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Attitudes and Water Scarcity

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Water is a unique resource in that not only is it essential for the survival of all species, it is central to any form of economic and social development. In agriculture and industry water is a raw material required for the production process. According to the World Commission on Environment and Development, 80 countries with 40% of the world population suffer from serious water shortages.

Water is not a renewable resource. Renewable resources can reproduce themselves – water cannot. However, it is not a wasting asset, either. Water is recycled by means of the hydrological cycle, which is an ecosystem service – a life-support system for all living things.

Increasing scarcity of water is now a well – recognised problem. However, scarcity is generally defined purely in physical terms e.g. cubic metres per capita or litres per person per day (lpp/pd). This limits the opportunities for social, economic and environmental adaptations. The growing scarcity, misuse and existing (mis)management of available water resources will pose serious problems to its sustainable use.

Good natural resource management depends on the requirement that users pay the true cost of services. Correct pricing is the key to developing water and wastewater infrastructure. There would appear to be some evidence that when water is subsidised, it tends to be wasted.[1]

How people perceive and manage water is determined by cultural traditions and societal values. Water is acknowledged as being precious but the fact that it has an irreplaceable value remains unacknowledged - it is undervalued. Consequently, solely using the price mechanism will not develop a culture of water preservation. There is an urgent need to educate society to a new attitude to water. Drought is not just about scarcity – it is also about society's relationship with water.

Australia, five years into a drought, tap water costs twenty times more than that for irrigation[2]. Appropriate pricing will have consequent effect on food prices. Average usage by urban Australians is 300lpp/pd as against 150lpp/pd in Europe. Singapore expects to reduce usage to 155lpp/pd by 2012.

[1] Water, an Essential Element for Life – contribution to the 4th World Water Forum in Mexico City, March 2006

[2] Rijsberman,F – quoted by James Grube, Reuters News Agency, 16 August 2006

Water is charged in the Thames area at about £0.95 per m³ compared to about £0.50 per litre for bottled water. Bottled water is a £4bn industry and still growing. There is, *prima facie,* a willingness to pay (?).

Public Perception

A recent survey [3], in the UK, found that 75% of respondents have looked at ways of reducing their consumption and 33% would be prepared to obtain all their water from standpipes in times of drought. Interestingly, 51% were motivated to reduce consumption for environmental rather than financial reasons. Over 75% believe that having a water meter in their home would change their behaviour and 82% would take action to limit consumption if prices doubled. However, over half the respondents admitted to being unaware of their household consumption. Appeals to save water, in the summer of 2006, resulted in a 10% decrease in consumption [4]. Households want to use water efficiently.

Public opinion would appear to be ready for private action to be reinforced by information and effective technology.

Attitude to Technology

Water reuse and greywater recycling has generated much interest in recent years. The treatment and reuse of domestic grey water and industrial process water has been promoted. However, the treatment processes involved needs to be proved to be technically and economically viable.

Desalination is a technology that appears to have considerable attraction. However this comes at a cost. In 2002, about 1% of global usage, equating to 14 million m³ per day, came from desalination plants at an energy cost of 6Kw per m³. The cheapest desalination technology produces water at a cost of about US$1 per cubic metre.

In late 2005, the first desalination plant was commissioned in Singapore. This produced water @ £0.30/m³ as against £0.12/m³ for reclaimed water. The Singapore Government continues to invest considerable sums of money to educate and promote the use of recycled water for both potable and non – potable purposes.

In Sydney, Australia, a capital cost comparison showed desalination costs at £1bn as against £1.5bn for recycled water. Operation costs were also lower at £62.5m/p.a as against £70m/p.a. It should be recognised that Australia has access to plenty of cheap coal.

There is considerable divergence of views regarding recycled water – South Australia Water considers "recycled water is high risk water" whilst Brisbane considers this to be the future.

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[3] "Water Efficiency –Public Opinion, Private Action". A survey of 1000 consumers by LogicaCMG, 5 October 2006. Full report – www.logicacmg.com/uk/waterefficiency

[4] Jacob Tomkins, Director, Waterwise (UK NGO).

In Australia, over 95% would consider recycled wastewater for toilet flushing, watering public parks and golf courses. Acceptance of using recycled water for irrigating dairy pastures and fruit and vegetables was 85%.

Public perception is such that reuse is acceptable practice. However, it was noted that 75% of those surveyed refused recycled water for drinking purposes [5].

This is a problem, since the major cost of water supply is distribution, not treatment. The cost of building a dual reticulation network makes most recycling schemes financially unviable, unless there are major water users close to the treatment plant.

Governmental Action

In the Gold Coast of Australia, a major initiative was launched in 2003, to provide incentives for residential consumers to purchase and install water saving devices e.g. water efficient shower rose, dual flush toilets, garden products, rainwater tanks. It has been estimated that an efficient shower rose can save 18kl per year. Rebates costing A$1mn were provided to 9,000 residents, over a 9 – month period and are estimated to have saved 160,000kl per year. All new builds are expected to provide Rainwater tanks and Recycled water for toilet and garden irrigation use.

