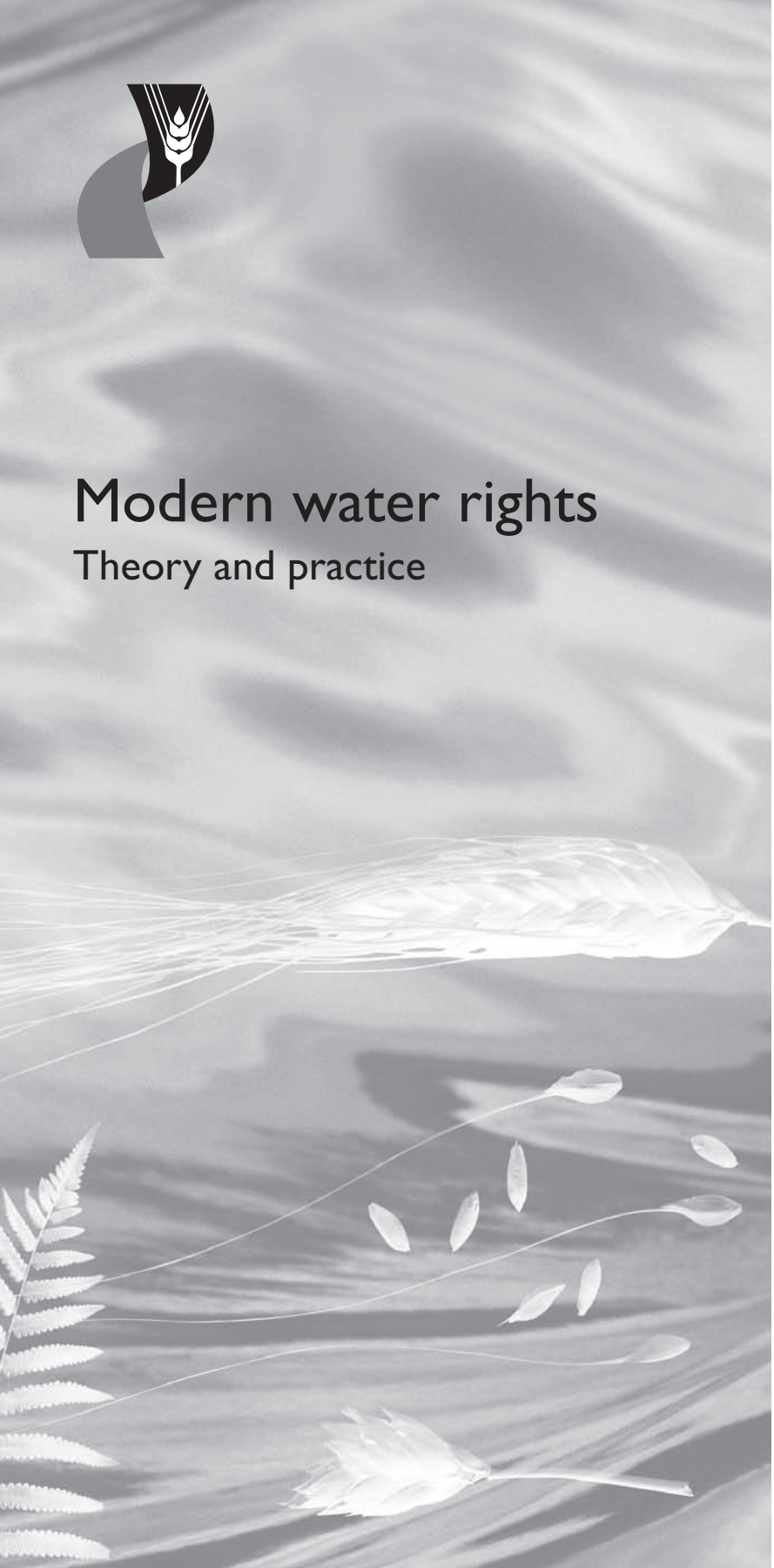

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92

Modern water rights

Theory and practice

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for the
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FAO Legal Office

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FOREWORD

Much contemporary discourse on water resources governance - i.e. a system and structure for the allocation of water resources to competing users, and for the protection of the resource from depletion and from pollution - is underpinned by the law of water resources in general, and by the law governing modern "water rights" in particular. Indeed, theoretically it is hard to conceive of "good governance" goals outside a legal frame of reference where water rights play a central role, and where a functioning system of modern water rights is the lifeblood of governance itself. In practice, a key focus of contemporary water law reforms virtually anywhere in the world has been and is the introduction of formal and explicit, i.e. modern, water rights, which enable the orderly allocation and sustainable use of valuable water resources.

This publication offers a fresh look at the theory and practice of modern water rights, from a comparative law angle. It sheds light on a number of key features of such rights, and contrasts these to traditional forms and kinds of water rights. It teases out and discusses the relevant problematique, including in particular that elicited the sale and leasing of water rights. Finally, a stock-taking and assessment of modern water rights systems impacts are volunteered. This publication complements two earlier issues featured in the FAO Legislative Studies series, i.e. Water rights administration - Experience, issues and guidelines (No. 70 of 2001), and Preparing national regulations for water resources management - Principles and practice (No. 80 of 2003). The former illustrates and discusses the practicalities of implementing and administering the modern systems of water rights which are at the centre of this publication. The latter provides a systematic account of the administrative lifecycle of modern water rights, as reflected in regulatory legislation. These three publications combined provide a rounded review and, in part, a critical analysis of the theory and practice of modern water rights. It is hoped that they will be of inspiration and use in the process of reforming water laws in general, and the laws concerning water rights in particular.

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Stefano Burchi
Officer-in-Charge
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LIST OF ACRONYMS

ACP	African Caribbean and Pacific
ABS	Access and benefit-sharing
AI	Artificial Insemination
AIA	Advanced Informed Agreement
AMS	Aggregate Measurement of Support
AnGR	Animal Genetic Resources
AoA	Agreement on Agriculture (WTO)
BSE	Bovine Spongiform Encephalopathy
BV	Breeding Value
CAC	Codex Alimentarius Commission
CAP	Common Agriculture Policy
CBD	Convention on Biological Diversity
CBPP	Contagious Bovine Pleuopneumonia
CGIAR	Consultative Group on International Agricultural Research
CGRFA	Commission on Genetic Resources for Food and Agriculture
COP	Conference of the Parties
DAD	Domestic Animal Diversity
EAGGF	European Agricultural Guidance and Guarantee Fund
EFSA	European Food Safety Authority
EPAs	European Partnership Agreements
ET	Embryo Transfer
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FFPs	LMOs intended for direct use as food or feed or for processing
FMD	Foot and Mouth Disease
FVO	Food and Veterinary Office
GATT	General Agreement on Tariffs and Trade
GATS	General Agreement on Trade in Services
GSP	Generalised System of Tariff Preferences
GMOs	Genetically Modified Organisms
IARCs	International Agricultural Research Centres
IGC	Intergovernmental Committee
IP	Intellectual Property
IPRs	Intellectual Property Rights
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
IVM/IFM	in vitro maturation and fertilization

LMOs	Living modified organisms
MAFF	Ministry of Agriculture, Forestry and Fisheries (Japan)
MERCOSUR	Mercado Común del Sur
MFN	Most Favoured Nation
MTA	Multilateral Transfer Agreement
NC	National Coordinator for the Management of AnGR
NCC	National Consultative Committees for the State of the World's AnGR
NDP	National Development Plan
NGOs	Non Governmental Organizations
OAU	Organization of African Unity
OIE	Office International des Epizooties
OPU	Ovum Pick-Up
PGR	Plant Genetic Resources
PIC	Prior Informed Consent
SARD	Sustainable Agriculture and Rural Development
SACU	Southern Africa Customs Union
SBSTTA	Subsidiary Body on Scientific, Technical and Technological Advice
SCP	Standing Committee on the Law of Patents
SoW-AnGR	State of the World's Animal Genetic Resources
SPLT	Substantive Patent Law Treaty
SPMs	Sanitary and Phytosanitary Measures
SPS	Agreement on the Application of Sanitary and Phytosanitary Measures
TBT	Technical Barriers to Trade Agreement
TK	Traditional Knowledge
TRIPS	Agreement on Trade-Related Intellectual Property Rights Agreement
UNCED	United Nations Conference on Environment and Development
UPOV	International Union for the Protection of New Varieties of Plants
WIPO	World Intellectual Property Organization
WTO	World Trade Organization
WWL-DAD	World Watch List for Domestic Animal Diversity (FAO)

1. INTRODUCTION

Throughout history the fugitive nature of water has posed conceptual and practical challenges to lawmakers. The vital importance of water to human activity is such that most societies and cultures have sought to establish legal rules over its use and allocation. But its fluidity and constant renewal as part of the hydrologic cycle has necessarily limited the appropriateness of traditional legal approaches to natural resources such as the concept of ownership.

Consequently in most jurisdictions legal rights to use water - water rights - have traditionally been linked to land tenure rights and in particular to land ownership rights. More specifically such rights have been conferred on the owners of land with direct physical access to a stream, river or other natural water source. Very often the only way to sell the right to use water was to sell the associated land right.

Driven mainly by increased pressure on water resources, but also by other factors that are discussed in this paper, a number of countries have recently undertaken substantive water law reforms. In some places such reforms are part of a process that began a hundred or more years ago. Elsewhere they represent a radical re-ordering of the status quo.

A key focus of such reforms has generally been the introduction of formal and explicit water rights that clearly specify the volume of water that is subject to each right (here after referred to as "modern water rights"), together with the associated institutional arrangements for their allocation, registration, monitoring and enforcement. Modern water rights are not intrinsically tied to specific land plots and in an increasing number of jurisdictions they are transferable and thus may be traded on a temporary or permanent basis. Long term, clearly defined and secure, they amount to a form of property right over the use of water.

From the perspective of society, modern water rights permit the orderly allocation and sustainable use of valuable water resources. From the perspective of the right holder they confer the necessary security to invest in activities entailing the use of water. More importantly they provide an effective mechanism for ensuring the proper management of water resources. As they are legally backed the state has an interest in ensuring that they are correctly implemented. Right holders in turn have a genuine and actionable interest in ensuring that this happens. In other words right holders are more

likely to take steps to ensure that their property rights to water are respected and that the state agencies involved fulfil their legal obligations in this connection thus making compliance with the applicable legal regime more likely. This contrasts with, for example, legal regimes that seek to govern natural resource use through short term licences that do not confer substantive benefits in the form of property rights or quasi property rights on resource users. If for whatever reason, including a lack of resources or political will, the state fails to implement such a regime other resource users, even those who hold the necessary licences, have little interest or incentive in seeing it enforced.

As pressure on water resources increases water rights become increasingly valuable. Indeed as the economic value of water becomes more widely understood the possibility of trading transferable rights is seen by some as providing an opportunity to allow markets to determine the "true" value of water, as uses migrate from lower value to higher value activities.[1]

It should be noted that the introduction of tradable rights is not a phenomenon that is restricted to the water sector. In the fisheries sector, for example, there is increasing interest in the use of individual transferable quotas that may be traded among licence holders (see, for example, FAO, 2004). And tradable rights are not necessarily restricted to the taking and use of natural resources: they may also relate to rights to pollute. Both Chile and California, jurisdictions considered in this paper, have considerable experience in the trade of air emission permits (See for example Bolt, K. *et al.*, 2001) and the concept of emissions trading entered upon the world stage with the entry into force of the Kyoto Protocol.

Within the water sector support for the introduction of market based solutions to the allocation of water resources is taken from recent reforms such as those of Chile as well as the experience of the western United States where the practice of trading water rights has existed for many years. At the same time, however, such experiences clearly show potential pitfalls that need to be avoided and it is to be noted that the trade in water rights is not permitted in all jurisdictions, even those where modern water rights have been introduced.

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1 This migration is almost invariably from agriculture to industry or to satisfy urban needs.

This paper reviews international experiences of the introduction and use of modern water rights. It is based on a survey of relevant primary and secondary legislation, published literature (including articles in academic and professional journals and specialist publications), unpublished texts and internet sources as well as practical experience.

The paper is set out in 14 sections beginning with a description of the traditional approaches to water rights of the two dominant legal traditions. Thereafter the reasons why so many jurisdictions have moved to establish modern water rights systems are considered. There follows a discussion of the consultation and education processes used to promote acceptance of reforms and behavioural change. Next the type and nature of legal reforms necessary for the introduction of modern water rights systems are considered and followed by a description of the basis on which water rights are initially allocated.

Experience shows that notwithstanding the difficulties of piloting the necessary legislative reforms necessary to introduce modern water rights, this stage is relatively straightforward compared to the practical and administrative procedures for rights definition and registration, procedures which must be taken into account from the very beginning of any reform process. Thereafter experience of the procedures for the sale and leasing of such rights, where permitted, will be considered as well as the implications of such transactions for third parties and the environment.

The issues of environmental allocations and dispute resolution mechanisms in connection with modern water rights are next considered followed by an examination of the, admittedly relatively few, cases in which specific steps have been take to safeguard the interests of the disadvantaged in connection with the introduction of such schemes.

Following an analysis of the impacts of modern water rights in terms of efficiency, equity, transparency and environmental impacts this paper seeks to draw out some basic lessons from international experience.

2. TRADITIONAL APPROACHES TO WATER RIGHTS

2.1. What are water rights?

At the outset it is important to clarify what is meant by the term "water right". Answering this question is complicated by the fact that there is no universally agreed definition. Indeed the term "water right" is actually used in different contexts and different jurisdictions to mean quite different things.

In part this is because conceptions of water and water rights vary so dramatically around the world. Water law, and thus water rights, reflect economic, social and cultural perceptions of water. Such perceptions are in turn shaped by a range of factors including geography, climate and the extreme variability in the availability of water resources as well as the uses to which water is put. In more temperate climates primary uses may include navigation, hydropower and recreational uses. Public perceptions of water are often focussed on excessive quantities in rivers and streams and the risks of flooding, particularly in low lying areas. In more arid climates, where irrigation is necessary, problems of water scarcity and levels of rainfall are matters of public interest and concern.

Consequently in discussing water rights it is important to clearly recognize that each country faces unique water issues. What is normal and reasonable in one country as regards both the use and regulation of water may appear quite strange or even irrational elsewhere. This observation applies equally to water rights and should be borne in mind in the discussion that follows.

Furthermore, because of the dynamic complexities of the qualitative and quantitative aspects of the hydrologic cycle, human intervention in that cycle and the many historical, social, ecological, economic and political circumstances that influence the use of water resources, water law and the rules governing water rights tend to be rather complex (FAO, 2001).

So just what is a water right? In its simplest conception a water right is frequently understood to be a legal right to abstract and use a quantity of water from a natural source such as a river, stream or aquifer.[2] But water

[2] Water rights may also exist in respect of lakes, of course, but due to the lack of hydraulic gradient pumping is likely to be necessary meaning that the abstraction of water is more expensive.

rights frequently go beyond an entitlement to a mere quantity of the simple chemical compound which is water: the flow of the water is also an important component of a water right.[3] Consequently a water right may confer a legal right to impound or store a specified quantity of water in a natural source behind a dam or other hydraulic structure. This may be as a precursor to abstraction or, as in the case of hydropower generation, it may relate to the use of water within the water course. This type of use is usually known as a "non-consumptive" use.

In addition a range of other activities involving water and water courses are generally regulated either as part of a water rights regime, or at least in close co-ordination with it. Thus, depending on the specific legal rules in force in a given jurisdiction a water right may be necessary:

- to divert, restrict or alter the flow of water within a water course;
- to alter the bed, banks or characteristics of a water course, including the construction (and use) of structures on its banks and adjacent lands including those related to the use and management of water within that water course;
- to extract gravel and other minerals from water courses and the lands adjacent to them;
- to use sewage water for irrigation;
- to undertake fishing and aquaculture activities;
- for navigation; and/or
- to discharge wastes or pollutants to water courses.

Why is this? The reason lies in the fundamental degree to which such activities are inter-connected. For example, those who abstract for irrigation or drinking purposes require relatively clean water, whereas industrial water users may be able to make do with water of a lesser quality. Consequently in authorizing the discharge of wastes or effluent to a water course it is necessary to take account of other existing uses of water. At the same time, the amount of water that is abstracted will affect the ability of a given water course to dilute and disperse wastes and effluent. Thus abstracted uses, particularly in times of low river flow, are likely to impact on the extent to which the discharge of wastes and effluent should be permitted. Even when

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[3] Indeed in many countries the flow of water has historically been more important than its quality when used, for example, to power water mills or for hydropower generation.

such activities are "non-consumptive", as described above, they frequently still affect other water uses. For example while the operation of a hydropower dam may not actually result in the removal of water from a river[4], the operating regime of that dam will affect flows at different times of the year. Similarly constructions on river banks for whatever purpose may affect navigation. And again in times of low flow depending on the particular river priority may be afforded either to navigation or to water abstraction. It follows that just as the entire range of activities involving the use of water may have a negative impact on the quantity, quality and flow of water in a given water course or aquifer, the legal rights which govern such activities will invariably also impact on each other.

Having considered what they regulate, the next question is what is the status of water rights? The key point to note is that they are legal rights: they are created pursuant to a country's formal legal system and thus they have legal consequences. Specifically they are capable of being asserted against the state and third parties. In the case of a dispute, a right holder can legitimately expect a valid right to be upheld by a court and as necessary enforced through the machinery and coercive power of the state.[5] Loss of, or damage to a water right is prima facie subject to the payment of compensation and the right to such compensation is enforceable in the courts.

The corollary is that a person who undertakes an activity that requires a water right without holding such a right will be subject to legal action from the right holder and or the state body responsible for water rights administration and possibly criminal/administrative proceedings.

So far this discussion has focussed on the taking and use of water from natural sources whether from surface water bodies or groundwater. It is important, however, to note that the existence of another category of "water rights", those which relate to the supply of water through a canal for irrigated agriculture or industrial use. Such supplies are usually made on the basis of an express or implied contract the effect of which is to give the beneficiary the legal right to receive a quantity of water at a specified time, usually in return for the payment of a charge or fee. Such rights – legal entitlements to

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4 Disregarding for the purpose of this argument the possibility of increased rates of evaporation concerning the water stored behind the dam.

5 Through the use, for example, of state-sanctioned force such as the use of court bailiffs to recover unpaid fines and even imprisonment for failure to comply with court orders.

specified volumes of water - are effectively a form of "water right". But obviously they are of a quite different nature to those described above. In some jurisdictions the person to whom the water is delivered may also hold a classical water right that relates to the initial abstraction of a quantity of water at the natural source prior to its diversion into the relevant canal. Very often, however, while the supplier holds an abstraction water right, the person to whom the water is delivered does not. The legal basis of their "water right" is the applicable contractual or quasi contractual arrangement with the supplier. Indeed a closer analysis shows that the right in question is not merely to take a quantity of water but rather the right to a service, namely the delivery of water through the canal system. At best these are "contractual water rights" (the right to a service). Whether or not rights created in such circumstances are "water rights" the point remains that they are quite different in nature to abstraction water rights.[6]

This point deserves to be emphasized as too often the literature, particularly that which advocates the use of tradable water rights, conflates abstraction type water rights with contractual water rights.[7] The point is that they are legally, conceptually and operationally quite different particularly as far as transfers are concerned. Once water has been taken from a natural source and diverted into an irrigation system it is effectively temporarily removed from the surface water cycle and confined to an artificial space. Once in the system, within known limits, the water can be moved around from land plot to land plot in accordance with an agreed schedule. Apart from conveyance losses the sale of a water right at, say, the tail of the system to a land plot at the head of the system has little practical impact on the system as a whole or the rights of other land owners. The legal form, issues relating to the grant, administration and even the trade in such rights are thus substantively quite different to those that arise in connection with water rights relating to natural water courses. Put another way if a modern water right, in the sense described above, is a right to remove water from the natural environment, a contractual water right creates an entitlement to receive a delivery of water through artificial structures, water that has previously been removed from the

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6 In fact in many developing and transition countries farmers enjoy rather weak contractual rights to water that confer little in the way of security. This, though, is a discussion that is beyond the scope of this paper (see FAO, 2005).

7 For example, World Bank, 1999a, Technical Paper describes the trade in what are described variously as water rights or water titles in the Siurana-Riudecanyes Irrigation Subscribers Association and Water Market system as a successful example of tradable water rights.

natural environment. Therefore while the experience of trading in such rights is of some interest in that it demonstrates that provided the appropriate legal and institutional arrangements are in place farmers and other water users may trade water entitlements, its relevance to the tradability and transferability of modern water rights is ultimately rather limited.

