the inputs which can be increased in the short-run, i.e. excluding capital costs; this is called Short-

Run Marginal Social Cost Pricing. If current usage charges are above the marginal short-run social cost estimated in this way, then reducing usage charges to below marginal short-run social costs will encourage users to make use of the idle capacity at no extra net-cost to the society. When the demand for a utility is at or above the designed capacity, not only should short-run marginal social costs be considered, but also the marginal costs of congestion; this is done to control usage of the facility through price rationing. Of course to deal with congestion, attention must also be paid capacity expansion and to the long-run marginal social costs. Capacity expansion can be economically justified when the charge customers are willing to pay exceeds the long-run marginal social costs.

- ⇒ **Average Costs:** Most public utilities which enjoy the benefits of economies of scale (decreasing average costs as the output expands) will face financial deficits when they use short-run marginal social cost principles in setting user charges. If average cost is decreasing with output, then marginal cost will be less than average cost; an efficient user charge set to marginal cost will not allow for total cost to be covered and will lead to a finance deficit. While this deficit can be financed through general Government revenues, another alternative is to set user charges to the average cost, as an approximation to efficient prices. An average cost user charge will be efficient only in the case where marginal costs equal average costs
- ⇒ **Average Incremental Costs:** Another approach to setting user charges on a cost-based approach, as mentioned by Bird and Tsiopoulos (1997a) is to consider average incremental costs. This looks at the additional cost of adding an extra user to the system (as opposed to marginal costs which looks at the cost of an additional unit of output/service). Average Incremental Costs are determined by breaking down each element of cost – fixed and variable, financial and social, to a particular incremental decision and then assigning to each additional user the incremental cost attributable, on average, to his or her usage.

If the goal of the user charge policy is to enforce behavior change in the consumption of a scarce resource, then the demand function for that service/good at different price points should be prepared. The demand function will show the price point at which the quantum of good/service consumed is socially desirable.

d. Other Considerations:

- i. **Distributional Impact:** A tax or levy is labelled as progressive if the financial burden (measured as the amount of tax as a percentage of the household income) it imposes is more on higher income households, and conversely it is labelled as regressive if lower income households bear the larger burden. User charges are often perceived as being regressive, because it is believed that they make essential public goods unaffordable for poor households and place a large financial burden on them. Bird and Tsiopolous (1997a) say that this is at best a simplistic view and that the matter is often more complex than this. According to them it is important to answer the questions of who benefits from a zero-price policy and what happens in the absence of adequate user charges. In their analysis of the income profiles of consumers of a large range of government services in Canada, they find that 'upper-income households typically benefit disproportionately from consumption of free, or low-cost, public services', which establishes that zero-priced services do not necessarily redistribute wealth in the best way. One example of this is subsidized higher education provided by the Government. It is generally accepted that higher education has large positive externality for the society. Furthermore in many countries it is the higher income households who access higher education more than lower income households.

Duff (2004) also stresses the importance of studying the incidence of a proposed user fee or tax in a more holistic manner, considering a) the incidence of other taxes and levies which may be changed as a result of this new levy: a new levy which is accompanied by the decrease of a regressive tax may have overall positive distributional effects.

b) an increase in the public provision of ‘free goods’ through the revenues raised from such a levy : if the public expenditure base increases through the collection of user fees from a new levy, and this leads to an increased supply of ‘free goods’, then the levy though regressive may ‘permit a greater degree of progression overall’ (Bird, 1976).

Also, the practical design of a levy or user charge can mitigate any regressive effects it has on lower income households in theory, through exemptions, cross-subsidies and block transfers from the service providers. A more detailed exposition of how such subsidies are provided in the water sector is given in Section 5.0.

- ii. **Budgetary flexibility:** Since the revenue from user charges and benefit taxes are earmarked to expenditure incurred in the provision of these goods and services, it is argued that these charges reduce budgetary flexibility in the allocation of funds. However, this is more an indicator of the enhanced accountability of government as a result of such a form of public financing, ensuring that governments spend according to the choices of expenditure that the public is willing to pay for.
- iii. **Political Viability:** As Duff (2004) mentions, it is important to consider if user charges are “likely to be politically achievable or whether they are mostly of theoretical interest, with little likelihood of actual implementation.” The introduction of user charges for services, even if designed scientifically and with specific goals like efficiency, cost recovery, or financial sustainability, is likely to be met with a lot of public opposition. Water, for instance, was promised free of cost to citizens during the Maharajas’ regimes in several parts of India. During demonstrations in Mysore in 2008-2009, against a PPP project designed to regularize user charge levy and collection, despite acknowledging that water could not be provided free of cost anymore, citizen groups still prominently used the historic fact to oppose economically efficient tariffs that

would be levied if the project was approved ^{7,8}. The association of such negative public sentiment to political repercussions results in almost no political will to enforce discipline in the collection of user charges. The questionnaire response we got from the Department of Collegiate Education on their user charge practice, for instance, recommended strongly that the computer laboratory charges be revoked because their students were protesting the charge. In so much as benefit taxes and user fees reduce budgetary flexibility and demand for publicly provided goods and services (where demand is elastic), government actors will be resistant to such levies, as these reduce their discretionary powers.

Having considered what literature on the topic says on the ideal design, purpose and structure of user charges, we proceed to a brief note on Karnataka's user charge collections in Section 4 and current practices of user charges in three sectors in Karnataka: Urban Water Supply, Irrigation and Roads in Sections 5,6 and 7 respectively.

4.0 User charges in Karnataka

User charges are generally considered part of the Government's non-tax revenue. The Medium Term Fiscal Policy (MTFP) of the Karnataka State Government, 2005-2009, notes that the stagnation in the Government's non-tax revenues is primarily attributable to the 'negligence and non-revision of user charges'.⁹ The report recommends the formulation of a comprehensive policy for the levy of user charges to avoid arbitrariness. It further notes that revision based purely on inflation rates compounds existing distortions in the charges. They recommend that 'collection of user charges should be monitored with same rigour as plan

⁷ <http://isslerhall.org/drupal/content/mysore-citizens-protest-tata-office>

⁸ See also the following news article on public protests at an announced tariff revision of water rates in Belgaum: <http://www.hinduonnet.com/2009/01/06/stories/2009010655290300.htm> for a recent instance

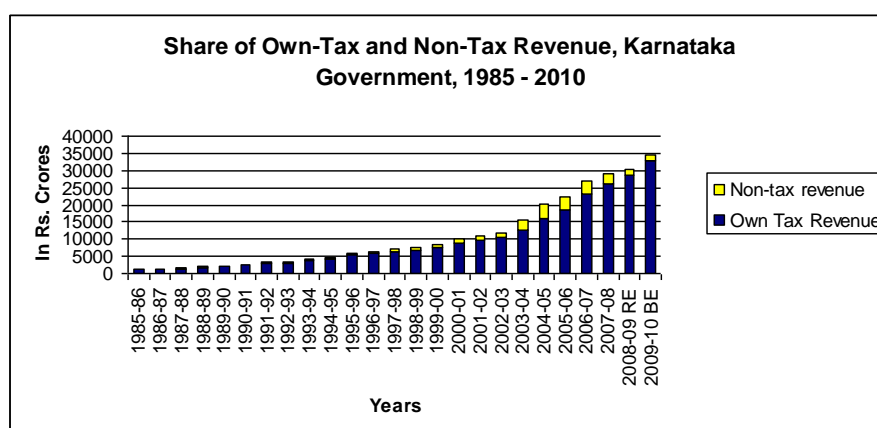
⁹ <http://www.kar.nic.in/finance/mtfp/mtfp05-09.pdf>

expenditure is monitored by every department and formats for monitoring the same should be made part of regular departmental and State level monitoring formats.’

At the national level as well, as noted in ‘State Finances: A Study of Budgets of 2008-09’ (Reserve Bank of India, 2010), Karnataka records one of the lowest percentages of Own Non-Tax Revenue (ONTR) to Gross State Domestic Product (GSDP): 0.7% in 2008 – 2009 (Revised Budget Estimates), which falls below the 12th Finance Commission target of 1.4% by 50%. The report notes that while the State expenditure on economic, social and general services is very high, the recovery from these services is insignificant.

Figure 2 shows the revenue collections from own-tax and non-tax items in Karnataka, from 1985.

Figure 2: Own-tax and Non-tax revenue collections (in Rs. Crores), Government of Karnataka, 1985 - 2010



Source: Government of Karnataka, Accounts at a glance for 1960 – 2009. Finance Department, November 2009

The non-tax revenue component can be broken down to revenue from General, Economic and Social Services.

Table 2: Budget extract of non-tax revenue from General and Social Services, 2008-2009 (RE) (Rs. in lakhs)

General Services	2008-2009 RE	Social and Community Services	2008-2009 RE
Public Service Commission	1,000.01	Education, Sports, Arts & Culture	6000.07
Police	5,212.52	Medical and Public Health	6999.8
Jails	99.99	Family Welfare	25
Supplies and Disposals	-	Water Supply and Sanitation	19.71
Stationery and Printing	463.89	Housing	1750.02
Public Works	1,504.72	Urban Development	42.97
Other Administrative Services	7,500.04	Information and Publicity	83.89
Contributions and Recoveries	1,987.87	Labour and Employment	2065.26
Towards Pension and other Retirement Benefits	-	Social Security and Welfare	1649.99
Miscellaneous General	3,026.00	Other Social Services	200
Total	20,795.04		18836.71

Source: Karnataka Government Revenue Receipts Extract, 2010

Table 3: Budget extract of non-tax revenue from Economic Services, 2008-2009 (RE)

(Rs. in lakhs)

Economic Services	2008-2009 RE
Crop Husbandry	1,665.06
Animal Husbandry	315.04
Fisheries	628.33
Forestry and Wild Life	12,775.28
Plantations	0.10
Food Storage and Warehousing	710.71
Co-operation	3,276.44
Other Agricultural programmes	8.80
Land Reforms	22.00
Other Rural Development Programs	749.92
Hill Areas	0.28
Major and Medium Irrigation	1,867.61
Minor Irrigation	1,109.01
Power	4,515.00
Non-conventional sources of energy	-
Village and Small Industry	3,407.80
Industries	679.00
Non-ferrous mining and metallurgical industries	51,875.07
Ports and Lighthouses	1,063.33
Shipping	1,125.40
Civil Aviation	31.06
Roads and bridges, Road transport	884.96
Inland Water Transport	33.79
Other scientific research	-
Tourism	2,935.70
Civil supplies	25.28
Other General Economic Services	39,203.47
	1,28,908.44

