Promoting water efficiency measures through pricing

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Sustainable Dunedin Symposium. 5 September 2003

This presentation

- Water and wastewater services and their pricing
- Report research on Akaroa
- Outline new charges
- Comment on Dunedin’s systems

Water and Wastewater Services

- Large, costly network services
  - Capital invested big part of TLA assets
  - Annual costs big part of TLA budgets
  - Water ~34% of annual DCC expenditure ($14.4m)
  - Wastewater ~30% of annual DCC exp't ($12m)
- Diverse range of pricing systems used
  - Hurunui all users: Charge per m^3
  - Christchurch residents: Charge cents per $CV
- Can have major environmental effects
- Choice of pricing system matters

The Dunedin Networks

Dunedin water supply

- 900 km of pipelines, 57 reservoirs
- 43,000m^3/day delivered

Dunedin wastewater system

- 810 km of pipeline
- 73 pumping stations, 7 treatment stations

Funding Water & Wastewater Services

- TLA have Funding Principles, e.g. DCC
- Rates set prices for water and wastewater services
- If p = 0, likely that usage ⇑ until MB = 0, and ⇑ demand for capacity, ⇑ operating costs, ⇑ environmental impacts.

Akaroa Water and Wastewater

Research on tourist use of these services, using micro data where possible. (FRST funded)

- Characterise Akaroa's water and sewerage system
- Evaluate BPDC service charges
- Propose a new pricing scheme

The Situation in Akaroa

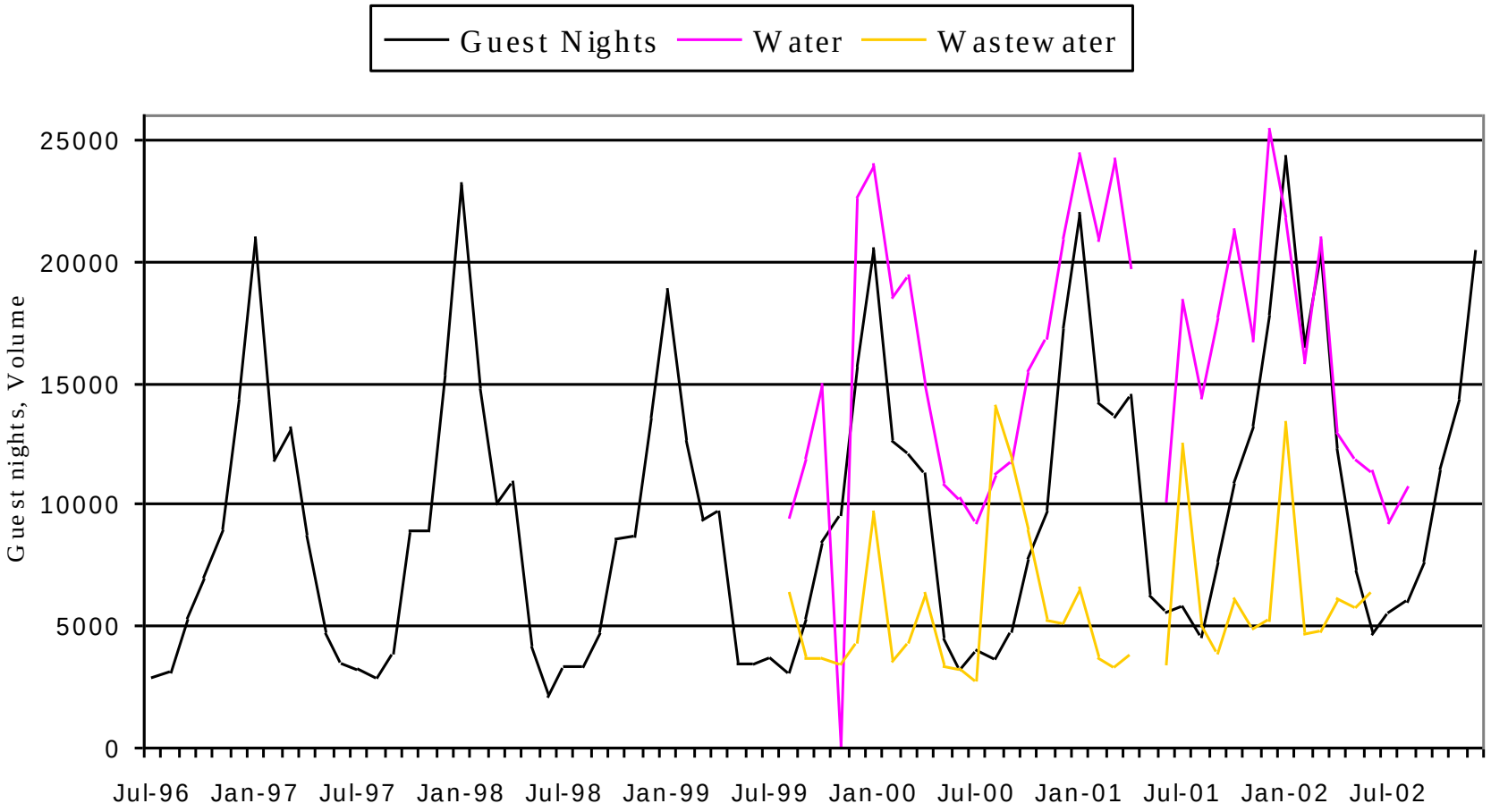
- Dry area
- Few permanent residents
- Holiday/daytrip destination
- Steep peak usage during summer

