

Municipal water service tariff structures for South African circumstances

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Goals vs feasibility of a water service tariff structure

- Goals – welfare of water users within municipalities
 - (- promote economic development within the municipal region)
- Feasibility – legal, socio-political, water availability and affordability

The SA Water Service Tariff Structure

- The municipal water service tariff structure defines what South African firms and consumers pay municipalities per cubic metre of potable water they purchase.
- It is a structure rather than a single rate
- It is a structure incorporating both inflow and outflow services
- In most urban settings the purchase of a cubic metre of potable water simultaneously gives rise to an equivalent demand for water outflow management

Two Examples – of water service tariff structures – 2009/10

- MBHASHE LM (Dutywa), Amathole DM
- NGQUSHWA LM (Peddie), Amathole DM

Use pot. Wat. per month (kl)	Availability - Mbhashe	Tariff use pot. Wat. Rand per kl	Tariff for sanitation Rand per kl	Water service tariff R/kl
0-6		R5.98	R3.97	R9.95 (should be 0)
7-10		R6.88 (+15%)	R4.21 (+6%)	R11.09
11-20		R8.13 (+18.2%)	R4.93 (+17.1%)	R13.06
21-50		R8.83 (+8.6%)	R7.33 (+48.7%)	R16.16
51-500		R9.28 (+5.1%)	R7.94 (+8.3%)	R17.22
501>		R8.63 (-7%)	R6.95 (-12.5%)	R15.58
NOTES	0 unless vacant site			75% of revenue from Equitable Share

Comments

- What informs the uneven steps (and differences in step between potable water and sanitation)?
- Why are users charged for first 6 kl/m?
- No availability charge in 2009/10 but was R62 in 2008/9.
- Use charge similar to NMBM

Use pot. Wat. per month (kl)	Availability - Ngqushwa	Tariff use pot. Wat. Rand per kl	Tariff for sanitation Rand per kl	Water service tariff R/kl
0-6		R8.41	R11.18	R19.59 (should be 0)
7-10		R9.06	R11.48	R20.54
11-20		R9.46	R11.93	R21.39
21-50		R10.46	R13.18	R23.64
51-500		R11.26	R13.98	R25.24
501>		R11.16	R13.73	R24.89
NOTES	Great Kei pays R27 capital charge -conservancy			75% of revenue from Equitable Share (25% own)

Comments

- High tariffs for water service users in poor areas
- Large differences in rates between the different Amathole LMs, e.g., initial rate is 97% higher in Ngqushwa than Mbashe
- For both cases the Amathole DM receives 75% of revenue from the treasury (Equitable Share fund)

What costs should be included in the tariffs?

What steps should the municipalities be following in setting them?

The 5 costs of the water services provided

- (1) Potable water production cost (TC/Q = Unit reference value)
 - Infrastructure cost per scheme
 - Treatment to potable standard
- (2) Distribution (reticulation) of water and collection of fees from users
- (3) Treatment (sanitation) and disposal of waste water
- (4) Alternative use for raw water (opportunity cost)
- (5) External Costs (environmental)

Costs not actually recovered (usually) – the last 2

- (4) Opportunity costs such as for the environment or agric
- (5) Net external costs = External costs – External benefits

- Water Transfer impacts
 - Dam impacts
 - Reduced functionality of water fed natural habitats
 - Waste disposal into rivers, dams, lakes and seas – again, undermining natural habitats
 - Spills + under-treatment of waste water
- MINUS
- New recreation opportunities
 - Electricity generating opportunities

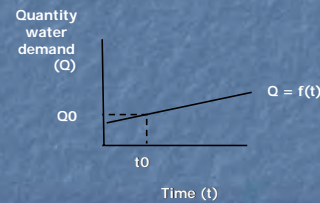
Five steps municipalities need to take in setting water service tariffs

- 1) Comply with law and national policy of the standards of water service provision
- 2) Forecasting water service demand
- 3) Selecting water source supply, treatment schemes, and plants
- 4) Calculating the total financial cost of water service provision and fixed and variable costs (theoretically including environmental but not opportunity costs)
- 5) Setting individual user tariffs, so as to meet the cost coverage constraint, the socio-political constraint and the short-run supply constraint (the latter is called demand management)

(1) Compliance with standards of provision – legal constraint

- The standards set play a major role in the cost of provision.
- (Given the municipal examples cited we may wonder if we really to look after poor communities by requiring that they too receive water services of the same standard as wealthy ones?)