What types of collections are made under these ‘Heads of Account’? On a more detailed inspection of items under which non-tax revenue is collected, we find that it is mostly for:

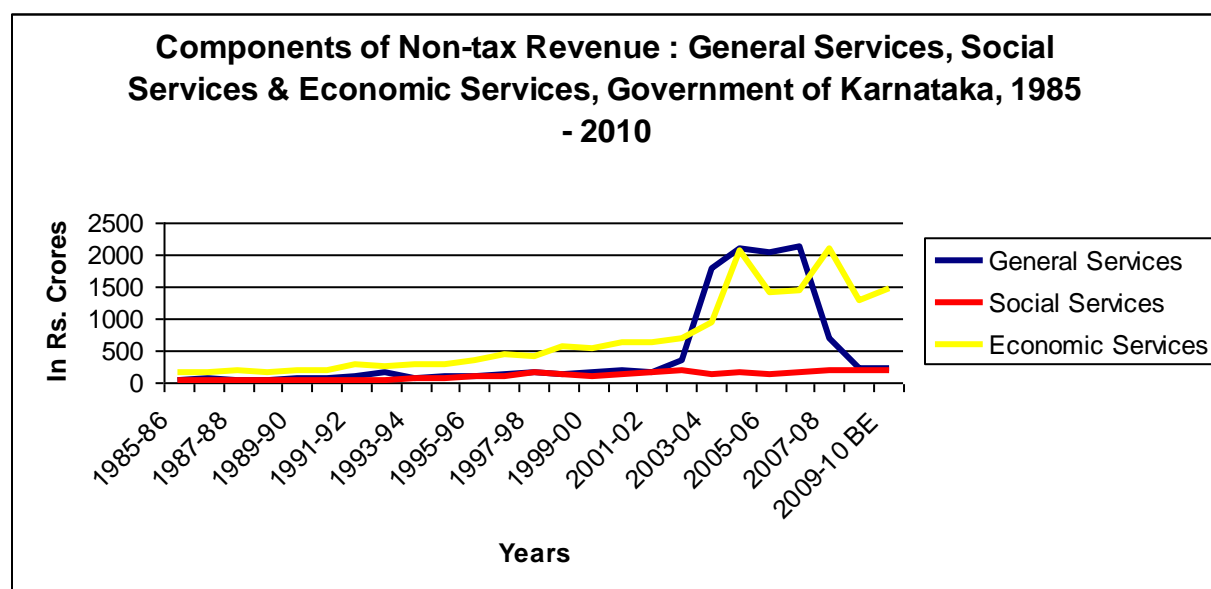
- i. Services rendered by Departments to other departments. E.g. ‘Charges for Police supplied to Other Governments’ and ‘Charges for Police supplied to Other Parties’.
- ii. Fees, fines and forfeitures: Such items are generally mentioned without any further detail of what type of services are they related to.
- iii. Hire-charges and rents.
- iv. Sale of publications, sale of old assets.

Is this list exhaustible? There are two prominent observations related to user charges on scrutiny of the list:

- i. Items like sale of old assets and machinery, recoveries of overpayments, leave salary contributions cannot be considered user charges. Using non-tax revenue estimates in general to speak of user charge collections in the State is erroneous.
- ii. In several services where there is a clear user charge component, the figures stated in non-tax revenue do not represent the total collections. For e.g. under the Head – *Water Supply and Sanitation*, the only items listed are ‘Receipts from Rural Water Supply Schemes’ and ‘National Rural Water Supply Schemes’. The amounts collected under such schemes are only in the range Rs. 25 lakh. This is because water and sanitation services have been devolved in the State to ULBs, parastatal agencies like KUWSDB and BWSSB, and departments of municipal corporations/councils. The collections made by such institutions do not get reflected in the Consolidated Fund. Similarly collections made by WUCS in Irrigation, Rogi Kalyan Samithis in Health will not reflect in State accounts. Apart from the accounts of specific organizations entrusted with user charge collection, the accounts at the municipal level will also need scrutiny.

Thus with the current level of data available, it is difficult to conclude on the overall state of user charge collections in Karnataka, looking only at non-tax revenue items in the State budget.

Figure 3: Revenue from General Services, Social Services and Economic Services (in Rs. crores), Government of Karnataka, 1985 - 2010



Source: Government of Karnataka, Accounts at a glance for 1960 – 2009. Finance Department, November 2009

We have studied in greater detail the user charge practice in one of social services – Water, and two of the economic services – Roads and Irrigation. This was after discussions with the ERC, following the submission of the interim report, that a study and classification of all the services provided by the Government was not possible within the time-frame given. Reports from these departments follow in the next three sections.

5.0 User charges in Water

Water supply, as a subject, was devolved to urban local bodies under the 74th amendment to the Constitution in 1992. However, very few urban local bodies have actually been assigned the function. In Karnataka, a few different scenarios play out in handling Water supply. In Bangalore, the autonomous Bangalore Water Supply and Sewerage Board (BWSSB), set up in 1964 under a Government of Karnataka Act, handles all operations and maintenance and capital works. In most tier II and III cities like Mysore and Shimoga, separate departments under the city municipal corporation/council handle water supply and maintenance; they receive capital grants and loan assistance from the State government and associated parastatal bodies like the Karnataka Urban Water Supply and Drainage Board (KUWSDB).

In this section we will first review the principles of setting a volumetric tariff which have been supported by the Government; we will then analyze the current tariffs, costs and revenues of water supply boards/departments in the cities of Bangalore and Mysore; lastly, we will offer some recommendations and points for the Government to consider.

5.1 Alternative tariff structures

In the table below we present the main tariff models followed in India. The Urban Development Department in Karnataka recommends a two-part tariff, with a fixed component and an increasing block tariff in the variable component.

Table 4: Alternative Water Tariff Structures

TARIFF STRUCTURES	TARIFF MODEL	DESCRIPTION	METHODOLOGY
Single part, variable tariff structure	Linear uniform volumetric method	Users pay in direct proportion to their consumption. In most cases, water is provided at a subsidized tariff to the	Average cost/KL is computed based on total water supplied and total cost incurred at various levels

	masses to ensure affordability	This average cost/KL is the base tariff charged to all customer groups. Subsidies to customer groups are provided on the base cost
	Volumetric increasing block tariff method (IBT)	<p>More than one price for water used, where each price applies to a customer's use within a defined block. Prices rise with each successive block. Water slabs are determined based on consumption pattern of the public. Per capita consumption norms defined for local bodies is taken as the base for this design</p> <p>Average cost/KL is computed based on total water supplied and total cost incurred at various levels</p> <p>Weights are derived based on water consumption norms and these define the corresponding level of per capita water consumption and depict the ratio of tariff in these slabs</p>
Single part, fixed tariff structure	When individual customers are not metered, a flat charge per month, irrespective of the volume of water used is charged.	Could be designed as a fixed charge per number of taps, size of the connection (ferrule). Or it could be a cess based on property tax or water tax
Two component	Combination of a fixed tariff and a variable	Combination of methodology followed

tariff structure	tariff. The fixed component considers the fixed costs in the short run like establishment, load based power costs, depreciation, loan servicing etc.	for single part variable tariffs and single part fixed tariffs.
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Source: TERI, 2010

5.1.1 Setting a volumetric tariff

In this first part, we will highlight the main points of the “Manual for fixing a volumetric tariff”, which the urban water supply department has approved and circulated amongst all ULBs in Karnataka. This will help us evaluate the current tariffs in Bangalore and Mysore, with respect to costs incurred, in the next sub-section.

In setting a water tariff in developing countries where several poor households would be denied access to water if it were priced at its true economic value, it is common practice to set a life-line tariff. Such a tariff has a very low usage charge up to the basic water need, with the rates increasing for consumption beyond the identified basic water need. This is called an increasing block tariff (IBT). Once the usage exceeds the first block, the additional usage is charged at the higher rate specified for the second block, and so on until the usage reaches the highest price category.

The Urban Development Department (UDD) has directed all Urban Local Bodies (ULD) vide Government Order No. UDD 204 UMS 95, dated 15.11.1996, to levy volumetric tariffs through the installation of meters. A Government of Karnataka Urban Water Supply “Manual for fixing volumetric tariff” has been circulated to all ULBs in 2009. The manual has been prepared with the goals of cost recovery (the long term objective is to recover full cost of providing service: operation and maintenance cost, debt service and a reasonable return on capital). A brief review of the procedure suggested follows:

- Establishment charges, power charges, chemicals and consumables, and other charges on periodic repairs and maintenance are considered to determine the total cost of supplying water in a year.
- Non-Revenue Water is taken to be 15%; Net quantity of water supplied to the city/town per year (in KL) = $0.85 * \text{Gross quantity of water supplied per day at source point ('Z' MLD)} * 365 * 1000$
- Average cost of water per KL to be charged from customers =

$$\frac{\text{Total cost of supplying water in a year}}{0.85 * Z * 365 * 1000}$$

- The suggested tariffs and consumption slabs are as follows.

Table 5: Water tariff slabs and rates proposed by Urban Development Department, Government of Karnataka

Slab	Comments	Tariff
0 – 8 KL	Lifeline supply for the urban poor. Around 55 Litres Per Capita Daily for 5 member household	50% * Average cost of water/KL (provide subsidy)
8 – 25 KL	Low & middle income group	Average cost of water/KL
25- 40 KL	Higher income group	Upto 1.5* Average cost of water/KL (disincentivise excessive consumption)
Above 40 KL	Very high income group	Upto 2 * Average cost of water/KL (disincentivise excessive consumption)

Source: Urban Water Supply “Manual for fixing volumetric tariff”

- The manual advises that ULBs revise water tariffs 3 years after the introduction of volumetric billing

5.2 Bangalore Water Supply and Sewerage Board (BWSSB)

The discussion on water supply in Bangalore is a microcosm of the situation in a rapidly

developing and urbanised India. Our water boards face sustained pressure and increased demand from both the rural and urban areas. Archaic and weak water pumping systems lead to high percentages of Unaccounted-for-Water (UFW) losses and leakages; UFW in Bangalore according to BWSSB estimates is in the range of 35-40%. In addition, water rates are not set according to an economic value of water which leads to poor cost recovery, financial unsustainability of water boards and over-consumption. According to a recent statement made by the Water Minister of the State Government, the BWSSB incurs an expenditure of Rs. 33 per kilolitre in the production of water, while it supplies it at Rs. 9 (for domestic purpose) and Rs. 15 per KL (for non-domestic purpose), leading to monthly losses of Rs. 48 Crore per month.¹⁰

Institutional framework: The BWSSB was formed in 1964 and owns all water and sewage assets in the city. It provides 900 Million Litres per Day (MLD) of water to the city and has 6.07 lakh metered connections. The Board handles Operations and Maintenance (O&M) for the city as well. As per the Bangalore Water & Sewerage Sanitary Act, 1964, the BWSSB can levy rates, fees, deposits, taxes and other charges to carry on its operations. It also has the powers to vary such rates, fees and rentals from time to time to provide sufficient revenue. Apart from O&M costs, the Board also raises revenue to cover taxes, interest payments, provide for adequate depreciation and maintenance, contribute to pension fund, meet repayment of loans and other borrowings, finance year to year improvements, and provide for other such purposes beneficial to the promotion of water supply and disposal.