Otherwise water rights, as the term is commonly understood, have nothing to do with the so-called "right to water", a putative human right which is claimed to exist either as a right in itself or as an ancillary aspect of the "right to food" created by article 11 of the International Covenant on Economic, Social and Cultural Rights,[8] or to provisions contained in progressive constitutions such as the "right of access to water" found in that of South Africa.[9] Clearly drinking water supplied through a reticulation system has some similarities to irrigation and industrial water supplied through a canal. But this sector too does not really involve a discussion of water rights. Instead the individual consumer may rely on a statutory duty imposed on the supplier to supply water to an individual reticulation system or communal stand pipe. An interruption to such a supply may amount to a breach of the notional human right to water but will not per se concern water rights.[10] It follows that the introduction of private expertise and financing in the urban water supply and sanitation sector through public private partnerships has little direct relation to the issue of water rights, although private actors will want to hold water rights as much as state or local government water supply entities.

Finally given its prominence in the literature about economic incentives in water resources management it is important to note that groundwater markets, in which land owners sell typically groundwater that they have abstracted to their neighbours for irrigation or to private or state purchasers

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8 Article 11 of the International Covenant on Economic, Social and Cultural Rights, provides that everyone has a right to an adequate standard of living for himself and his family including adequate food, clothing and housing. The "Right to water" was developed in General Comment 15 on the Covenant by the Committee on Economic, Social and Cultural Rights. Such "General Comments" constitute authoritative interpretations of the provisions of the Covenant to clarify the normative contents of rights, states parties" and other actors" obligations, violations and implementation of the rights at national level (FAO, 2003).

9 Article 24. Although as will be seen this right of access to water is actually translated into substantive form in the South African water legislation.

10 Of course the supplier may and usually will require its own water right to secure its source of water.

(often by the tanker load) for on-sale elsewhere and which are particularly prevalent in a number of parts of India, generally have nothing to do with water rights or the trade in water rights except to demonstrate that farmers and other water users understand that water has an economic value.

2.2. Traditional land based approaches to water rights

Throughout history all societies in which water is used have had their own approaches to regulate access to water, their own conceptions of water rights. Such influences are still found in so-called "customary" or "local" law practices as well as influences from religious law such as the Hadiths of Islam. Customary or local law continues to play an important role in water allocation decisions in many developing countries, particularly in rural areas. Nevertheless, as already mentioned, the focus of this review is on formal water rights and the approach of formal legal systems.

In this connection it is important to emphasize that European conceptions of water and water law have strongly influenced the development of formal water laws around the world, through the two principal European legal traditions: the civil law tradition and the common law tradition.

The civil law tradition, which sometimes described as the Romano-Germanic family, is found in most European countries (including the former socialist countries of Eastern and Central Europe), nearly all countries in Latin America, large parts of Africa, Indonesia and Japan as well the countries of the Former Soviet Union. The common law tradition emerged from the law of England.[11] Countries in which the common law tradition applies include Australia, Canada, India, New Zealand, Pakistan, Singapore, and the United States, and the remaining African countries that are not in the civil law tradition as well as other Commonwealth countries and a number of countries in the Middle East.[12]

While the colonial period explains the reason why European water law was "received" into the legal systems of so many countries, it is not the only reason. A number of countries that were never occupied by the colonial

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[11] Strictly speaking the English jurisdiction includes Wales and thus all subsequent references to England should be understood to mean England and Wales.

[12] Some jurisdictions, such as Cameroon and South Africa, are influenced by both the civil law and common law traditions.

powers looked to European and subsequently North American law in revising or modernizing their own legislation.[13]

A full discussion of the differences between the two legal traditions is beyond the scope of this paper. A key difference, however, is the role of the courts in the development of the common law, through so-called "judge-made law", alongside the enactment of legislation by the relevant legislatures. In general terms the laws of the civil tradition have been subject to a much more significant degree of codification and the courts are perceived as having a more interpretative role.

This section looks at the traditional approaches of the two main legal traditions to surface water rights, ground water rights and contractual water rights.

2.2.1. Rights to surface water

Under both the common law and civil law traditions, the right to use water depended primarily on the use or ownership of land or structures built on such land. The logic of this approach lies in the fact that historically most water rights, apart from those relating to "instream" uses, related to the use of water on land.

This approach, of conferring a privileged position on the owners of land adjacent to water courses, was one of the elements of Roman water law which had a major influence on the development of water law under the two European legal traditions, prior to the introduction of modern water rights regimes.[14] Indeed some of these influences can still be observed.

Roman law, for example, denied the possibility of private ownership of running water. The Institutes of Justinian published in 533-34 held that running water was a part of the "negative community" of things that could not be owned along with air, the seas and wildlife.[15] It was nevertheless

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13 For example Japan's 1896 Civil Code was heavily influenced by the German Civil Code.

14 It should be noted, however, that there were (a) regional variations within Roman water law and that (b) like any legal system, the rules were varied and modified over time.

15 Roman law is not the only legal system that rejects the idea of private ownership of running water. Islamic law, which also takes this approach plays an important role in shaping legal rules about the use of water.

recognized that things in the negative community could be used and that the "usufruct" or right to use the benefit of the resource needed to be regulated to provide order and prevent over-exploitation (Getches, 1997).

Roman law distinguished the more important, perennial streams and rivers from the less important. The former were considered to be common or public while the latter were private. The right to use a public stream or river was open to all those who had access to them.[16] Roman law, however, recognized the right of the government to prohibit the use of any public water and required an authorization for taking water from navigable streams (Teclaff, 1985).

2.2.1.1. The common law tradition

The countries of the common law tradition did not follow the distinction between public waters and private waters.[17] The common law did, however, maintain the principle of Roman law that flowing waters are *publici juris*. From this basic principle, two divergent approaches to water law and water rights developed: the doctrine of "riparianism" and the doctrine of "prior appropriation".

(a) The doctrine of riparianism

The doctrine of riparianism was developed gradually over the years through a series of court decisions and reached its zenith, in terms of its development, in England and the New England states of North America in the course of the nineteenth century.[18] Riparian rights were not considered to be subsidiary land rights, such as easements or servitudes, but were instead an integral part of the right of ownership of the land in question.[19]

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16 Since Roman law did not provide for involuntary servitude of access, it could to that extent be considered a riparian system.

17 Except to the extent that a distinction is made between the ownership of the banks and bed of tidal and non tidal waters. The banks and bed of former are generally in the private ownership of the riparian land owner while the banks and bed of the latter are owned by the Crown (i.e. the state).

18 It should, however, be noted that riparian doctrine which was developed by the courts, replaced an earlier conception of water rights based on priority of use which was not as closely tied to land ownership (Scott and Coustalin,1995).

19 A the same time riparian rights were considered to be interests in real property as opposed to personalty. See Getches, op cit.

Regarding its substantive content, the riparian doctrine held that a riparian right holder had the right to make "ordinary" use of the water flowing in the watercourse. This encompassed the "reasonable use" of that water for domestic purposes and for the watering of livestock and, where those uses of water were made, abstraction could be undertaken without regard to the effect which they might have had on downstream proprietors (Howarth, 1992). In addition a riparian land owner also had the right to use the water for any other purpose provided that it did not interfere with the rights of other proprietors, upstream or downstream. Such purposes were categorised as being "extraordinary" uses of water. The limits of "extraordinary" water use have never been precisely defined, and are indeed probably incapable of full definition. But it is clear that they are subject to significant restrictions. Specifically, the use of the water must be reasonable, the purpose for which it is taken must be connected with the abstracter's land and the water must be restored to the watercourse substantially undiminished in volume and un-altered in character.

The question whether a particular extraordinary use is reasonable is a question of fact which must be determined by reference to all the circumstances. In addition to such natural riparian rights, a riparian owner could acquire additional rights in the nature of "easements", which are types of land tenure right, in accordance with relevant rules of land tenure.

Notwithstanding its complexity, the doctrine of riparianism spread throughout the English speaking world. As already mentioned, important developments took place in the damp climate of New England, where it still applies in some states. However when the doctrine reached the dry and arid climates of the American West and South West its practical limitations were clearly recognized leading to the development of a new doctrine, that of prior appropriation.

(b) The prior appropriation doctrine

The prior appropriation doctrine was developed in the nineteenth century to serve the practical demands of water users in the western United States. It originated in the customs of miners on federal public lands who accorded the best rights to those who first used water just as they had accorded mining rights to those who first located ore deposits. In any event given that their gold washing activities were taking place on federal public lands and not on private land they simply could not seek to apply the doctrine of riparianism.

Nevertheless the prior appropriation doctrine was later extended to farmers and other users, even on private lands. The flexibility of the common law tradition is such that this new, more suitable water rights doctrine, was accepted as the law in a number of states and indeed it continues to apply in the states of Alaska, Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah and Wyoming (Getches, 1997). In addition a number of states, including California, have hybrid systems under which both the prior appropriation and riparian doctrines apply simultaneously.[20]

The key significance of the prior appropriation doctrine is that it comprehensively severed the linkage between land and water rights. Water rights are acquired on the basis of beneficial use, rather than land ownership. More specifically, water rights are granted according to where a person applies a particular quantity of water to a particular beneficial use. Those rights continue as long as the beneficial use is maintained.

Most appropriation jurisdictions consider water to be a public resource owned by no one. The right of individuals to use water under the prior appropriation system is based on application of a quantity of water to a beneficial use.

The traditional elements of a valid appropriation are:

- the intention to apply the water to a beneficial use;
- an actual diversion of water from a natural source;
- the application of the water to a beneficial use within a reasonable time period.

The date of the appropriation determines the user's priority to use water, with the earliest user having a superior right. If water is insufficient to meet all needs, those who hold the earliest appropriations (senior appropriators) will obtain all of their allocated water; those who appropriated later (junior

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[20] The other states are Kansas, Mississippi, Nebraska, North Dakota, Oklahoma, Oregon, South Dakota, Texas and Washington. To take the example of Texas, after independence from Mexico the state adopted the riparian water doctrine and for well over a century there was genuine confusion over water law and water rights. In 1889 Texas returned to a modified prior appropriation law, passing an Irrigation Act under which all un-appropriated water became the property of the state. A person could claim water rights from the state on first-in-line first-in-right depending on whether the water was put to beneficial use (Bath, 1999).

appropriators) may receive only some, or none, of the water over which they have rights.

All of the states in which the prior appropriation doctrine applies have statutory administrative procedures to provide an orderly method for appropriating water and regulating established water rights (Getches, 1997). In some states appropriators have the option of: (a) applying for a permit; or (b) perfecting a common law appropriation by posting a notice and diverting water. Nowadays it is, however, more typical for state law to require a permit as the exclusive means of making a valid appropriation.

A number of criticisms are made against the prior appropriation doctrine. One criticism is that it tends to discourage water saving by senior appropriators who know that their entitlements are relatively more secure. Furthermore, users have been able to continue seizing water as long as a single drop remained in the stream or aquifer (Freyfogle, 1996). While these and other issues have led to calls for water law reform, little progress has been made to date. Indeed what is perhaps most interesting is the fact that being divorced from land tenure rights, trades in water rights have long been accepted, or even encouraged. In fact most of the world's experience of transferable water rights derives from the western states.

It follows that while references are made to the experience of the western states in the discussion that follows, rights created under the common law doctrine of prior appropriation are not really modern water rights in the sense used in this paper, save to the extent that they do specify the volume that may be abstracted. Nevertheless the experience of the western states does offer a number of useful insights into the issues of water law reform and the tradability of transferable water rights.

2.2.1.2. The civil law tradition

The Roman law distinction between public and private waters retained an influence in the countries of the civil law tradition even until quite recently. Generally speaking, while an administrative permission was necessary for the use of public waters this was not necessary in the case of private waters.

For example, the influential French Civil Code, the Code Napoleon, which was promulgated in 1804 after the French Revolution, maintained this distinction. Public waters were those which were considered to be

"navigable" or "floatable"[21] and belonged to the public or national domain. Their use required a government permit or authorization.

Private waters, which were those located below, along or upon privately owned land, could be freely utilized subject to certain limitations of a statutory nature such as servitudes and rights of way. The right to use such private waters, both surface and underground, derived from land ownership which recognized the owner's right to use at pleasure the water existing upon his land without any limitation.[22]

Similarly the Spanish Water Act of 1886 considered as private all surface waters, that is waters springing in a private property and rainfall waters, but only for its use on that land and not beyond the limits of that estate.[23] This approach was largely repeated throughout the "civil law" world in Asia, Latin American and parts of Africa. In the Democratic Republic of Congo, for example, the beds of every lake and of all navigable water courses, whether floatable or not, are part of the public land domain and the water of such lakes and water courses as well as groundwater also belongs to the state.[24] Subject, however, to any legal and administrative measures which regulate use or the granting of concessions, the right to use such water is open to everyone.

Finally, the difficulties of accommodating different and competing uses of private waters led the courts to limit the absolute right of use by making it subject to numerous restrictions, particularly as regards the prohibition to pollute water, etc. Gradually the concept of private waters began to lose its force (Caponera, 2000).

It should, however, be noted that in connection with "public waters" a concession has always been required in most jurisdictions of the civil law tradition. Such concessions can be seen as the precursor of modern water

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21 A river is "floatable" if logs can be floated down it.

22 *Ius utendi et abutendi.*

23 However there was a possibility of some administrative control reflected in articles 413, 415, 420–422 which defined private waters as "special property" subject to some restrictive covenants (FAO, 1999).

24 In the civil law tradition a distinction is typically made between state owned property in the "public domain" and state property in the "private domain". Property in the latter may, in accordance with specific legislation be privatized. Property in the former may not unless and until it is transferred to the private domain.

rights in the countries of that legal tradition. Of course significant variations existed from jurisdiction to jurisdiction with regard to the constraints placed on the users of private waters but this in outline is the basic position.

2.2.2. Rights to groundwater

Historically most of the focus of water law and water rights has been on surface water resources. It is only relatively recently, over the last hundred or so years, that specific legal responses have been formulated in water legislation to the issue of groundwater management. As regards the use of ground water both the common law and civil law traditionally also conferred specific benefits on adjacent or, to be more precise, super-adjacent land owners.

2.2.2.1. The civil law tradition

Traditionally, within the civil law tradition, in accordance with the basic principles of Roman law, groundwater was seen as the property of the owner of the land above it. This basic approach is reflected in article 552 of the French Civil Code which states that:

> Ownership of the ground involves ownership of what is above and below it. An owner may make above all the plantings and constructions which he deems proper, unless otherwise provided for in the Title Of Servitudes or Land Services. He may make below all constructions and excavations which he deems proper and draw from these excavations all the products which they can give, subject to the limitations resulting from statutes and regulations relating to mines and from police statutes and regulations.

2.2.2.2. The common law tradition

Although the conceptual approach taken by the common law tradition was slightly different, the effect was largely the same. Under the common law there is no property in water percolating through the sub-soil until it has been the object of an appropriation.[25] The effect is that a land owner is entitled to sink a borehole or well on his land to intercept water percolating underneath his property, though the effect is to interfere with the supply of underground water to nearby springs.[26] Yet at the same time, the owner of land through

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25 Ballard *v* Tomlinson, 1885, 29 Ch. D. 115, Howarth, op cit.

26 An exception is made, under the common law, for underground water flowing in a defined channel in which case the riparian doctrine applies (Howarth, op cit.).

which ground water flows has no right or interest in it which enables him to maintain an action against another landowner whose actions interfere with the supply of water (Howarth, 1992).

In practice, however, as a result of the development and use of modern well drilling techniques and pumps, the approaches of the main legal traditions no longer offer a viable means of effectively regulating the use of groundwater, even though they continue to apply in a number of jurisdictions. In the state of Texas, for example, the common law rules described above, sometimes described as the doctrine of "capture", still apply.

In the United States most western states still apply the prior appropriation doctrine toward all or some of the groundwater within their jurisdictions, providing individuals with relatively secure rights to the use of specified amounts of this resource. Other states follow variations of the "beneficial use" doctrine, allowing overlying landowners to pump unspecified amounts of groundwater as long as they do not engage in wasteful uses or interfere with the rights of other overlying owners. Because the doctrine does not confer rights on individuals to abstract specific quantities, ground water is essentially an "open-access" resource for overlying owners (Blomquist *et al.*, 2001*)*. In Arizona, for example, until 1980 when the Arizona Groundwater Management Act was enacted groundwater use was governed by the beneficial use doctrine whereby a land owner can pump as much water as s/he can reasonably use on the overlying land. (Blomquist *et al.*, 2001*)*.

In California, where it will be recalled both riparian and prior appropriation doctrines apply, the position is a little complicated and must be determined on the basis of court decisions with little or no statutory guidance. In outline:

- overlying land owners have rights to the reasonable use of groundwater on their land;
- relative to each other, overlying land owners have correlative rights to water, and share proportionately in water supply reductions in the event of shortages;
- appropriators (those pumping water who do not own overlying land) have a seniority system with respect to one another, with reductions in water use imposed first on junior rights holders; and
- overlying owners have a superior right compared to appropriators to the amount of water for their reasonable use, and appropriators have a right to the surplus remaining, if any.

Increasingly, however, problems of groundwater overdraft have led to the introduction of statutory controls over groundwater abstractions in the western United States.

2.2.3. Rights to water in artificial water courses

Under the traditional approaches of both of the main legal traditions, it is only with regard to water in artificial water courses that adjacent land owners are not treated as being in a beneficial position.

The common law is quite clear that the owner of land adjacent to a canal or other artificial water course has no rights whatsoever to the water in the absence of some form or "grant or arrangement".[27] Indeed to take water from such a canal would probably amount to theft (Howarth, 1992). This is because when once abstracted or appropriated, the existence of a property right in the water has the consequence that it is capable of being the subject of theft. The position taken by the civil law tradition is broadly similar.

As already described, it is the operator of the canal or scheme, the person who abstracts water from a natural source, who will usually require a water right. Furthermore, as a matter of logic it is difficult to see how an ordinary statutory water right could be conferred on the land owner as that person is not responsible for the abstraction of the water in the first place. A mere "right to water" would not be of much use without the ability to enforce it against the operator of the irrigation scheme. In the case of state funded schemes this is usually a state body such as an irrigation agency. As a result the study of irrigation water rights is a somewhat neglected area.

In some jurisdictions irrigation water is supplied by a state agency on the basis of a detailed formal contract. In California, for example, water user associations may hold 25 to 30 year contracts with the Federal Bureau of Reclamation (FBR) or the State Water Department for the supply of water. In a recent decision the Federal Court found that compensation was payable to farmers for breach of such contracts following a re-allocation of water for conservation purposes (Eilperin, 2004). Similar contractual arrangements are

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[27] Rameshur Pershaud Narain Singh *v* Koonj Behari Pattuk (1878) 4 A.C. 121 P.C.

being introduced in the former socialist states in conjunction with major irrigation sector reforms.[28]

Another complication as regards the relevance of water rights for many irrigators is the fact many irrigation systems in South Asia and parts of China have absolutely no physical direct link with the types of water resources that are subject to water rights regimes. Instead monsoon rainwater is collected in reservoirs or tanks from which it is distributed through canals to irrigate crops during the dry season. Such irrigation systems can find themselves effectively beyond the scope of statutory water rights and the formal water management framework.

[28] For example in Azerbaijan and Romania.

3. REASONS FOR MOVING TO A SYSTEM OF MODERN WATER RIGHTS

The introduction of modern water rights is usually part, albeit an important part, of more substantive water sector reforms. Driven largely by concerns over pressure on water resources as a result of such factors as population growth and, increasingly, climate change the last thirty or so years have seen a great deal of international activity concerning water reform. This is demonstrated by the creation of a range of new initiatives and bodies concerned with the water sector as well increasingly large and elaborate international summits and meetings. Indeed it is arguable that "water reform" has become something of an industry in itself.

The "Dublin Principles", which were concluded in the run-up to the United Nations Conference on Environment and Development (UNCED) held at Rio de Janeiro in 1992 have been influential in guiding the shape of water sector reforms, including reforms to water rights. In an attempt to concisely state the main issues and thrust of water management (Solanes *et al.*, 1999) they provide that:

- freshwater is a finite and vulnerable resource, essential to sustain life, development and the environment;
- water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels;
- women play a central part in the provision, management, and safeguarding of water; and
- water has an economic value in all its competing uses, and should be recognized as an economic good.

Sufficiently vague to allow widespread agreement these principles leave their substantive content, in respect of which there may be wide disagreement, unstated. The first two Principles may have had some indirect effect on water rights reform; the central role of women, however, remains largely unrecognized as far as water rights regimes are concerned. The fourth Principle has been in many ways the most controversial. It is reflected in the introduction of charges for the use of water that is subject to water rights and also in the ongoing debate about tradable water rights.

Much of the heat of this debate has centred round the basic question as to whether water is a "public good" thus meriting special treatment or whether it

can be treated as a form of commodity and regulated through market forces. Inevitably this debate has impacted on questions of water rights and particularly the question of their transferability and tradability.

Leaving aside the overall process of water reform and focussing on the issue of water rights reform it is clear that each country has its own specific reasons for moving to formal and explicit rights based systems. These include:

- the ill-adaption of traditional land based approaches to specific climatic conditions;
- the inadequacies of traditional land based approaches;
- the need to take account of environmental considerations;
- the need to better recognize the economic value of water;
- the transformation from socialist to market based economies;
- regional initiatives;
- to support or entrench wider economic reforms;
- to support other reforms;
- the promotion of social goals;
- the completion of earlier reforms; and
- pressure on water resources.

