

LAND AND WATER – THE RIGHTS INTERFACE

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1 INTRODUCTION¹

This paper is concerned with the interface between land tenure rights and water rights. Such rights relate to what are arguably the most important natural resources of the modern nation-state. Land, in the form of territory, is a pre-requisite for a state's existence² while freshwater is a pre-requisite for life.

The relationship between these two resources is of equal significance. Water is necessary for most productive uses of land. In a growing number of countries with arid climates the main constraint to agricultural growth is the availability of water rather than land.³ At the same time the use of land has major impacts on both the quality and quantity of water resources. In other words, decisions regarding the use and allocation of one resource impact directly or indirectly on the use and allocation of the other. To ensure sustainability, the need for an integrated approach to the use and management of these resources is increasingly recognised.

The principal mechanism for the allocation of land and water resources is the institution of legal rights: land tenure rights and water rights. The substance of such rights and the manner in which they are allocated have major implications for the use and management of land and water resources as well as for the social and economic development of states and their citizens, with particular impacts on the livelihoods of the poor.⁴

At the outset it is important to recognise the fundamentally important role that land tenure rights have played throughout history in the socio-economic development of states and nations, a role that they continue to play. A primary production factor, source of employment and repository of personal wealth, land performs an economic function of paramount importance. In many societies, both social status and power depended, and indeed continue to depend, on the size and structure of land holdings.⁵ What form land tenure rights should take and how those rights are or should be allocated therefore raise questions that are fundamentally political in nature. The answers to those questions, in the shape, form, content and allocation of land tenure rights, land tenure regimes and reforms to such regimes are themselves symptomatic of what are ultimately ideological expressions of the relationship between humans and the land.

For centuries lawmakers have used private property, including land, as a tool to stimulate individual enterprise and economic growth.⁶ Very often such growth has

¹ This paper was prepared for FAO's Water Resources, Development and Management Service (AGLW), Development Law Service (LEGN), and Land Tenure Service (SDAA), together with Sub-programme 3.1 ("Access to natural resources") of the Livelihood Support Project executed by FAO with funding provided by DFID.

² The existence of territory is a pre-requisite for the recognition of a state international law. Jennings, R. and Watts, A. (eds) *Oppenheim's International Law*, London, 1992 at page 121.

³ For example, the increasing scarcity of agricultural land in the arid Near East is caused by serious water shortage and the high costs of irrigation. El-Ghony, M.R. (1996) *Recent changes in agrarian reform and rural development strategies in the Near East* FAO Paper Presented to the Rural Development International Workshop Held at in Godollo Hungary 9 to 13 April 1996 at page 9.

⁴ Largely as a result of the lack of available land and water the projected increase in the number of people living in absolute poverty in the predominantly affluent Near East (excluding Pakistan, Afghanistan and Somalia) from 80 million in 1990 to nearly 110 million in 2000. El Ghomeny, *op cit*.

⁵ Vogelsang, F. *After land reform, the market?* (1998) FAO paper at page 21.

⁶ Freyfogle, E.T. 'The Particulars of Owning' 25 *Ecology Law Quarterly* 574 (1999) at page 583.

been at the expense of the poor and the landless or those rendered landless. Revolutions have been fought and political fortunes have waxed and waned over the issues of land rights and land reform. Indeed land reform, or the absence of land reform, remains an acutely sensitive political issue in many parts of the world.⁷ Following the end of the cold war, current orthodoxies, as reflected in the policies of governments and donor agencies, emphasize an increased role for private land rights, private property and the liberalization of market transactions in the land sector.

In many jurisdictions, water rights have for a long time been considered as a subsidiary component of land tenure rights, a right to use water often being dependant on the existence of a land tenure right. In contrast to land tenure rights, however, debate over water rights and their reform has tended to be less concerned with ideology than with hydrology, with hydraulic engineering than with social reform. In short, water rights have had a much lower popular profile than land tenure and land rights.

In part this is because although water is necessary for most productive uses of land,⁸ water rights are not. To take the case of agricultural land, in temperate climates sufficient moisture is provided from rainfall to permit the growth of crops and other vegetation. Irrigation is simply unnecessary thus obviating the need for water rights. As regards urban and peri-urban areas, most land is supplied with treated water through piped water supply networks. While the supplier⁹ will generally need to hold water rights in respect of any water that it abstracts from a natural source, households and commercial users connected to such a network rely on the supplier's statutory duty to provide them with wholesome water, rather than on water rights. Generally speaking, in urban and peri-urban areas water rights are of little practical concern to most water users other than the operators of market gardens¹⁰ and large industrial enterprises, such as factories and power stations, which may hold their own separate water rights: this is often cheaper than relying on treated drinking water from the water supply system.