Current tariff and costs: The current tariff for domestic consumption is a two-part tariff composed of a fixed part and a variable increasing block tariff (IBT) (See Table 7 below).

The costs incurred in the provision of water supply are provided in Table 7. The BWSSB aims at full cost recovery (on a no-profit, no-loss basis). The current average cost of water supply based on the cost figures is presented in Table 9. The UFW is taken at 35% for calculations. The average cost is almost 6 times the variable lifeline tariff. Even the next slab is highly subsidised at Rs.9/KL. While the last two slabs are priced at the economic cost, they should

¹⁰<http://epaper.timesofindia.com/Default/Scripting/ArticleWin.asp?From=Archive&Source=Page&Skin=TOINEW&BaseHref=TOIBG/2010/04/07&PageLabel=5&EntityId=Ar00502&ViewMode=HTML&GZ=T>

actually be priced much higher to cross-subsidise the low-income households and also to discourage such higher consumption. The current tariff in Bangalore does not satisfy the economic efficiency criteria.

Table 6: Tariff rates for water supply, BWSSB

Consumption (KL)	Water Tariff Rs. Per Kilo Litre	Minimum Charges
0-8000	6.00	48.00
8001-25000	9.00	201 .00
25001-50000	15.00	676.00
50001-75000	30.00	1,326.00
75001-100000	36.00	2,226.00
100000 & above	36.00	5,826.00

Source: BWSSB website

Table 7: Costs incurred by BWSSB, 2005 – 2011 (in Rs. Crores)

Category of costs	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
Power Charges	221.84	227.92	228.10	243.20	240.00	250.00
Establishment	70.85	82.33	91.77	112.30	120.55	150.17
O&M	25.54	28.81	39.63	60.37	115.84	143.97
Depreciation	23.11	62.73	64.05	61.90	64.00	64.00
Debt Servicing	106.94	104.50	104.02	112.47	147.86	180.03
Total	448.28	506.29	527.57	590.24	688.25	788.17

Source: BWSSB presentation to ERC, May 2010;

Table 8: Average cost of Water supply for BWSSB, 2010-2011

Cost incurred in water supply for 2010-2011 (in Rs.Crore)	788.17
Quantity of water supplied (in MLD)	900.00
Quantity of water supplied (per year in KL)	32,85,00,000.00
Average Cost (considering loss of water due to UFW at 35%) (in Rs/KL)	36.91

Source: Cost estimates from BWSSB presentation to ERC, May 2010

Metering and revenue collections:

Table 10 presents the revenues collected against expenditure incurred.

Table 9: Revenue and Expenditure, BWSSB, 2005 -2011

Years	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
Revenue	437.29	487.21	486.94	534.76	530.40	530.40
Expenditure	451.01	509.31	529.22	594.01	688.26	788.18
Deficit	13.71	22.10	42.28	59.24	157.86	257.78
% of Deficit to Expenditure	3.04	4.34	7.99	9.97	22.94	32.71

Source: BWSSB presentation to ERC, May 2010

BWSSB claims 100% metering and 99% revenue collection efficiency. The Board has introduced online bill payment facility in addition to payment at special BWSSB kiosks and Bangalore One centres. Door to door cash collections were stopped on account of complaints that these amounts were not being remitted by the collectors to the Board. All these initiatives have assisted in a good collections record. The deficit, however, between expenditure and revenue has increased over the years – while tariffs have remained the same since 2005-2006, the costs in the supply of water have risen by 43%. BWSSB has submitted a proposal to the Government for a tariff hike aiming at better cost recovery.

5.3 Vani Vilas Water Works (VVWW), Mysore

Institutional framework: Vani Vilas Water Works (VVWW) is a wing of Mysore City Corporation (MCC), and handles water supply for the city. In addition to pumping water from the source (see Table 11), VVWW was also entrusted with maintenance of the water works systems. The water works in Mysore City is currently designed to pump 186.73 MLD to the city. The first stage of water supply to the city was designed in 1896 and the details of current water schemes are as follows:

Table 10: Current water supply projects, Vani Vilas Water Works, Mysore

SI No.	Scheme	Commissioned Period	Designed Capacity (MGD)	Total Quantity of Water Supply (MGD)
1	Belagola Headworks a) 1st Stage Augmentation to Water Supply Scheme b) 2nd Stage Augmentation to Water Supply Scheme	1896 1998	3.50 8.00	3.00 5.00
2	Hongally Headworks a) 2nd Stage Water Supply Scheme b) 3rd Stage Water Supply Scheme	1969 1979	8.00 12.00	4.90 9.23
3	Melapura Headworks 1st phase Water Supply Scheme 2nd Phase Water Supply Scheme	2002 2007	11.00 11.00	9.50 9.50
	Total		53.5 or 243.10 MLD	41.13 or 186.73 MLD

Source: Vani Vilas Water Works, Mysore

VVWW initiates the tariff decision and revision procedure for the MCC. VVWW can set tariff on a no-profit, no-loss basis.

Tariff: VVWW also charges a two-part tariff. It differs from the BWSSB tariff design in that all customers pay that same flat/fixed rate of Rs.60/month. The variable tariff is an increasing block tariff. The current tariff was set over 3 years ago.

Table 11: Tariff rates for water supply, including details of the rates before the last revision, Vani Vilas Water Works, Mysore

Consumption Qty (Ltrs)	W.E.F 1-7-1996 Rate/1000 Ltrs (in rupees)	W.E.F 1-1-2006 Rate/1000 Ltrs (in rupees) Monthly minimum rate : Rs. 60/month
0-10000	1.25	NA
10001-25000	1.65	NA
0-25000	1.65	2.00
25001 - 50000	2.65	3.75
50001-75000	3.65	6.00
75001 - 100000	5.15	8.00
100000 and above	6.15	10.00

Source: Vani Vilas Water Works, Mysore

Costs and Revenue Collections: As per the information provided by VVWW, cost breakdown and revenue collections are provided in Tables 13 and 14. Electricity costs for water are shown in the MCC budget as State Finance Commission devolutions. VVWW officials mentioned, however, in discussions, that they aim at recovering electricity costs as well through the tariff collections. The Executive Engineer, VVWW said that the state finance commission devolutions to meet the deficit in costs which have not been recovered eat into the grants for new capital works to the Corporation from the State Government.

VVWW, like the BWSSB, is also running into large deficits in ensuring that revenue matches expenditure, as Figure 6 shows.

Table 12: Cost incurred in the pumping and supply of water, Vani Vilas Water Works, 2000 - 2010

Years	Water O&M Costs		UGD O&M Costs		Capital Costs	Total Costs
	Salary	Non-salary	Salary	Non-salary	Water Distribution Network (including Pipes, valves, Pressure meters)	
	(in Rs. Lakhs)					
2000-2001	210.92	495.08	28.6	98.12	32.5	865.22
2001-2002	232.18	534.85	31.2	105.21	18.5	921.94
2002-2003	294.02	630.98	39	130.21	12.5	1106.71
2003-2004	344.5	558.05	42.1	315.88	20.6	1281.13
2004-2005	415.32	492.57	74.25	245.37	12.8	1240.31
2005-2006	415.48	585.92	80.1	145.92	32.5	1259.92
2006-2007	497.13	782.2	84.2	254.78	85.5	1703.81
2007-2008	523.2	498.18	87.52	356.15	220	1685.05
2008-2009	558.96	516.61	96.6	502.85	150	1825.02
2009-2010	413.34	636.55	72.5	474.5	120	1716.89

Source: Vani Vilas Water Works, Mysore

Table 13: Revenue collected, Vani Vilas Water Works, Mysore, 2000 – 2010

Years	Billing Cycle	No. of metered connections	Amount collected (in lakhs) (a)	Other charges	
				Installation Fees(in Rs.) (b)	Total Receipts (a) + (b)
2000-2001	bimonthly	95,415	600.97	123.52	724.49
2001-2002	bimonthly	98,462	869.85	122.8	992.65
2002-2003	bimonthly	101,154	1016.2	169.4	1185.6
2003-2004	bimonthly	104,824	918.14	133.85	1051.99
2004-2005	bimonthly	117,667	1024.13	127.04	1151.17
2005-2006	bimonthly	119,994	1424.94	85.24	1510.18
2006-2007	bimonthly	123,619	1363.77	109.33	1473.1
2007-2008	bimonthly	127,614	1443.59	134.04	1577.63
2008-2009	bimonthly	131,639	1688.12	115.9	1804.02
2009-2010	bimonthly	134,081	1182.17	102.1	1284.27