- Unsuccessful search for new springs
- Investment in a new dam costly - $3m?

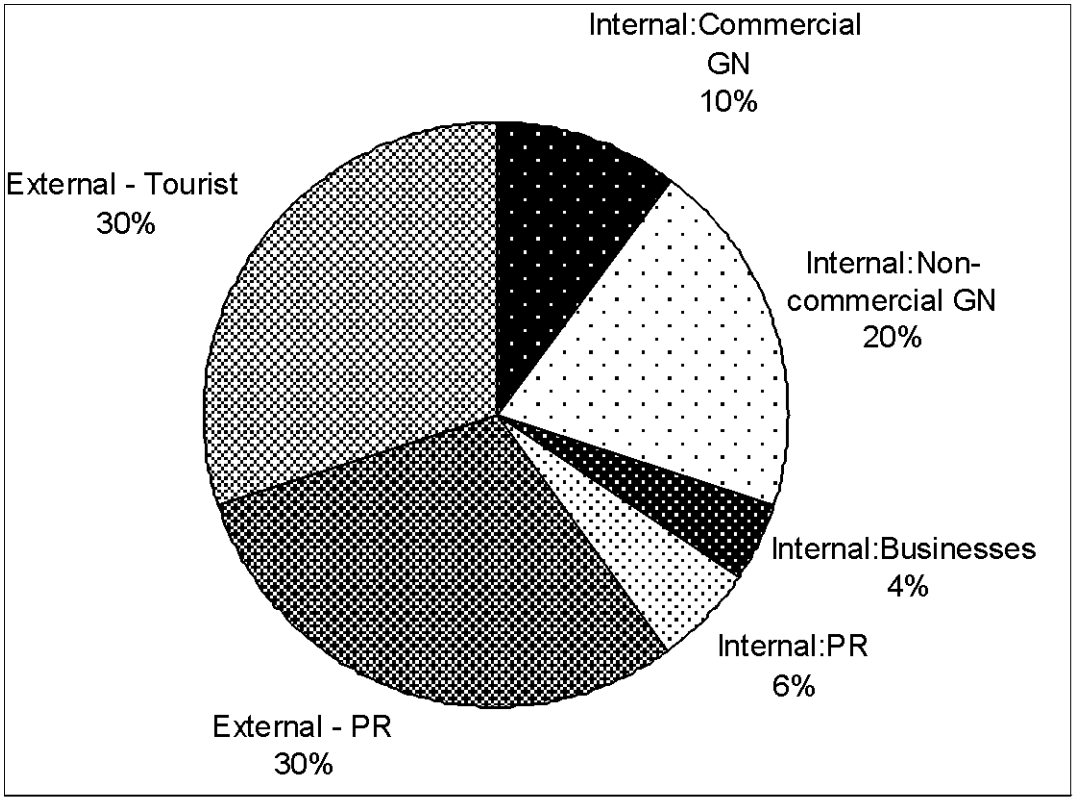
The Data Collection Process

- 3 four-day studies (Oct, Dec, Jan) including:
  - Water metering
  - Visitor counts at various points
  - Visitor and resident surveys
  - Accomodation surveys
- Management account data (yearly)
- Monthly water flows for 6 years
- Monthly visitor counts for 3 years

Tourism and Water/Wastewater Flow



Water Modelling Results (peak)



BPDC Rates and Charges

- Combination of UAC, infrastructure contributions and pan charges
- Excess water charges only apply above 300 cubic metres per year
- Essentially flat rate for residents, most businesses pay excess water charges

Current Share of Costs

	HH	RP	Com	Mo
Annual water, sewage, refuse rates paid	1.00 :	1.00 :	1.01 :	4.30
Annual water usage	1.00 :	5.7 :	3.7 :	32.5

