

INVESTMENT COST AND COST RECOVERY - WATER SECTOR SRI LANKA

P H Sarath Gamini¹ and Dr. D.R.I.B Werellagama²

Project Director, Greater Kandy Water Supply Project¹ and Former Senior Lecturer, Uni. of Peradeniya²

ABSTRACT

Water is an essential element for the survival of mankind and 30% of world's population has no proper access to drinking water. 40% of Sri Lankan population has organized water supply facilities and 59.4% is dependent on other sources such as wells, tube wells, streams and rivers etc, including 10% dependent on unprotected sources (Department of Census, 2012). The Government of Sri Lanka has given priority to provide safe drinking water supply for all in 2025 and 60% piped water supply coverage by 2020. The national authority to provide drinking water is the National Water Supply & Drainage Board (NWSDB). It provides drinking water to majority of the urban population through major water supply schemes and the present house connection coverage is 1.5 million connections. Major constraints on coverage expansion are, insufficient funding for capital investment, high purification and operation cost, lack of proper mechanism for cost recovery and lack of awareness related cost of water among stakeholders.

Capital investment (including distribution cost) at present is in the range of Rs.250,000 to 490,000 m³/day installed capacity for medium and large water supply schemes including the distribution system. The average operation and maintenance cost ranges from Rs. 36 to 40/m³. Therefore, the average cost of providing water supply facilities is Rs. 158 / m³ including recovery of capital investment. The present cost recovery of the NWSDB is Rs. 47/ m³. Hence, the water sector is heavily subsidized and has become a burden to the government. This shortfall has to be reduced for the government to secure funding for coverage expansion to achieve the targets set for 2020 .

Therefore, innovative methodologies are required to identify the cost of providing water supply facilities and implement a cost recovery system in order to meet the challenges in the water sector.

This paper promotes necessity of a national database and initiates the formation of such a database.

Furthermore, the present procedures on capital investment assessment of operation cost, cost recovery have to be reviewed and it is proposed to implement the following recommendations to achieve the coverage targets through a proper cost recovery system.:

1. A national level data base with information on the cost of providing drinking water facilities has to be established.
2. A cost recovery system to be drastically changed with special attention to the domestic sector where only 25% of the total cost of water is recovered.
3. A special task force to be appointed representing all stakeholders including political authorities, public officers and professional organizations to develop new strategies to address above issues.

Key Words: *Cost of water, Capital cost, O&M Cost, Cost recovery, Billing Rates*

INTRODUCTION

Water is an essential element for the mankind and water supply facilities are not available for more than 30% of the world population. 40% of Sri Lankan population has organized water supply facilities and 59.4% is dependent on other sources such as wells, tube wells, streams and rivers etc, including 10% dependent on unprotected sources (Department of Census, 2012). The Government of Sri Lanka has given priority to provide safe drinking water supply for all in 2025 and 60% piped water supply coverage by 2020.

The national authority to provide drinking water is the NWSDB. It provides drinking water to 1.5 million families in the urban/semi urban parts of the country and to expand the piped water supply coverage up to 60% in year 2020. Major constraints on the expansion of coverage are,

- a) Lack of capital due to poor cost recovery where only 1/3rd of the total cost of water is recovered from the consumers.
- b) High (per capita) investment required for water resource development and because distribution systems are laid in low density areas as well.
- c) All potential low cost water resources are being used and new water resource development requires huge investment.
- d) Water sharing issues
- e) Pollution of water bodies indiscriminately

Therefore, innovative methodologies are required to identify the cost of providing water supply facilities and implement a cost recovery system in order to meet the challenges in the water sector.

1. CAPITAL INVESTMENT

Capital costs of Water Supply Projects are being estimated during the planning stage considering tentative preliminary designs with basic rates developed by the NWSDB. However, in practice, actual implementation cost is very much different to the original estimate due to non availability of a proper database on the cost of electromechanical equipment, road authority charges during reinstatement, and quality & country of manufacture of pipes and other equipment.