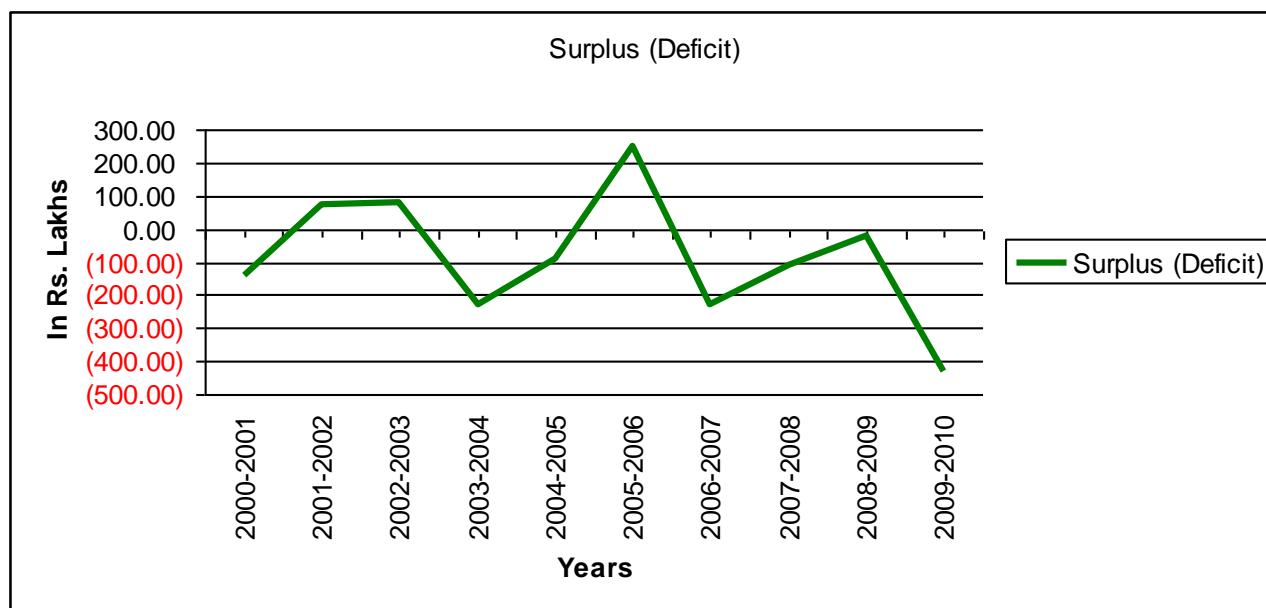
Source: Vani Vilas Water Works, Mysore

Table 14: Surplus/Deficit incurred in water supply by VVWS, 2000 - 2010

Years	Total Receipts (in Rs. Lakhs)	Total Costs	Surplus (Deficit)
2000-2001	724.49	865.22	(140.73)
2001-2002	992.65	921.94	70.71
2002-2003	1185.6	1106.71	78.89
2003-2004	1051.99	1281.13	(229.14)
2004-2005	1151.17	1240.31	(89.14)
2005-2006	1510.18	1259.92	250.26
2006-2007	1473.1	1703.81	(230.71)
2007-2008	1577.63	1685.05	(107.42)
2008-2009	1804.02	1825.02	(21.00)
2009-2010	1284.27	1716.89	(432.62)

Source: Vani Vilas Water Works, Mysore

Figure 4: Surplus/Deficit (from the costs incurred and revenue collected) in water supply by VVWS, 2000 - 2010



Source: Vani Vilas Water Works, Mysore

Metered connections: The total number of water connections in Mysore is 134,081. However of these only 33%, i.e. 48,270 meters are functioning. For the meters which do not function, charges are levied on the basis of the average 6 month consumption before the meter stopped functioning. This directly translates to a huge loss of revenue for the water board, as 67% of domestic customers are not paying according to their true usage patterns. Despite the UDD Government Order (No. UDD 204 UMS 95) in 1996, directing all ULBs to ensure metered connections, compliance with the order has been poor. KUWSDB must devote adequate resources, financial and technical, to ensure that all ULBs aim to achieve 100% metered connections within the next 2 years.

UFW: The losses due to UFW are 33%. The cost of water lost due to losses and leakages is a big reason the water boards are financially unsustainable.

Average Costs: The average cost that VVWS should charge to recover O&M costs and minor capital costs is as follows:

Table 15: Average cost of Water supply for VVWS, 2009-2010

Average Cost of Water for VVWS	
9 month O&M cost still Dec 2009 (in Rs. Lakh)	1,716.89
Proportionate estimated 12 month cost till Mar 2010 (in Rs. Lakh)	2,289.19
Proportion of cost for domestic customers (90.9% of water supplied is for domestic customers; October 2009)	2,080.87
Quantity of water supplied (in MLD)	186.73
Quantity of water supplied (per year in KL)	68,156,450.00
Average Cost (not considering loss of water due to UFW) (in Rs/KL)	3.05
Average Cost (considering loss of water due to UFW) (in Rs/KL)	4.56
Current tariff	Rs/KL
0 - 25 KL	2.00
25 - 50 KL	3.75
50 - 75 KL	6.00
75 - 100 KL	8.00
100 KL and above	10.00

Source: Cost estimates from Vani Vilas Water Works, Mysore; Calculations, CBPS

Comparing this average cost with the existing tariff, it appears that the tariff for the second slab of 25 KL to 50 KL - Rs.3.75/KL matches average cost best. The first slab, if considered to be the lifeline supply, is subsidized up to 35% of average cost. And the highest tariff slab is more than 3 times the average cost. Of course, when one considers the loss of water due to UFW, average cost increases significantly. It is a debatable point if the entire losses due to UFW in the system can be transferred to the customers through higher tariffs. The efficiency of the existing tariff rate can only be measured after considering the number of customers in each slab. VVWS did not have data on hand of the number of customers in each tariff slab, so we cannot estimate how effective the cross-subsidies are. This is an important point as the lack of information available with the Water Board points towards the lack of significant work on tariff setting and review. This also hinders any effective outside review like ours.

PPP in service delivery: In December 2008, JUSCO was awarded a six-year performance based water management contract in a tripartite agreement with MCC and the KUWSDB. It was the first PPP project targeting water supply for an entire city on a 24/7 basis (all previous projects like the 24/7 project in Hubli-Dharwar-Belgaum have been pilots for sections of a city with populations less than 1 lakh). According to the Detailed Project Report (DPR) prepared by KUWSDB, the main problems associated with the existing water systems in Mysore were, "un-

equitable supply, non-availability of adequate pressure in distribution mains, inadequate storage capacity of service reservoirs, inadequate size of distribution mains, old and dilapidated pipelines, illegal tapping of feeder mains at many locations, unauthorized house connections, faulty metering, inadequate operation and maintenance staff, adoption of inappropriate design methodology"¹¹. The project has three phases spread over six years. The first phase of twelve months will involve complete hydraulic remodelling of the present system and preparation of a capital investment plan. In the second phase of three years, JUSCO will rehabilitate the distribution network to reduce water losses and gradually increase various service standards. The third and final phase of two years will involve providing 24x7 water supply in the entire city ensuring sustainability of achieved service standards. In addition, JUSCO has taken over the management and maintenance of the supply system for six years, for which it will be paid Rs 16.2 crore annually. There has been a lot of debate on whether PPP models in the water sector are nothing but euphemisms for total privatization of the system.¹² The Mysore project itself has been met with much opposition from citizens groups. While performing a comprehensive evaluation of different PPP models is not within the scope of this paper, from the user charge discussion perspective it would be important to see the efficiencies the private sector player brings to the system with respect to regularizing the recovery of usage charges. In the case of Mysore, the large component of non-revenue water due to leakages, un-metered and unauthorized connections was one of the big issues which led to this PPP because VVWW lacked the technical and human resources to resolve this. JUSCO's performance targets specifically include improving the collections of water charges, and reducing the difference between the quantity of bulk water supplied and the quantities for which revenue is collected (i.e. to reduce non-revenue water). The contract does not appear to be a case of privatization because JUSCO will not own any of the facilities

¹¹ DPR <http://jnnurm.mysorecity.gov.in/news/01/16/2009/dp>

¹² See Dwivedi (2010), "Public Private Partnerships In Water Sector: Partnerships or Privatisation?", a Manthan publication, for an analysis of PPP projects in India and abroad, advocating caution in adopting PPPs. A host of reasons is provided, ranging from lack of transfer of any real risk to the private agency, governance issues because of lack of transparency and accountability, and equality and social justice because it is felt that in the delivery of essential services like water by private agencies, the poor will be left out

and will hand-over management of the system to MCC and VVWW after 6 years. Also, all PPPs do not lead to un-equitable water distribution. In the much debated case of water privatization in Bolivia, a study across 4 cities (one in which the water system is managed as a co-operative, two in which it was privatized, and one in which it is publicly provided), pre- and post-privatization, showed that access to water by low-income consumers increased in the period when service was provided under private concessions. (Hailu et al 2009).

5.4 Recommendations

a. Autonomous state water regulatory authority: In the last few years, a few States in India have taken the step of setting up independent water regulatory authorities. Maharashtra passed the Maharashtra Water Resources Regulatory Authority Act (MWRRA) in 2005, following a comprehensive State Water Policy in 2003 and water sector improvement projects in 2005. The main powers of the water regulatory authority are to regulate the distribution of bulk water supply, establish a water tariff system for levying water charges with a view to establishing a stable and self sustainable management of service delivery to users, and review and clear water resources projects. Uttar Pradesh, Arunachal Pradesh and Gujarat are also in the process of passing legislation towards the creation of separate water regulatory bodies. These reforms in the water sector follow the reforms initiated in the electricity and telecom sectors in the 1990s, which led to the creation of State Electricity Regulatory Commissions (SERCs) and the Telecom Regulatory Authority of India (TRAI). The electricity reforms paved the way for transparency in the setting of electricity tariffs and removed government interference. Karnataka should also pursue the route of setting up independent state water regulatory authorities to serve as a link between the State government water resources department, city level water service providers, municipal corporations/councils and the citizens.

b. Tariff setting authority: Water differs from electricity and telecom in that it is a state subject while the other two are on the concurrent list, subject to state and central regulation. In handling water supply, several bodies take on administrative responsibilities: metropolitan-level water boards, state-level specialist agencies, water departments of city Municipal Corporation and councils. In the cases we have reviewed of BWSSB and VVWW, the water boards and city corporations hold the power to determine the appropriate tariffs to be

charged. The practice of allowing ULBs and water boards to determine their own tariff structures can allow them to factor in different local considerations, and focus their efforts on different problems they may face. For instance, in Bangalore, the water board has 100% metering and 99% collection efficiency, but tariffs are far removed from the actual average costs of water production and supply, and therefore tariff revision needs to take place to ensure economic efficiency. In Mysore, the current tariff is not very different from average costs, but the water department is losing a large portion of its revenue because of 60% non-functioning meters and poor collection rates. Hence, VVWW needs to focus on strengthening institutional mechanisms of tariff billing and collection. It is recommended in light of such local intricacies in tariff-design that the power to set tariffs remains with ULBs and water boards. The state wide water regulatory authority, if set-up, can design a comprehensive policy detailing tariff setting principles, cost recovery goals, service delivery standards, which the city-level service providers will have to adhere to.