Clearly these reasons are very often inter-linked in a given context. For example, the recent reforms in South Africa sought to respond to most of these issues. Nevertheless, for the purpose of analysis it is still useful to examine these different headings individually.

3.1. Ill-adaption of traditional land based approaches to specific climatic conditions

As already described, the application of the riparian doctrine in arid climates through its adoption in colonial and post colonial jurisdictions caused a number of practical difficulties. As mentioned much of the development of the riparian doctrine took place in damp and water rich climates of England and New England, and indeed much of the case law on riparian rights related to disputes over the situation and operation of water mills rather than water abstraction. Such principles transferred with difficulty to more arid climates.

In Canada, for example, the riparian doctrine effectively prohibited irrigation on any large scale in the southern regions of the prairie provinces which have

an arid desert like climate. [29] After "considerable unrest" the Federal Government passed comprehensive water legislation in 1894 in the form of the North West Irrigation Act, S.C. 1893, chapter 30.

Similar problems were faced in Australia where a move to formal licence based regimes began in the 1880s, when Victoria introduced new water laws based on the recommendations of a Royal Commission chaired by Alfred Deakin. He proposed that water allocations should be tied to the land, that rights to water should be vested in the Crown (the equivalent of the state), and that allocations to landholders should be the responsibility of the state governments. Riparian owners retained limited common-law rights for domestic use, stock watering, gardens and a maximum of two hectares of irrigated land for fodder crops. Over the next fifteen years, similar legislation was introduced in the other states.

3.2. The inadequacies of traditional land based approaches

Even in their original jurisdictions the traditional approaches had begun to run into difficulties both as far as individual users were concerned as well as in ensuring the effective management of water resources.

As already noted the riparian doctrine raises a number of difficult conceptual points such as the nature of "reasonable use" and the limits of "extraordinary water use". In practical terms whatever legal logic the doctrine may have the simple fact is that it does not provide the means to clearly specify how much water a right holder may abstract and use at a given point in time, in times either of full river flow or of drought. In short, the doctrine fails to provide the legal certainty necessary to make investments. Indeed even during the nineteenth century as the doctrine reached the zenith of its development, its limits had become clear. To take the example of England, some 4 500 Private and Local Acts of Parliament were adopted between 1800 and 1947 that gave rights to use water as well as comparable numbers concerned with land drainage, river improvement and inland navigation. In other words there were effectively two separate and largely uncoordinated water rights regimes in place making it increasingly difficult to plan and manage the use of water resources. Consequently all uses on the basis of statutory and riparian rights were brought into a formal water rights regime with the enactment of the Water Resources Act 1963.

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[29] They have an average precipitation of 28 centimetres per year.

At the same time in many of the eastern United States a modified approach to the riparian doctrine has been introduced through the introduction of a licences that specify the volumes of water that may be taken.[30]

Similar difficulties arose with the traditional approach of the civil law jurisdictions. Whatever logic it may have held for the legal scholars of old, the idea of distinguishing private waters from public waters is nonsense from a hydrological perspective. The difficulty of reconciling the different activities of neighbouring landowners over their separate yet connected "private waters" led to innumerable court disputes and piecemeal legislative reforms. The response has been the systematic introduction of formal and explicit water rights.

Another clear example of the inadequacies of traditional land-based approaches is provided by the experiences of their inability to prevent the depletion of aquifers, for example in Texas where groundwater provides about 60 percent of the water that is used each year particularly for irrigated agriculture and urban water supply (Kaiser, 2004). While the courts have made some modest modifications to the rule of capture, described above, by limiting pumping when it is: (1) wasteful; (2) maliciously done to harm a neighbour; or (3) causing land subsidence to another property it is clear that these minor developments in the law are not of themselves sufficient to prevent over abstraction of groundwater.

3.3. The need to take account of environmental considerations

Traditional approaches to water rights allocation failed to take account of the environment. If the volumes of water that are subject to traditional water rights are not quantified it is difficult to make provision for the ecological requirements of rivers. The mere quantification of rights does not automatically resolve this issue. As already mentioned the prior appropriation doctrine permits the appropriation of all water in a given water course.

Early attempts to introduce formal water rights regimes in the pre-environmental era similarly neglected the ecological and aesthetic functions of rivers and water bodies. However, now that environmental issues are so

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[30] Not all though, in some states it is sufficient for water users simply to notify their use to the water administration. Evidently these are states that do not suffer from water shortages.

much higher up national agendas, all recent reforms to water rights regimes have simultaneously sought to take them into account.

Thus a key objective of the recent Australian reforms described in this paper has been to promote environmental objectives in part by reducing the need for major new infrastructure by better using the existing water resources. In addition reductions in agricultural overuse should have a positive environmental effect through a reduction in water logging, salinization and biocide dispersion.

Similarly environmental concerns have largely influenced the development of the water policy and legislation of the European Community.

3.4. The need to better recognize the economic value of water

Where water rights are less than clear damaging economic consequences can follow. These involve a much reduced incentive to augment the value of the water, of farmland and other infrastructure which uses it, as well as reduced incentives to conserve it.

A desire to prevent the waste and over-use of water through the introduction of tradable transferable water rights was one of the main reasons behind the recent reforms to water law and water rights in Australia. Australian interest in tradable transferable water rights (TWR) began to surface in the mid-1970s and the state of Victoria first introduced such rights in the early 1980s. For some, their introduction seemed to offer a new flexibility to existing arrangements, with clear economic and environmental advantages.

First, the maturing of the Australian water economy in recent decades is associated with high average total cost for the long-term supply curve. So TWR potentially offered a new direction that, by reallocating water supply, would reduce the pressure for aggregate supply expansion. This reallocative effect would not be merely within the farming sector. There was also the prospect of reducing agricultural overuse to open up supplies for a range of urban and industrial uses.

Secondly, supply reallocation within agriculture was a major objective. There was a widespread belief by the mid-1980s that TWR would switch water from lower to higher productivity uses in the farming sector. In Australia, at that time, the agricultural sector accounted for 80 percent of total water use. In

Victoria, each year, up to a third of irrigators were using less than their full water right allotment. Specific switches into river red gum watering, salinity dilution and dairy farming were forecast.

In 1995 the Council of Australian Governments introduced its water reform process, according to which all of the state governments committed themselves to introduce a "system of water allocations or entitlements backed by the separation of water property rights from land title and clear specification of entitlements in terms of ownership, volume, reliability, transferability and, if applicable, quality."

3.5. The transformation from socialist to market based economies

While most of the former socialist countries of Eastern Europe and the former Soviet Union had water legislation in place under socialism, this seldom created formal and explicit water rights. Instead annual licences were issued for the use of water resources. Given that the state controlled or owned both the water resources and enterprises undertaking economic activity this mattered little in practice.

The shift to a market based economy has clearly altered the situation and both national and foreign investors will require water rights. So far, however, and unlike the situation with regard to land tenure rights, progress in this area has been relatively slow particularly in the former Soviet Union with only Armenia and Kyrgyzstan having enacted legislation that creates substantive water rights.

3.6. Regional initiatives

In some European countries the introduction of formal water rights is a result of European Community legislation, specifically the Water Framework Directive.[31] Scotland, for example, notwithstanding its damp climate has forty to fifty thousand abstractions and between five and ten thousand impoundments, but until the recent introduction of the Water Environment and Water Services (Scotland) Act 2003 most of these were not controlled by legislation but were regulated on the basis of traditional principles (Allan, 2003).

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[31] Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.

3.7. To support or entrench wider economic reforms

In some jurisdictions water rights reforms have been enacted to support or entrench other economic reforms. For example in New Zealand the Resource Management Act was adopted in 1991 in the wake of a radical re-ordering of the roles of state entities: economic development was to be the primary responsibility of the private sector through the use of market forces with the role of the state to be restricted to the management of resources.

This form of economic re-ordering was even more evident in Chile following the seizure of power by General Pinochet in a coup in 1973. This was followed, *inter alia*, by a fundamental shift in the management of water resources. In a break with the socialism of President Allende, the new government moved to a market-orientated economic policy. In the agricultural sector, land and water rights were shifted to private ownership, property rights in water were introduced or clarified, and market allocation of the good was envisaged. This can in turn be seen as a backlash against the 1967 Agrarian Reform Law which had greatly expanded government authority over water use and water management, at the expense of private rights (Bauer, 2004).

State-owned water rights were terminated and the 1981 Water Code entitled secure, transferable water rights reforms which can be seen as ideological to the extent that they sought to retrench and concretise the land and water (counter) reforms.

3.8. To support other reforms

Historically through to the end of the 1980s the structure of property rights for water and land in Mexico was consistent both with the country's centralization of political and economic power as well as with the strong role played by public sector institutions in allocating resources and producing goods and services.

In particular, following the Mexican Revolution of 1910, the agricultural sector, including its land and water rights, had an exceptional nature, with a strong social welfare role. With the exception of small farms, the farm sector consisted of *ejidos*, land in social property and owned in common by the farmers living there. In the *ejidal* system, state irrigated land was managed in Irrigation Districts.

The bulk of surface water for irrigation was distributed directly by the National Water Commission or *Comisión Nacional del Agua* (CNA) headquartered in Mexico City. Water allocations could not be sold, rented or used on other lands beyond the 20 hectare maximum per farmer. In fact there was a short-term water rental market, illegal but facilitated by local officials, where larger farmers were active. But because of the discretionary power of the CNA and the Ministry of Agriculture, there existed great uncertainty in access to water concessions – they could be reduced or revoked for a wide variety of reasons. This system of water allocation went hand-in-hand with low water productivity and economic efficiency as well as *ejido* dependence on central subsidy of the Irrigation District. By the 1980s the time seemed to be ripe for a shift from central controls to local freedoms and this was seen to make a strong case for the introduction of water rights held by farmers themselves alongside the transfer of responsibility for the operation of irrigation infrastructure from the state to farmer-operated water user associations.

This enactment of Mexico's National Water Law in 1992 coincided with a series of policy reforms initiated in the late 1980s which included:

- the privatization of communal land holdings (*ejidos*) through the1992 Agrarian Law;
- the transfer of the operation of canal systems to farmer-controlled water user associations;
- the revision of the role of the CNA; and
- the introduction of more liberal trade policies in conjunction with the conclusion of the North American Free Trade Agreement (NAFTA) (World Bank, 1995a).

3.9. The promotion of social goals

In relatively few cases have water rights reforms had social goals. An exception is South Africa where water law reforms were a direct result of the historic elections of 1994, the first involving universal suffrage. The Government of National Unity embarked on a Reconstruction and Development Programme aimed at ending poverty. The 1998 Water Act sought to implement the two key principles of the 1997 National Water Policy, "sustainability" and "equity".

With 83 percent of agricultural land previously in the hands of white farmers and the majority of water for irrigated agriculture also controlled by them through the white-dominated irrigation boards both land tenure reform and water reform were necessary to right the injustices of the apartheid era (World Bank, 2000). One of the key features of the Water Act was the abolition of riparian rights and its replacement with a modern permitted water rights regime with the specific objective of removing the privileged position of riparian land owners.

3.10. The completion of earlier reforms

In a number of cases recent water rights reforms have sought to complete and perfect earlier reforms. In the Australian state of Queensland, for example, the water entitlement provided by a water licence was often poorly specified. That is, the licence did not make clear the extent of the entitlement. In particular the absence of a volumetric cap on the amount that could be taken led to unreal expectations by licensees and the potential for actual use to expand in an unconstrained way causing negative impacts on neighbours and the environment. Water users also had no specification of the reliability of supply that could be expected under a licence. In surface water systems licensees sometimes found that although their licence did not change, the amount of water that could be obtained under the licence was progressively reduced by the construction of new dams (Cox, 2002).

Similar problems existed with regard to the water legislation of the other states, legislation which provided for administrative water rights, albeit rights that were generally tied to specific land plots. In 1994 the Council of Australian Governments (CoAG) endorsed a strategic framework for the efficient and sustainable reform of Australia's water industry. One of the key elements the framework addressed was water rights. The CoAG agreed that each member government would clearly specify rights in terms of ownership, volume, reliability, transferability and, if appropriate, quality (Productivity Commission, 2003).

Turning to Mexico, one of the objectives of the reforms described earlier was to complete a process begun by the first Federal Water Law, enacted in 1972. However no implementing regulations had ever been issued in connection with that law. It provided "national waters" to be used exclusively on the basis of a concession granted by the Federal Executive. It was estimated that there were about 300 000 users by 1992 but only 2 000 concessions had been

issued mainly because this power could be exercised solely by the President (FAO, 2001).

3.11. Pressure on water resources

Last, but not least, underlying all of these issues is the simple fact that around the world pressure on water resources has hugely increased. The reasons are well known and include population growth, the rise of mega-cities, rising affluence leading to greater water demand as well as new industrial and commercial processes.

Already, around one third of the world's population live in countries that suffer from moderate to high water stress. Continued population growth and the effects of climate change, a phenomenon whose eventual impacts are not yet fully understood, suggest greater pressure still. It is reckoned that the demand for water will increase by around 50 percent in the next 30 years and that around 4 billion people, one half of the world's population will live in conditions of severe water stress by 2025.[32]

A lot of this increased demand will come from irrigated agriculture which is particularly sensitive to small temperature variations. The agriculture sector is already the main water use sector in many countries around the world and some forty percent of world food production is currently produced on around 250 million hectares of irrigated land (Bogdanovic, 2002), an increase of some 200 million hectares over the course of the twentieth century. This increase is a result of major investments in the sector that have the effect that on average some 73 percent of all water abstractions are for irrigation, with an even higher share in lower income countries (World Bank, 1992): in India irrigation accounts for 93 percent of the gross amount of water used (World Bank, 2003).

Furthermore, the level of demand for irrigation water is unlikely to decrease in the near future. At least 17 percent more freshwater than is currently available will be needed by 2025 to produce sufficient food for the 8.8 billion people who it is estimated will populate the planet, even if everything is done to make irrigated agriculture more water efficient. If this is not done, it is estimated that at least 55 percent more freshwater will be needed.

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32 With conditions particularly severe in Africa, the Middle East and South Asia (World Bank, 2003).

From time to time newspapers talk in turns of an increasing scarcity of water. In fact, unlike oil and other non-renewable natural resources, the volume of freshwater has remained remarkably constant over the millennia (McCaffrey, 2001). What is needed is better and more efficient management.

It has been suggested that the single greatest problem in water resource management in the developing world is that property rights in water are very insecure and ineffective. But pressure on water resources is not limited to developing countries. In Texas, for example, it is estimated that the population of the state will almost double in the next 50 years from 19 to almost 36 million (Pitts *et al.*, 1999) a pattern that is repeated throughout the American West and Southwest (Blomquist *et al.* 2001).

Given that in many jurisdictions few additional resources remain to be exploited - there are few viable dam sites left in Australia for example - better management and allocation of water resources is really the only available option. In modern societies law plays a key role in this process of allocation and management, primarily through the mechanism of water rights. It follows that the introduction of modern water rights in particular and water rights reforms in general will continue to be on national agendas in most countries around the world for the foreseeable future.

4. THE CONSULTATION AND EDUCATION PROCESS INVOLVED

Having identified the need for water rights reform, this section examines the consultation and education processes that have been undertaken in connection with the reforms themselves.

Each jurisdiction has its own particular formal procedures for the adoption of new legislation. In common law jurisdictions, a consultation paper (sometimes known as a "green paper") is typically circulated by the sponsoring ministry for comment from other ministries/state agencies as well as civil society (including the business community and non-government organizations (NGOs). Based on the responses received a more formal legislative proposal (sometimes called a "white paper") is then circulated for comment, sometimes following cabinet approval. Draft legal text is then prepared by the sponsoring ministry, government legal service or parliamentary counsel for inter-ministerial consultation followed by cabinet approval prior to submission to the legislature.

In contrast, in the civil law jurisdictions of the countries of the Commonwealth of Independent States the first step is usually for the sponsoring ministry to prepare and circulate a draft legal text through two rounds of "inter-service" or inter-ministerial consultation before submission to the government (cabinet or council of ministers). Such formal procedures are determined by custom, law or government instruction but in any event a detailed comparison can really only be of academic interest as far as the enactment of legislation for the introduction of modern water rights is concerned.

What is of more interest is to consider the consultation and education processes that have been undertaken before the start of the formal procedures as well as the extent to which formal procedures create genuine opportunities for public consultation.

In a number of the jurisdictions considered in this paper little in the way of consultation and education took place in connection with the introduction of water law reforms.

For example, a consultation and education process was not seen as a fundamental requirement for the shift to market institutions by the

authoritarian government of President Pinochet in Chile. The government, before assuming power, had developed a clear notion that private rights in property were the key to economic success. What consultation took place concerned the modalities of the new code prior to its inception in 1981.

The lack of consultation is not confined to more authoritarian regimes. Water law reform was one of the flagship legislative reforms of the Socialist government that was elected in Spain in 1982. While the concepts and draft texts were carefully but rapidly prepared by a large and competent team of experts there was little public debate on the matter as the administration favoured an internal discussion process in order to meet tight legislative deadlines.[33]

Generally speaking, however, there is now a trend towards genuine consultation by governments with a wide range of stakeholders before substantive reforms are undertaken in natural resources sectors such as the water sector.[34]

There are a number of benefits of taking such an approach. First of all widespread consultation has a very valuable educational function: those who are affected by eventual reforms will be relatively more familiar with their effects and objectives not least by reason of having directly or indirectly participated in their final development. Secondly, experience suggests that widespread and genuine consultation leads to the preparation of better and more effective legislation, particularly in respect of complex sectors such as water. Thirdly, while consultation is sometimes dismissed as but a form of "political correctness" the fact is that substantive reforms may have important and complex socio-economic impacts on livelihoods that legislative procedures may have difficulty capturing. In other words there is a form of moral case for listening to the voices of those affected. Finally, and arising from the points just made, experience shows that if a broad consensus can be reached as a result of a genuine consultation process it is ultimately much easier at the political level to enact legislation particularly with regard to vital natural resources such as water.

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33 Similarly in Mexico the shift towards liberalization in the early 1990s offered the farmer greater control in his access to water. But the process of liberalization was a top-down movement and so the consultation and education process for the introduction of modern water rights was minimal (FAO, 1999).

34 Even in England recent and ongoing water sector reforms have undergone a lengthy and elaborate consultation process.

For example, in the Australian state of Victoria the consultation and education process with respect to the most recent reforms designed to introduce effective transferable water rights involved the production of background documentation on transferable water rights, questionnaire and interview surveys on farmers" interest in the subject, the launch of research projects on prior experience in other parts of the world (such as northern Colorado), and conferences between farmers and the state government on the opportunities offered by a new system. Similar, quite intensive consultation work took place in the other Australian states.

In South Africa the formal step of issuing a Government White Paper in 1997 on water law reform was the product of two years of extensive study and wide consultation. The first outcome was the production of the "Fundamental Principles and Objectives for a New Water Law in South Africa" which were approved by the Cabinet in November 1996. These Principles in turn guided an intensive programme of work involving the Minister and other political leaders, officials from the Department of Water Affairs and Forestry and other government departments, organized user groups and South Africans from all walks of life and from all provinces in a process of consultation, research and synthesis.

The process of consultation began with the distribution, in May 1995, of the booklet "You and Your Water Rights" for public comment. A Water Law Review Panel then produced a set of principles for a new water law, taking into account the comments from the public. These principles were further refined and released on 17 April 1996 as the basis for further public consultation. Consultative meetings were held in all nine provinces of South Africa, organized in such a manner that the voices of the rural poor and the disadvantaged would be heard.

Other interest groups such as agriculture, industry, mines, municipal users and environmental groups were encouraged to arrange their own meetings to discuss the principles. They also took part in the consultative meetings and in bilateral meetings with the minister and department. Other national government departments and both provincial and local spheres of government were also consulted.

The consultations ended in a Water Law Review National Consultative Conference in October 1996 which discussed practical approaches to implementation as well as the principles that would guide the drafting of the

law. The final Fundamental Principles and Objectives for a New Water Law for South Africa ("the Principles") were approved by Cabinet in November 1996.

Eleven technical task teams were then appointed to translate the Principles into practical proposals which informed the policy positions of the White Paper. The draft National Water Bill was subsequently drafted on the basis of the White Paper, which was tabled in Parliament during the course of 1997. The new National Water Act was finally adopted in 1998.

A similar but somewhat simpler approach was undertaken in Kyrgyzstan in connection with the preparation of the recently enacted Water Code. One of the key objectives of the sponsoring ministry, the Ministry of Agriculture and Water Economy, was to establish a system of modern water rights to complete and complement the land tenure and irrigation management reforms already undertaken (agriculture is the country's largest economic sector). The notion of modern water rights was almost entirely novel in a culture that was influenced both by rather top-down soviet bureaucracy as well as Islamic notions that water is a "Gift from God". The process, which was supported by the United States Agency for International Development (USAID) began with a concise review of the deficiencies of existing (soviet style) legislation[35] and the related obstacles to effective water management.