However, in jurisdictions with arid climates or in times of drought and water shortage water rights rapidly climb national political and socio-economic agendas.¹¹ The traditional response to water shortages has been an engineering response, through

⁷ In Southern Africa, for example, as well as in Brazil where in July 2003 President Luiz Inacio Lula da Silva reiterated to landless workers' leaders his commitment to wide-ranging land reform. BBC Website <http://news.bbc.co.uk> 3 July 2003.

⁸ Without water, without moisture to hold its soils together, land has few productive uses, particularly land that is subject to land tenure rights. Land used for roads and other communication links, car parks, waste disposal sites, may not actively need water. But all human activities around that land certainly will. And while otherwise barren land may contain oil or other mineral wealth beneath its surface, water will almost inevitably be needed for the extraction of those resources.

⁹ Historically a municipal or public body but increasingly a private water supply company.

¹⁰ In this connection the important role of urban agriculture in Africa is to be noted. In Accra, Ghana, for example an estimated three percent of the city's labour force is engaged in urban agriculture which supplies some 90 percent of the city's vegetable supplies (Amuzu and Leitman. Environmental Profile Accra Case study prepared for the Urban Management and Environment Component, UNDP/World Bank/UNHCS Urban Management Programme 1991). It is an important component of household survival strategies for the urban poor, as well as a source of livelihoods and food for them. It has the potential to provide jobs for the urban unemployed (Maxwell D. and Zziwa S. *Urban Farming in Africa: the case of Kampala, Uganda* ACTS Press, Nairobi, 1992). However, such activities often take place on land without secure tenure and without secure water rights, relying on wells and sometimes on wastewater.

¹¹ This is particularly the case when the rights of urban water suppliers are affected, thus leading to restrictions on the use of water by the affluent such as for swimming pools and garden sprinklers.

the construction of dams to store water and canals and pipelines to convey it to those places where it is needed. An increased awareness of the environmental costs of this kind of approach and a growing reluctance on the part of governments to meet the financial costs, together with the fact that in many cases the cheaper and easier schemes have been constructed, means that increased focus is being placed on the better management and allocation of available water resources.

Indeed as the world's water resources come under increased pressure, the importance of water rights is likely only to increase. 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: the World Commission on Water estimates that the demand for water will increase by around 50% 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 2025.¹²

Much of this increased demand will come from irrigated agriculture which is particularly sensitive to small temperature variations. Agriculture is already the main water use sector in many countries around the world and generally the sector in connection with which most water rights are held.¹³ In many jurisdictions the economic value of land tenure rights that relate to irrigable land often depends directly on the existence of adequate water rights.¹⁴ At the same time, demand for water from the world's rapidly growing cities is almost certain to increase. It is common, particularly in newspapers and the popular media for discussion of this subject to be held in terms of increased scarcity of water resources and of shortages. In reality, the volume of freshwater on the planet has been remarkably constant over the millennia.¹⁵ Increased pressure on water resources is a result of population increases as well as economic growth. In other words much of the 'scarcity' of water is socially defined¹⁶ and a key role is played in this process by water rights that define who has access to water - and who does not. It is against this background that water rights, and decisions about water rights, will play an increasingly important role over the coming years, a role that will invariably impact on decisions and choices concerning the use of land.

Largely as a response to increased concerns about the quality and quantity of water resources, the last thirty or so years have seen many countries undertaking substantial reforms to water sector legislation and thus to water rights. In contrast to the trend towards private ownership and private rights in the land tenure sector, reforms to water legislation have seen the assertion of state control over water resources and the introduction of complex regulatory mechanisms for the allocation of administrative water rights. Furthermore, in a number of jurisdictions, such water

¹² With conditions particularly severe in Africa, the Middle East and South Asia. World Bank, *Water Resources Sector Strategy: Strategic Directions for World Bank Engagement* World Bank, Washington D.C. (2003) at page 1.

¹³ Even in England, with its famously damp climate, an increase of 52% over the 1995 figure is estimated for irrigation water demand by 2021. Bough, J. 'Water abstraction and agriculture: Towards sustainable use of water resources' 2 *Environmental Law Review* 234 (2002) at page 235.

¹⁴ In many parts of California, for example, the value of agriculture land is almost entirely dependent on the existence and availability of water rights.

¹⁵ McCaffrey, S. *The Law of International Watercourses – Non-navigational uses* (2001) Oxford University Press, Oxford, at page 4. Having said that, recent research suggests that in some parts of the world climate change is causing glaciers to melt and this will in fact have a significant impact on the volumes of water available for abstraction from rivers that are fed from glacier melt, such as many of those in Central Asia.