Having a realistic estimate during the evaluation of projects proposals and evaluation of bids and during implementation stage are very important. Hence, it is required to establish a national level database of all investments made on large water supply projects covering Civil, M&E, O&M equipment and support services.

2. STUDY- METHODOLOGY

Ten large projects and its sub projects were studied through questionnaires sent to 15 Project Directors.

In addition, a specific study was carried out by Greater Kandy Water Supply Project (GKWSP) on the distribution and transmission costs based on economical pipe diameters. GKWSP pilot projects on house connection (HC) program (273 HC) were also utilized for this study.

Table 01: Total Cost Estimation and Capital Investment of Selected Water Supply Schemes

For Small Schemes (< 8,000m ³ /day)							
Scheme		Present Production (m ³ /day)	Investment & Year		Total Cost (MRs)		Investment (000'Rs/m ³)
Gravity	Pumping		Year	Investment (MRs)	Base Cost 2012	Relevant Cost 2012*	
	Ragala	1,500	2010	606	733	733	488
	Ginigathhena	3,000	2010	791	957	957	319
	Walapane	3,000	2010	931	1,126	1,126	375
	Rikilliagaskada	4,000	2010	884	1,069	1,069	267
	Ulapane	8,000	2006	1,445	2,268	2,268	283
	Balangoda	7,000	2010	1,268	1,533	1,771	253
	Kolonna	7,000	2010	1,839	2,224	2,224	317
For Large Schemes (> 8,000m ³ /day)							
	Mathale	30,000	2012	7,872	7,872	10,309	344
	Meewathura	32,000	2006	6,114	9,559	12,448	389
	Ambanganga	18,000	2012	6,993	6,993	6,801	378
	Udathenna - Ukuwela	18,000	2012	6,278	6,278	6,278	349

MRs- Million Rupees

Note :

- * Schemes which have more existing facilities are deleted from the evaluation.
- * Matala, Walapane, Udathenna-Ukuwela, Meewathura & Balangoda schemes were modified by adding values of existing infrastructure and it is given as relevant cost.

All cost figures of completed projects were adjusted to 2012 prices by using Institute for Construction Training Development (ICTAD) inflation index.

3. CAPITAL INVESTMENT OF VARIOUS COMPONENTS OF WATER SUPPLY SCHEMES

Organized water supply systems include: raw water sources; abstraction of water from the source, transmission to the water treatment locations, treatment plants and carrying treated water to the demand centers; reservoirs, pumping stations to feed high elevated areas, distribution system which consists of pipe line to carry water to household institutions. Studies show that cost of water treatment and water distribution represents 2/3 of the total cost.

4. RECOVERY OF CAPITAL INVESTMENTS

Table 01 shows that investment of 250,000 to 490,000 Rs/ m³/day (installed capacity) is required to provide organized water supply facility. The selling rate per m³ to recover the total capital investment within 30 years were estimated with various interest rates and given in Table 02.

**TABLE 02: Capital Recovery Component of Water Sector Investment
Depending on Loan Interest Rate and Recovery Period (Rs/m³)**

Number of Recovery Years	Interest Rate				
	6%	8%	10%	12%	15%
20	79.62	93.02	107.27	122.26	145.90
25	71.44	85.55	100.61	116.44	141.28
30	66.35	81.12	96.88	113.37	139.09
40	60.70	76.58	93.39	110.78	137.50

Assumed Capital investment is Rs. 250,000 m³/day for installed capacity and NRW component is 25%

Table 02 shows that at least to recover the capital investment; it is required to sell water at Rs. 80 to 115 / m³. At present, the consumer pays Rs.18,000 to 23,000 to get the house connections (within 10 m from the distribution main).

Average cost of complete house connection is Rs. 18,500 (House Water Connection Pilot Programme, 2013). Capital investment per family to provide water supply infrastructure is Rs. 175,000 to 340,000 (0.7 m³/d/family). Therefore capital cost recovery from this (house connection) payment is only around 2% of total investment per family.