(2) Water service demand forecasting

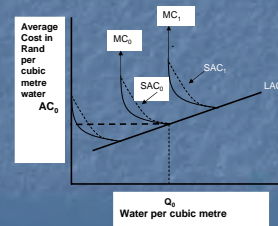


Forecasting demand up to time horizon t_0

(3) The investment in infrastructure decisions

- Economies of scale in choice of water supply scheme and with the associated declining marginal costs - short run marginal costs are lower than the short run average costs
- Lower cost infrastructure options (lower unit reference values) are exploited (chosen) before the higher cost ones
- The costs of treating water reinforce the increasing long-run trend because higher quality sources of water are selected for treatment before lower quality sources (the latter being more costly to treat)
- Sanitation of waste water features - economies of scale plus high external diseconomies

Choosing the investment/scale in supply infrastructure



(4) Adding other costs to the production cost

$TC = \text{potable water prod cost} + \text{waste treat cost} + \text{distribution cost}$

(distribution cost = reticulation + metering + management costs)

Fixed cost and Variable cost determination – an optional extra

Fixed costs are those of providing access to the potable water distribution network and to the sewerage/outflow management infrastructure. In many cases they may be the greater proportion (so identifying them is important).

Variable costs are for the use of potable water and outflow management capacity

Ideally the tariff structure should distinguish between the two

Increasing block tariffs for demand management and to tax luxury use

- Applied only to rich households - group A
- $T_A = v_1 T_{A1} + v_2 T_{A2}$
- Where T_{A1} is tariff for basic allocation of water (the min tariff) and T_{A2} is tariff for > permissible allocation of water, $T_{A1} < T_{A2}$
- $1 = v_1 + v_2 =$ proportions of total cost paid by group A for < and > permissible allocation of water

Tariff structure excluding availability (access) charge

- $TC/Q = w_A T_A + w_B T_B + w_C T_C$
- $= v_1 w_A T_{A1} + v_2 w_A T_{A2} + w_B T_{A1} + w_C T_C$
- $= (v_1 w_A + w_B) T_{A1} + v_2 w_A T_{A2}$
- Given that $T_B = 0$
- Firms and households pay T_{A1} for a defined quantity of water and households pay the premium tariff T_{A2} for the luxury extra quantity

The final constraint - affordability

- There must be sufficient community willingness (ability) to pay for the water service provided
- It is in this connection that there appears most naivety within the DWEA and government more generally of South Africa

What is missing in SA government thinking about municipal water service tariff structures

(1) Sufficient attention paid to the affordability constraint

- How are South Africa's poor municipalities (clubs) going to attract sufficient 'full paying members' to sustain the target standard of service provision? (The less such people there are, the greater the tariff needed to be imposed on these few and the greater their incentive to exit the municipality. There are limits to cross-subsidisation within municipalities.)

- How exactly is demand taken into account in water service tariff setting? Do municipalities know anything about the WTP for their water services? What efficiency rationale underlies the nature of water services they provide?

- Are the universal legal and policy constraints on standard of service appropriate?

(2) The accounting information underlies the determination of availability charges *vis a vu* use charges?

(My observation is that this setting is arbitrarily determined, miscalculated or ignored - see Mbashe example.)

(3) The rationale for increasing block tariffs

(Their only uncontroversial economic merit is as a tool of demand management - for drought situations - but they are being employed to address the socio-political constraint.)

(4) Planning on how to incorporate opportunity and external costs into tariff setting

The End

Thank you for attending

Comments/questions?