Next a short paper was prepared on the contents of a typical modern water code based on international experience alongside ten issues papers describing the "hard" or key policy issues that would need to be agreed on. These documents were widely circulated among government ministries, local and regional government, NGOs concerned with water and environment issues, as well as water users.

A series of discussion meetings were held around the country and experts from the Food and Agriculture Organization of the United Nations (FAO) were invited to make a presentation at a high level seminar attended by ministers and senior officials. Next an inter-ministerial working group was established composed of senior experts as well as NGO representatives to work through and reach a consensus on the "hard" and key issues. The findings of these working groups were presented at a further national high

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35 The law, the 1995 Water Law, was essentially the Water Code of the former Soviet Socialist Republic of Kyrgyzia with the words "soviet socialist" removed.

level workshop which, with the approval of the Minister, then mandated the preparation of the first draft text.

Meanwhile the government had requested FAO's assistance in starting to prepare the ground for the implementation of the new code, and in particular the implementation of the water rights regime. Those findings, coupled with a series of workshops and widespread consultation on the draft led to the development of a text that the Ministry could then submit to the formal pre-legislative approval procedure. Throughout, the key issues being addressed and the content of the code were described in a water law bulletin (published in Kyrgyz and Russian) published four times a year and with a print run of 15 000 that was widely distributed around the country. Finally, mention should be made of a study tour to South Africa that was organized by FAO for senior government officials and which enabled them to experience at first hand the substance and effects of the South African reforms.

5. THE LEGAL AND REGULATORY BASIS

In this section the legal and regulatory basis for the introduction of formal and explicit water rights is considered. After examining the formal source of the "legal rules" for the introduction of such rights, the substantive conceptual content of the different steps in the process is considered.

5.1. The need for primary legislation

In all of the examples considered, modern water rights have been established on the basis of primary legislation. More specifically, and depending on the jurisdiction and legal tradition involved, such rights have generally been introduced through the enactment of new legislation in the form of a water or water resources "act", "law" or "code".

In connection with the notion of integrated water resources management there is a trend towards enacting comprehensive water legislation that addresses all aspects of the hydraulic cycle thus including ground water and surface water (and even cloud seeding and rainwater harvesting). Nevertheless in some jurisdictions groundwater continues to be regulated under separate legislation. This tends to be either because groundwater is overwhelmingly more important than surface water (in countries with little rainfall for example) or, as in the case of several American states, because a specific response is needed to ground water over-abstraction which does not require amendment of the surface water regime.

The need for primary legislation is explained as follows. New water rights regimes invariably affect existing water rights including traditional rights. In most jurisdictions existing traditional water rights, whatever deficiencies they may have, are a form of property right. Indeed in the case of private waters under the civil tradition such rights are in fact a form of ownership right.

If such rights are to be modified, or even cancelled, this can only be done on the basis of primary legislation and even then only on the basis of very clear wording. New water legislation can, and often is, subject to challenge by those adversely affected. For example provisions in the 1985 Spanish Water Law concerning pre-existing groundwater rights were challenged as amounting to an illegal "taking" up to the level of the Constitutional Court.

Equally if new legislation is to establish modern water rights as a form of property right, an issue returned to below, this too can only be done on the basis of primary legislation.

In the case of federal states the level at which primary legislation is enacted will depend on the provisions of the relevant constitution. In all of the cases considered with the exception of Mexico, such laws are enacted at state level, for example in the cases of Australia and Canada. The effect is, of course, that water legislation, and thus approaches taken to water rights, in different jurisdictions within a federal state can be markedly different. While this observation is true for those jurisdictions in which this issue is addressed primarily in legislation, it is, as already seen, even more marked in the United States where the two common law doctrines continue to play such an important role.

Indeed Mexico is perhaps unusual in that responsibility for waters is a Federal competence. But it is not unique. For example, a Federal Water Resources Law was recently adopted by the Russian Federation.[36]

5.2. The "nationalization" of water resources

In many jurisdictions the first step in establishing a system of formal rights is to bring water resources within the ownership or control of the state. Because, as described above, the common law has not generally recognized the concept of ownership over flowing water resources even by the state, water legislation in common law jurisdictions has tended to declare a superior state control right over water.

This is done through a variety of different legal techniques. These have included:

- a declaration (or sometimes a reiteration) of state ownership, as in Albania's Law on Water Resources of 1996;
- the inclusion of water within the public domain of the state, as happened in Italy in 1994 and Morocco in 1995 in connection with groundwater reforms;
- a declaration that water is "national property for public use" as is the case in the Chilean Water Code;

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[36] Water Code of the Russian Federation No. 74-FZ, dated 3 June 2006.

- a declaration that water is "public property" as provided for in section 1 of the Israeli Water Act 1959 and in respect of groundwater in New Mexico's 1927 groundwater legislation;
- the vesting water resources in the President of the State on behalf of and in trust for the people, as provided for in Ghana's Water Resources Commission Act of 1996;
- the placing of national water resources under the trusteeship of the National Government as in South Africa under the National Water Act 1998;
- bringing water resources under the superior use right of the State in Uganda's 1995 Water Resources Act and the Australian state of Victoria's Water Act of 1989.

Usually, such state ownership or control applies to all of the water resources within a state's territory thus including both surface water and groundwater.[37]

Having placed water resources under state ownership or control the next step is to address the validity of existing water rights. Apart from provisions that either continue such rights on a deemed basis or provide for their conversion into the new form, an issue returned to below, this is usually achieved by a simple statutory declaration.

Two examples from different Australian jurisdictions are instructive.

Section 8(7) of the Victorian Water Act provides:

> "The rights to water conferred by or under this Act on a person who has an interest in land replace any rights:
> (a) to take or use water;
> (b) to obstruct or deflect the flow of water; or
> (c) to affect the quality of any water; or
> (d) to receive any particular flow of water; or to receive a flow of water of a particular quality
> that the person might otherwise have been able to enforce against the Crown or any other person because of , or as in incident to, such interests."

This is in those cases where the existing rights would be replaced through the transitory provisions in the new law.

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[37] Although Spain's recent water legislation omits fossil groundwater.

A simpler means of achieving a similar but less comprehensive result appears in section 7(9) of the South Australian Water Resources Act 1997. It provides:

> "Rights at common law in relation to the taking of naturally occurring water are abolished."

5.3. Institutional arrangements for water resources management

Having placed water resources under state control or ownership and dealt with the status of existing water rights, logically the next legislative step is to create the institutional arrangements for the management of those resources, including the issue of water rights.[38]

Typically the ultimate responsibility for water resources management, together with necessary legal powers, is formally conferred on a minister, usually acting through a statutory Director or Director General of Water Resources, such as the Department of Water Affairs and Forestry in South Africa, or some other statutory body such as an authority (such as the Jamaica Water Authority) or agency (such the Environment Agency in England) or General Directorate of Waters such as the *Dirección General de Aguas* in Chile. For the purposes of this paper the generic term "water administration" will be used.

While a water administration typically has overall responsibility for water resources management, including the administration of water rights, throughout the relevant jurisdiction there is an increasing trend for water management to be undertaken on a drainage basin approach. South Africa with its statutory Catchment Management Agencies, provides one example while the European Community provides another.[39]

In other words water is managed by reference to the shape or form of the land that forms the catchment of a major river, and its tributaries, from the upper watersheds down to the sea, or other final "terminus" (such as a lake).

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38 The word "institution" is used in the sense used by lawyers. Social scientists would probably use the word "organization" as law is itself is seen as an institution.

39 The Water Framework Directive requires water to be managed on the basis of river basin districts (article 3).

The following factors are cited in support of this approach:

- its hydrological unity from a management perspective;
- the interdependence of different parts of each river basin;
- the river basin provides a natural forum for conflict resolution;
- the river basin is an obvious focus for data collection and analysis;
- many externalities are internalized at the river basin level;
- there are opportunities for optimizing water development and operation at the river basin level. (Winpenny, 1997)

While this approach is correct from a hydrological perspective, given that surface water within the basin will naturally flow in a common direction towards that terminus, it does mean that water resources management is undertaken in what can be a very large land area that usually does not accord with administrative boundaries. After all, rivers and lakes make good natural borders, both internal and external.

As such it can become a rather complex process. It can also make it more difficult to accommodate groundwater management within surface water basins, as aquifer boundaries often do not follow the latter. Nevertheless, the trend is certainly in this direction and it is a trend that is increasingly provided for in water legislation.

5.3.1. Stakeholder involvement

The complexity of water resources management and the need to involve so many stakeholders means that legislative provision is often also made for co-ordinating and/or decision-making mechanisms at the central level as well at the level of individual basins or catchments.

Such arrangements typically seek to give effect to the second of the Dublin Principles, namely that water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels.

An example of the former kind of body is the inter-ministerial National Water Council provided for in the Albanian Water Law which is chaired by the Prime Minister. A similar entity was introduced into the Tunisian legislation in a 2001 amendment to the 1975 Water Code.

Examples of the latter include the river basin councils of France, Spain and Mexico. While South Africa's Catchment Management Agencies operate under the overall supervision of the Department of Water Affairs and Forestry, each is governed individually by a management board comprised of water users and other stakeholders. While the range of roles and tasks of such bodies vary from jurisdiction to jurisdiction, their establishment goes beyond mere rhetoric.

Particularly as regards planning activities and decisions on water rights issues, it very frequently happens that "hard decisions" have to be made that may negatively affect rights holders. Apart from the fact that participatory approaches arguably lead to better decisions being made, the fact remains that the negative impacts of hard decisions are much more easily implemented if those affected have played a part in reaching them.

5.3.2. Specialized water management entities

In addition to providing for the establishment of a water administration, there is an increasing trend for water legislation to devolve responsibility for aspects of the management of individual water resources at risk of depletion or contamination to specialized water management entities such as water user associations, which are typically established on the basis of generic enabling legislation, [40] or resource specific statutory bodies which are typically established individually on the basis of a specific act or law.

Water user associations, which are legally independent entities controlled in a participatory and democratic manner by water users have a long history in water management around the world. Best known historically for operating irrigation and drainage systems, recent years have seen a significant broadening of their activities (FAO, 2004).

For example in Spain the 1985 Water Law made the establishment of groundwater user associations (GUAs) compulsory in overexploited aquifers. Like water user associations in most jurisdictions GUAs are established as bodies of public law or public corporations pursuant to the 1985 law which also sets out their relationship with the water administration, under whose overall supervision they remain. The fact that they function on a democratic

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[40] In other words all water user associations within a given jurisdiction are established on the basis of the same enabling legislation.

basis and are controlled by users means that GUAs have a greater inherent authority when it comes to making "hard" decisions such as, for example, restricting groundwater abstractions.

A similar approach is found in California, Texas and a number of other western states in the form of groundwater districts. In Texas, for example, in response to concern about the over-extraction of groundwater some 88 groundwater districts, a form of water user association, have been established in respect of around 89 percent of the state's groundwater. They are locally controlled by local voters. These districts may, but are not required to, set limits on pumping and wells. They have been described as "planning giants and regulatory dwarfs": while they have extensive powers to study, report, disseminate and plan they have been limited in their ability to disturb the basic rule of "capture" described above (Kaiser *et al.*, 1998).

In response to concerns over the effectiveness of the groundwater districts, coupled with continued fears over the state of the important Edwards Aquifer in 1993 the Texas legislature enacted the Edwards Aquifer Authority Act to establish the Edwards Aquifer Authority (the Authority) as a special statutory body. The Authority is a regulatory agency charged with preserving and protecting the Edwards Aquifer in an eight-county region. However, legal challenges prevented the Authority from operating until 28 June 1996.

The Act created a 17-member board of directors that sets policy to manage, conserve, preserve and protect the aquifer, and works to increase the recharge and prevent waste or pollution of the aquifer. The board has 15 selected members from the eight-county region and two non-voting appointed members to carry out the duties set out in the Act. The Act also established the South Central Texas Water Advisory Committee made up of representatives from down stream counties to interact with the Authority when issues related to downstream water rights are discussed. The tasks of the Authority are i*nter alia*:

- to fully implement the requirements of the Edwards Aquifer Authority Act;
- to develop an effective, comprehensive management plan based on sound, consensus-based scientific research and technical data;
- to maintain continuous spring-flow;
- to protect and ensure the quality of ground to surface water in the Authority's jurisdiction

- to promote healthy economies in all parts of the region;
- to research and develop additional sources of water; and
- to provide strong, professional management of groundwater resources.

Crucially, with the exception of some wells used to abstract water for domestic and livestock purpose, any well that withdraws water from the Edwards Aquifer is required to have a properly installed water flow meter. The flow meter measures the amount and velocity of the water that is discharged through the well and these are verified periodically by the Authority's technicians.

The Authority's activities are conducted on the basis of its Groundwater Management Plan (GMP) that includes a set of nine goals with appropriate management objectives and performance standards necessary for the effective management of the Edwards Aquifer.

5.3.3. Water administration tasks and powers

While a full discussion of the structure and tasks of water administrations is beyond the scope of this paper their basic tasks usually include:

- planning;
- the organization of stakeholder fora (as described in the previous sub-section);
- monitoring of water quality and water quantity ;
- the issue and administration of rights, including the maintenance of registers;
- the enforcement of water law and water rights regimes including prosecution activity.

In other words, much of their practical activity relates directly or indirectly to water rights.

First of all, as already mentioned, the level and flow of water varies in most watercourses primarily as a result of climatic variations. The first task for a water administration is to monitor the level and flow of waters throughout the length of a water course as this will have impacts on both the quality of water and the amount that can be abstracted or otherwise used pursuant to water rights. This requires the costly installation and operation of measuring equipment, and if the river or stream in question is fed from glaciers or snowfields may also require monitoring conditions in the high mountains.

The measurement of water rights themselves is also a relatively complex matter requiring continued activity. Particularly in times of drought, when pressure on water resources is likely to be at its highest, the temptation to "cheat", to abstract more than permitted by the water right or any restriction placed upon it, is likely to be at its greatest.

But the quantity of water in a watercourse is not the only matter that requires constant measurement. Since time immemorial humans have disposed of wastes to rivers and streams, with or without treatment, and while increasingly regulated the practice continues. Solid and liquid wastes from urban sewerage systems, from factories and other pollutants from surface water run-off (particularly fertilizers and pesticides) contribute to lowering the level of water quality in rivers and streams and in groundwater formations and thus the quality of water that is subject to water rights.

The importance of monitoring and enforcement cannot be over-emphasized: where they are ineffective the value of water rights will be diminished (Productivity Commission, 2003). Furthermore it is necessary for the legislation to confer on the officials of water administrations the necessary inspection and enforcement powers. Such powers may include the right to enter privately owned land to undertake inspections and monitoring activities as well as the right to take enforcement measures. Such measures may in turn include a power of arrest as well as the power to impose fines, to initiate prosecutions under criminal or administrative law and to impose administrative penalties such as the suspension or cancellation of water rights. Criminal prosecutions may lead to a range of penalties including imprisonment. Typically powers may also be conferred on water administration officials to direct how specific activities involving the use of water are undertaken or to order certain activities to be stopped or remedied.

In short, apart from the need for constant measurement and monitoring activity water rights are dependent on the active management of watercourses. Such activities, indeed all of the activities mentioned in this section clearly have human resource and financial costs. Indeed the costs of setting up the institutional arrangements of this type have led some to question whether institutional models for integrated basin management, of the sort pioneered in Australia and Europe are really replicable in developing countries, particularly given the huge catchments of many Asian rivers (see, for example, Shah, 2002). There is clearly substance to these arguments. On the other hand, hydrology cannot simply be ignored and it may well be the

case that in particularly large river basins administrative or provincial actors have of necessity to be involved for example through the use of inter-province river, or in federal jurisdictions, inter-state, commissions. A full discussion on this point is, however, beyond the scope of this paper.

5.4. "Free" uses of water

Water legislation typically provides a range of exemptions for activities that would otherwise require a water right. Indeed such entitlements are sometimes described in legislation in terms of "rights".[41] Typically, this is done by reference to the type of activity, the volume of water used or a combination of both.[42]

In Spain, for example, such uses are classified as "common uses" and include the use for drinking, bathing, and other domestic purposes as well as livestock watering. In the province of Saskatchewan, Canada, the exemption derives from the size of the parcel of land to be watered, while recent water law reforms in England exempt abstractions of up to 20 cubic metres per day from the water rights regime.[43]

In Ghana it is an offence to exploit or in any way use natural water resources without a water right granted by the Commission except for water use for the fighting of fire or where water is abstracted by mainly manual means. [44]

Until recently the legislation of Alberta in Canada provided that riparian land holders could continue to use water for "domestic purposes" which were defined in section 1(g):

> "Household requirements, sanitation and fire prevention, the domestic watering of animals and poultry and the irrigation of a garden not exceeding one acre adjoining a dwelling house on the land of a riparian owner."

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41 Article 13 of the Albanian Water Law, for example, provides that "Everyone has the right to use surface water resources freely for drinking and other domestic necessities and for livestock watering without exceeding its use beyond individual and household needs …"

42 Nevertheless water legislation usually provides that such "free uses" of water may also be subject to restriction in times of drought.

43 Similarly, agricultural irrigation is exempt from permit requirements in Kentucky and Maryland (up to 10 000 gallons a day) (Getches, op cit.).

44 Opoku-Agyemang in Bogdanovic, 2002.

In practice this provision caused problems on stressed river systems with such riparian owners consuming the entire stream-flow. It is also difficult to quantify the quantity of water to which riparians are entitled and there were a number of exaggerated claims. The new legislation restricts such "domestic" rights up to a limit of 1 250 cubic metres per year per household and gives such uses highest priority in times of shortage.

There is no great theoretical justification for exempting such uses from formal water rights regimes. Instead, a value judgement is made by the legislature that takes account of the increased administrative and financial burden of including such uses within the formal framework, their relative value to individual users and their overall impact on the water resources balance.

Similarly as regards groundwater rights, legislation typically provides that a formal right to abstract and use groundwater is not necessary in connection with certain specified purposes provided relatively small volumes of water are used. In Australia, for example, a formal water right is not necessary for the abstraction and use of groundwater for stock and domestic purposes (including household garden irrigation). Such exemptions are usually justified on the basis that their use will have little impact on the total available water supply as well as the administrative burden of seeking to regulate them. However, the sheer number of individual wells can ultimately have a significant negative impact on the quantity (and quality) of groundwater and related surface water resources (see Drennan, 1997, and Caldwell, 1998).

5.5. The introduction of water rights

The next step is to introduce modern water rights. As to their legal form, water rights are mostly now created on the basis of a legal instrument issued by the water administration. Such instruments are variously described in legislation as "licences", "permissions", "authorizations", "consents" and "concessions". From a general legal perspective such terms are synonymous. Having said that, in those cases where the word "concession" is used in water

legislation this generally relates to cases where a particularly long term of use is envisaged coupled with major investments in infrastructure.[45]

As to their substance, modern water rights are administrative use or "usufructory" rights. The question arises as to whether or not they are property rights.

Some modern water legislation seeks to make this explicit. For example South Australia's Water Resources Act 1997 states that "a licence (including the water allocation of the licence) is personal property vested in the licensee and will pass to another person under Division 3 [which deals with the trading of licences] or…in accordance with any other law for the passing of property".

In Chilean law while water is considered a public good, individuals can obtain rights of use over water by receiving a grant from the state, by prescription or by purchasing water rights. Although these are use rights, rather than ownership rights, they are governed by private as opposed to public or administrative law.

In other jurisdictions the question as to whether or not modern water rights are a form of property is not specified. The fact that they gain their existence from an administrative or regulatory procedure does not by itself preclude them from being property rights. After all, intellectual property rights in the form of trademarks and patents are usually acquired through an administrative procedure.

In conceptualising property both of the main legal traditions differentiate between personal (movable) property such as chattels and real (immovable) property such as land tenure rights. It is also important to note that property rights do not necessarily equate with ownership rights.

Therefore, the fact that water rights may be subject to restrictions, even restrictions on their sale or transfer in some jurisdictions, does not necessarily

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[45] The word "concession" is in any event a somewhat slippery term with several different meanings some of which are also used in the water sector. For example a person may hold a "concession", in the sense of an exclusive right, to operate a pop-corn stand in a cinema. Similarly, following the so-called French model, a private water supply company may hold a concession, in the sense of an exclusive right, to operate an urban water supply network. In a sense a water right that is described as a concession confers an exclusive right on the holder to use a given volume of water at a given location, but then this can said of any water right.

mean that they are less than property rights. No one would seriously argue, for example, that a right over, say, premises conferred on a lessee pursuant to a lease is anything other than a (real) property right even though it is of limited duration, may specify what the leased premises may be used for and may prevent or restrict assignment of the term.

Consequently it can be said with some confidence that provided they are sufficiently secure and for a sufficiently long duration such water rights are indeed a form of property right.[46] These issues of duration and security are considered below in the section on the definition of rights.