In SE Australia, incentives for using recycled water include pegging the price to the lowest of a 3 – tier charging system. Incentives for households include exchange of shower heads, changing top loading washing machines, purchasing and installing rainwater tanks (up to A$1,000 for a 5,000 litre tank connected to toilet and laundry). It is assumed that tanks can save up to 40,000 litres per household per year. All "new builds" are expected to have dual reticulation as well as rainwater tanks.
Australia estimates that the cost of retro – fitting is 4 times that of a "new build". Cost estimates for reclaimed water are up to 15 times whilst that for storm water is 6 times as much as potable. Water pricing for most recycling projects to date has been driven by the perceived need to provide incentives for potential customers by pricing below the cost of drinking water - a considerable subsidy. So whilst there is widespread acceptance of the principle of recycling there is not a corresponding willingness to pay.

In Singapore, NEWater (reclaimed water) is expected to provide 15% of total water demand by 2011. Used, mainly, for non – potable purposes, it is blended with reservoir water, treated and then supplied to the public for drinking purposes. The present addition of 1% of total daily consumption is expected to rise to 2.5% by 2011.

The domestic tariff is two – tiered. The second tier costs 20% more than the first with a 50% increase on the Water Conservation Tax rate. In the 10 years to 2005, whilst average consumption declined by 11%, the water bill more than doubled.

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[5] Commonwealth Scientific and Industrial Research Organisation, Australia (C SIRO) - 3 – year survey "Behaviour in Relation to Waste Water Reuse" (2005)

The domestic tariff for consumption up to 40m³ is the same as the non – domestic tariff. Hence there are no subsidies from the commercial sector to the domestic user. There is no "lifeline" tariff for the poor, either. Instead, they receive targeted rebates and financial assistance.

It is tempting to suggest that all "new builds" in the UK should have provision for the use of recycled water – "on-site" at household scale or delivery through piped network. However, whilst recycling leads to sustainability, costs and energy consumption has to be put into the equation. There is also the psychological barrier to drinking recycled water.

Low water consumption equipment e.g. showerheads, taps, dual flush toilets, could be made mandatory for new builds. Bathrooms with only showers are an obvious answer, however, this requires change in attitudes. In Australia it was found that people simply took longer showers! This goes to show that technology, on its own, is not enough.

In the UK survey, mentioned earlier, by Logica, 69% of respondents would change their behaviour if the Government conducted a campaign to raise awareness. Education, carried out through transparency of charging, explaining usage e.g. a standard garden sprinkler uses 600litres/hour, leaving water on whilst brushing teeth uses 3litres/minute, graphs on individual bills showing usage against the average, should increase public awareness.

Conclusion

Escalating population and economic activity will put ever - increasing strain on water resources. Irrigation is and continues to be the largest sector of water consumption. Industry is increasing its demand for water as input for production, backing its claim by producing higher economic returns. Population growth is also creating mounting demand. Under the circumstances assessment and control of demand becomes paramount.

The issues of water loss reduction, sustainability of source and supply, and cost – effectiveness of systems operation have always been problematical for network operations. In recent years water loss management has emerged as an integral task for Operation and Management programmes. Despite significant advances in technology, water supply systems continue to have high levels of water losses.

Water re-use is of fundamental importance to the environment and economy. Reuse links the hydrological cycle and can result in an increase in the water volume. Environmental benefits include reduction of wastewater discharge, dependency on surface supplies and assurance of supply. However, energy requirements need to be taken into account. [6]

Customarily, engineers and planners have sought to provide for ever - increasing demands in water supply. Technical efficiency is only one aspect of the solution, enhancing the efficiency of distribution is another factor [7]. However, there is now a realisation that water is a limited resource, difficult to access and an expensive commodity.

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[6] Rijsberman,F (2004) – *The Water Challenge*. Copenhagen Consensus Centre, Environmental Assessment Institute, headed by Bjoren Lomborg.

[7] "Water Resources are much higher problem than Climate change…it is a supposition of the future" Peter Brabeck-Letmathe, CEO, Nestle, in Davos 27 January 2007.

Attention, therefore, should be shifted from managing the supply to reducing the need for increased supply. Demand management, instead of the current supply – orientated system, should become the determining factor in most water supply schemes as well as for water conservation.
"EU countries are going to have to radically change their water management policies if they are going to reach the standards set in the new EU water law," said Andreas Wurzer, head of WWF's European Freshwater Programme. "Our findings show that countries are doing the bare minimum to comply with the Directive because of a lack of capacity or political will. We need a change of attitude so that countries realize the value of water."

Water is not only a natural resource that should be managed it is also an economic commodity that should be optimised. It is also a human entitlement that has to be fulfilled.

Generally, whilst there is growing appreciation that water is precious, psychologically it is still seen as a low – cost resource and viewed as limitless. Demand management strategies call for behavioural change - changes in lifestyle and perception. Since most schemes are voluntary consumer awareness is paramount.

Water, in all its competing uses, has an economic value. It is suggested that changing the approach from "ability to pay" to charging according to "what it is worth", (allowing for full development and delivery costs) will encourage sustainable patterns of water use and generate the necessary resources to expand services. Boston (USA) saw demand drop by 30% when prices were increased. It is important to signal value so that waste hurts.

Water has become a key political issue as climate change [7] and loss of wetlands reduce supply. It is now generally accepted that water must be used more efficiently and must be made available to the environment in sufficient quantity for natural systems to function [8].

The political issue is to balance conservation incentives against the needs of those unable to pay "what it is worth".

Institute, headed by Bjoren Lomborg.

[7] "Water Resources are much higher problem than Climate change…it is a supposition of the future" Peter Brabeck-Letmathe, CEO, Nestle, in Davos 27 January 2007.

[8] Water Crises in Rich Countries – WWF Report, August 2006