c. Tariff design: The 2-part tariff consisting of a fixed charge and a variable IBT, as applicable in Mysore and Bangalore, is generally preferred by experts because it ensures equity, cost recovery and water conservation. This tariff design should be followed for all metered connections. Furthermore, the Government should move towards charging across the entire State according to a volumetric, metered basis. Accessing funds from Centrally Sponsored Schemes (CSS) like the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) requires the mandatory reform of metered connections, so it is a wise investment for State Boards and ULBs. Where metered connections are not possible, the tariff design which most closely approximates accurate volumetric, metered billing should be implemented. Some practices currently being followed in different Indian cities for unmetered connections are: a percentage of annual property tax (30%) in Ahmedabad, determination of an average consumption of water according to the household floor area in Delhi, a monthly minimum charge according to the pipe size or ferrule in Hyderabad. Fixing the charge according to property tax does not lead to water conservation behaviour amongst customers, and Ahmedabad has one of the lowest cost recovery percentages of 60 -65% (TERI, 2010). Therefore the other two methods are superior until 100% metering can be achieved.

d. Subsidies: The UDD manual recommends subsidizing average cost 50% for the lifeline tariff and charging customers in the higher consumption brackets 1.5 to 2 times more. We recommend that to ensure the cross-subsidy is more effective and accurate, more scientific and econometric methods can be used at the time of tariff revision. If a very small section of the population lies in the tariff slabs which are charged above the average cost of water, then the excess revenue generated will not be sufficient to meet the cost of the subsidy given to a large number of customers in the lifeline tariff slab. There is a wealth of literature on determining the appropriate mark-up or mark-down above average cost in public utility services, beginning with the seminal Ramsey (1927 model). One model that can be considered by the Water utilities is the Ramsey-Wilson model with changing welfare weights, which achieves the goals of both economic efficiency (by recovering breakeven cost of the water supply system) and equity (by cross-subsidizing between higher and lower consumption category customers). A brief summary of the model as applied in Pushpangadan and Murugan (1998), for a dataset of 425 households in Trivandrum, is given in Annexure 3. To determine the subsidy, the model uses actual water consumption quantities and income measurements to determine price elasticities of demand for customers in different tariff slabs. Maximum welfare is given to consumers in the lifeline tariff slab by charging them the breakeven rate minus a subsidy, which has been generated by a mark-up for customers in the higher consumption categories. We could not perform the same experiment to measure subsidy in a scientific, non-arbitrary manner for either of the water utilities we studied, as they did not have the data to calculate the price elasticities. However, the results found by Pushpangadan and Murugan (1998) are indicative of the utility of the exercise. In the sample analyzed by them it was found that breakeven cost was two times higher than what was being charged currently; customers in the highest consumption category could pay 2.2 times their current rate based on the price elasticity of demand calculated, and the lowest category of customers could pay 1.7 times more than what they were currently paying. Clearly, given the current costs of running the water system, the existing tariffs would not have resulted in even breakeven cost recovery. To be able to interpret the results with most certainty, care should be taken to ensure that the selection of the sample is done in random, but stratified manner: i.e. the proportion of customers in the sample across the different consumption categories matches the proportions found in the population.

6.0 User charges in Irrigation

Some of the central objectives of decentralized participatory irrigation techniques and management institutions, that began in developing countries in the last decade, have been the recovery of water rates at near economic value, improved revenue collections, minimized wastage of water, enhanced operation and maintenance, efficient and equitable service delivery (Samal and Kolanu, 2004)

In June 2000, the Karnataka Irrigation Act, 1965 was amended to allow the formation of Water User Co-operative Societies (WUCS) for participatory irrigation management (PIM). WUCS were formed under the Command Area Development Authority (CADA) for major and medium irrigation projects. The area of operation of the WUCS is ascertained and notified by the Irrigation Officer. The CADA staff are responsible for organizing and motivating the farmers to form the WUCS and also for offering the necessary training. The area under a WUCS ranges from 500 to 1000 ha. Farmers with lesser cultivated area remain unorganized. WUCS, after registration, are expected to raise Rs.100/ha from all the farmers under the WUCS; once they raise this, they are entitled to receive a one-time grant of Rs.900/ha (of which Rs.450/ha is from the Centre, Rs.450/ha is from the State).

Water is supplied to the WUCS in bulk supply for the purpose of irrigation. Water rate is levied at a volumetric basis of Rs.12 per 1000 cubic metre. The WUCS collect water charges from the members of the Society and non-members who hold land within the jurisdiction. They are also empowered to levy charges to cover operations and maintenance costs for parts of the irrigation systems which have been handed over by the Government or Nigam to the Society, and also administrative and other related costs incurred by the Society. The Nigams/Zones raise and present the water demand for each WUCS based on the volumetric tariff mentioned earlier. The WUCS keep 20% of the seasonal volumetric water bill for their use and hand over the rest to the Nigams. Furthermore, the Government also allows them to retain up to Rs.40/ha for maintenance of the canal network that has been handed over, up to the outlet.

Currently, only about a little over 40% the area irrigated under major and medium Irrigation projects of Karnataka is reported to be managed by WUCS. Consequently the 3 Nigams - Krishna Bhagya Jala Nigam Ltd (KBJNL), Cauvery Neeravi Nigam Ltd. (CNNL) and Karnataka Neeravi Nigam Ltd (KNNL), and the Revenue department (for non-Nigam projects) continue to manage a bulk of the work on levy and collection of water rates.

6.1 Problems currently being faced

- 1. Slow formation of WUCS/ Reluctance of farmers to form WUCS:** Currently, WUCS function in 21 Major and Medium Irrigation projects. Of the 15,86,524 Ha of land irrigated under these projects, only 40.11% of this area is managed by 1405 functioning WUCS; there is need for 1656 WUCS to become functional in order to fully cover and manage the remaining irrigated area.¹³ Formation of WUCS under the CADA has not been completely successful. There have been instances of farmers being reluctant to organize themselves into WUCS. Such behaviour is mainly seen amongst farmers in the head-reach of the main canal because assured quantities of water is available to them. On the other hand, farmers in the tail-reach who suffer from water shortage because head-reach farmers tend to grow water-intensive crops, are keener to form WUCS to try and eliminate such hardships. According to the Director of the Water and Land Management Institute (WALMI), inability of WUCS to collect the farmers share at the rate of Rs 100/- per hectare, as well as decline in the bank interest rates which have lead to a reduction of revenue to WUCS by way of interest, have all been responsible for the lack of demand to form WUCS.
- 2. Insufficient area under each WUCS:** It is also felt that the area under a WUCS (500 to 1000 Ha) is not sufficient to ensure economic viability of operations of the WUCS. According to officials from the Krishna Bhagya Jala Nigam Ltd (KBJNL), the WUCS have been unable to mobilize adequate financial resources to meet their operating expenses, maintain their network properly, and levy and collect water rates from their

¹³ Note from the Water Resources Department regarding Water Users Co-operative Societies and Low Collection of Water Rates, submitted to the Expenditure Reforms Commission, Government of Karnataka in January 2010

members. Up to 20% of the money generated by the WUCS is used for canal management purposes. KBJNL is supposed to provide a matching grant to the WUCS for the amount of funds they have collected, but that has not been put into practice. As WUCS are unable to meet the costs of O&M and repairs works on their feeder networks from the funds that they have raised, the condition of these canals handed over to them has considerably deteriorated.

3. **Nominal Water rates:** The volumetric water rates currently in force were set in 2002, and there is urgent necessity to revise and enhance these rates. The water rates currently in force are also very nominal compared to rates in neighbouring States of Andhra Pradesh and Maharashtra.
4. **Very poor recovery rates of demand raised:** The collection rate of water demand raised is abysmal. From 2001 to 2007, the average collection rate in all Major and Medium Irrigation projects was only 17.48%. Details about the KBJNL managed WUCS are provided below. The collections from 2004 to 2009 have been only 11.51% of the total demand raised. In the officials' views the farmers in the WUCS have the ability to pay. The problem is the lack of coercive power that the WUCS have to make their members pay and also the lack of penalties for non-payment.¹⁴ It is also felt that the Secretaries of the WUCS, being farmers themselves, do not have any incentive to collect water rates, and that they often shirk that responsibility to engage in their own livelihood work.

¹⁴ The water users society *are* empowered to stop supply of water if violation of cropping pattern is found and if users fail to make payment of water charges, under the amendments to the Irrigation Act, 1965. There are administrative problems with how to deal with non-payment. Within a WUCS, a particular farmer cannot be cut off from water supply as the entire lateral network of farmers will be affected. However, KBJNL officials are of the view that rogue WUCS which are unable to get their members to contribute fully should be cut off completely from the main canal network

Table 16: Demand raised and collections made by the WUCS managed by KBJNL, Major & Medium Irrigation, 2004 - 2009

Years	Demand Raised (in Rs. Lakhs)	Collection of Water Rates (in Rs. Lakhs)	% of collections	Balance
2004-2005	317.11	37.59	11.85	279.52
2005-2006	496.98	62.02	12.48	434.96
2006-2007	700.98	52.35	7.47	648.63
2007-2008	101.7	41.64	40.94	60.06
2008-2009	654.47	67.78	10.36	586.69
Total	2271.24	261.38	11.51	2009.86

Source: KBJNL

Table 17: Demand raised and collections made under all Nigam and Non-nigam projects, Major & Medium Irrigation, 2001 - 2007

Year		2001-2002	2002-2003*	2003-2004	2004-2005	2005-2006	2006-2007
Total Area Irrigated (in Ha)		1,353,254.00	867,829.00	487,488.00	2,039,413.00	1,318,107.00	1,115,639.00
Demand of Normal Water	Area in Ha	849,891.00	668,134.00	409,673.00	1,107,455.00	1,018,153.00	755,256.00
	Amount (in Rs. Lakhs)	1,965.74	1,026.45	3,971.41	1,895.14	1,597.97	1,529.99
Violation of Cropping Patterns	Area in Ha	406,949.00	166,238.00	65,766.00	275,191.00	262,701.00	203,746.00
	Amount (in Rs. Lakhs)	5,964.64	2,660.94	730.85	3,525.76	3,492.25	2,067.29
Unauthorised Irrigation	Area in Ha	96,414.00	33,457.00	12,049.00	656,767.00	37,253.00	30,799.00
	Amount (in Rs. Lakhs)	2,750.41	917.60	349.54	1,678.88	921.77	678.88
Maintenance Cess/Fines		114.90	67.92	34.51	75.34	87.86	86.62
Total Demand		10,795.69	4,672.91	5,086.31	7,175.12	6,099.85	4,362.78
Total Collections		1211.86	1074.5	475.33	2056.39	978.45	724.73
Collections% (on demand)		11.23	22.99	9.35	28.66	16.04	16.61

* Water rates for the year 2002 - 2003 is waived off due to drought situation as per G.O. No. WRD 83 MBI 2003, dated 8-9-2003

Source: Major & Medium Irrigation Departments, Water Resources Department, Government of Karnataka

5. Loss of revenue due to cross subsidization: The Irrigation Act allows Nigams to levy rates for water supplied to Municipal/ULBs, for Water supply schemes, or for power generation. However, as per the KBJNL officials, the Administrative Department has issued circulars/directions waiving the collection of user charges from such groups. For hydro-electric power generation, payment of water rates up to 50 MW is waived. KBJNL also has requests from Thermal power projects to allocate huge quantities of water from the dams and rivers under them. Not charging for and/or subsidizing water provided for other uses has led to significant revenue losses for the Nigams.