Without the holiday homeowners	RP	Com	Mo
Annual water, sewage, refuse rates paid	1.00 :	1.01:	4.30
Annual water usage:	1.00 :	0.65 :	5.70

Hanemann Evaluation Criteria

- Revenue generation
  - Sufficient
  - Stable over time
  - Complexity and administrative costs
- Cost allocation
  - Non-arbitrary
  - No cross subsidiation
  - Include all private and social costs
- Provision of incentives
  - Statically efficient water use
  - Dynamically efficient water use
  - Encourage water conservation
  - Transparent water charges

Akaroa Charges Evaluated

Criteria		**Compliance**	**Justification**
Revenue generation			
	Sufficient	**Yes**	The collected rates cover all costs.
	Stable over time	**Yes**	Predictable and no significant changes with water use.
	Administration costs & complexity	Costs only	Essentially flat rate and little differentiation between users.
Cost allocation			
	Non-arbitrary	No	Due to big first block of water.
	No cross subsidisation	**No**	High water users are subsidised as well as certain groups of users.
Incentive provision			
	Static efficiency	No	Big first block of water, no seasonal peak charges.
	Dynamic efficiency	No	High water allowance sets no incentives to change long-run behaviour.
	Encourage conservation	**No**	The lack of differentiated water charges sets no incentives to engage in water conservation.
	Correct interpretation	Partially	Transparent system, but no recognition of right incentives.

Proposed New Charges

- Same scheme for all ratepayers
- Combined water and wastewater charging
  - Wastewater as percentage of water demand
- Combination of fixed and volumetric charges
- Seasonal variation in water blocks and charges
  - E.g.: block limits may decrease and/or charges increase over summer/peak period

Marginal Cost Pricing

- Economic efficiency arguments in favour of MCP
- Possibility of underfunding
  - Risks sufficiency criteria
- Difficulty of calculation
  - Adds high complexity and makes revenues unstable
- Complicated for customers to understand
  - Deters from water conservation incentives

➢ Use combination of tools to get close to MCP

One Charging Scheme

- Collapsing many charges into one scheme
- Important difference to service is the amount of water used
- All sectors are treated equally

Combining Water and Sewage

- Sewage is impractical to meter
- Evidence for correlation between the two m^3 in other communities
- Akaroa: high stormwater infiltration hinders correlation estimation

- Combination reduces administration and complexity

Fixed and Volumetric Charges

- Accounting for fixed and variable costs
- Block increases in price per cubic metre
  - E.g.: \$1.80/m³ for first 200m³, \$2/m³ for next 500m³, \$3/m³ for all subsequent m³
- High first fixed charge and lower but increasing subsequent fixed charges
  - E.g.: \$110 for first 200m³, +\$40 for next 500m³, +\$65 for all subsequent m³

Seasonal variation

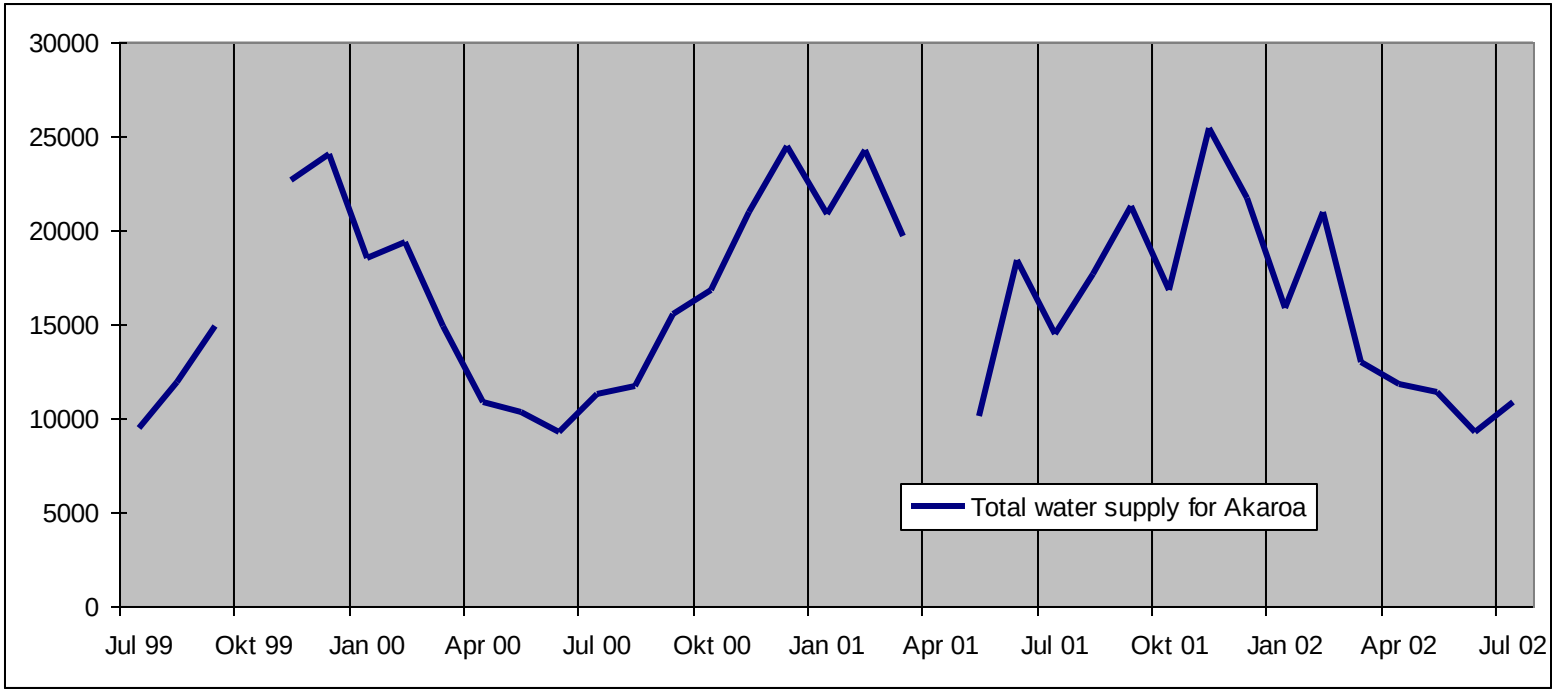
- Better reflection of monetary and environmental cost at the time of the year
- Peak use has high percentage of discretional use
- Effectiveness of peak pricing to reduce water demand

