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# Tackling Water Scarcity - Water Trading Concepts and Possibilities



## The Problem

Concern over water scarcity is not a new topic but only in the last 3 or 4 years has it begun to receive mainstream public and media attention in the way climate change did 10 or 15 years ago.

Water scarcity is being driven by two converging phenomena: growing freshwater use and depletion of usable freshwater resources. Global demand for water used for domestic, agricultural, industrial and energy purposes is reported to have increased by 300% in the last 50 years[1]. Much of the new demand arises from food production[2] with the World Bank estimating that demand for food is likely to rise by 50% by 2030. Larger populations need more food, and more affluent societies are developing greater meat eating habits which use more water. Agricultural crop needs for water are also increasing with the growth of biofuels crops.

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This growing need for water has been matched by depleting freshwater water resources across the world, in particular groundwater on which many countries rely for their food irrigation. Climate change is disrupting precipitation patterns which make rainfall less predictable and more prone to extreme weather where water cannot easily be captured for use. Water pollution also affects available resources.

The impacts of water scarcity can obviously mean falling productivity for agriculture (and rising food prices) but also interruption for big business. For example a US power generator had to temporarily stop power production at some plants in 2008 due to drought causing low water levels.


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[1] There was a global rise of 83% from 2005 to 2008 – Alex Evans in "Rising Food Prices – Drivers and Implications for Development", Chatham House Briefing Paper - April 2008.

[2] 70% of freshwater withdrawal is used for irrigated agriculture - The United Nations World Water Development Report 3 – 2009.

In addition to affecting lives and business operations, there are fears that water scarcity will lead more often to security concerns within or between countries, and even trigger armed conflict. Such concerns are not new and often revolve around treaties used to determine the usage of water from cross-border rivers. Egypt has an age old dispute with its neighbours about how the waters of the River Nile are used, with Egypt currently refusing to sign a new treaty which would allow neighbours greater use rights. A recent US Senate Committee Report notes tensions in Pakistan and India over the potential for depletion of waters in Kashmir controlled under the Indus Treaty, with Pakistan in particular claiming that Indian infrastructure projects such as hydroelectric dams could threaten its access to water.

## Increasing Supply and Reducing Demand

The extension and improvement of water infrastructure is a traditional way of increasing water supply. Reservoirs are built to catch an increasing share of rainfall, rivers are dammed to capture more of the flow; ancient pipework infrastructure is modernised to reduce leakage. Desalination projects in many countries aim to create new sources of water[3]. However, the expense of these projects, their effects on neighbours (as in the examples mentioned above) and the impacts of climate change will mean that these methods are unlikely to be sufficient in themselves to address water scarcity.

Matching supply and demand will therefore require more effort to be made on the demand side. Already, there are a wide array of techniques to reduce demand by domestic and commercial customers. These include, for example, applying water–saving technology in irrigation projects (e.g. drip irrigation) or in a domestic context, placing technical requirements for design of water-using appliances. The European Commission is currently considering how building standards can be introduced to ensure buildings become more water efficient.

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One of the major issues identified in hampering the efficient use of water is the artificially low price of water. Whilst, with metering, customers often pay for the actual amount of water they use, this tends not to include the full external costs of water supply. For example, major national infrastructure costs of creating dams and pipelines or the ecological cost of extraction are often not factored into the cost of water. This acts as a disincentive for water users to be efficient in their use.

## Water Trading – the Australian System

Increased interest is now being shown in water trading systems as a way of potentially increasing the efficient use of water in a scarce water environment. They can also help allocate resources between competing demands[4].

Essentially water trading is a structure for buying and selling entitlements to use water. The philosophy behind it, like in any market, is that water will be allocated to the person who can make the most economically productive use of the water and is therefore willing to pay more for it. From an irrigation perspective, for example, this should lead to more efficient food production as water use is applied to higher value food products.

One of the most developed water trading systems is in Australia which has been in existence and developing for around 20 years but is still being implemented[5]. We set out below a brief description of how the system operates.

In basic terms, in order to establish a water trading market, rights to use water ("water rights") need to be separated from the rights to land (e.g. riparian rights where the owner of land is entitled to the water flowing through it). In Australia, this

[3] As at the end of 2010, China was reported as having 57 desalination projects completed or in progress.

[4] This could be competition between different uses, e.g. between crops and energy use (an example is Alberta's proposed Oil Sands extraction schemes which would compete for water with local agriculture); or between different crops e.g. where crops are grown for food or for biofuel purposes.

[5] Other developed trading systems are in place in the some US states, South Africa, Chile and Mexico.

has been done by abolishing so-called "riparian" rights and transferring them into tradeable water entitlements[6]. A cap is placed on additional water extraction and water users are then required to purchase water entitlements from other users who do not need their full entitlement. The trade can be of permanent entitlements or temporary duration rights (called allocations).

An entitlement will comprise a right to extract a defined percentage of available water volumes per year. Carryover rights will allow limited banking of rights to the following "water year". Unlike a carbon allowance, however, a water right may only give a right to access water where it is available (i.e. if a river has sufficient flow) and therefore rights are classified as to the source's reliability.

In theory, city dwellers in one region could buy water entitlements from an owner in another region. However, the need to physically transfer the water has so far been a barrier to this type of trade. The expense of transferring water through pipelines or tankers means that trading occurs mainly within areas that are hydrologically linked, such as the Murray-Darling Basin in Australia (MDB)[7].

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There is no one water exchange, and the market functions through private trades, using brokers, water exchanges or even message boards. Each state has its own water trading rules.