6.2 Recommendations

- 1. Urgent attention towards improving formation and functioning of WUCS:** The WRD must focus efforts to improve the formation and functioning of WUCS. Officials from KBJNL feel that the apathy of CADA staff towards organizing farmers has been responsible for the slow rate at which WUCS' have been formed. Further, the poor functioning of existing WUCS is attributed to poor implementation of the law and statutes governing the creation of WUCS. If WUCS are to function efficiently and serve as primary agencies for the collection of water rates, urgent attention must be paid towards their formation and capacity-building.
- 2. Basis of water rates:** Pricing of irrigation water is seen as an important component of the demand side management of water use. A quick summary of the different kinds of rates that can be charged for Irrigation water can be found in Box 3. The Vaidyanathan Committee Report on the Pricing of Irrigation Water (Gol, 1992) suggested a two part tariff consisting of a flat annual fee on a per hectare basis that all farmers within the command area pay as membership fee to be part of the system, which entitles them to claim water, and a variable fee according to the water used (volumetric or area based). The annual flat fee the Committee recommended was Rs.50/hectare.

The current rules on the levy of water rates in Karnataka stipulate a volumetric tariff depending on the quantity of water supplied. The irrigation department should consider hold consultations with a few representative WUCS to also consider charging an appropriate fixed rate.

The two-part tariff, with fixed components takes care of the problem economic theory identifies with setting price equal to marginal cost, in the case where the marginal cost keeps falling with the size of the unit. The marginal cost in such a case will always be lesser than average cost, and hence prices set this way will not recover the full average costs and will require Government subsidization. Such falling marginal cost can be seen in distribution networks in Irrigation projects. It is recommended therefore to set a two part tariff involving variable cost and a lump-sum amount.

Box 3: Criteria of tariff fixation for irrigation water

Criteria for Tariff Fixation	Details
1. Area based	1a) Fixed rate per hectare, where the charge is not related to the area irrigated, the crop grown, or the volume of water received. In this form, it is usually part of a two-part tariff – designed to cover the fixed costs of the service
	1b) A fixed rate per hectare irrigated. The charge is not related to the type of crop grown, or actual volume of water received (except that a larger irrigated area implies a greater volume of irrigation water)
2. Crop based	2) A variable rate per irrigated hectare of crop i.e. different charges for different crops, where the charge is not related to the actual volume of water received, although the type of crop and the area irrigated serve as proxies for the volume of water received
3. Volumetric	3a) A fixed rate per unit of water received, where the charge is directly related to, and proportional to the volume of water received
	3b) A variable rate per unit of water received, where the service charge is directly related to the quantity of water received, but not proportionately (for example, a certain amount of water per hectare may be provided at a low unit cost, and additional water above this further quantity at a very high unit cost). This method is referred to as a rising block tariff.
4. Tradable water rights	4) Under tradable water rights, the entitlements of users in an irrigation project, or more widely, other users, are specified in accordance with the available water supply. Rights holders are allowed to buy or sell rights in accordance with specified rules designed primarily to protect the rights of third parties. Sales

require authorisation by a licensing authority or may have to be approved by courts without reference to any specified authority.

Source: Thierry Facon, 2004

- 3. Reduction of implicit and explicit subsidies:** Several authors have pointed out that all subsidies do not accrue to the end users of irrigation (see Mitra (1997), Vaidyanathan Committee (1992)). The government must review and determine the amount of implicit subsidy attributable to costs of inefficiency in producing and distributing irrigation services on account of defective design, cost and time overruns in project implementation, overstaffing, high administrative costs etc. Efforts should be made to reduce both this implicit subsidy and the explicit subsidy through the under-pricing of water by improving efficiencies, raising water rates and enforcing scheduled rates.
- 4. Broaden base of revenue sources:** The Irrigation department should broaden its base of revenue sources. There should be necessary guidelines set for pricing water supplied by the Nigams for domestic and industrial water consumption, hydro-electric and thermal power generation. The recommendation of KBJNL officials is that a Irrigation Tariff Regulation Commission, similar to the KERC, be formed, which will decide the economic pricing of water across irrigation, domestic and industrial water supply, and electricity projects.
- 5. Increase volumetric water rates to reflect economic value, and ensure higher cost recovery:** The water rates in Karnataka were set in 2002, and need urgent revision. In the table below, the demand raised and maintenance expenditure incurred on the Minor Irrigation schemes is provided for 2006 to 2009. In the minor irrigation schemes, water charges are fixed based on the type of crops and the quantity of water required by the crop per hectare. The maximum rate is Rs. 988/ ha for an annual crop like sugarcane, and the minimum rate is Rs. 37/ha for a crop grown with manure (vide GO No. NEE YI-16-NPC- 99(P)). As can be seen, even if 100 % of the demand raised was collected, even 10% of the annual maintenance expenditure would not be met. Currently, the Minor Irrigation Department meets the maintenance expenditures through an available maintenance grant. To improve the financial sustainability of the

WUCS, the water rates must be revised urgently. Furthermore, there should be a mechanism to automatically revise water rates at the end of every alternative crop year. Water rates should also be revised considering the index of agricultural produce prices, to accurately reflect the gains to farmers. The MWRRA has released several detailed reports on setting water rates in the Irrigation sector.¹⁵ These merit review from the WRD.

Table 18: Demand raised and maintenance expenditure, Minor Irrigation, 2006-2009

Year	Total Area Irrigated (in Ha)	Demand Raised (in Rs. Lakhs)	Expenditure incurred (in Rs. Lakhs)	Demand raised % on expenditure
2006-2007	87967	388.38	5993.34	6.48
2007-2008	98814	408.27	3794.96	10.76
2008-2009	94771	372.34	4433.55	8.40
Total	281552	1168.99	14221.85	

Source: Minor Irrigation Department, Water Resources Department, Government of Karnataka

- 6. Cost recovery - Recommended O&M :** On the topic of cost recovery, the Vaidyanathan Committee and the Tenth Finance Commission both state that water charges must cover at least the entire O&M costs of irrigation and 1 per cent of the capital cost to begin with. Mitra (1997) found that at the all India level, the gross receipts from irrigation covered on average only 50% of the O&M costs (working expenses), which meant that most states needed to double their water charges in order to meet complete O&M costs. There is also the question of recommended O&M charges per hectare of land. **The Twelfth Finance Commission recommends that in the major and medium irrigation sector, an O&M cost norm of Rs.600 per ha for utilized potential and Rs.300 per ha for unutilized potential may be considered based on normative expenditure requirements for maintenance of irrigation works.** This norm for minor irrigation works should be half of those for major and medium irrigation projects. Most states according to Mitra (1997) spend much lesser on O&M expenditures.

¹⁵ http://www.mwrra.org/current_tariffs.php

- 7. Roadmap for cost recovery should be set:** The Irrigation Department should lay a proper roadmap for cost recovery looking at current rates of recovery and all the relevant policy recommendations discussed here. To improve recoveries, the entire burden does not need to pass onto the end user through hikes in the variable water rates. Other steps that seem very urgent are (i) improving the institutional mechanisms of assessment and collection; imposing penalties for non-payment (ii) charging higher rates for water intensive crops, like paddy, sugarcane (which is already implemented by States like Maharashtra, Gujarat and Orissa; Maharashtra revises water rates periodically and also charges some of the highest rates and would be a good model state for the Karnataka Irrigation department).
- 8. Improve political will in recovering economic value of water:** The political unwillingness to charge adequate user charges because of electoral politics has caused great harm to the overall health of public service delivery organizations in developing countries. In Irrigation especially, as several authors have pointed out it has led to a general low-level equilibrium (Baza and Ahmad, 2000). Performance is low on most relevant counts: service quality and coverage are both low, the water authority has low net revenues, and there are severe organizational efficiencies, with few incentives to maintain existing facilities or improve services. Moreover, this situation implies an ‘equilibrium’ in the sense that there are inherent forces tending to maintain the current state (Strand and Walker, 2004). Such a situation is very apparent in the Karnataka Irrigation system – the officials are aware of the paying capacities of the farmers, especially those who grow cash crops, but the lack of political will to enforce payment and collections at economic rates has done great harm to the systems. Setting up an independent water regulatory authority will help in regularizing water rate levy and collections, and free the process of political interference.
- 9. Provide statutory empowerment of water user committees in JSYS to levy and collect water rates:** In the World Bank financed Jala Samvardhane Yojana Sangha, the Minor Irrigation department manages integrated tank development programs through community based tank management. Under the scheme, 1555 Water User Associations have been formed and tanks have been handed over to such

associations. Though in project concept, such Tank User Groups (TUGs) are approved to collect water tax and retain 90% of it for their O&M purpose, they do not have the statutory rights under the Karnataka Irrigation Act, 1965. Therefore, to improve their user charge collection powers, such statutory powers should be provided by the Government at the earliest. Such institutional reform will also ensure that the proper benefits of PIM accrue through the complete empowerment of WUCS and TUGs as autonomous, legal entities with rights to fully manage and control the canal networks and irrigation sub-systems handed over to them.