Finally, it should be emphasized that such rights exist entirely independently to land tenure rights.

[46] Joseph Sax, in the context of American water rights, has no doubt that they are property rights even when created by permit (Sax, 1990).

6. THE INITIAL ASSIGNMENT OF RIGHTS

Once new legislation is in force, and the necessary institutional arrangements are in place, the question arises as to how initial rights are assigned. In fact this question needs to be broken down into two separate parts. The first question concerns how pre-existing uses and water rights are brought within the fold of the new water rights regime (the actual mechanics of registration are considered in the next section). The second question is how new rights are established under the new regime.

6.1. The recognition of existing rights and uses at the time of the reform

The treatment of existing rights can be a delicate subject, as mentioned above, due to the risk that those adversely affected will seek to argue that their extant rights have been expropriated. From a legal perspective the simplest solution is to recognize all existing lawful uses at the time immediately before the new legislation enters into force.

Thus in England, following the initial introduction of a system of formal water rights with the entry to force of the Water Resources Act 1963, established uses were treated as vested proprietorial rights and their holders were entitled to a "licence of right". This meant that the holders of all statutory rights to abstract water, as well as those riparians who could show that they had been abstracting water in the five years before the system came into force became entitled to a licence as of right, irrespective of whether it would have been possible for a new licence to have been granted because of the environmental impact of such abstractions. This meant that no-one lost the right to continue an established use of water and so no question of compensation arose.

In Mexico, upon the introduction of a new water rights regime the fundamental basis for the initial allocation of water-rights was the formal or informal water concessions already held during the 1910–1992 period.

In Chile the situation was a little different as previous water law reforms had seen the creation of a range of earlier water rights. In 1975, two years after taking power, the government through administrative orders and transitory laws, froze the actual use of water at 1975 levels to establish a base for the assignment of water rights. Most water users therefore had a good basis for

obtaining water rights by prescription, although as will be seen below problems of recording remain.

In New South Wales, Australia, existing licences issued under the Water Act 1912 are being converted automatically into water access licences under the Water Management Act 2000. In Alberta, Canada, the 1996 Water Act provided that existing licences, which are known as "deemed" licences, continued to be valid. Section 18(2) states (Percy, 1999).

> "A person who holds a deemed licence under this section may continue to exercise the right to divert water in accordance with:
> (a) the priority number of the deemed licence, and
> (b) the terms and conditions of the deemed licence and this Act, and if a term or condition of the deemed licence is inconsistent with this Act, that term or condition prevails over the Act."

A similar but more restricted approach was taken in the South African legislation. Following the entry into effect of the new regime in a given area, only two types of use could be carried out without a licence:

- reasonable domestic use, domestic gardening, animal watering, fire fighting and recreational use;
- continuation of an existing lawful water use.

Existing lawful uses are uses that have taken place within the previous two years and must be registered as such - they are not licensed unless the responsible authority decides they should be, but must be registered so that their lawfulness can be verified.

When legislative reforms have the effect only of modifying existing formal rights these are typically recognized in the new legislation. The Australian state of Victoria assigned the initial rights on the basis of the rights held under the legal arrangements existing prior to 1987/1988.

Following the establishment of the Edwards Aquifer Authority in Texas, pre-existing users were required to apply for permits based on their claimed historical water usage for the period June 1972 to May 1993. In addition they were given priority over new users through a guaranteed water supply.

Typically, though, existing rights and existing uses of water are subject to a formal review at some stage after the entry into force of the new water rights

regime. At this stage they can be adjusted to take account of other recognized rights and planned uses of the water resource in question.

6.2. The grant of new rights

With regard to applications for the grant of new water rights the key point to note is that such rights can only be issued to the extent that they do not conflict with existing water rights and any environmental restrictions on the level of abstractions. It follows that after the introduction of modern water rights, as described in the previous section, there may be no water left in respect of which future rights can be issued.

The discussion that follows therefore only addresses those situations where there is sufficient water for new rights to be granted. The complexity of the process of determining such allocations can be usefully shown by the statutory procedures whereby water rights are allocated and reviewed. Such procedures, which are usually spelt out in primary legislation amplified as necessary by regulations, typically provide for:

- the making of a written application accompanied by specified documentation (such as a plan) and, depending on the size and nature of the proposed use an environmental impact assessment. Such applications are usually required to be made in a standard form but this is not true of Chile;
- the payment of an application fee;
- an inspection by the water administration;
- the publication of the application in a local or national newspaper. Sometimes those directly affected such as right holders are to be notified individually;
- a period during which objections may be filed by third parties (such as existing water users who may fear that their rights may be adversely affected by the proposed use or environmental NGOs concerned, for example, by the negative environmental impacts of a proposed use of water);
- a review of the application by the water administration, and the holding of a public hearing if appropriate; and
- a decision.

In many jurisdictions it is now no longer necessary to be a riparian land owner in order to make such an application. Instead, in most jurisdictions it is sufficient simply to provide evidence that the applicant has some form of access right to the water resource. But in some jurisdictions even this is unnecessary. The South African Water Act, for example, entitles a person who is authorized to use water to claim a "servitude of aqueduct" over land belonging to another person for the purpose of abstracting or conveying water. Such a servitude may be acquired on the basis of an agreement or a court order and in accordance with ordinary land law principles a court may order the payment of compensation.[47]

The question next arises as to the basis on which such decisions are to be made. In other words how are water rights allocated?[48] To ensure that such decisions are not made on an arbitrary basis by the water administration, modern water legislation typically requires the use of one or more mechanisms to promote rational and effective decision-making. Of these the most important is probably planning.

The legislation of a number of jurisdictions requires the preparation and periodic revision of river basin plans. In France, for example, the 1992 Water Act introduced a complex water resources planning system based on General Water Plans (*Schémas directeurs d''aménagement et de gestion des eaux*) covering one or more basins and Detailed Water Plans (*Schémas d''aménagement et de gestion des eaux*) covering one or more sub-basins (or an aquifer) (FAO, 2002).

Other jurisdictions whose legislation requires the preparation of plans include Spain 1985, Italy 1989, Morocco 1995, South Africa 1998, Uganda 1995, South Australia (Australia) 1997 and Texas (USA) 1997. Furthermore, the European Community Framework Water Directive means that the preparation and periodic review of River Basin Management Plans is mandatory for European Community Member States.[49]

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47 National Water Act, Act No. 36 of 1998, Chapter 13, Part Two.

48 In addition in the states of the western United States where the prior appropriation doctrine applies continued beneficial use of appropriated water is a condition of the continued existence of a water right. See Part 5 below.

49 Article 13.

Typically, the legislation also specifies the minimum content of such plans. For example the minimum contents of Spain's National Water Plan are specified in the Water Law. The Plan must include:

- measures necessary for the co-ordination of the basin plans;
- preferred option to possible alternatives regarding the above;
- plans and conditions for inter-basin transfer;
- any foreseen changes in the uses of the resource which may affect existing uses for the supply of towns or irrigation.

The purpose of such plans goes beyond the simple allocation of water rights. [50] They may set development and management priorities and increasingly a key concern is to strike an appropriate balance between the needs of societies to use water and the protection of the environment.

Nevertheless, such plans do generally set out priorities for the use of water. This is required, for example, by the Spanish Water Law which states that priorities are to be determined in the relevant "Basin Hydrological Plan". However, in the absence of such a plan, the priorities should be: (1) drinking water supply; (2) irrigation of land and agricultural uses; (3) industrial uses for electricity production; (4) other industrial uses; (5) aquaculture; (6) recreational uses; (7) navigation and water transportation; and (8) other uses.[51] In the event that two applicants are competing for the same water resources, the water administration is bound to have regard to and apply the relevant priorities for water use.

In some jurisdictions priorities themselves are set out in water legislation. The problem with that approach is its inflexibility. Changes in perceptions of priority cannot be accommodated without a change to the law.

In order to ensure both support for such types of plan as well as to ensure that key interests are not omitted during the course of their preparation, as described above, modern water legislation typically provides for the creation of various basin or sub-basin level fora, such as basin councils or committees,

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[50] Indeed in New Zealand the relevant plans are "regional resource management plans" which are prepared on the basis of the Resource Management Act 1991 and which require regional councils to prepare comprehensive plans for the management of all natural resources including water.

[51] Article 65 of the Water Law, as amended.

in which stakeholders can participate in their development and or review. Sometimes such bodies hold additional functions such as determining applications for particular categories of water rights.

Other mechanisms that assist in preventing arbitrary decision-making in the context of the allocation of water rights include:

- the setting of statutory minimum flow requirements for rivers from which no derogation is permitted as is the case in France, England and Spain;
- the establishment of water "reserves", whereby specified volumes of water are set aside for priority purposes, including environmental needs as in the case of Armenia, Jamaica, Mexico, Victoria (Australia) and South Africa;
- the development of "water sharing plans" that seek to protect water resources and dependent ecosystems and set overall abstraction limits as in New South Wales (Australia);
- the requirement for an environmental impact assessment as required in the member states of the European Union and South Australia (Australia);
- the satisfaction of a test of public welfare in a number of jurisdictions in the western United States.[52]

A range of other statutory tests may be provided for. Thus in New Zealand the water administration must consider "any actual or potential effects on the environment of allowing the activity".[53] In South Africa the water administration is required to address a broader range of considerations in determining applications for water rights, including the need to redress the results of past racial and gender discrimination, the efficient and beneficial use of water in the public interest and the strategic importance of the water in question.[54]

In England above the minimum thresholds, all abstractions require a licence. These are issued on a "first come first, served basis" up to the level which the aquatic environment can sustain. The water administration exercises its discretion within the framework of a catchment management plan - which is

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52 This test is commonly required by legislation in connection with applications for permits for water rights under the prior appropriation in the western United States. It is the second test to be applied, the first being whether or not there is sufficient un-appropriated water (Getches, op cit.).

53 Resource Management Act, section 104(1)(a).

54 National Water Act, section 27(1).

a comprehensive review of the water resources and water use in a given catchment or group of catchments that is prepared on a consultative basis – and the statutory "minimum acceptable flows" that must be defined and secured for all waters.

The procedure is a little different in Chile. Essentially if the water administration determines that there is water available it is bound to issue a water right to whomsoever asks for it. If there is more than one applicant for the same water right then the issue is determined on the basis of an auction. In Mexico too, the water administration may auction water rights in the case of competition for the same water.

Once allocated, details of water rights are usually recorded in official registers maintained by the water administration and it is the register. Article 30 of Mexico's National Water Law, for example, requires the water administration to maintain a "Public Registry of Water Rights". Typically it is such a register, and not the individual document held by the right holder such as a permit, that is conclusive as to the existence and scope of each water right. It follows that the process of initial registration is a key part of the process of introducing a system of modern water rights.

7. EXPERIENCE WITH PROCEDURES FOR REGISTRATION OF RIGHTS

Following the introduction of a new water rights system the main practical challenge is the systematic registration of water rights. Surprisingly, perhaps, the issue of water rights administration, which comprises the initial registration and subsequent management of water rights, has attracted relatively little attention from academia or research institutions.

The importance of registration should not be under-estimated. As De Soto argues the presence or absence of clear title has huge impacts on the value of property and thus on economic activity (De Soto, 2001). In Chile one of the hindrances to the water market has been the incomplete registration of water rights (Briscoe *et al.* 1998).

In some jurisdictions where good records of existing water rights are available, such as the example of New South Wales in Australia this can be a relatively straightforward administrative task. Problems arise, however, when existing water rights, existing water uses or both are not formally registered. One commentator argues that success in implementing and enforcing modern water rights, not only in developing countries, is extremely difficult to achieve. He goes on to state that "probably the most complex challenge water laws pose is the "administration of water rights", i.e. the granting of licences, concessions, permits and other comparable legal titles for the abstraction of water from watercourses, lakes and other expanses of surface water, and for the extraction of groundwater; and the granting of licences, permits, and other comparable instruments for the discharge of waste and wastewater directly to or indirectly into a water body or onto the soil." (Garduno, op cit.)

Why is this the case? The sheer number of water rights involved is one common reason. Next, the process is necessarily time consuming – to register one water right it is effectively necessary to consider the impact of that right on other rights as well as the environment.

In Mexico prospective rights holders had first to establish evidence of previous rights in the application for a concession, which included: the name and address of the applicant; basin, region, and locality to which the application referred; the site from which national water was to be extracted; the volume of water required; the initial use to which the water was to be put;

the point of discharge; details of investments necessary to extract and use the water; and the period for which the concession was sought. Previous water use could be established by certification from an irrigation district or *ejido* administrator as to the individual's land and water rights under the previous law.

Consequently it is necessary to accept that the implementation of a water rights administration system is "a lengthy process whose duration must be measured in decades, not in years." (Garduno, op cit.) In Texas the process of adjudicating surface water rights took twenty years, and it relied on public and private organizations with strong capacity. Furthermore several universities in the state of Texas supported the process (Garduno, op cit.). This is perhaps an extreme example: the reasons why this process was so time consuming included the fact that each water right was subject to a field inspection as well as final determination by a court.

In other jurisdictions the process is often simpler. Typically new water legislation requires existing water users to register their rights within a given period. On the basis of experience it is clear that it is necessary to confer relatively long grace periods and for the water administration to take a "generous" approach to the process. Specifically it is necessary to be very realistic about the likely timetable for registration even in the early design stages of new legislation.

The Albanian water law gives a typical example of an approach that was not likely to succeed. All existing water users were required to register their use of water within 60 days of the entry into force of the law or face criminal or administrative penalties. The combination of a short grace period coupled with the mere threat of sanctions almost guaranteed failure. And indeed this is exactly what happened. Similarly in Uganda following the enactment of the Water Statute in 1995 the Water Resources Regulations provided only one year for existing users to register and the Water Discharge Regulations did not provide for a transition period at all. This was unrealistic not least because the draft effluent standards did not take account of laboratory capacity in the country (Garduno, op cit.).

Experience shows that in such circumstances few water users will respond and that it will be necessary to revise such time periods. For example in Alberta, Canada, the Water Resources Act 1970 required non-domestic users of groundwater to obtain a licence. The initial two years' period of grace was

ultimately extended to seven years and even after that time many ground water users had failed to make the necessary application (Percy, op cit.).

The Mexican water law and regulations came into effect in December 1992 and January 1994, respectively (the day after their publication in the *Official Gazette*) and provided for only a three year period to register the estimated 370 000 users. This period was insufficient and so in 1995 and 1996 the President of the Republic issued decrees and pardoned the arrears of water charges of those who applied for water abstraction and waste water discharge permits.

In South Africa two important features of the National Water Act assisted in its implementation. One is that water use permits were initially required in water stressed areas, thus providing for a realistic and gradual approach to the regulation of water resources abstraction. The other is that the Act empowered the Minister to bring different sections into force at different times. This allowed more than one year for preparation.

In order to encourage people to bring their uses of water within the rights regime active publicity using all available popular media is a pre-requisite. At the same time even the use of generous grace periods and effective publicity is likely to be ultimately unsuccessful if it is based simply on a threat of prosecution for non-compliance. Lessons learned in the context of the Mexican experience were applied in South Africa. These included the need to plan the implementation aspects of the introduction of a new water rights regime at an early stage. Thus implementing regulations were developed alongside the primary legislation. In addition a separate implementation team was established to anticipate what the implementation of the bill would require (Garduno, op cit.).

Finally the case of Mexico, which is believed to be the largest systematic water registration undertaken thus far, shows that an impressive number of water rights can be issued even if some formal "corners" have to be "cut". Garduno notes that:

> "Thanks to the Presidential decrees, mass media campaigns and hundreds of meeting with water users, by March 1999, 241 000 users had been granted abstraction permits, which were recorded in the Water Rights Register. At that time it was expected to complete the registration of existing water users by the year 2000. The fact that all applicants were granted permits without carrying out water balance studies may be considered an "ecological price"

> that had to be paid because in some of the river basins and aquifers where permits were granted water is scarce. This "ecological price" will make it possible to register all existing users in order to be able to set the stage for sustainable water resources development and management."

The background to this comment is that the water legislation provided for five to 50 year permit duration. However, according to the 1996 decrees all applicants were initially issued with ten year permits. This was a short enough duration for the government to be able to rectify a grant when users asked for a permit renewal, but long enough to improve information on water availability (taking into account both quantity and quality) and on water uses, in order to make a decision based on adequate studies.

8. THE DEFINITION OF RIGHTS

This section looks in more detail at the definition and substance of modern water rights. What are the features of such rights that enable them to be classified as property rights? Key features include:

- the description of the volume of water that applies to the right;
- the duration of the right;
- the number and content of conditions attached to the right; and
- the mechanisms that guarantee the security of the right.

The key objectives are to promote certainty and security on behalf of the right holder. Such attributes directly affect the value of the right irrespective of whether or not it is tradable or traded.

8.1. The volume of water that is subject to the right

The key benefit of modern water rights over the traditional approaches described above is that the volume of water that is subject to the right is clearly specified.

Typically if the flow of water in a watercourse is regulated (by a dam or a weir) a water right specifies the volume of water that may be abstracted and/or used. Most rivers, however, are not regulated and the volume of water available for abstraction varies from year to year depending on the availability of water resources. Similar variations may exist with regard to the volume of water that is contained in aquifers.

If the flow is not regulated then a water right will specify a fraction of the flow that may be abstracted by reference to the overall flow rate of the water course. In the Australian states of New South Wales, Queensland and Victoria, for example, annual allocations are announced each year as a proportion of the entitlement of each water right. In other words the water rights are made up effectively of two separate components. This proportion can vary significantly from year to year and from to state to state depending on the legacy of past allocation policies and from resource to resource depending on availability during each irrigation season (Bjornland and O'Callaghan, 2003).

In Chile, although the law defines water use rights as a volume of flow per unit of time, in practice rights are a share of stream flows, since variability renders the volumetric/time specification impractical (Rosegrant *et al.*, 1996). Similarly in Mexico while water rights are technically specified in volumetric terms, rather than in proportion to the stream flow, in practice the allocation of streamflow converts this volumetric flow to a proportion of streamflow right.

While each right holder will usually be required to maintain a record of the volume of water used or abstracted as a condition of his/her water right, the accuracy of such records must be routinely verified by the water administration through physical inspections. Particularly in times of drought, when pressure on water resources is likely to be at its highest, the temptation to "cheat", to abstract more than permitted by the water right or any restriction placed upon it is likely to be at its greatest.

It follows from the above that the correct monitoring of river or aquifer flows or storage by the water administration is in fact a key contributing factor to the effective administration of a water rights regime. Without careful monitoring of natural flows and the level of abstractions by rights holders the security offered by a water rights scheme is lost. Such monitoring activities can be an expensive process and in part this explains why in a number of developing countries formal water regimes are simply un-implemented. For example research conducted in the Pangani River Basin in Tanzania in 1994 revealed that of 2 265 abstractions of the time that should have been licensed only 171 were subject to formal water rights (Dinar *et al.*, 1997).

8.2. Duration

With regard to the duration of water rights there are two basic options: either they are time limited or they are of indefinite duration. While rights of indefinite duration do exist in a number of jurisdictions, including California, Chile and Colorado the general trend is clearly towards time limited water rights.[55]

The reason for setting rights with a fixed term is to maintain sufficient flexibility to re-allocate water in accordance with future needs. The key issue

[55] In Texas, for example, administrative water rights are not time limited and nor were those introduced in England following the entry into force of the Water Resources Act of 1963.

for policy makers is to strike an appropriate balance between the security needed to encourage investment and the need for flexibility as regards future allocations of water. Too short a term and the right does not confer a sufficiently long period over which to recoup the value of investments. Too long a period and future re-allocation of water resources is exceedingly difficult.

This is because compensation would have to be paid if the right were cancelled. It is one of the reasons why Chile faces difficulties with regard to water re-allocation. The simple logic is that once indefinite rights are conferred they are conferred forever. Any mistake, of whatever sort, in the allocation process will be costly to remedy and this is one of the reasons why reform of prior appropriation rights in the American West is not really on the political agenda.

Indeed the issue of duration poses something of a policy dilemma as far as tradability is concerned. A fixed term right is a wasting asset whose economic value, all else being equal, diminishes by the year. A person wishing to acquire water may decide to wait until a future re-allocation takes place rather than purchasing an existing right. At the same time the price that could be expected for a fixed term right is much less than might be expected for an indefinite right. In other words the introduction of fixed term rights is likely to reduce the effectiveness of water trades.

Nevertheless it is the desire to maintain flexibility with regard to future water needs that has led most jurisdictions to limit the duration of rights. Typically over a range of jurisdictions modern water rights last for 15–20 years in respect of ordinary activities and up to 50 or even 70 years in respect of major investments such as the construction of a new hydropower dam.[56]

Thus in Spain an administrative concession may not exceed 75 years while in Mexico they last for between five and 50 years and in South Africa they may last for up to 40 years.