Increasing focus is being placed on enhancing the sustainability of water resources alongside the trading structures. For example a regulatory basin management plan will soon be put in place for the MDB which will provide for integrated management of water resources including ensuring quality and quantity of water (including environmental sustainability limits on extraction). In addition, the Federal government and State governments purchase entitlements to increase water flows for environmental sustainability reasons.

## Widening of Water Trading

Is water trading going to expand on an international scale? Although interest in water trading concepts is increasing, there are significant barriers for an internationalisation of water trading. Looking at the Australian experience, the Australian market has reportedly increased to around AU$3 billion by 2010. It appears that water trading in the MDB has provided significant economic benefits to the local region and also provided irrigators with a greater security of supply and ability to deal with drought conditions[8].

However barriers to trade and expansion of markets have included:

- The high cost of water transfer (e.g. through pipelines or tanker). This will limit the ability to trade water beyond hydrological boundaries. Australia is however seeing development of a wider inter-state water grid which is expected to make the market more robust.
- The variety of trading rules: Each state is allowed to apply its own trading rules. This has led for example to the imposition of controversial caps on trading outside irrigation districts[9]. Such caps were ostensibly for water security purposes but commentators complain that this unduly restricts trading and growth of the market.
- The complexity and bureaucracy of the trading system – most trades need the approval of a trade approval authority.

[6] This process of "unbundling" still continues in various states.

[7] So for example an extraction from one end of an aquifer can be traded for an extraction at the other end. The Murray-Darling Basin in Australia, extends over 3 states and receives 90% of the region's water. This area has seen 70-80% of Australia's total water trades ("Regulating the Australian Water Market", Vicki Waye and Christina Son, 2010, Journal of Environmental Law).

[8] National Water Commission - Australian Water Markets Report 2008–2009.

[9] E.g. 4% in Victoria.

- The rights being traded relate only to a percentage of available water rather than an actual volume. This makes water and water rights a potentially problematic type of commodity to trade more widely (and very different from carbon which is the same no matter where it is emitted).

Whilst water trading is on the agenda at an international level[10], these issues make it unlikely that wide-spread physical water trading systems would ever be established on more than a national level and are likely to be based on schemes controlling defined water catchment areas. However, it seems probable that more national and regional schemes will be adopted over time[11]. These schemes will need to be able to adapt to changing weather patterns as well as changes to how we use water.

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## Other Solutions?

Other possible solutions on the table include international "virtual water trading". Virtual water use refers to the concept that water is not only used directly in products and services but is also imbedded in any product that is manufactured, imported or exported (throughout the supply chain). The idea of a national "water footprint" could therefore be used to create a global system of virtual water trading. A nation's footprint would be the volume of water used in the country added to the net import of virtual water to that country[12].

A proposal for an international system of virtual water trading would operate by nation states being issued permits based on a "reasonable share" of the world's water resources linked to their water footprint[13]. Such permits could be traded on the basis of an international protocol such as the Kyoto Protocol on carbon emissions. There are immense political and sovereignty issues involved in establishing such a system, in particular over the question of "how much water should a state be entitled to?". A suggested alternative to the "reasonable share" approach could be reduction targets based on the water-footprint in a specified reference year or period[14]. This reduction target approach has even greater resemblance to the Kyoto Protocol (with its historical business model premise) and is possibly more likely to lead to a workable international agreement as a result. Whilst these ideas are being increasingly discussed, it looks unlikely that we will see an international agreement on a global water market in the near future.

Other suggested possibilities are:

- A more formal and universal approach to water pricing. This would ensure that consumers (domestic, agricultural and industrial) are made to bear the full costs of the water they consume including external costs, e.g. for environmental degradation (i.e. a form of "polluter pays" approach). Such costs would also deal with any distortions caused by subsidies, for example subsidies to agricultural businesses which contribute to low value crops being grown in areas with significant water scarcity. It has been suggested that an international

[10] See for example the United Nations World Water Development Report 3 – 2009.

[11] In the UK, for example 4 differing proposals for a formal water trading system are being considered.

[12] This concept is explained in more detail on the Water Footprint Organisation's website www.waterfootprint.org.

[13] World Trading Organization working paper "The relation between international trade and freshwater scarcity" Arjen Y. Hoekstra (January 2010).

[14] Ibid.

protocol in the UN sphere be put in place to achieve this[15]. Water pricing has its own political difficulties given the position of water as a basic human need and the challenge of how to design a pricing approach for areas affected by poverty.

- A water labelling system (similar to the energy efficiency labelling systems seen on electrical products in the EU) to improve transparency of water impacts on products and services.

## Conclusions

Like climate change, water scarcity is emerging as one of the most significant global challenges of our age. The challenges of addressing water scarcity at an international level are significant both technically and politically. Similarly to climate action, a plethora of approaches will no doubt need to be implemented: from increased infrastructure, to water efficiency policies, through to possible international pricing and trading initiatives (although these international projects will be a longer term vision). Regulation of water use will almost certainly increase in the future, along with more in depth scrutiny by stakeholders and NGOs on corporate water use.

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Businesses in the agricultural, energy and industrial sectors can all be heavy users of water. As such they will be subject to new regulatory schemes as they develop over time. They will have much to contribute in the debate to help design approaches that are both sustainable and equitable, but that also help to future-proof their own businesses. A good first step on the road to future-proofing will be to consider carrying out a complete corporate water footprint analysis to see how much a business relies on water throughout its operations and supply chain. This will assist in identifying and planning for an increasingly water-constrained world.

[15] Ibid.

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