7.0 User charges in Roads

7.1 Overview of road user fees

According to Duff (2004), one significant element of municipal and state government expenditure that can be financed through user charges and benefit taxation is transportation, through taxes on fuel, motor vehicle registration fees, public transport fares etc. The practice in some countries like Canada is to use the revenue generated from public transport fares directly for expenditure in that area, and put revenue from fuel tax and motor vehicle registration fees for instance, into the Consolidated Fund to meet expenditure in transportation related areas. The US Government, on the other hand, deposits all fuel and other vehicle-related taxes to a Highway Trust Fund since 1956, which is used to reimburse states for expenditures on approved projects, including new road construction, road improvements, heavy maintenance road safety programs, and, even mass transit projects (Nix, 2001). Road funds with other components of user fees also exist in countries like Japan, Belgium, Netherlands, Switzerland and New Zealand.

7.2 Central Road Fund, India

India also has a Central Road Fund created under the Central Road Fund Act 2000. Under the Act, additional cess (currently Rs.2 per litre on Petrol and Diesel) is levied on petrol and diesel sale. The revenues collected through the cess are routed to the CRF through the

Consolidated Fund of India. The CRF is managed by the Ministry of Finance, Government of India. The allocations of the receipts are statutorily predetermined. 50% of the cess on diesel is used for the development of rural roads; the remaining 50% of the cess on diesel and 100% of the cess on petrol are used as follows: 57.5% for the development and maintenance of National Highways, 12.5% for Railway Safety Works, 30% for the Development and Maintenance of State Highways and Interstate Roads.

7.3 Road financing in India and related problems

According to Chen (2005), road financing in India has followed largely a traditional approach, viz. that roads are treated as public goods, they are financed from general revenue with little connection between the costs of road provision and the taxes or charges paid by road users, and there is not much attempt at direct road pricing. This reliance on national and state fuel cesses has contributed to the under-funding of the roads sector, poor road maintenance and substantial economic losses according to the author. There is a Rs. 1000 Billion gap in highway financing according to Chen (2005) over the period 2002 - 2011, taking into consideration the total maintenance and capital requirement and the road user charges revenue.

Box 4: Classification of taxes & road user charges in India

	Taxes	User Charges & Fees
Central Government	(Central Customs)	Cess on fuel
	Excise on Motor Vehicles	Road user tolls
	Central sales tax on inter-state transaction & shipment of vehicles	
	Excise duty on fuel	
	Excise duty on spares/ lubes/ accessories	
State Government	Sales tax on vehicles	Excess over average sales tax (for broad definition)
	Entry tax	

Sales tax on fuel	Registration fee
	Taxes levied on passenger & goods vehicles
	Cess on fuel
	Road user tolls
	Permits, licenses, fines & penalties
Sales tax on spares/lubes/accessories	

Source: Chen (2005), 15th International Road Federation World Meeting

Further problems identified with the nature of road taxes and user charges are:

1. Poor earmarking of road taxes for road related revenues: Road sector taxes account for 15.5% of the total tax revenue in India (the corresponding figure in the US and Western Europe is only 3-7%), but only 1/3rd of such road taxes are returned to the sector for maintenance and investment purposes
2. Absence of a national road user charge policy and procedures to harmonize the level and type of road user charges
3. Motivation for changing tax levels is only to increase the tax revenue with little regard to economic efficiency or equity
4. Poor accountability mechanisms for road users to ensure their taxes are used in an efficient manner
5. Undercharging of heavy goods vehicles: Fuel taxes are inadequate to reflect the costs imposed by heavy vehicles. The costs are not fully recovered by fixed annual fees

7.4 Recommendations on the design of road user fees in Karnataka

The PWD in Karnataka has already commissioned work on the topic of user charges – PwC had conducted a study as part of the Technical Assistance provided to KSHIP by the World Bank on the scope, structure and formation of a Karnataka Road Fund. The outcomes of this

study are currently being reviewed by officials of the Department and the World Bank and hence we did not have access to relevant portions of these reports.¹⁶ Similarly, IDeCK have carried out a study on the potential to toll roads in Karnataka for KRDCL. KRDCL facilitated a discussion with their engineers on the procedure to arrive at the toll potential of a road, but again we did not get the actual study report. Hence in this sector, given the sufficient technical and professional expertise required to arrive at the possible rates of levy, our study is primarily a theoretical discussion of best practices in benefit taxation and road user charges.

1. **Optimal design of road benefit taxes and user fees:** In order to fix an economically efficient price for road user charges, economic analysis suggests that the following should be considered (1) a fixed amount to recover the administrative costs of motor vehicle and driver licensing systems; (2) a variable amount corresponding to maintenance costs, amortized capital costs, and opportunity costs of underlying land; (3) an additional variable amount related to negative externalities in the form of environmental and accident costs that are not internalized through insurance premiums; and (4) a further variable amount reflecting congestion costs associated with travel on peak routes and at peak times, the revenues from which can be used to finance new or improved transportation infrastructure.¹⁷ A multi-part tariff is generally identified as being the solution to declining marginal costs as output increases. In the roads sector, this possibly can be taken care through environmental and congestion costs. Under the State Motor Vehicles Taxation Act, 1957, the Karnataka Government levies Vehicles and Service Tax, Road Tax on Lorries, Cess on Vehicle Tax, and Taxes and Cesses on the gross revenue from fares and freights of Public Service Vehicles owned by a fleet owner. The rates of taxes and cesses depend on the category of vehicle, weight of goods carried, number of passengers,

¹⁶ The section of the PWC report we got from KSHIP was 'Financing options for PPPs in the Road Sector'. We did not find anything related to the user charge discussion to reproduce here.

¹⁷ Bird (1976)

floor area etc.¹⁸ These charges are only weakly related to the external environmental costs (which depend on fuel type and engine type) and wholly unrelated to congestion costs which depend on type of vehicle, time of day, and driving location. Especially in a metropolitan city like Bangalore which is reeling under traffic congestion problems, undertaking a review of congestion pricing policies, existent in urban cities like London, Singapore and Hong Kong may be a useful exercise to draw up feasibility scenarios.¹⁹

2. **Subsidization:** Roads networks have always been identified as having large positive externalities because of the increased social and economic interactions they facilitate between communities, increased productivity and economic growth. To the extent that road networks generate such positive externality, expenditures on the network can be subsidized using general taxation measures. User charges also do not preclude general taxation measures required for redistributive justice in road networks, to maintain acceptable service levels in remote, less populated areas for instance.
3. **Toll policy:** The GoK has notified under the Karnataka State Highways Act, 1964 the rates of toll to be collected as toll or user fee for sections of State Highways or Major District Roads developed under PPP mode. Tolls as user fees are extremely essential to attract private concessionaires to PPP projects. In the roads sector especially there is significant need for private participation, to provide the viability gap funding.

¹⁸ See Schedule of the Karnataka Motor Vehicles Taxation Act, 1957 at http://www.karnataka.gov.in/dpal/pdf_files/MOTOR%20VEHICLES%20TAXATION%20ACT-new%20%28Final%29.pdf

¹⁹ For more information on congestion charges, see Transport for London, Central London Congestion Charging Scheme: Three Months On (London: Transport for London Congestion Charging Division, June 2003) and Nigel C. Lewis, Road Pricing: Theory and Practice (London: Thomas Telford, 1993)

Table 19: Toll rates, Government of Karnataka, 2010

Types of vehicle	Basic Toll Rate effective from 28-01-2009 (Rs. per km and per trip) (4 lanes and above)	Basic Toll Rate effective from 28-01-2009 (Rs. per km and per trip) (2 lanes)
Car, Jeep, Van or Light Motor Vehicle	0.65	0.50
Light Commercial Vehicle, Light Goods Vehicle or Mini Bus	1.05	0.75
Bus or Truck	2.20	1.50
Heavy Construction Machinery (HCM) or Earth Moving Equipment (EME) or Multi Axle Vehicle (MAV) (3 to 6 axles)	3.45	2.25
Over-sized vehicles (seven or more axles)	4.20	3.00

Source: Public Works, Ports & inland Water Transport Secretariat Notification, No. PWD 18 EAP 2009 (P1), 26 May, 2009

The toll will be collected by the private developer selected by the KRDCL. The rates at each toll plaza shall be specified by the Government on the basis of the above rates. The toll rates will be revised every year on March 1st according to the Wholesale Price Index for the previous year ending 31st December. The toll policy applicable for the National Highways has a slightly different approach. The toll rate specified for the base year is increased without compounding by 3% each year; furthermore only 40% of the change in WPI is added onto this new base rate. Making the toll revision totally dependant on the movements of the WPI exposes the revenue realized to WPI risk. The GoK may also want to review their revision policy to keep a fixed increase in toll plus a variable component partially dependent on WPI movements.

As per the PWD, at present only 1/3 rd of the road tax collected in the State is earmarked for the roads sector. They state that at least 60% of tax and tolls should be routed back to the sector for development and maintenance of roads.

4. **Relationship between road levies and public transport:** Can road levies and taxes be used to induce behavioural change towards increased use of public transport? Duff (2004) supports the use of revenues from road taxation and user fees towards the expansion of public transport services, arguing that 'public transit and urban commuting by road are such close substitutes that such expenditures should be permitted. By increasing the number of commuters who are likely to use public transit, expenditures on this mode of transportation provide direct benefits to drivers by easing congestion on urban roadways. Research also shows that road levies and charges are more readily accepted by users where revenues are devoted to improving public transit. (Nevin and Abbie, 1993). In Bangalore, there have been recent attempts to attract more urban road users to public transportation through the observance of 'Bus Days' once a month. As traffic congestion is a significant problem in Bangalore, it is worth testing out if road charges would be more acceptable if it was made known that the revenues would be appropriated to improve public transport.

8.0 Recommendations

8.1. Summary of recommendations on services studied

Detailed recommendations for water, irrigation and roads are found in Sections 5, 6 and 7 respectively. In this section, we will summarize some common recommendations that emerged:

- a. **Formation of a Government level and department level policy on the recovery of user charges:** The State Government must have a policy document detailing its position on user charges: what type of costing (marginal, break-even/average costs) is it recommended departments undertake, what is the targeted recovery rate in each sector for the next 5 years, how will the question of equity be addressed (cross subsidization, rebates at the utility provider level), recommended institutional mechanisms for user-fee collection. The state should also consider in the case of some departments, like the Water Resources Department (WRD), the setting up of an independent state water regulatory authority to serve as a link between the State government water resources department, city level water service providers, municipal corporations/councils and the citizens, decide guidelines for the setting of tariffs, enforce implementation and adherence to these norms.
- b. **Economic pricing of services and cost recovery:** Under-pricing and arbitrary pricing of services causes great harm to the financial sustainability of service utility providers, efficient use of the services and the quality of services as well. Departments must in the short run, aim to recover the average or break-even cost of services – such cost must include O&M costs, and debt servicing costs. In the long-run, utility providers must aim to recover capital costs and a return on equity (in the case of private concessionaire managing tolled roads - private concessionaires will only take up a project if their internal rate of return (IRR) is being met). Departments should regularly collect and analyze the cost data to see if the tariffs are sufficient to recover costs. Formats for these should be prepared by the Department and handed over to all other city-specific agencies, ULBs, city corporations/council departments

involved in the user charge collection. For services like Urban water supply and Irrigation, the best tariff design we find is a two-part tariff with a fixed charge plus a variable increasing block tariff for different consumption categories. Such a tariff is economically efficient and dis-incentivizes over-consumption. For such services the State should also move towards 100% metering and volumetric tariffs to avoid inefficiencies in cost recovery. These measures will also help in accessing funds from CSS like the JNNURM.