In Queensland water rights last for ten years subject to ten yearly reviews. In England, for example, following recent amendments to the legislation new water rights will be time limited, usually to a term of 12 years. As mentioned

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[56] This is because it usually takes longer to make a return on larger water sector investments.

in the previous section in Mexico water rights may last for between five and 50 years. In South Africa the duration of rights depends on the nature of the use but there is a maximum of 40 years reviewable every five years.

Sometimes the duration of water rights may depend on the degree of information available about the resource. For example, the legislation of the American State of Iowa restricts the term of the right to ten years if the aquifer capacity is uncertain.

Another approach is that taken in New South Wales (Australia). Water rights under the Water Management Act 2000 are of an indefinite duration. But while the unit share in the water resource that the right applies to is fixed, the total amount of water that can be abstracted from that resource is determined on the basis of ten year water sharing plans. In other words while the unit share of each water right may remain fixed in practical terms the amount of water which that share relates to may be significantly altered over time.

Once a water right has been issued, the holder can expect to be able to rely on that right throughout the period of its duration. While at the end of that period the right holder may have an expectation that the right will be continued, he/she has no legal guarantee in this respect. In other words no compensation is payable if a water right is not renewed, either in full or in part.[57]

Apart from the issue of tradability does the fact that a water right is for a fixed term reduce the degree of security that it confers on the holder? At first sight the longer the duration of a right then *prima facie* the greater should be the degree of security. By analogy with land tenure rights one of the key attributes of the strongest type of right, the right of ownership, is that it is unlimited in time. Use rights created in respect of land may also be indeterminate or for a fixed term, while as already mentioned, rights created under leases are generally for a "certain" or fixed term.

Nevertheless, the fact that such rights are time limited may not matter too much as far as security is concerned. As one commentator has observed in the context of land tenure rights, "in situations where land users and the private sector are confident that the government will honour contracts, long-

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[57] Generally a water administration is bound to act in a fair manner and will usually, all else being equal, try to ensure that existing rights holders can continue their use of water even if at a lesser amount.

term and secure lease rights that are fully transferable can become virtually indistinguishable from private ownership. For example in Israel most land is state owned and leased to farmers for terms of 49–99 years without any negative impact on the functioning of land or credit markets." (Deininger, 2003). The key issue would appear to be whether or not the right is likely to be respected. In this connection the problems in Chile with regard to weak enforcement and recording of rights mentioned above may actually mean that they are less secure than fixed term rights elsewhere.

In conclusion, it does not necessarily follow that water rights of indefinite duration provide a greater degree of certainty. Nor, it must be added, does the fact that water rights are time limited necessarily mean that the water administration will have that much greater flexibility in the re-allocation of water following their expiry. More specifically, while the law may grant the necessary legal powers to enable water to be transferred from one category of use to another, say from agriculture to urban use, in practice political considerations may render such powers academic. As always there is no simple legal solution to disputes over scarce resources. Nevertheless, given the every increasing pressure on water resources, coupled with the impacts of climate change, time limiting water rights does at least remove one potential legal obstacle to the re-allocation of water even if it does not provide a complete "fix".

8.3. The conditions to which the right is subject

A popular modern conception of rights sees them as comprising a bundle of both rights and obligations. Water rights are no exception: they are typically subject to a range of conditions. Breach of such conditions usually has legal consequences which may include enforcement action pursuant to criminal or administrative law or the temporary suspension of even the cancellation of the water right. Only in the case of Chile are water rights not subject to conditions.

Modern water rights are typically subject to two separate types of conditions, general conditions and specific conditions.

8.3.1. General conditions

General conditions, which are usually set out in primary or secondary legislation, typically apply to all water rights within a jurisdiction or to water rights that relate to a particular water body or a particular type of water use. For example all water rights relating to the agricultural use of water may be subject to a general condition that may not apply to the use of water for, say, hydropower generation. Examples of general conditions include the following:

(a) To pay fees relating to the water right

Conditions requiring the payment of water use fees give effect to the "user pays principle" as well as the fourth of the Dublin Principles. They can also be a useful source of revenue. Criteria for the setting of the rate of charges vary and include:

- the volume of water abstracted, the area in which it is used and source from where the abstraction takes place (France and Arizona);
- the volume of water abstracted (Victoria, Australia);
- the kind of use to which the water is put and the source of the abstraction (Germany);
- the type of source from which the water is abstracted (The Netherlands);
- the "profit" made by the water user (Spain) ;
- the administrative costs of water rights administration relating to the issue and management of water rights (England); and
- the kind of use to which abstracted water is put (Italy and Mexico).

Prompt payment of such charges is usually a condition of the water right and non-compliance with such a condition may lead to the right being suspended or cancelled. The payment of fees or charges may also be prescribed in connection with applications to the water administration for new water rights or the modification of existing rights. In Chile, however, no taxes or fees are payable by rights holders either in connection with the issue of new rights or holding rights over time.

(b) To make use of the water that is subject to the water right

This kind of condition is almost a standard feature of modern water rights. The effect is that a failure to use the water that is subject to the right for a specified period, say three years, may lead to the right being forfeited. Examples include the German Water Law as amended on 23 September 1986 and the Spanish Water Law of 1985 (as amended). Also in Chile, as a result of significant amendments to the 1981 Water Code which were passed by Congress in 2005, failure to use water under a water right for a given period leads to forfeiture of the right.

Indeed, in those jurisdictions in which the "prior appropriation" doctrine applies the fact of use is not itself sufficient: the water that is subject to the right must be put to "effective and beneficial use". The objective of this kind of condition is to allay concerns over the risks of speculation and the "hoarding" of rights to water resources. Some support for these concerns is provided by the Chilean experience particularly in so far as non-consumptive hydropower rights are concerned.

(c) To use the water for the purpose for which it was allocated

Such a purpose will usually be specified as a special condition to each water right. The use of this kind of condition permits the allocation of water between different water user sectors in accordance with an agreed water resources plan.

(d) To measure the volume of water that is abstracted and/or used

This type of condition is also commonly found in modern water legislation. Its purpose is to assist in the monitoring of water use by the water administration. As such it is a form of self monitoring. An associated condition, which may be impliedly or expressly stated, is that such information be transmitted to the water administration.

(e) To take measures to protect water resources

Such conditions are typically found in connection with rights to groundwater, for example by restricting or prohibiting specified activities near the well head or borehole so as to prevent contamination of the aquifer.

(f) To treat any waste water prior to its discharge

Again the particular type of treatment that is to be used, and any parameters for the quality of the waste water that is discharged, will usually be set out as a specific condition to each water right.

(g) To return unused or excess water to the water course from which it was abstracted.

In many cases the same volume of water may be used by more than one user, for example where excess irrigation water returns to the water course from which it was extracted. Such flows can be a valuable source of water. In California and Colorado under the prior appropriation doctrine downstream rights-holders can appropriate and therefore lay legal claim to such return flows, provided they can demonstrate that the return flows are put to a beneficial use and that the upstream rights holders would not be injured by the appropriation. Once constituted, such rights create an obligation on upstream water users to undertake their activities in such a manner as to ensure that the downstream rightholders are not harmed. Thus an upstream right holder would not be entitled to transfer his water right, or to increase the efficiency of his use of water, in such as a manner as to reduce the volume of return flows and thus the downstream water rights. On the other hand in Chile, because water rights are not subject to conditions, neighbouring land owners have no rights to return flows, unless these are formally constituted.

8.3.2. Specific conditions

Such conditions are, as their name suggests, specific to each individual water right. They are usually spelt out in the instrument that creates the right. Such conditions form an integral part of the water right itself and allow the water administration to exercise a degree of control over how the water is used.

There are a number of relatively common specific conditions. Although modern water rights no longer arise as an incidence of land ownership, a number of specific conditions typically concern land. It is, for example, common for a condition to specify the point on land at which water is to be abstracted. This may be a point on the banks of a river or a specific location above an aquifer. Sometimes this is simply described on the face of the instrument that creates the water right. Elsewhere, such as under the new

water rights regime in New South Wales, this matter is addressed by way of a description of the "nominated works", the structures or equipment through which the water that is subject to the right is to be taken. Another condition typically concerns the point at which any water is to be returned to a surface water body. Finally a third specific condition that concerns land specifies the land on which the water is to be used. In other words it is a condition of the relevant water right that the water is to be used only on or in connection with a specific parcel of land.

Another example of a specific condition is one that indicates the use to which the water is to be put, as is the case in California and Colorado. This has impacts on transferability to another use as the instrument creating the right will first need to be amended. As already mentioned Chilean water rights are not subject to any conditions and water rights in New South Wales do not specify the use to which the water that is subject to the water right is to be put.

Other examples of specific conditions include those that specify how the water is to be used (for example for spray irrigation as opposed to surface (flood) irrigation), the time or periods in which the right may be exercised and any variations in the volume that may be abstracted as well as how wastewater is to be treated. In some jurisdictions, such as Germany, the scope and content of water rights may be varied by the water administration after the right has become effective.

If properly applied, specific conditions have the effect of making each water right separate and uniquely adapted to the resource to which it relates. Nevertheless, the more specific the conditions are, the more difficult it may make it to trade or transfer a particular water right. In general terms it may be considered that the more conditions to which a right is subject the less secure it is: the greater the number of conditions, the greater chance of one being breached and the right being brought to an end. On the other hand, to the extent that conditions are inserted to minimise adverse effects to third parties including other water rights holders it could be argued that they in fact contribute to security by strengthening water rights. Put another way the security of a water right depends not only on the conduct of the water administration but also on the conduct of other water users.

8.4. The formal mechanisms that guarantee the security of the right.

Once a water right has been issued, the right holder can expect to be able to rely on that right throughout the period of its duration against both third parties and the state.

At the expiry of the right while the right holder may have an expectation that the right will be continued he/she has no legal guarantee in this respect. In other words no compensation is payable if a water right is not renewed, either in full or in part.[58]

During the duration of the water right it can be difficult for the right holder to identify who is interfering with the flow of water and thus his water right.[59] Indeed it may be impossible for an individual to do this and consequently the primary responsibility for the enforcement of water rights lies with the state rather than with the right holder. Consequently the water administration is the primary guarantor of each water right. At the same time, however, the other main possible source of insecurity as far as a water right is concerned is the state itself.

The rights and duties of the water administration are usually spelt out in water legislation. The effect is that a water administration may not re-allocate water that is subject to a water right to a third party, except in circumstances specified in the applicable legislation and on payment of compensation or the provision of an equivalent volume of water from another source.

In England, for example, the water administration is instructed not to grant any new licence that would permit an abstraction that would derogate from an existing protected right. If the licensing authority breaches this duty then it has to pay compensation.[60] Such compensation is payable irrespective of proof of negligence on the part of the authority - it is sufficient to prove that the licensing authority has in fact allowed an abstraction that has adversely affected the claimant's protected right. However the minister can over-rule

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58 Generally a water administration is bound to act in a fair manner and will usually, all else being equal, try to ensure that existing rights holders can continue their use of water even if at a lesser amount.

59 Not always of course. The impact on existing right holders of the construction upstream of, say, a major new dam would be quite evident.

60 Sections 29(2) and 50 of the Water Resources Act 1963 now sections 39(1) and 60 of the Water Resources Act 1991.

this instruction and compensation, which may be from central funds, will be payable.

The circumstances in which water that is subject to an existing water right might lawfully be re-assigned to another use can be *force majeure* or the need, in the "public interest", to re-allocate water for some other use in accordance with the applicable basin plan. The effect, at the end of the day, is broadly similar: rights may not be arbitrarily suspended or re-allocated by the state.

In England licences can be revoked and compensation is payable unless the licence holder has effectively abandoned the licence by making no use of it for seven years or by refusing to pay the annual charges. Although this solution could be a method of solving problems of unsustainable abstraction, in practice this power has not been used as most problems have been resolved through negotiation.

Similarly section 42 of the Saskatchewan, Canada Water Corporation Act 1984 confers power on the Water Corporation subject to the approval of the Lieutenant Governor in Council to cancel any water right where it considers this to be in the public interest. The licence holder is entitled to compensation:

> "for the actual value, at the time of the cancellation, of any structures or works that:
> (i) were used by the holder of that licence to secure water and transport it to the point of use; and
> (ii) are of no use to the holder and are surrendered to the Crown."

However, in practice, the scope of this power is so broad that it will probably never be used due to the political outcry that cancelling a water right would cause (Percy, op cit.).

Finally, all water rights suffer from an inherent degree of uncertainty. Evidently each right can only be exercised to the extent that there is sufficient water present in the source, and the probability of an entitlement being met at all times and, eventually, the security and dependability of a water right will increase with flow regulation.

Therefore water legislation usually makes provision for a waiver of government liability for failure to satisfy the water right holder's requirements stipulated in the instrument of the water right, and for the suspension or limitation of water rights on a stream or river in times of drought or low water flow. Such provisions are usually contained in a condition to the water

right. With the exception of water rights created under the prior appropriation doctrine, under which senior appropriators are placed in a superior position, such reductions are usually made proportionately across all rights in a given basin or district.

9. SALE AND LEASING OF RIGHTS – PROCEDURES AND IMPLICATIONS

As described above the assignment of new water rights typically takes place on the basis of a relatively complex process that is designed to promote the rational and planned allocation of water as well as reducing the risks of arbitrary decision-making by the water administration. Nevertheless, whatever its merits, the fact remains that this is ultimately an administrative process and one that can be somewhat bureaucratic. By its nature, such a system is not particularly flexible. Nor is it necessarily very efficient. It does not create incentives for the holders of water rights to reduce their consumption of water and once all of the available water in a given water body has been allocated, a situation that is increasingly common around the world, there is little that can be done until existing water rights expire and, following the conclusion of a new water resources planning exercise, new rights are allocated. It is true, as described in the previous section, that water administrations typically hold the necessary powers to re-allocate the water that is subject to existing water rights to some other purpose in the "public interest". But apart from the fact that this is usually a costly solution, as compensation will usually be payable, it is also likely to be controversial.

An apparently cheaper and more effective solution is to permit the sale or lease of such water rights. The sale or leasing of water rights would appear to have a number of benefits. For a start if water rights holders can sell or lease any water that they can save through using water more efficiently this should lead to more water being made available. Furthermore, apart from ensuring a more economically efficient allocation in place of the planned approach of most water rights regimes, tradable water rights are also seen as a relatively painless means of re-allocating water rights, and thus water, from less to more economically productive uses.

In fact the transfer of water rights is not in itself a new phenomenon. Such transfers are invariably permitted on the death of the right holder, by way of succession, or following the sale of any land to which the right was appurtenant. But what is being discussed here is different. Notwithstanding the separation of modern water rights from land tenure rights, the question ultimately comes back to the relationship between the right and land. Specifically, if a water right is to be sold or leased it must be necessary not only to use the water that is subject to the right at a new location but also to abstract it from a new location – further up or down a river or from a

different point above the surface of an aquifer.[61] Such rights are commonly described as "transferable water rights" or "tradable water rights".

9.1. Experience to date

The starting point as regards water rights trades is whether they are permitted at all. In a number of jurisdictions, such as France, they are not. Elsewhere, such as Chile and South Africa, as well as the Australian jurisdictions, the legislation makes it clear that they are. Similarly the Mexican National Water Law contains a chapter on the transfer of water rights. Elsewhere the scope of potential trades is limited. In Kyrgyzstan, article 30 of the new Water Code permits the transfer of water rights for uses other than for irrigation. Irrigation permits are not transferable separately to the land to which they relate.

In England, trades in water rights are possible, although not specifically provided for in the legislation. Indeed under the current legislation it is usually necessary for the parties to make an application to the water administration for a new or varied licence in order to complete a trade. Is this a genuine trade of a water right? Clearly it will require the amendment of the licence that creates the right but arguably the right to a quantity of water - the legal right itself - is being transferred.

Similarly under the New South Wales Water Act 2000 it is expressly envisaged that changes will be necessary to "licences" - the instruments that create water rights to enable such rights to be used at a different location following a transfer or sale. Similarly amendments to an existing licence will be necessary if the benefit of part of a water allocation is transferred elsewhere or if a licence is subdivided or consolidated. Again the point remains that the water right derives from the licence but the licence is not itself the water right.

Section 25(2) of the South African National Water Act provides that:

> **"Transfer of water use authorizations**
> 25. (1) A water management institution may, at the request of a person authorized to use water for irrigation under this Act, allow that person on a temporary basis and on such conditions as the water management institution may determine, to use some or all of that water for a different purpose, or to

[61] And in the case of surface water to discharge any residue or waste water to another point.

> allow the use of some or all of that water on another property in the same vicinity for the same or a similar purpose.
> (2) A person holding an entitlement to use water from a water resource in respect of any land may surrender that entitlement or part of that entitlement -
> (a) in order to facilitate a particular licence application under section 41 for the use of water from the
> same resource in respect of other land; and
> (b) on condition that the surrender only becomes effective if and when such application is granted."

In other words the transfer effectively requires the issue of a new entitlement but specifically permits a person to surrender an existing authorization to enable a transfer to take place, but on the basis that the surrender is only effective if the transfer application is approved. In addition the section makes it clear that some or all of the entitlement may be transferred on a permanent or temporary basis.

In all of the cases considered in the preparation of this paper some degree of scrutiny by the water administration is required in connection with water rights trades. This is because of the external impacts such trades might have: (a) on the environment and hydrology of the water course to which the right relates; and (b) on other third parties including other water rights holders.

In some jurisdictions the degree of state scrutiny is quite low. In Chile, for example, to assure rights of third parties, any transfer of the rights of use of natural watercourses requires authorization from the water administration; and in artificial watercourses from the water user association responsible for its operation. The most frequent transactions in water rights are "rentals" or temporary trades between nearby farmers with different water requirements during different periods. Such trades offers greater flexibility and, unlike permanent transactions, do not require formal registration in the water rights register.

At the other end of the scale, section 81(7) of the Alberta Water Act provides that

> "An application for a transfer of an allocation of water under licence may be considered only if
> (a) the ability to transfer an allocation in the area of the province referred to in the application has been authorized
> (i) in an applicable approved water management plan, or
> (ii) if there is no applicable approved water management plan, by an order of the Lieutenant Governor in Council. "

In other words there can effectively be no transfer of water rights without the direct or indirect consent of the Cabinet. Furthermore the legislation provides for the scrutiny of applications to transfer water rights. Section 82(3) of the Water Act provides:

> "… (3) The Director may approve a transfer of an allocation of water under a licence only if
> (a) the volume of water to be transferred does not exceed the volume of water under the licence from which the allocation is to be made.
> (b) the transfer of the allocation, in the opinion of the Director does not impair the exercise of rights of any household user, traditional agriculture user or other licensee… and
> (c) the transfer in the opinion of the Director, will not cause a significant adverse effect on the aquatic environment."

The involvement of high level politicians in the process means that Alberta's transferability provisions are far from ideal. However, the legislation provides one example of accommodating public fears about the transfer of water rights, while at the same time incorporating the essential elements of a system which will allow transfers to take place if the political will is present (Percy, op cit.).

In between there are a range of procedures with approval typically being conferred by the water administration. In Mexico, for example, the basic position is that while simple changes in the title holder that do not involve any alteration to the water right are to be concluded by simple notice of registration, in all of those cases where, in accordance with regulations, "the rights of third parties may be affected or the hydrological or ecological conditions of the pertinent basins or aquifers altered or modified", the prior approval of the water administration is necessary. There is, however, provision for relatively straightforward transfers to take place on the basis of a simplified procedure within, say, a given basin. As regards the transfer of rights relating to groundwater, the law provides that this is generally to be undertaken jointly with the transfer of the relevant land although provision is made for separate transfers in accordance with regulations issued under the National Water Law.[62]

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[62] Interestingly the relevant provision, article 35, provides that in such cases the transferor and transferee are jointly and severally liable for the costs of capping wells that are no longer used.

Formal or informal restrictions usually guide the decision-making process. Thus in England in practice trades are generally only possible if the licences involved are located within the same catchment or groundwater unit. The water administration also needs to be satisfied that water rights trading does not result in environmental damage where a new licence or a variation to an existing licence is required. This could occur, for example, in an environmentally stressed catchment if as a result of a trade the holder of a new licence uses a significantly greater proportion of the volume of water authorized on their licence than the holder of the original licence. There may also be potentially damaging local impacts that need to be considered, for example the location of the new abstraction. The water administration may therefore place conditions on licences in order to prevent damage to the environment occurring as a result of trading. Similarly in New Zealand the legislation does allow water rights to be traded but only if the transfer is expressly allowed in the relevant regional plan or if it has been approved by the water administration (Peart, 2000).

In the jurisdictions of the western United States, where there is the greatest experience of trading water rights, such transfers are generally subject to rather elaborate approval procedures. For example, in the American state of Colorado, all transactions involving water rights are embedded in a legal and administrative structure that carefully regulates external effects. Each district has its own specialist Water Court and the office of State Engineer investigates all technical aspects of proposed transactions (Perry *et al.*, 1997).

In a review of practice in the western States Colby *et al.* identified four types of change for which one can apply regarding a water right. These are a change in: (1) nature or person of use, (2) place of use, (3) point of diversion, and (4) season of use. These types of change are not mutually exclusive and the four aspects may be simultaneously changed in any combination.