¹⁶ Soussan, J. 'Water/Irrigation in Sustainable Rural Livelihoods' in Carney, D. (ed) *Sustainable Livelihoods – what contribution can we make?* London, DFID, 1999, at page 187.

rights have become fully tradable and there is currently much speculation as to the extent to which this approach may be replicated elsewhere.

Yet notwithstanding the importance of land tenure rights and water rights, and the fundamental relationship between the resources to which they relate, a preliminary literature search suggests that relatively little comparative analysis has been undertaken of the two regimes and the interface, or relationship, between them.¹⁷

This scoping paper sets out to begin the process of exploring that interface. It seeks to answer a number of basic questions. First of all just what are land tenure rights and water rights? Second, how do the respective regimes compare? Third what linkages, if any, are there between land tenure rights and water rights and, if there are none, does this matter, either in general or as regards specific aspects of the interface? A key objective of the paper is to examine which aspects of the rights interface merit further research. In comparing the two regimes a final subsidiary objective of this paper is to try and identify which areas, if any, in one sector can shed light on areas for future research in the other.

This paper is based on a comparative analysis of different land tenure and water regimes around the world. In this connection it is important to note the extreme variability in land and water resources among states. Although the variability in the total land area of each state can be quickly gleaned from viewing a map of the world the variability in availability water resources is equally marked, irrespective of land area.¹⁸ Of course the pressures on both land and water resources can only be understood by reference to population levels and, as noted above, the total useable land area within a state's borders may often depend on the available of water. In short, each country faces unique water issues¹⁹ as well as unique pressures on its land resources.

¹⁷ Of particular relevance among the relatively small number of works that do address this issue are: Huggins, C. *Rural Water Tenure in East Africa: a comparative study of legal regimes and community responses to changing tenure patterns in Tanzania and Kenya* African Centre for Technology Studies, Nairobi, 2002; Derman, B., Ferguson, F. and Peters, P *Promoting Equitable Access to Water Resources*, Brief No. 12, University of Wisconsin, Madison, 2002 and Kirsten, J., Perret, S. & Van Zyl, J. *Land Reform and the New Water Management Context in South Africa: Principles, Progress and Issues* Paper prepared for a seminar of the Natural Resources Management Cluster and Land Policy Thematic Group, The World Bank, Washington DC 27 September 2000 both of which addresses the relationship between land tenure rights and water rights reforms in Southern Africa; Bjornland, H. & O'Callaghan, B. *Property Implications of the Separation of Land and Water Rights* Paper presented at the North Annual Pacific-Rim Real Estate Society Conference, Brisbane, Queensland 19-22 January 2003 which addresses the implications for land tenure rights of making water rights tradable.

¹⁸ At a country level there is extreme variability in total renewable water resources (TRWR): from a minimum of 10 m³/inhabitant in Kuwait to more than 100,000 m³/inhabitant in Canada, Iceland, Gabon and Suriname. For 19 countries or territories the TRWR per habitant is less than 500 m³, and the number of countries with less than 1,000 m³/inhabitant is 29. Within states there can be extreme spatial and temporal variability either throughout the year or between years. Food and Agriculture Organization of the United Nations *Review of world water resources by country* FAO, Rome, 2003.

¹⁹ Percy, D.R. *Security and flexibility in water rights – lessons and pitfalls in modern Canadian legislation* (1999) Paper presented to the Third International Water Law Conference, Dundee Scotland, at page 4.

2 WHAT ARE LAND TENURE RIGHTS AND WATER RIGHTS?

First of all, land tenure rights and water rights are legal rights. As such they are capable of being asserted against the state and third parties in a court of law. 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.²⁰ Loss of, or damage to, a land right or a water right is *prima facie* subject to the payment of compensation and the right to such compensation is enforceable in the courts.

Second, land tenure rights and water rights have the same basic purposes. From the perspective of society they permit the orderly allocation of valuable resources. From the perspective of the right holder, they confer the necessary security to invest in the resource or activities entailing its use. When rights are secure and tradable the holder may also be able to use them as collateral through a mortgage to raise credit.

Third, while most societies since ancient times have had their own rules concerning rights to use land and water, modern conceptions of formal land tenure rights and water rights are both overwhelmingly influenced by European conceptions of land and water as reflected through the two European legal traditions: the civil law tradition and the common law tradition.