5. STATUS OF CURRENT COST RECOVERY SYSTEM IN NWS&DB

TABLE 03: Summary of (O&M) Cost NWSDB 2012/2013

Operating Expenses	2012 Actual	2013 Budget Estimated
Operation & Maintenance Cost (MRs)	12,046	14,602
Total Quantity Sold (Million m ³)	359	374
Selling Rate to Recover (O&M) Cost (Rs/m³)	33.5	39.06

Billing records of the NWSDB's Commercial section was analyzed and resulted in Table 04, Table 05, Table 06 and Figure 01 as given below.

TABLE 04: Billed Quantity, Consumption & Bill Values-All Sector-All Island (last 5 years)

Year	All Sectors			Domestic			Non Domestic			Billed Quantity as a Percentage of Total		Bill Value as a Percentage of Total	
	No of Connections (000')	Consumption (MCM)	Bill Value (MRs)	No of Connections (000')	Consumption (MCM)	Bill Value (MRs)	No of Connections (000')	Consumption (MCM)	Bill Value (MRs)	Domestic %	Non Domestic %	Domestic %	Non Domestic %
2008	1,185	300.94	7.87	1093	207.01	3.84	92	93.93	4.03	68.8	31.2	49	51
2009	1,262	309.64	11.12	1166	214.98	5.72	96	94.65	5.39	69.4	30.6	51	49
2010	1,349	322.83	12.39	1247	226.11	6.47	102	96.72	5.92	70.0	30.0	52	48
2011	1,445	344.50	13.34	1336	241.92	7.03	109	102.58	6.30	70.2	29.8	53	47
2012	1,585	373.77	15.09	1466	266.45	8.35	119	107.32	6.74	71.3	28.7	55	45

MCM = million cubic meter

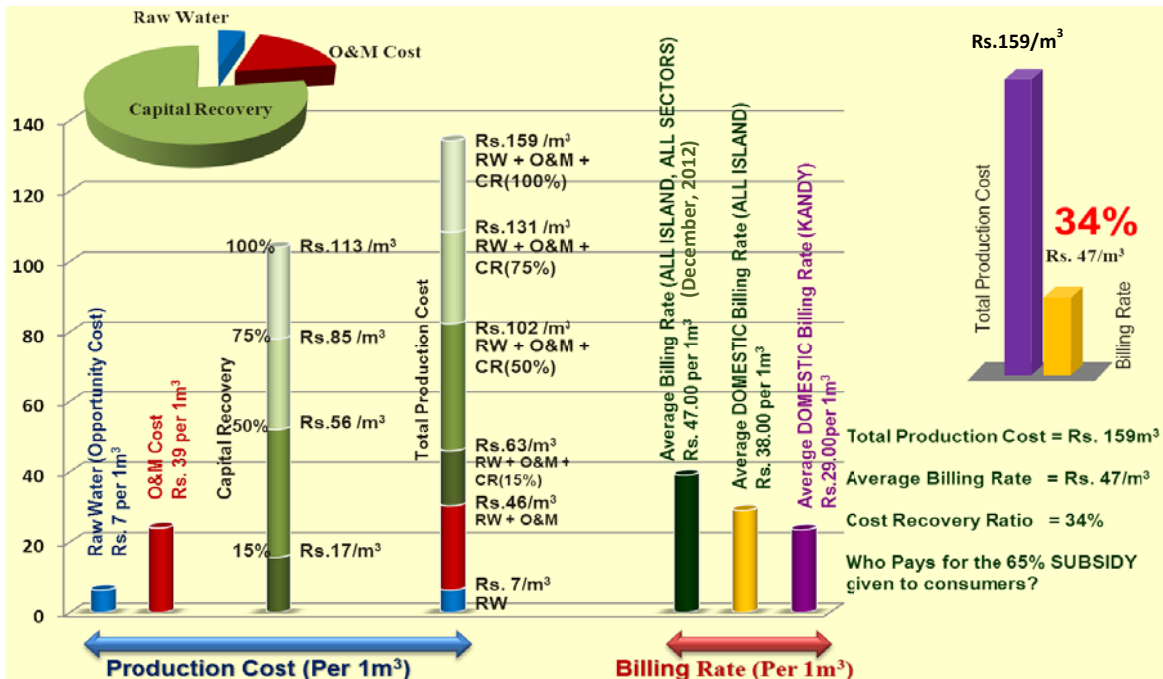
More than 70% of water is used for the domestic sector and it will reach close to 75% in 05 years. At the moment, domestic sector generates only 55% of the total revenue.