The basic procedure, which is set out in schematic form in Figure 1, is as follows:

(a) Filing of the application

Applications are usually evaluated by an administrative unit: a department of water resources or state engineer's office if the water right is within the jurisdiction of the state, a water district governing board if the transfer is

within a district or the Bureau of Reclamation for transfers involving the use of federal project water (Colby *et al.* 1989).

The first step is to file an application in the prescribed form, accompanied by the prescribed fee. Colorado approvals are much more likely to be contested requiring the retaining of lawyers and other specialists at an early stage.

(b) Processing the application

Each application is then reviewed by the relevant agency for accuracy, completeness and consistency with water rights records. Routine applications are dealt with at local level. More complicated ones require review at the state level.

(c) Public notice

All states require some form of public notice of the application to alert all parties who may be interested in the outcome. This is usually done by publication in a newspaper circulating in the relevant counties. In some states the publication costs are borne by the agency, elsewhere by the applicant. Sometimes specific individuals, including holders of adjacent water rights or public officials, must also be notified individually.

(d) Filing of protests

Next, persons who believe that their interests may be adversely affected are entitled to file written protests against the proposed transfer.

(e) Processing protests

Each individual protest is then reviewed by the water administration for accuracy and completeness.

(f) Resolving protests

The next step is the resolution of filed protests. This is generally achieved in one of two ways: either privately through negotiations between the parties concerned or formally through an administrative hearing. In Idaho, for example, pre-hearing conferences are routinely scheduled to seek to promote negotiated solutions.

(g) Administrative hearing

If a negotiated solution cannot be reached, then the matter proceeds to an administrative hearing. Such hearings may be held in a formal or informal manner, the former generally being more costly and time consuming.

(h) Ruling

Following the hearing, or a negotiated agreement, the water administration must issue a ruling. Sometimes the time limits within which these must be issued are specified in the legislation. Outcomes are typically confined to: (a) approval of the transfer application as requested; (b) approval of the transfer applications subject to modifications to take account of protests; or (c) the rejection of the transfer application.

(i) Appeal of Ruling

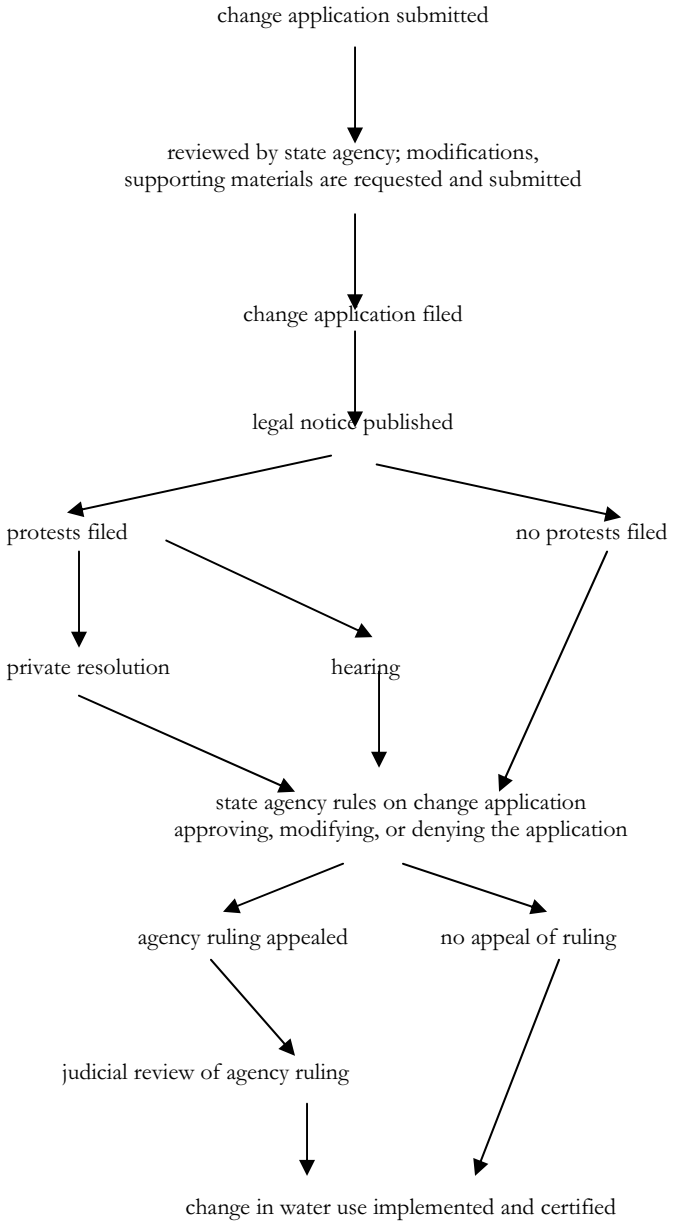
Parties who are dissatisfied with the ruling are generally entitled to appeal against it, within specified time limits. Such appeals may be to the ordinary courts or to a higher level appeal body within the water administration.

(j) Proving/certifying the transfer

Following the ruling, and the outcome of any eventual appeal, the transfer application is formally issued and certified.

One of the reasons why transfers may lead to extensive negotiations and disputes in the western states is because of the negative effects that they may have on return flows and thus on downstream water rights as described above. In essence it is up to the proposed transferor to prove that the transfer will not harm downstream rights.

FIGURE 1 - CHANGE OF WATER RIGHT PROCESS
(Colby *et al.* 1989)



Even more complex procedures are necessary in connection with interstate water trading, as for example in Australia's Murray Darling Basin. This is because in contrast with intra-state trades, inter-state trades involve a complex adjustment of rights between states under the (interstate) Murray Darling Basin Agreement, to reflect the water traded between individuals. Part of the complexity arises also as a result of the different levels of security that water rights hold in each state, differences which in turn reflect the conservative or speculative water allocation philosophy that underlies the relevant legislation, the extent to which water rights are supported by the availability of large water storages, the location within the catchment and climatic conditions. South Australia, being the downstream state, and thus the beneficiary of upstream water storages, has much more secure water rights (which were also allocated in a relatively conservative manner). Consequently inter-state trades have taken place only on a "pilot" basis to date.

9.2. Concerns, perceptions and trends

Although a number of influential commentators consider that the marketing of water rights offers a way to increase the efficiency of water use and allocation and to allow resources to move from lower to higher value uses (Bogdanovic, op cit. See also Briscoe, 1997), not everyone is convinced that markets offer a real solution to issues of water allocation (Dellapenna, 2000).

Some of these concerns about markets are as much shaped by ideological opposition to free market models as anything else. Some of the criticisms of modern water rights are simply ill-informed, confusing as they do the involvement of the private sector in urban water supply (through the use of concessions, lease contracts, etc.) with the "privatization" of water as a resource. As described above, no water rights reform seeks to achieve this outcome.

Other concerns that have been identified include the following:

- cultural or religious objections to the notion that water should be bought and sold;
- equity and monopoly concerns regarding acquisition of water rights by large organizations and the exclusion of the poor from access to water;
- concern that small-scale operators will sell their rights cheaply and lose their livelihoods;

- fears that water transfers will damage the environment, cause aquifer depletion, and/or the degradation of river systems;
- fear of change and loss of public sector control over water;
- the need for new legal, regulatory and institutional frameworks;
- difficulty of defining, measuring and enforcing water rights;
- changes needed to infrastructure and delivery systems;
- difficulties of establishing or strengthening public and private institutions to facilitate a properly-functioning water market; and
- the challenge of convincing governments that the potential benefits from trading water in a market are sufficient to offset the costs of establishing tradable water rights. (Thobani, 1997)

In fact a closer examination shows that a number of these objections are not so much to the introduction of transferable water rights but to the introduction of modern water rights. For example, as outlined above, new legislation is usually necessary for the introduction of modern water rights and the task of defining, measuring and enforcing them can indeed be difficult. Cultural and religious objections to the sale of water may be more difficult to counter, but in fact modern water legislation typically addresses rights over water rather than the water itself. Finally, as outlined above, the relatively complex procedures in place for reviewing trades in water rights should mean that the state, acting through the water administration does not "lose control" over the use of water. Nor, provided such procedures are correctly applied, should there be negative environmental or third party impacts.

On the other hand, a number of other concerns do merit further consideration. First of all there is the concern over the potential impacts of water trades on rural communities. In Australia and the western United States many rural communities have opposed transfers of water to users out of the community in part on the assertion that such transfers can impose significant economic and social costs on the community. For example, where farming land is fallowed as a result of an external transfer, jobs can be lost, and tax revenue can decline (leading in turn to a reduction in governmental support services). In a community's worst nightmare, the social fabric of the community itself might begin to unweave as local residents sensing economic trouble leave the area (Thompson, 1998).

On the other hand, third party effects exist whenever significant resources are allocated or re-allocated or removed from a community, for example when a mine or factory closes down (Thompson, 1998). Should water be treated any differently? Some argue that it should, as it is a fundamental resource that once lost cannot be replaced.

Reflecting community concerns a number of water user associations in Australia do not permit trades out of their territory or, if so, for only a limited volume of water. This is because communities realise the value of the water and want to retain that value within the community (House of Representatives, 2004). And indeed only South Australia introduced trades in water rights from the outset, whereas New South Wales, Queensland and Victoria first introduced trades in annual allocations (also called annual or temporary trades). This was due to significant community concerns about the effects of large scale sale of water out of certain areas on the ability of farming communities to survive.

While trades of groundwater rights are permitted within the Edwards Aquifer in Texas such transfers may only take place within the boundaries of the aquifer region. Furthermore irrigators may only market (lease) up to 50 percent of their water while other permit holders are entitled to market the entire right (Kaiser and Phillips, 1998).

Another concern relates to the risk of speculation and hoarding. There is some evidence that this has happened in Chile where available non-consumptive rights have been acquired on a speculative basis by the hydropower companies. Recent (2005) amendments to the 1981 Water Code, however, have undone the legal bases for this to happen. Chile is unusual, though, in that water rights used not to be subject to a condition requiring that the water to which they relate be put to use. In other jurisdictions this type of condition should reduce the risks of "pure" speculation in that to be maintained such rights would have to be put to use. Nevertheless this issue remains a concern and the Australian Parliamentary committee recently recommended further research into this area. Indeed, after some twenty years experience, the Australian governments remain bullish about the potential for water rights trades to promote a more efficient use of water resources while recognizing environmental needs. Problems are still being faced and one argument is that in fact the issue of tradability and transferability was not sufficiently considered when the current legal frameworks were put in place. In other words, some have argued that, irrespective of whether or not they

subsequently take place (for only market conditions can determine this) the design of reforms designed to permit the trade in water rights should carefully and comprehensively anticipate all of the key aspects of future trading activity including its impacts on the environment and third parties. Transferability and tradability should not be conceived as a simple "bolt on" attachment to more traditional water legislation.

So much for the concerns, perceptions and trends in this sphere, what of the experience of water rights trades?

9.2.1. Number of trades

Remaining with the example of Australia, notwithstanding the complexity of the procedures involved a recent review of inter-state water trades found that some 51 trades had taken place between 2000 and 2002 which involved 9.5 MCM of water moving across state borders to be used to grow high value crops in South Australia's warmer climate (IUCN, 2002).

Turning to in-state trades, trading in water licences has occurred on regulated rivers in New South Wales since the early 1980s. Initially introduced as a drought relief measure and on a temporary (seasonal) basis, trade was somewhat restrained. Permanent transfers were introduced in 1989 and trading on unregulated streams is permitted under new rules announced in 1998. Despite the incremental easing of restrictions on trades in water rights, one commentator described the water market in 1999 as "essentially thin" with transactions being almost totally confined within the irrigation sector. Inter-sectoral transfers such as trades from rural to urban water use, were rare (Pigram, 1999).

In addition, it was noted that in southeast Australia the water market remains incomplete, in part because of transaction costs and inadequate information.

Some less desirable features can be noted, including:

- the sale of large quantities of water at low prices by those with salinity and other problems;
- buyers purchasing large amounts of water are the most prominent market participants and pay the lowest price; and

- buyers acquiring small quantities of water to maximise the efficiency of their irrigation are willing to pay high prices, as are irrigators in urgent need of water to finish a crop.

Taken together these features suggest that a "thin, immature market" is erratic and does not necessarily direct water in the most efficient, socially equitable manner. Irrigators in financially stressed circumstances may even be "forced" to sell their water at a discount, or dispose of their licensed allocation totally, under such market conditions (Pigram, op cit.).

Nevertheless, although there is clearly scope for improvement an Australian Parliamentary Committee recently found, that "having considered all the evidence … water trading is a key mechanism in ensuring that water is used more efficiently. Water markets allow industries to make better and more flexible use of limited water resources and provide the opportunity for new investment in high value-added agriculture".

But these are relatively small scale examples. In terms of sheer numbers it is necessary to look to the experience of the western United States. A survey of water rights transactions in 19 western states between 1990 and 2000 showed that an impressive 1 065 sales had been concluded during that period together with 552 leases ((Czetwertynski, 2002). However, a more detailed examination shows that overall relatively few sales of water rights took place during this period. The average number of transactions was less than three in all states except Colorado and Nevada. Indeed the figures are somewhat distorted by the large number of transactions that took place in Colorado, particularly those involving the sale of essentially contractual water rights in one major irrigation project (the Colorado Big Thompson Project). If the sale of contractual water rights is disregarded the figures show that in terms of the average annual number of transactions, leases dominated in all states except Kansas and Utah.

Another interesting point that emerges from the survey is that in all of the states, farmers were very seldom the buyers of water rights. Even within the Colorado Big-Thompson Project farmers were buyers in only 15 percent of the 848 recorded transactions. In the main, buyers of water rights in western water markets are providers of municipal/industrial water supplies; farmers are typically the seller of such rights. While farmers as lessees of water rights were much more common they were nevertheless a minority in most states. It

is also interesting to note that by far the greatest number of trades in this period were concerned with surface water rather than groundwater rights.

Nevertheless active markets in groundwater rights do exist. Within the Edwards Aquifer, for example, the Authority staff has processed 1 192 partial sales and lease transfers representing 270.7 MCM of groundwater withdrawal rights, of which only 803 are currently active representing 175.3 MCM. Active transfers include 113 sub-leased transfers representing 33.2 MCM. In addition, nine changes of ownership or miscellaneous transfers represent 4.35 MCM of Edwards Aquifer groundwater.

Turning to the example of Chile, the experience of the last twenty years shows that the frequency of water rights transactions remains limited to a few areas of the desert north and the metropolitan area of Santiago (Bauer, op cit.). Full data are not available for Mexico or South Africa although the evidence suggests that some limited trades are taking place.

In conclusion, therefore, it seems to be the case that notwithstanding the quantity of literature that it has generated, the actual volume of trades in water rights remains relatively low even in the western United States. Equally, though, it is clear that a "market" does exist for water rights in those jurisdictions, witnessed by the existence of water rights brokers and Web sites that advertise water rights that are for sale. Some caution is, however, merited in connection with the United States experience, particularly as regards its replicability. Specifically, the prior appropriation doctrine with its indefinite water rights in some senses encourages water rights trades as it is effectively the only means of re-allocating water to different uses. Elsewhere water rights markets are clearly in the process of development. But in any event, as argued below, the sheer number of trades should not in itself be seen as a particularly important measure of the success or otherwise of transferable water rights.

8.3.2. Benefits and conclusions

Recent research from South Africa on the limited and heavily regulated trading officially sanctioned by the water administration since 1992 on the Lower Orange River found that water rights had moved to farmers who had achieved the highest estimated return per unit of water supplied. Similarly the research in the inter-state trades in the Murray Darling Basin found that trade does cause water to be used for higher value uses, as well as causing it to move down stream (Briscoe, op cit.).

Research by Hearne in Chile suggests that water markets had led to economic benefits in some areas, including economic benefits due to transfers to higher value users (namely form rural to urban use) although the supporting research suggested that water rights sales and transactions were the exception rather than the rule.

A full evaluation of the economic arguments in favour of tradable water rights is beyond the scope of this paper. Indeed in a lot of the economic debate concerning transferable water rights empirical data tends to be used in a selective manner in order to substantiate whatever argument is being made. In broad terms, however, the experience appears to show positive economic benefits from water rights transfers. Indeed some of the best examples relate to trades in contractual water rights (such as in the Colorado Big Thompson Scheme) in respect of which transaction costs tend to be relatively low. Too often, however, assessments of the economic benefits of transferable water rights have taken place in somewhat abstract terms by reference to notionally perfect market conditions.

Nevertheless a number of preliminary conclusions can be drawn. The first is that the efficiency gains, the gains from trade, are always reduced by the transaction costs that occur during the rights trading process. Thus, the greater the security, simplicity and clarity in the arrangements for trading rights, the smaller the transaction costs and the greater will be market activity. Cumbersome trades, insecurity or uncertainty in their meaning, the possibility of legal challenge, the complexity that arises from rights to return flows and third party challenge and so forth all make for a narrower market. On the other hand, the fact remains that water is a unique resource. By reason of the potential third party and environmental impacts of water rights transactions, water rights markets are unlikely ever to achieve theoretical perfection in so far as transaction costs and the existence of complete information is concerned. Put another way, the likely need for some form of ongoing state approval, to prevent harm to the environment and third party rights holders, means that the relatively high transaction costs of individual trades will tend to negate some of the more optimistic claims for the power of markets (Bauer, 1998).

So the first conclusion is that the design of the trading process, particularly its legal content and structure, must be carefully undertaken and that in the context of the introduction of a new water rights regime the practical mechanisms of trading should be borne in mind from the outset. In this

connection the relevant legal and policy framework can assist in defining more carefully which types of trades are more likely to be approved, for example, those within the same basin, aquifer or sector within an aquifer. Of course the market alone will determine if trades subsequently take place.

The second conclusion concerns trades within the agriculture sector. When rainfall is limited, or when there is need for additional water in the short term to expand output of a specific crop, experience shows that inter-farm trades can be beneficial. So temporary sales of water, for a season for example, can be advantageous in terms of farm productivity and higher gross margins. The second lesson is that the design of tradable water rights that can take place within the agricultural sector and for a season or a year can help increase crop output and farmer income. Trading between farmers in long-term or permanent contracts can also lead to a switch from irrigation that has a low gross margin per unit of water consumed to higher efficiency crops.

The third conclusion is that water used in an urban location has a predominantly higher value than that used for irrigation. In such circumstances the gains-from-trade can be high. This is because irrigation consumes large quantities of water in terms of evaporative losses. The third lesson is therefore that in efficiency terms rural-urban transfers are likely to be particularly beneficial and that the design and administration of tradable water rights should facilitate such transfers in willing seller-willing buyer situations.

The fourth conclusion is that the introduction of tradable water rights can make it possible to deploy the existing supply of water more effectively, rather than committing to the large-scale infrastructures of long-distance, inter-basin transfers. The same point holds for demand management initiatives. Indeed, tradable water rights are themselves a form of demand management. Lesson five is that demand-management and institutional change in the form of transferable water rights deserves consideration as possibly a superior mechanism to purely civil engineering solutions.

10. ENVIRONMENTAL ALLOCATIONS

The basic advantage of modern water rights as far as the environment is concerned is the simple fact that they explicitly specify the volumes of water that may be abstracted or used. This means that it is possible to measure the total amounts of water taken from a given water course or aquifer and thus to calculate the volume of water that is, or should be, left to meet ecological requirements. Such requirements may include ensuring the sustainability of aquatic ecosystems and the use of dilution flows for the enhancement of water quality. Additional benefits may arise from improved riverine ecologies including the possibility of recreational uses as well as aesthetic values.

As already noted, two basic legal techniques are used to ensure that sufficient water is left in a water body.

One is to impose a statutory definition of minimum flows of which the water administration must take account in the issue of new water rights. In Mexico, for example, a minimum streamflow must be established for rivers pursuant to the National Water Law of 1992.

The other technique is to designate a reserve for environmental purposes. Thus the South African National Water Act creates a buffer to protect two of its fundamental tenets – that of ensuring that water is allocated equitably and used beneficially in the public interest, while promoting environmental values. Consequently, pursuant to section 16 the Minister must determine the "Reserve" for all or part of each water course. As far as environmental protection is concerned the Reserve is defined to mean "the quantity and quality of water required to protect aquatic ecosystems in order to secure ecologically sustainable development and use of the relevant water resource".

Once it has been determined for a given water course the Minister, as well as any other state body including the water administration, must give effect to the Reserve when exercising any power or performing any duty pursuant to the Act (section 18).

Of course these kinds of techniques can only be effective as long as the initial assessment of the environmental requirements of a given water body are correct in the first place and do not change significantly over time. Clearly in the context of climate change the requirements of surface water bodies may indeed need to be modified in the future. If water rights are time limited then

such revisions can take place when they fall to be renewed or varied. This kind of consideration may militate against the grant of perpetual water rights.

