The role of Property and the influence of Institutions on the Efficiency of the Allocation of Water in South Africa

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Abstract

Historic supply management (massive dam and water transfer projects) and low priced irrigation water (100% Government subsidies to water delivery projects) has led to over use of water in agriculture, spiralling land prices, environmental degradation and political tension (both civil and international).The recently published National Water Policy for South Africa, designed to alleviate some of these problems, shows several defficiencies in principles and policy measures. It is clear that the proposed water licenses are insecure; this will not induce efficient water allocation nor will it enable effective participation of water users in water management. Short run licenses encourage over use of water. Continued demands by farmers (and forestry) for low-priced water and demands by the majority indigenous population for greater access to water are leading to increased water conflicts. Trading of Water Use Rights among farmers in the Crocodile River Catchment of Mpumulanga Province, in the early 1990s has led to more efficient use of water. It has also led to the shelving of plans for the construction of a new dam. In practice, trading has been a substitute for dam building. Trading has been limited by law to farmers, however it could be expanded to include all industries and municipalities, this can only happen with stronger entitlements and removal of barriers to trade.

Background water history

In 1652, the Dutch established a colony in South Africa. They introduced the concept of State Control over water from the Roman-Dutch law in 1655, after merchantmen became ill after drinking impure water from the streams of the Table Valley. At that time all land was owned by the Dutch East India Company.

After the occupation by the British of the Cape in 1806, English law was established and operated by magistrates. Freehold individual land rights were granted by 1821 that included riparian rights over water, a well-acknowledged concept in the English Common law . Over time the new system entirely superseded the old one.

Soon it was found that the riparian system had its problems. The conditions in South Africa were unlike England, especially for inland flood rivers with little stable flow on a dependable basis and large floods after storms. The problem with the riparian principle was that it operated on a basis of a proportional share in the water by the riparian landowner. However, trying to apportion a fast-flowing but irregular volume

of water on a proportional basis was very difficult, and new legisaltion followed soon after.

Representative government came into existence in South Africa for the first time in 1854, when the Cape colony elected a parliament consisting of two houses. The first Select Committee on irrigation sat in 1858 and considered irrigation projects on the Olifant's River, in the west of South Africa. Bills dealing with irrigation came before Parliament in 1861, 1863, 1866 and 1874 but none became law. Legislation was first promulgated in the Right to Passage of Water Act in Cape Region in 1876. The 1882 Act was comprehensive, defining priorities of water use. This Act remained unrepealed until the codification of the irrigation law of the Cape Colony in 1906 when the majority of its provisions were incorporated into that statute and ultimately formed the basis of water law until 1956.

The 1912 Water and Irrigation Act accepted the riparian system as the going mechanism for regulating water use, and introduced a distinction between normal flow and surplus water (normal flow was defined as water available on such a basis of dependability that it could be used for irrigation without the need for storage, while surplus water constituted all other water). In other words, normal flow simply denoted what statistically, was the apportionable portion of water.

From 1912, the riparian system was applied with the intention that disputes over apportionable flow had to be adjudicated by water courts. This was the position until South Africa underwent its own industrial revolution in the late 1930s. It was then realised that a regulatory mechanism for the agricultural sector alone was no longer adequate and that it had to be extended to other water user sectors. Also, at this time, considerable interest was given to analysis of the system of water use and rights in the Western United States, where water conditions were similar to that of South Africa. Several amendments to the 1912 Act occurred.

After a Commission of Enquiry in the early 1950s, the Water Act of 1956 was promulgated. This Act provided for a much greater participation of the government in constructing large-scale water works. Water pollution had become a problem and extensive powers were vested in the State.

1956 Act made provision for a new type of government water control area, in addition to the irrigation schemes established in the 1912 Act. Where it was considered in the public interest, the Minister of Water Affairs could declare a government water control area (WCA) in which he assumed full powers of control and apportionment of water in that area. This control was designed to resolve disputes among riparian owners. As the pressure on available water became greater, apportionment had to be refined with the result that it became extremely expensive for individuals. One of the objects of introducing WCAs was to pass on this financial burden to the State. As demand has continued to increase, apportionment of water has become increasingly expensive, even for the State. **One key aspect of the 1956 Act was that exchange of water use rights by farmers was forbidden**.

However, in 1989 the Minister of Water Affairs allowed water to be exchanged, subject to reporting and lodging all trades with the Irrigation Boards. Some boards encouraged trade and by 1993 trade was prevalent on these rivers. Drought conditions

from 1992 onwards leant urgency to trades. However, the New Constitution (1996) and Water White Paper (1997) furthers the role of the State in control over water, and will restrict trading.