TABLE 05: Average Billing Rate (Sector wise)

Year	All Sector		Domestic		Non-Domestic	
	Bill Value (MRs)	Avg. Billing Rate (Rs./m ³)	Bill Value (MRs)	Avg. Billing Rate (Rs./m ³)	Bill Value (MRs)	Avg. Billing Rate (Rs./m ³)
2,003	4,366	18.86	1,718	11.48	2,648	32.36
2,004	4,460	18.34	1,804	11.16	2,656	32.59
2,005	5,839	23.09	2,806	16.63	3,033	36.04
2,006	6,947	26.48	3,207	18.29	3,740	43.00
2,007	7,422	26.04	3,485	18.21	3,937	41.93
2,008	7,875	26.17	3,841	18.56	4,034	42.94
2,009	11,119	35.91	5,725	26.63	5,394	56.99
2,010	12,393	38.39	6,469	28.61	5,924	61.25
2,011	13,336	38.71	7,034	29.08	6,302	61.43
2,012	15,088	40.37	8,350	31.34	6,738	62.78
2012Dec.	1,417	47.06	810	37.95	607	69.22

Average billing rate in December 2012 (with latest tariff revision) is around Rs. 47/m³, and estimated sale unit for the year 2013 is 374 MCM. The total billed value expected during the year 2013 is around Rs. 17,500 Mn. The total O&M expenditure is estimated as Rs. 14,600 Mn. leaving Rs.3.0 billion for capital repayments and expansion of coverage.

FIGURE 01: Capital Cost Recovery Component for Different Recovery Ratios, O&M Cost and Present Billing Rate for a Typical Water Supply Scheme



Note: Capital investment is Rs. 250,000 m³/day for installed capacity (12% interest rate, 30 years recovery), Non-Revenue Water (NRW) – 25%

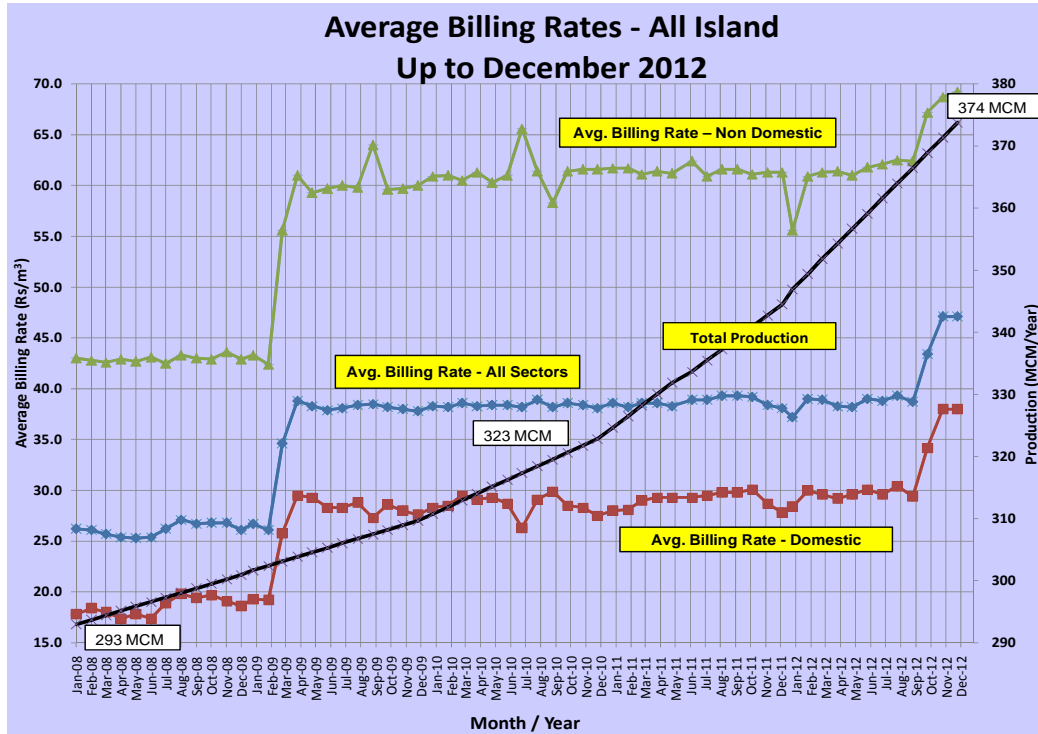
TABLE 06: Bill value variation according to the consumption pattern for domestic sector (Total No. of domestic connections 1,466,000 (Dec. 2012))