On the other hand, on many water courses around the world, even those on which formal water rights have been granted, it is too late to consider leaving a reserve of minimum stream flow: all of the water is subject to existing water rights.

What solutions are available? In the case of time limited water rights, depending on the urgency of the situation, one solution is simply to wait for the rights to expire. A more costly alternative would be for the water administration to cancel a number of existing rights, partially or wholly, in the public interest so that the water can be re-allocated for environmental ends. However, given that in many jurisdictions compensation would be payable such an approach would likely be expensive. It would also no doubt be controversial not simply because the right holders may be unwilling to give up the water rights in question but also due to the difficulty of agreeing the level of compensation payable. As the experience of compulsory acquisition of land shows, this kind of valuation exercise is invariably difficult and contentious although it is by no means impossible to conclude.

The situation becomes more problematic in those jurisdictions where water rights are of indefinite duration. Thus in Chile given the existence of vested property rights in the use of water it is virtually impossible to reassign water or to develop effective river basin institutions to take account of environment and ecosystem protection.

Indeed in Chile and the jurisdictions of the western United States, where water rights are also of indefinite duration and the water administration has no residual power to cancel water rights and reallocate water, this purchase of water rights is the only practical means of ensuring that sufficient water is made available for the environment.

Thus in a number of the western United States environmental non-consumptive uses have been found to have economic values that compete with traditional consumptive uses of water. These non-consumptive uses include water for recreation, such as rafting and fishing, fish and wildlife, and water quality maintenance. Both private and public entities have begun to acquire environmental water rights. For example, an NGO called the Nature Conservancy has begun to acquire environmental water rights in Arizona,

Colorado and Nevada. The Washington State Legislature has established a "water trust" for the Yakima River and several other rivers to help restore in-stream flows (Moore and Willey, 1991). What is particularly interesting is that these uses are starting to compete in the marketplace for traditional water rights demonstrating that there is a genuine willingness on the part of North American society to pay for environmental water uses.

In other words, these examples tend to show that transferable water rights can be used creatively to conserve water resources for environmental and other ends. Similarly in the Edwards Aquifer in Texas the Aquifer Authority has begun a programme of buying back groundwater rights to retire them from use.

11. DISPUTE RESOLUTION MECHANISMS

Disputes are inevitable from time to time in connection with the use of any natural resource, water being no exception. One of the benefits of introducing a system of modern water rights is that, provided the institutional arrangements are sufficiently simple, the legislation is sufficiently clear and the water administration is sufficiently honest, in theory the number of disputes should be reduced.

Nevertheless, it remains the case that disputes do arise and indeed, depending on just how it is done, the level of disputes may actually increase initially as the new system is introduced. Equally, as described above the transfer of water rights can be a contentious process if other holders fear that their rights may be negatively affected. Indeed while the relative complex formal procedures for reviewing water rights trades in the western United States are designed to rigorously examine all transfer applications, experience shows that the more legally complex a procedure is the easier it becomes to challenge its legality as a means of challenging the substance of an unfavourable outcome.

Given that modern water rights are legal rights, the courts are the natural and ultimate arbiter of disputes involving their allocation and use. In most countries, though, court proceedings are expensive and time consuming. This can have implications for the transfer of water rights through trade. For example Briscoe *et al* describe how the lack of effective dispute resolution mechanisms in Chile has contributed to unnecessary high levels of conflict between water rights holders in the Maule Basin. Specifically the lack of a river basin management institution means that there are information symmetries and gaps, that there is no institution able to act as an "honest broker" and there is no low financial and transaction cost arbitration procedure available.[63] Furthermore, "it is evident that the judicial process is unsatisfactory from several perspectives. Disputes take years to come to conclusion and are costly" (Briscoe *et al.*, 1998).

The situation is exacerbated by the fact that the courts, which in Chile are general courts in that there are no public/private court divisions, have in the

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[63] Some care is needed with regard to the costs of arbitration. Commercial and international arbitration procedures have numerous advantages over court resolution including speed and flexibility over time tabling. Cost however is not always one of them not least because the arbitrators must themselves be paid.

face of what are really rather complex and possibly irreconcilable difficulties, taken to hiding behind narrow and formalistic interpretations of the rights and responsibilities of the parties.

In some jurisdictions, such as New Zealand, specialist environment courts are responsible for resolving disputes concerning water rights. In Colorado there is a specialist water court while South Africa has a statutory water tribunal. The National Water Act provides for the establishment of a Water Tribunal as an appeal and dispute resolution mechanism in connection with the implementation of Act. This Tribunal is designed to create a more accessible forum than the rather obscure Water Court that previously existed. What is interesting is that the members of the tribunal, who are appointed by the Minister on the recommendation of the Judicial Service Commission, need not necessarily be legally qualified. The Act simply says that they must have knowledge in law, engineering, water resource management or related fields of knowledge.

Specialist courts and tribunals offer a number of advantages including the fact that their members are familiar with the relevant law as well as the complexities of water management. Consequently they may be a quicker and more efficient means of resolving disputes.

What about less formal procedures? Briscoe compares the situation in Chile with that of New Mexico where the state engineer acts as a specialized arbitrator of water disputes (Briscoe *et al.*, 1998). The role of the state engineer in arbitrating disputes in New Mexico is mentioned above and again this type of solution can be effective. Typically such decisions are subject to ultimate review by the courts.

Finally, though, such dispute resolution mechanisms do not have to be located solely at the level of the water administration. Specific local resource management bodies, such as Spain's underground water user associations, described above, can play a vital local level role in quickly resolving disputes among water users.

12. SAFEGUARDING THE INTERESTS OF THE DISADVANTAGED

Generally speaking water rights reforms have had few re-distributive or socio-economic objectives. For example neither the Chilean nor the Mexican water legislation made any special provision for safeguarding the interests of the disadvantaged.

An exception is South Africa whose recently enacted Water Act seeks to implement the two key principles of the 1997 National Water Policy, "sustainability" and "equity". With 83 percent of agricultural land previously in the hands of white farmers and the majority of water for irrigated agriculture also controlled by them through the white dominated irrigation boards both land tenure reform and water reform were necessary to right the injustices of the apartheid era (World Bank, 2000).

One of the key features of the Water Act was the abolition of riparian rights and its replacement with a modern permitted water rights regime. However, notwithstanding this achievement the fact remains that until substantive land reform takes place that also confers de facto access to water sources to non-white farmers, water rights reform risks having only a limited impact regarding the socio-economic objectives.

Indeed, many uses of water by the very poor will frequently fall within the *de minimis* exceptions to the need to hold a formal water right. Recognizing this, one of the purposes of the "Reserve" required to be established under the National Water Act (apart from the environmental objectives described above) is to ensure that sufficient water is kept available for such users.

Another notable approach of the South African act is the provision that it makes for the establishment of suitable participatory mechanisms to ensure that the poor along with other stakeholders can participate in decision and policy making in connection with water resources management. Unfortunately, recent research suggests that, notwithstanding the government's efforts, it is proving more difficult to include in the reform process black communities in the former homelands who operate in the "informal" water sector (Shah, *et al.*, 2000).

13. THE IMPACTS OF THE RIGHTS BASED ALLOCATION SYSTEM IN TERMS OF EFFICIENCY, EQUITY, TRANSPARENCY AND THE ENVIRONMENT

13.1. Efficiency

As already described, throughout history all societies in which water is used have had their own systems for allocating rights to use water. Provided such approaches permitted the rational allocation of water while conferring sufficient security on water users then it seems reasonable to conclude that the manner in which this was does was not particularly important.

History suggests that some of these systems actually worked very well at least for a time. Indeed in many parts of the world customary or local law water rights regimes continue to operate in a manner that is effective and satisfactory for their users.[64] Similarly the traditional approaches of the common law and civil law traditions were not irrational at the time when they developed. Before the industrial revolution their relatively simple rules coupled with a relative lack of competition for water made them reasonably effective. Indeed the fact that no administration was required and that they were essentially self-implementing can be seen as a positive benefit compared with the costs of funding a water administration.

However, as described above, these traditional approaches do not work today. Times have changed. Thus for example, while the doctrine of capture may have worked perfectly well in, say, the scarcely populated Texas one hundred years ago, increases in population and water demand, coupled with more efficient well technology clearly shows that this doctrine is obsolete and redundant as a tool of water management.

In this sense, therefore, an assessment of the overall efficiency of modern water rights arrangements is ultimately a comparison with the traditional approaches which by and large now simply do not work. Overall, and given that they provide the means of regulating access they must be a more efficient

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64 While a full discussion of customary or local law approaches to water right is beyond the scope of this review, experience shows the limits to such approaches. Specifically the rules that they provide for only apply within the relevant local community. Therefore while *intra*-community water rights may work quite successfully they cannot influence of control the relationship between the community and other water users.

way of allocating and managing resources, even though they do have their own costs.

Clearly among water rights regimes, some may be less costly to administer than others and careful design should seek to minimise administration and transaction costs. To the extent that trades in water rights can improve the efficiency of water use then this too must be a net gain to society, provided negative third party and environmental impacts are prevented.

As regards the possibility of improving the efficiency of modern water rights, the evidence reviewed above suggests that notwithstanding the restrictions in place, trade in water rights can lead to a more economically efficient use of water resources.

13.2. Equity

This issue of equity is also hard to objectively assess. At first sight the introduction of a system of modern water rights may appear unfair, particularly in cases where existing users operate on the basis of vague or unclear rights or even in the absence of specific rights. Why should they be granted rights? Is it not the case that such persons are granted a windfall simply because they had the good fortune to be using the water at the time when modern water rights are introduced?

There is of course a grain of truth in this argument but it is difficult to see any other realistic approach. In many legal systems ownership rights are conferred on those who use or capture a particular resource. Fishing is an example. Indeed the question could be put the other way. Why should rights be conferred on those who have not invested in using the resource? Where is the equity in that? Of course part of the problem is that those who have been using the resource are often land owners and thus richer members of society. But this is to address deeper questions of social equity that go far beyond the question of water law reform.

Measures can be taken in designing modern water rights to promote fairness among rights holders and other stakeholders and to ensure that wider social and environmental impacts are minimised or prevented. For example the inclusion of users and other stakeholders in decision-making will generally result not only in better decisions being made on "hard" issues but also fairer and more acceptable decisions being made.

As regards the form and substantive content of water rights there is therefore clearly an appropriate balance to be struck between the private interests of individual rights holders and the wider public interest. The point is that irrespective of whether or not it is categorised as an economic good water quite clearly has an inherently public character (Getches, 1996). This is likely to mean that for reasons of equity the state, acting through the water administration, should continue to play a significant role in water resources management, as is the case in Australia, Mexico and South Africa. The effect of such state involvement may well have the effect of reducing the potential notional benefits of allowing markets to determine the allocation of water through tradable water rights. But in terms of equity, both as regards existing rights holders as well as society at large together with the environment, this may well be the price that has to be paid.

13.3. Transparency

The introduction of a system of modern rights is likely to result in water allocation and, ultimately, management being more transparent, provided it is done in an appropriate manner. A number of key factors can contribute in this respect. These include:

- setting clear, objective and verifiable standards for decision-making in connection with the issue, modification or transfer of water rights;
- involving water users and other stakeholders in decision-making fora;
- establishing clear and effective procedures for the recording and registration of water rights;
- making sure that information is made available to the public and other water rights holders including ensuring public access to inspect registers of water rights.

In general terms all of the jurisdictions reviewed in this paper seek to a greater or lesser extent to promote transparency through the use of such techniques. A key point to note is that transparency benefits the use of economic mechanisms such as the trade in water rights both by making sure that sufficient information is available to potential buyers and sellers and in ensuring that transfers and trades are correctly recorded.

13.4. The environment

To the extent, as described above, that by clearly defining total permitted abstractions environmental needs are taken into account, modern rights must almost by definition be better for the environment than traditional water rights. This initial observation is subject to a number of caveats including most importantly that the relevant water rights regime is actually implemented correctly.

Time limiting new water rights appears to offer the greatest degree of flexibility as far as future environmental needs are concerned and provided the rights concerned are of sufficiently long duration they should provide sufficient security for the purposes of investment. As described above, in most jurisdictions procedures for the sale or trade of water rights seek to ensure that environmental issues are taken into consideration. Indeed water rights trades may have positive environmental impacts, for example by reducing salinity and water logging as a result of over watering.

14. CONCLUSION

The key points that emerge from the analysis contained in this paper can be summarized as follows.

First of all traditional land based approaches to water rights, including rights to groundwater, no longer provide a sound basis for the sustainable management and use of water resources. Consequently the need to better manage water resources is usually the underlying reason why modern water rights regimes are introduced.

Effective and widespread consultation can greatly facilitate the introduction of reforms that involve the introduction of modern water rights while at the same time ensuring that those reforms better serve the needs of society and stakeholders.

The fact that water rights are property rights, or quasi property rights, means that primary legislation is usually necessary for sector reform and the introduction of modern water rights. The first formal step in the process of introducing modern water rights is to place water under state ownership or control through such legislation. New institutional arrangements are necessary for the administration of modern water rights. Such arrangements, in the form of a water administration, should include mechanisms for stakeholder participation. A water administration may have competence throughout the relevant jurisdiction. It may alternatively be established specifically to manage a given aquifer or water body. Clearly it is necessary to confer the appropriate powers and legal duties on such an entity if it is to be able to operate effectively.

Modern water rights are invariably established on the basis of administrative instruments such as licences, authorizations or permissions. They apply to the use and abstraction of both surface and groundwater.

Following the introduction of a modern water rights regime some minor uses of water may usually continue without needing a formal water right, although some care is needed in this connection as an excessively large number of "free" water uses may still negatively impact on a given water resource.

With the introduction of a modern water rights regime, rights are typically issued to existing water users on the basis of their declared historical use. If

following this exercise any remaining water resources remain for allocation, new water rights are issued by the water administration on the basis of a range of statutory steps and measures, including the use of management plans, which are designed to promote rational water use and to prevent arbitrary decision-making. Following the enactment of the necessary legislation, the process of registering water rights is a major administrative and logistical task that may take many years to complete. It is necessary to bear this process in mind during the design of legislation and to take such measures as may be necessary to actively encourage existing water users to claim and register their water rights.

In order to be effective, modern water rights must confer a sufficient degree of security upon right holders both as regards other water users and the state, acting through the water administration. Thus typically water rights may not be modified or cancelled in the absence of fault on the part of the right holder unless compensation is paid. Nevertheless no water right can provide an absolute guarantee that a specific volume of water will always be available in a given resource irrespective of climatic and other natural conditions.

As to their substance, modern water rights typically specify the volume of water that may be abstracted. This may be expressed as a fixed amount or as a proportion of the available water. There is a trend towards limiting the duration of water rights as this makes future re-allocation possible even at the expense of security for rights holders. Furthermore, modern water rights are typically subject to a range of general and specific conditions, including a condition requiring the payment of water fees or charges. Breach of such conditions can lead to the right being lost.

In an increasing number of jurisdictions water rights may be traded. Water rights trades are, however, generally rather carefully regulated by the water administration to minimise negative impacts on third parties and the environment. Most trades in water rights have involved rights relating to surface water. Nevertheless trades in rights to groundwater have taken place in a number of jurisdictions. The evidence suggests that transferable water rights can lead to the economically more efficient use of water resources. Leaving aside arguments over the efficiency of markets for water rights, the fact remains that provided that trades are freely entered into and perceived as

beneficial by both parties [65] they do ultimately offer a relatively un-contentious means of re-assigning water from low value to high value uses.

Given that they specify the volume of water that may be abstracted from a given water resource, modern water rights should make it possible to set overall limits on total abstractions so as to permit sustainable resource use.

With the exception of recent reforms in South Africa few modern water rights regimes have taken account of social equity considerations. However, provided it is undertaken in a fair and transparent manner, the introduction of modern rights should lead to a more efficient, equitable and transparent use of water resources that better takes account the needs of the environment. In short the introduction of modern water rights is beneficial.

Notwithstanding these positive conclusions, the fact remains that many countries have yet to introduce modern water rights' regimes. Why is that? Of course the precise reasons for this will vary from country to country but such reasons are worth considering in that they may suggest actual, or perceived, dis-benefits of moving towards the introduction of modern water rights.

The key issues are probably cost and administrative capacity. It will not have gone un-noticed that many of the examples cited in this paper are from richer countries. The costs in question are not so much those relating to the preparation and adoption of legislation but those of registering and recording water rights as well as the costs of monitoring water resources and enforcing the legislation relating to a water rights regime. Furthermore, implementing a modern water rights regime is a relatively complex process that requires efficient administrators as well as other technical skills.

At first sight, the large number of water users that may be involved (particularly farmers dependant on small land plots) may make the idea of introducing modern water rights in developing countries appear even more daunting. As regards surface water rights, however, if farmers are supplied with water through irrigation schemes, as is often the case, then whatever rights to water they should have are not modern water rights, of the type being discussed here, but rather contractual water rights as discussed in section 2.1 above. There may still be a strong case for the grant of water

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[65] In other words provided the vendor considers s/he has made a good deal and has not been forced to sell at an unfairly low price out of, say, economic necessity.

rights to the operators of such schemes if only to safeguard abstractions for irrigation.[66]

As regards rights to groundwater, the sheer number of actual or potential abstraction points, the issue of cost together with consequential difficulties of monitoring and enforcing abstractions takes on a greater significance. Indeed it seems reasonable to conclude that as concerns groundwater, water rights reforms need to pay particular attention to governance and enforcement mechanisms that involve right holders and other stakeholders in decision-making.

Ultimately, though, the costs of introducing a modern water rights regime, and the relative complexity (and thus cost) of whatever regime is chosen, have to be set against the potential costs of inaction. The limitations of traditional water rights are not restricted to richer countries: examples exist in developing countries that do not have modern water rights regimes of new irrigation schemes being built in the upper catchments depriving existing downstream schemes of "their" water[67] as well as of water being diverted from reservoirs built for irrigation to quench the needs of thirsty cities. Needless to say ordinary farmers tend to be the ones who suffer in such cases. As competition for water increases such kinds of conflict are likely only to increase.

In such circumstances policy makers in developing countries may well determine that the costs and resource implications of introducing a modern water rights regime are justified even if for no other reason than to protect the interests of existing water users. Nevertheless even in countries where there is overall water scarcity it will often make sense to focus initially on those basins or aquifers where there are particular problems such as over-abstraction/over use. From a legal perspective this can be done through specific (primary) legislation that applies only to the basins/aquifers in question. Alternatively it may be preferable to enshrine a water rights regime in national (or state) legislation but to provide for its staged implementation (basin by basin, for example[68]) so as to ensure the best use of limited financial and administrative resources.

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66 A full discussion of the limitations of contractual water rights' regimes, typically found in developing countries, is beyond the scope of this paper.

67 "Theirs" on the basis of a moral rather than a legal right.

68 Or aquifer by aquifer.

Even, however, if the hydraulic and economic arguments in favour of the introduction of a modern water rights regime are accepted by policy makers the potential political challenges should not be overlooked, notwithstanding consultation and education exercises undertaken. The first challenge concerns the notion of water privatization. As outlined in this paper, although modern water rights are a form of property right, reforms leading to their adoption do not legally constitute the privatization of water. Indeed in most cases they simply reflect and reinforce existing water rights or uses of water. Nor does the introduction of a system of modern water rights have anything to do with private investment in the urban water sector.

Nevertheless the point is sensitive particularly in developing countries where land and water are the primary livelihood resources. How to allocate water rights on a fair basis that takes account of existing uses of water is a key issue that needs to be addressed from the very beginning (although again most farmers whose land is supplied with water through irrigation schemes need secure contractual water rights rather than modern water rights of the type being discussed here) while safeguarding the interests of the disadvantaged. Another key issue is to distinguish between the notional right to water for personal, household use and the concept of modern water rights. Again, as argued in this paper, they are quite different.

The issue of tradability or transferability may pose a greater challenge particularly in countries where a large proportion of the population relies on agriculture. Tradability (or the prospect of tradability), which for resource economists may be one of the principal attractions of modern water rights, can be one of the main practical political obstacles to the introduction of such a regime. Indeed, unless the circumstances in which trades can take place, if at all, are carefully regulated from the outset so as to safeguard the interests of the agriculture sector in general and the poor in particular then the introduction of a modern water rights regime may be difficult to achieve. This is not to contradict the findings concerning tradability made earlier in this study but simply to question the extent to which these can be easily translated into the situation of many developing countries.

Indeed this leads to the final observation of this paper. Although international experience appears to point to a broadly common approach to modern water rights, based on a shared set of assumptions and outcomes, it must be clearly emphasized that there is no a single best practice model. As recently noted by the Australian Productivity Commission, the "choice of

arrangements depends, to some extent, on the economic characteristics of water, the unique features of each jurisdiction, including its legal frameworks and existing organizational arrangements catchment hydrology within jurisdictions" (Productivity Commission, op cit.). In other words the design of a system of modern water rights for a given jurisdiction will need to take account of its specific cultural, hydrological/hydrogeological, economic and sociological conditions. There is no blueprint.

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