Number of Seasons

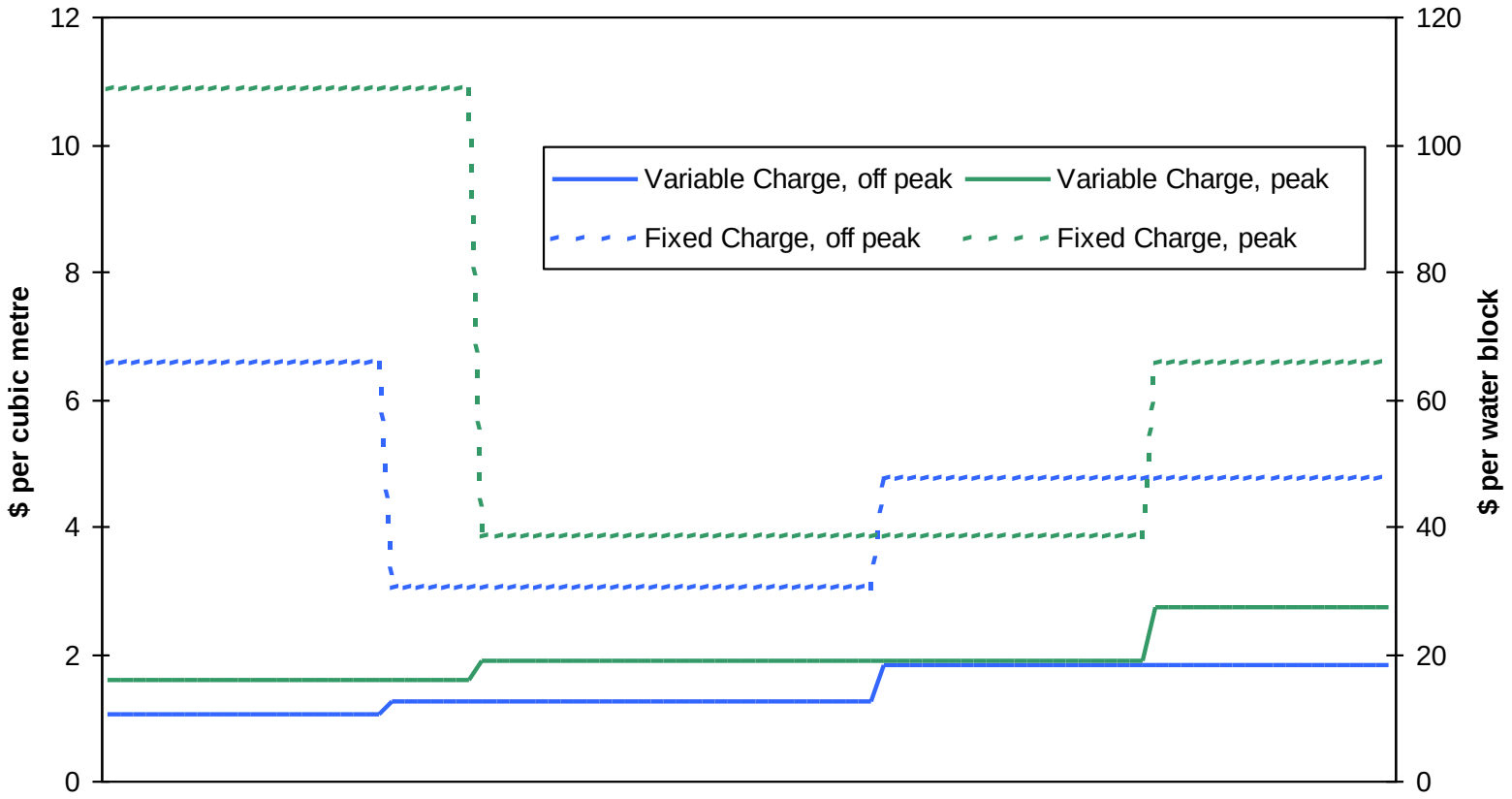
- Four seasons/three prices preferred
  - Reflects pressure on system better
  - Greater efficiency
  - Closer to marginal cost pricing
- Two seasons/two prices possible
  - Lower administration cost
  - Higher acceptance by community (?)