The civil law tradition, sometimes described as the *Romano-Germanic family*, applies to most European countries (including the formerly socialist countries of Central and Eastern Europe), nearly all countries of Latin America, large parts of Africa, Indonesia and Japan, as well to the countries of the former Soviet Union.²¹ The common law tradition emerged from the law of England. Examples of jurisdictions where the common law tradition applies include the United States, Canada, Australia, Singapore, New Zealand, India, Pakistan 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.²² The colonial period explains why European land and water law was 'received' into the legal systems of so many countries, but it is not the only reason.²³ A number of countries that were never occupied by the colonial powers looked to European and subsequently to North American law in revising or modernising their own legislation.²⁴

Having considered the status, purpose and background just what are land tenure rights and water rights?

²⁰ Including the use of state sanctioned force such as court bailiffs and ultimately fines and even imprisonment for failure to comply with court orders.

²¹ Some commentators have argued that the influence of technical assistance from experts from the common law tradition (primarily the United States) has led to the creation of a new hybrid tradition within the former socialist countries. Nevertheless, the form of post-socialist law is certainly that of the civil law tradition.

²² Some jurisdictions, such as Cameroon and South Africa, are influenced by both the civil law and common law traditions.

²³ Land and water laws were not the only areas of European law that shape modern legal systems.

²⁴ For example Japan's 1896 Civil Code was heavily influenced by the German Civil Code.

2.1 Land tenure rights

As regards the substance of land tenure rights, a definition of 'land tenure' proposed by FAO seems a logical place to start.²⁵ It is:

the relationship, whether legally or customarily defined between people, as individuals or groups, with respect to land.

The definition first suggests that land tenure rights are 'legal rights' that define the relationship between people, whether as individuals or groups and land. However it then goes beyond formal legal rights to include customary rights. Thus an examination of land tenure 'rights' that addresses only formal rights will risk omitting coverage of a large aspect of the concept of land tenure. However, rather than considering the nature of customary rights *per se* this paper will examine their relationship with formal land tenure rights and formal land rights administration regimes.

Another definition notes that the expression 'land tenure' is originally a legal term that means the right to hold land rather than the simple fact of holding it.²⁶ The word 'tenure' derives from the Latin term for 'holding' or possession and its use in this context derives from the English feudal period when, following their conquest of England in 1066 the Normans declared all previous land rights void and replaced them with grants from the new King.²⁷ As such the concept applied to the terms on which land was held, in particular the rights and duties of the holder.

In practice, a combination of private land ownership and extensive individual rights has been a cornerstone of European, North American and Australian concepts of land tenure for the last two hundred years.²⁸ As a result, the main focus of the European legal traditions has been on private property rights.²⁹ While all legal systems envisage that some land may be owned by the state, or its equivalent,³⁰ and many have special legal rules for such holdings,³¹ the primary focus of the European traditions has been individual private land ownership.

Both of the main European legal traditions distinguish between property rights relating to land and those that relate to other goods. 'Immovable' property rights in the civil law tradition and 'real' property rights (or 'realty') in the common law tradition that relate to land are distinguished from 'movable' or 'personal' property, sometimes described as 'chattels'.³² As will be seen below, many ongoing reforms currently seek

²⁵ Food and Agriculture Organization of the United Nations *Land tenure and rural development* FAO Land Tenure Studies No. 3 (2002) FAO Rome at page 7.

²⁶ Bruce, J.W. *Review of tenure terminology* (1998) Tenure Brief No. 1, Land Tenure Centre, University of Wisconsin, Madison, p 1. One legacy of the Norman era is that strictly speaking all land in England and Wales is owned by the Queen, the best title that an individual can hold being the estate of the 'fee simple absolute'. To all practical extents and purposes this is equivalent to ownership.

²⁷ A pattern that their English descendants would in turn repeat in later centuries.

²⁸ Hanstad, T 'Land Ownership' in Prosterman, R. & Hanstad, T. *Legal Impediments to Effective Rural Land Relations in Eastern Europe and Central Asia* The World Bank, Washington D.C., 1999, at page 16.

²⁹ As with the word 'tenure' some care is needed with the word 'property'. While it is frequently used to describe a thing that it is owned – as in the expression 'that is my property' – from a semantic perspective property is not the actual thing that is owned but the subject of a relationship of ownership: property is the condition of being 'proper' to or belonging to a person or persons.

³⁰ For example the Crown or the Federal Government.

³¹ For example a number of jurisdictions in the civil law tradition include land assets among the 'domain' or 'patrimony' of the state.

³² In the common law a land parcel includes any buildings or structures attached to that land and they are thus included in the category or 'real property'. Buildings and structures are similarly classed as

to promote the concept of private property rights, specifically rights of land ownership. But while important, ownership is not the only type of important land tenure right.