Water Use and Efficiency

In 1995, available water resources were used as follows: public water supply 12%, Industry 7.5%, mining 2.75%, electricity generation 2.25%, forestry 7.5%, stock watering 1.5% and agriculture (mainly irrigation) 51%. The remaining 15.5% was returned to maintain flows in rivers (this includes supplies "used" in nature conservation) (Robbins, 1995, p.11).

Agriculture uses the most water, and hence policies to improve the water use efficiency of this sector are more important than improvements in all the other sectors combined.

South Africa is a water stressed country (just above 1000 cubic metres per person). Only 750 cubic metres are utilizable with current technology of which 86% are currently used. Of this significant amounts are exported as 'virtual water' in the form of cereal and fruit crop exports. From an hydrological and agricultural standpoint this makes little sense. The better soils and higher rainfall zones are in countries such as Zambia and southern Tanzania, far further north than South Africa. However, there is little agricultural production in these locations. Therefore, a key future problem for South Africa is to produce more food with less water than it currently is doing.

Control and Ownership of Water

Well designed water institutions (rules under which decisions of allocation are made) can promote order and relative certainty, and improve water use.

As mentioned before, 'ownership' of water has changed hands from the Dutch East India Company to the British government to individual land owners. For the last two hundred years water has been owned by the state but used individually by farmers, subject to proportional communal use with other users along the river. At present the status of ownership is in limbo as the National Water Bill 1998 has not yet been approved. This Bill will probably remove the riparian principle (rights to use water proportionately belong to all landowners whose land abuts a river of other waterway). The most likely change in ownership is for the government to allow individuals (as well as trusts, companies etc.) to purchase (or for some be given) licenses to use water. The licenses will run for between 5 and 40 years. The licenses will probably not be transferable, and this restriction will prove the most problematic of all the changes. Also, the new constitution specifically states that "no provision may impede the state from taking legislative and other measures to achieve land, water and related reform".

The implications of insecure water rights are manifold. The most important is the lack of future investment likely in agriculture, because as an old saying in South Africa has it: "when you buy land for farming you buy it for the water".

Secure water rights lead to:

1. investment incentives
2. improvement of water use efficiencies
3. consent to any reallocation
4. compensation for any transfer (including expropriation in the public interest).

Water Markets

There are several key issues which I do not have the time to touch upon here in any details, such as new intial allocation problems and compensation (or probably no compensation) for existing rights. My research has been an analysis of the impacts of allowing water to be able to move to its highest valued use within the farming community (i.e. water use rights trading amongst farmers).

The problem of water scarcity is essentially one of conflict between different uses and users in or between catchment areas. Trading of water use rights between users can turn conflict into competition. One of the advantages of allowing water users to trade water rights is that trades, such as on the Crocodile River Catchment reveal the preferences of many of the farmers. It is found that the net present value of trades is approximately three to four fold greater than the price paid in water rates by farmers. Thus effectively demonstrating to the officials that water had been significantly underpriced. In fact, this should not have been necessary as water tariffs covered only about 70% of the operating costs and none of the capital costs and hence were obviously too low.

The gains from these trades has been estimated at between $2m and $12m. Furthermore, water use has changed relatively little from these trades, as for example, farmers are still growing citrus, sugar and bananas. The water is now being used by more profitable farmers, with better irrigation techniques. It is therefore safe to assume that there has not been an increase in abstraction or pollution from these trades.

Given the evidence from other semi-arid regions where trading has been broadly enacted such as Chile it is worth contemplating whether such a move is possible in South Africa. Non-agricultural users currently pay over ten-fold (in some cases 100*) more for their water than do farmers, and hence about three-fold more than the trade price. It is therefore obvious that efficiency gains would be forthcoming if trade were expanded to include other sectors of the economy - as has been the case in Chile (although environmental problems would have to be better understood before a wider market developed).

Perhaps the most beneficial aspect of water use rights trading has been the impact on infrastructure development. The agricultural sector has demanded since 1991 that a new water transfer system be established in the CRC. Since the trading began, demands have subsided, as efficiency has increased. Indeed it is for this reason that Government officials at the Water Research Commission are seriously looking at water trading. It may be a substitute for expensive, and often environmentally damaging dam building.

Furthermore a significant water dispute is occurring between Mozambique and South Africa over water reaching Maputo, its capital. The Crocodile River is one of the key rivers that flow to Maputo. Trading would increase flows to Maputo.