- c. **Subsidies:** In the short-run, when a utility can set tariffs to only recover O&M costs, they must receive subsidies from the Government (generally received in the form of SFC devolutions for capital work). If current tariffs are significantly under-priced (as seen in the case of Irrigation water where current tariffs cannot recover even 10% of maintenance costs), then the utility cannot implement a single, immediate tariff hike to reach economically efficient prices. Such a hike is bound to face severe resistance from the users. In this case, before the tariff can be stabilized to economically efficient rates, subsidies should be obtained to cover the gap in revenues. At the same time, the department and concerned user charge collections agencies should prepare the paying public, through an awareness campaign, for the necessity of a tariff increase.

Subsidies can also include cross-subsidization amongst different customer categories based on consumption. We recommend that to ensure the subsidy provided is effective and accurate, more scientific and econometric methods can be used at the time of tariff revision. If a very small section of the population lies in the tariff slabs which are charged above the average cost of the service, then the excess revenue generated will not be sufficient to meet the cost of the subsidy given to a large number of customers in the lifeline tariff slabs. Such unscientific subsidy calculations can derail cost recovery roadmaps. A derivation of the seminal Ramsey (1927) model for mark-ups in public utilities – the Ramsey-Wilson (1993) model can be considered, to set subsidies according to econometrically calculated price elasticities of demand, displayed by different consumer groups.

d. Tariff setting authority: In deciding between uniform state wide tariffs versus ULB(or equivalent body like the WUCS in Irrigation) decided tariffs, the following factors can be considered:

- Where different local considerations and costs have to be factored in for tariff setting, and the ULBs have good costing and information systems, ULB based tariffs can be adopted
- Where the service provider and user charge collection agency does not have good accounting, costing and information systems, a state wide tariff should be implemented. With time, the agency should be given greater flexibility by setting up tariff bands. In all cases the state department should design a comprehensive policy detailing tariff setting principles, cost recovery goals, service delivery standards, which the service providers will have to adhere to.

e. Tariff revision: Tariff revisions should be done at least every 3 years. In the short run, where services are under-priced significantly, tariffs should be reviewed and analyzed every year. Tariff revisions should consider inflation effects on the cost of inputs, increases in fixed costs, changes in the paying ability of different customer groups etc. Tariffs should not be just arbitrarily increased by x%, for the sake of a revision. Such practices prevent any cost-recovery roadmap from being achieved.

f. Improve political will in recovering economic value of services: The political unwillingness to charge adequate user charges because of compulsions of electoral politics has caused great harm to the overall health of public service delivery organizations in developing countries. Tariff setting should be freed of political interference; one way of doing this could be setting up independent regulatory authorities like in the electricity and telecom sectors.

9.0 Way forward

The way forward from this report would be for this broader discussion to spin off into more in-depth State Department projects to form detailed user charge policies, for the next 5

years at least. The theoretical discussions and good and bad practices identified in the departments we have studied, will serve as useful starting points. Setting such a policy will require detailed information on the regulatory environment, cost structures, demand structures, customer willingness and ability to pay, institutional collection mechanisms and accountability measures. User charges have tremendous potential to complement general taxation measures, enforce greater accountability in public service delivery and ensure more conservative, responsible consumption behavior on the consumer side. It is essential for the Government to give the formation and implementation of user charge policies the due seriousness it deserves, if it is to improve the quality of its public expenditure.

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11.0 Annexures

Annexure 1: User charge questionnaire

Center for Budget and Policy Studies

MAITRI BHAVAN 1st Floor, No 4. M.N.Krishna Rao Road, Basavangudi, Bangalore 560004

Context: Please spend some time to answer the following questions for a study conducted by us for the Expenditure Reforms Commission, set up by the Government of Karnataka, under the Chairmanship of Mr. B.K.Bhattacharya. These questions are being asked in relation to user charge rates and collections by your department. This information will be used by us to make relevant recommendations in the field of user charges and suggest areas for improvement to be considered in the forthcoming budget 2010-2011. Examples have been given to illustrate the questions wherever possible. For any clarification please contact: Arundhuti Gupta 9886764398/65907402

1. Please list the various schemes, programmes and/or projects under your department. A list or additional sheet may be enclosed.
2. Please list those schemes that charge a user-fee from the citizen/consumer
3. What is the current practice with regard to user charges in your department?
4. What is the purpose of charging a user fee under each of the schemes/project?
5. Please explain how user charge is fixed? Who decides on the rate of user charge to be levied?
6. How long has the user fee been charged for each scheme?
7. Is there prescribed time duration till when these user charges will be levied?
8. What part of the following costs has been met through the collection of user charges?
 - All expenses (including capital expenditure)
 - Interest and depreciation
 - Operation and Maintenance
9. Are there any norms or guidelines followed on how much revenue the department wants to raise/recover through user charge?
10. What is the process of revising the user charges? When was the last time the user charges were revised in your department? Give details
11. Please provide us with the data on the user charges collected over the last 5 years by your department under the heads given in question 8. Enclose a separate sheet using your existing formats
12. Is the user charge collected maintained under separate head of accounts? If yes, please give details
13. How is the money collected from user charges spent? Please give some of the commonly recurring expenditure for which these funds are used.

Annexure 2: Ramsey-Wilson model with welfare weights

1. The second best pricing rule of Ramsey (1927) for natural monopolies or public

utilities is as follows:
$$\frac{p - MC}{p} = \frac{\alpha}{\varepsilon} \quad (1)$$

where p = price set for the commodity; MC = Marginal Cost; α = Ramsey number which is equal to $\frac{1 + \lambda}{\lambda}$, where λ is the Lagrange Multiplier, and ε is the own price elasticity of the commodity.

Therefore this rule says that the price mark-up over Marginal Cost for a commodity should be inversely proportional to the price elasticity of demand to set an efficient price. However, the Ramsey model as it stands has adverse distributional effects because it states that the price charged should be higher for groups which have lower elasticity of demand and lesser ability to pay. So in water supply, for instance, this translates to household customers being charged more than commercial or industrial customers, and further distortions in the tariffs charged for customers within the domestic category.

2. To adjust for this, we modify Ramsey's original model by adding welfare weights as suggested by Wilson (1993)

"Consumers are divided into two groups: one group consuming above a given quantity q^ and the other below it. The rates are obtained by assigning '1' for quantities above q^* and '0' for below q^* for the Ramsey number. This would mean that maximum welfare is assigned to small consumers, below q^* , by charging a rate below the marginal cost and minimum or zero welfare for consumers of large quantities, above q^* , by charging a monopoly price."*

$$\begin{aligned} P &= MC; q < q^* \text{ \& } \alpha = 0 \\ P &= MC \left\{ \frac{1}{1 - \frac{1}{\varepsilon}} \right\}; q > q^* \text{ \& } \alpha = 1 \end{aligned} \quad (2)$$

3. In the paper, as a cost function for MC is hard to arrive at because of lack of data, it is proxied by Break-Even cost : variable cost (wages, electricity, chemicals, maintenance and repair), plus replacement cost (the investment for plant are considered, taking the interest rate on any loans taken the amount due is calculated, that is divided by the life of the asset, it is adjusted for inflation and the amount due is considered as an annuity), plus quasi fixed costs (unrelated to production, like administrative costs). The breakeven rate is ascertained by dividing the total costs by the total annual production of water . We consider the proportion of domestic to non-domestic water consumption in the sample, and consider the proportionate break-even rate.
4. As there exists very little actual data on the price elasticity of demand for public utilities, price elasticity is arrived at by using the recoverability theory of Pollack-Wales (P-W) (1978). The main basis is to conduct a cross-sectional household survey. If in a single period there are two or more slabs of tariffs that are charged to two sets of customers, then a cross sectional study is possible.
5. In addition to data on total water consumed, information on the number of members in each household (i.e. number of adult males, adult females and number of) and the floor area of the house is collected
6. The water consumption of one house in one month is adjusted using the Adult Equivalent Scale to arrive at a water consumption figure for each member of the household relative to an adult male. The consumption of an adult male is taken as the per capita consumption in one month
7. Price and Income elasticity, using expenditure functions from the P-W method:
 - Expenditure functions are arrived at by regressing per capita consumption on per capita floor area. Per capita floor area is used to proxy income as actual income information collected is considered subject to wide error margins
 - Income elasticity:

In an Equation of the form: $\ln x = a_1 + a_2 \ln M$ (3)

Where, x = quantity of water consumed;

M = income of household proxied by household floor area

a_2 is the income elasticity

- Price elasticity: The intercept in Eq (3) can be further written out to equal:

$$\begin{aligned} a_1 &= a_0 + a_3 \ln p_1 \\ a_{11} &= a_0 + a_3 \ln p_1 \end{aligned} \quad (4)$$

Solving these two equations simultaneously will yield a value for a_3 , the price elasticity

8. In this case, Eq 2 is modified to vary welfare weights across 3 tariff slabs. The modified Ramsey – Wilson tariffs charged are:

$$\begin{aligned} P &= MC - \frac{k}{\varepsilon}; q < q^* \text{ \& } \alpha = 0 \\ P &= MC; q = q^* \text{ \& } \alpha = 0 \\ P &= MC + \frac{1}{\varepsilon}; q > q^* \text{ \& } \alpha = 1 \end{aligned} \quad (5)$$

Therefore, in the middle tariff slab, where a majority of the customers lie, the rate charged is the Marginal Cost. The customers in the last tariff slab are charged a surplus over and above the MC. This surplus is distributed to the customers in the first tariff (using the proportion k in which the sample is spread out between the first and the last tariff)