Determination of seasons

- Four seasons/three prices:
  - Jun/Jul/Aug/Sep – lowest, Oct/Nov – medium, Dec/Jan/Feb/Mar – highest, Apr/May – medium
- Two seasons/two prices:
  - Dec – Apr – high price, May – Nov – low price



Illustrative Charges



Results for Akaroa

- Winners and losers
  - Off peak
    - Tourism businesses pay less
    - Permanent residents and ‘dry’ commercial businesses pay slightly more
  - Peak
    - Tourism businesses pay considerably more
  - Holiday homeowners generally pay less

Implementation Issues

- More accurate data on water and wastewater use is needed for setting the actual water charges
  - For the individual connection
  - Over time/seasons
- Communicate changes within community
- Estimate demand changes

➢ Needs time for accurate implementation

  - Will customers adapt behaviour before final implementation?

Pricing, Before and After

- 5 fixed charges, differing pan charges, 1 CV-based charge, excess water charge
- Cross-subsidiation

- Set of fixed charges and set of volumetric charges for chosen number of seasons
- User-pays principle, no discrimination

What about Dunedin?

Do its **rating systems** for water and wastewater services **contribute to sustainability goals**?

Could they be improved?

Dunedin water & drainage rates

	Water	Drainage
Residential (connected)	$299 / property + fire protection water rate 0.1427c/$ CV	$181.50 / property
Non-Residential (connected)	$299 / property + fire protection water rate 0.1427c / $ CV, 70.6c/ 68.2c/54.4c m3	$181.50 / property + 0.37c/$ LV + 0.092c/$ CV

Dunedin pricing, comment…

- No incentive for residential users to reduce water use, or use of the wastewater system.
- Non-residents declining $/ m^3 of water hence decreasing incentive to reduce water usage.
- Non-residential properties have no price incentive to reduce volumetric use of wastewater system.

Changes in Dunedin pricing?

- DCC is **aware of lack of incentives** to conserve water, and use of the wastewater system, see LTCCP, s.5.
- **Meters are necessary** to introduce water charges/m^3.
  - Meters cost ≅ $300/property, last about 20 years.
  - Annual costs of 4x/year meter reading, $5.00 -$6.00.
- **Wastewater usage** can be charged by a **proxy** - m^3 of water used.
- Use **seasonal prices** to encourage conservation in summer.

Do prices reduce water use?

- Price elasticity of demand for water is < 1.0
- Water usage falls by 15+% with water charges/m^3
- Price elasticity is greatest during peak use periods, as more water use is discretionary
- Water meters & charges assist identification of leakages
- Water meters installed in Akaroa, December 2002
  - Water use over summer peak period 40% less than in 2001/02

Sustainability and Three Goals of Rating Systems

- TLA are concerned about revenue stability
  - Two part pricing to ensure that revenue does not fluctuate unacceptably with changes in water usage

- Fixed charge plus volumetric charges as solution
  - Sufficient revenue is collected
  - Costs are more accurately allocated
  - Incentives are provided to conserve water and reduce use of wastewater system

Rating systems and Sustainability

- Reduced water use means
  - less demand for infrastucture
  - lower operating costs
  - less pressure on the water sources

- Achievements are useful contributions towards
  - economic,
  - social and
  - environmental sustainability objectives.

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