Conclusion

The probability of water trading being further encouraged is slight. Control of water is likely to be centralised, and according to the head of the WRC, trading on the Orange river (the only other area of significant trading), has all but halted because of "uncertainty caused by policy statements".

It is completely understandable that the black majority want redress for past discrimination, and a re-allocation of water rights is politically desirable, and perhaps even economically efficient. (South Africa is one of the few countries in the world where farmers (predominantly white) have low political power). However, in the name of rectifying past wrongs, water policy, law and legislation will centralise decisionmaking, lower economic efficiency, and transfer power to the new urban black elite, from the former white elite. A golden opportunity to use SA's incredible natural resources wisely will have been wasted.

Appendix of Trade Information

The characteristics of the trading that took place in the Crocodile River Catchment (CRC) in the Eastern Transvaal, South Africa, is similar to water trading regimes around the world, such as in Chile.

Local WUAs were essential in Chile and in the CRC, the CRMIB was the key reason that trading occured. The CRMIB processed all the trade information and enforced allocations.

There are only a handful of buyers (four of whom account for 90% of trade volume) but 45 sellers.

Table 2.1 Trade data

General Trade Information		Permanent	Temporary
Number of Trades		23	46
Number of zero-priced trades		4	23
Area (ha) traded		563.3	2140.69
Volume of Water Traded (million m^3)		5.36	21.04
Total Value of all contracts (Rand)[1]		529,450	405,309
Average of NPV of trade price (Rand/m^3)	r = 12%	0.0225	0.0305
	r = 21%	0.0394	0.01
Average of NPV of non-zero trade price (Rand/m^3)	r = 12%	0.0273	0.0611
	r = 21%	0.0477	0.021

[1] In 1994 (when this trade data was compiled) 1 Rand = £4.60

There were 23 permanent trades, 46 temporary trades, including one trade that involved temporary and permanent transfers. Half the temporary trades were traded at zero price and most were for just one year. A zero-price trade does not imply zero value, as with the trade went the responsibility for the buyer to pay the water rates, which was as much as 0.0084 Rand/m^3. Several of the zero-priced trades were between the farms owned by the same man or company, but with farms in different parts of the catchment[2]. All inter-farm trades were at a non-zero price.

All of the water trades to date have taken place between farms or properties in the upper region of the river and those along the lower portion. The area along the upper portion of the river has higher rainfall and cooler climate than the lower crocodile region, therefore the properties and farms are entitled to a lower quota, (8,000 m^3/hectare/year compared to 13,000 m^3/hectare/year on the lower section) as discussed in Chapter 1.

The farms along the lower section downstream of Crocodile Gorge generally grow more water intensive crops such as citrus and sugarcane. Nuts and other fruit that are less water intensive are grown upstream. In addition the lower land is flatter, encouraging extensive arable farming. All these factors mean that demand for irrigation water on the lower sections of the Crocodile River is higher than demand along the upper sections, hence most trades (97% by volume and hectarage) are from a farmer in the upper/middle Crocodile selling to a farmer in the lower Crocodile, although a few trades in the same part of the river have occurred, nonetheless all are downstream.

The direction of trade (upstream or downstream) is often important ecologically because one of the objections to water trading usually discussed (Preston, 1996), is the problem that in principle, can occur to instream flows. If a farmer downstream sold the rights to a farmer upstream, the users of water (including the ecosystem) in between may be deprived of the water needed (for non-consumptive uses such as power generation, or dilution of industrial effluent) even if the total quantity allocated and used along the river did not change. This potential externality problem is not an issue in this case as all trades are downstream. However, were future trades made upstream, analysis of instream flow requirements would have to be made[3].

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[2] The fact that many initial trades were zero-priced and intra-firm is typical of fledgling resource markets. The majority of the initial trades in sulphur dioxide permits, under the US Clean Air Act (see Palmisano, 1996) were of this nature. However, once trading became accepted and was encouraged, much inter-firm trading began. In many ways the so-called SO_2 airshed bubble, is similar to intra-catchment water use rights trades.

[3] JIBS (1991) has calculated instream requirements for the Crocodile River, however, there is an international dispute (debate) between South Africa and Mozambique as to the latter's water requirements. The Crocodile River reaches the sea at the port of Maputo, the capital of Mozambique. If international agreement is reached the amount of water required by Mozambique, for instream flows will probably be higher than the existing level, reducing the quantity of South African quotas. According to Bruwer (1991) the negotiations should ensure that all rivers have a minimum flow requirement, not just a total level, acceptable to Mozambique, which is supplied by one or two rivers.