Consumption Range	% of Consumers	% of Consumers (Cumulative)	% of Bill Value (Cumulative)	Average Billing Rate (Rs./m ³)
0-15 m ³ /month	60.6%	60.6%	19.4%	21.41
16-20 m ³ /month	17.8%	78.3%	34.1%	24.41
21-25 m ³ /month	10.3%	88.6%	47.8%	30.87
26-30 m ³ /month	5.2%	93.8%	59.3%	42.33
31-40 m ³ /month	4.0%	97.8%	74.8%	59.01
41-50 m ³ /month	1.2%	99.0%	82.4%	76.83
> 50 m ³ /month	1.0%	100.0%	100.0%	106.42

Source: NWSDB Commercial Division Dec. 2012

Above table shows that only 1.0% of domestic consumers pays more than Rs.75/m³ and 88% of domestic consumers pay less than Rs. 31/m³ which is not sufficient to even cover operation and maintenance cost (Rs. 39/m³ as given in Table 03).

Figure 02: Average Billing Rates – All Island (last 5 years)



Average billing rate (all sector) increased during May 2009 – Dec. 2012 by around 24% and the overall inflation during this period is around 25% as per Colombo Consumers Price Index (CCPI).

CONCLUSIONS & RECOMMENDATIONS

1. Estimation of Cost of Water is difficult due to lack of a database on cost of goods and services. (This has a bearing on calculating the correct tariff).
2. Domestic customers are heavily subsidized and only 1% of consumers pay the average billing rate of more than Rs. 107 /m³, whereas total cost of water is more than Rs.160 /m³.
3. Cost Recovery System is to be changed drastically to improve the financial capacity of NWSDB; if the NWSDB is to borrow funds required to achieve coverage targets.
4. Due to technical complexity of water sector activities, it is difficult to estimate the investment required to expand the water supply facilities in future unless a national database of cost information is established.
5. Repair maintenance cost is less than 6% of total cost. Operation & Maintenance budget estimations also should be reviewed (based on a O& M database) specially on maintenance of assets such as pump, generators, pipe & valves, water meters, house connection materials, water treatment equipment and civil structures (including life cycle costs and replacement costs). This will help in requesting a realistic budgetary allocation for maintenance material and personnel; to ensure the long term sustainability of the water supply system.

ACKNOWLEDGEMENT

The authors gratefully acknowledge the review comments given by Mr. R S C George, Deputy General Manager, National Water Supply & Drainage Board, Mr. J. M. J. C. Jayalath, former Project Director of Kandy City Waste Water Management Project; All Project Directors of NWSDB for the contribution given by providing the required data; and the Greater Kandy Water Supply Project Staff for the preparation of the support documents.

REFERENCES

Department of National Planning, 2010, Ministry of Finance and Planning, *Mahinda Chinthana*, Department of National Planning, Colombo

'House Water Connection Pilot Programme', 2013, Cost of House Water Connections, Greater Kandy Water Supply Project.

Principal Source of Drinking Water, 2012, Census of population and housing, Department of Census & Statistics – Sri Lanka, viewed on 5th of February 2013, Online, <http://www.statistics.gov.lk/PopHouSat/CPH2012Visualization/htdocs/index.php?usecase=indicator&action=Map&indId=528>