The other principal type of land holding envisaged under the European legal traditions is leasehold tenure whereby land is rented by a 'tenant', someone other than the owner, for a specified period, usually in return for the payment of 'rent'. The owner may be a private land owner or the state and the rent payable can be either in money or in kind. While leases created in respect of certain types of land or premises may be subject to specific statutory provisions that restrict, for example, the level of rent that can be charged, the circumstances under which the lease can be determined or even extended,³³ the parties to a leases are otherwise free to agree on the level of rent payable³⁴ and indeed the term of the lease, which may last from a few weeks to a thousand years. Such an agreement, the 'lease' or 'lease agreement', will usually specify the use or uses to which the land will be put and will also specify the mutual obligations of the parties.³⁵ Of course the parties to a lease must also comply with any prescribed legal formalities concerning the form or content of a lease.³⁶

Not all jurisdictions, however, permit the private ownership of land. For doctrinal reasons both socialist and nationalist states have often rejected the notion of private land ownership. For example, on achieving independence many African nations vested their land resources in the state or in the president. Land was 'nationalised' in this way to assert the power of the state over traditional chiefs and to allow the appropriation of land for development in the belief that the state would be best placed to manage and distribute land in the interests of all.³⁷ Under this kind of approach, individuals may typically be granted long term use rights, which usually do not attract the payment of rent, or long term leases which do. The legacy of this approach is still found in a number of African countries, such as Tanzania and Mozambique, where all land remains in state ownership, with individuals holding use rights.

While land reforms in many of the former socialist states of Eastern Europe and Central Asia have seen the introduction of freely tradable private land ownership rights, some states have taken a more cautious approach. Particularly as regards agricultural land, in some countries individuals are permitted only to hold use rights and, generally as a result of fears over land speculation and hoarding, there are

immovable property in the civil tradition, although in some jurisdictions a building may be owned separately to the parcel of land around and below it.

³³ Examples include tenancies concluded in respect of agricultural land, business premises and certain types of housing. The objectives of such restrictions vary. As in the case of the first two categories they are often to promote business continuity at least in the case of richer countries. As regards housing, the objectives are usually social in that the restrictions seek to protect poorer tenants against richer land lords. On the other hand, such type of social protection may also be found in respect of land leased for agricultural purposes, for example in the case of 'share-cropping' whereby the rent is paid in kind out of the production from the land.

³⁴ Some rental payments are for a nominal amount, a so-called 'pepper corn' rent.

³⁵ These might include an obligation on the part of the tenant to undertake periodic repairs to a building for example. Under the common law, the most important covenant on the part of the land lord is the 'covenant for quiet enjoyment' whereby the tenant is, provided he pays the rent and complies with his obligations, entitled to enjoy the holding throughout the term of the tenancy without interference from the landlord.

³⁶ An example from the common law will suffice. A lease must be for a specified determinable period of time, even if this period is indefinitely renewable. Thus a lease 'for the duration of the [second world] war' was held to be void for uncertainty. *LACE v CHANTLER* [1944] KB 368.

³⁷ Quan, J, 'Land Tenure, Economic Growth in Sub-Saharan Africa' in Toulmin, C. & Quan, J. (eds) *Evolving land rights, policy and tenure in Africa* DFID/IIED/NRI London 2000, at page 33.

restrictions on the sale or transfer of land in others even where ownership rights exist.

Even in countries that permit private land ownership, large areas of land may remain in state ownership. In some countries this is largely unproductive land; elsewhere it is, for example, forest land. Depending on the applicable legislation individuals may, or may not, be able to acquire legal rights to use such land.³⁸ The amount of land under state ownership varies considerably from country to country.³⁹

Land tenure is, however, concerned with far more than ownership, lease and use rights. The unique and immovable nature of land means that it is frequently subject to numerous simultaneous uses, claims and legal rights. Take, for example, a single parcel of privately owned land. Part of this land may be subject to a lease. The remainder of the land may be subject to a legal charge or mortgage, whereby money is lent against the security provided by the land. An owner of an adjacent parcel of land may hold a right of way over part of the land parcel (an 'easement' or 'servitude'⁴⁰) or rights to use part of that parcel for a specific purpose, such as a right to graze livestock or to gather timber (a use right or right of *usufruct*). At the same time the land parcel may benefit from a similar right over an adjacent parcel.⁴¹ Unknown to the owner, a third person – a 'squatter' – may be in illegal and unauthorised occupation of a far corner of the land parcel. If nothing is done to remove him, after a certain period of time the squatter may eventually acquire legal rights over the land parcel, or part of it.⁴² Further questions may arise as to the relationship between the formal owner of the land parcel, often a male, and other family members. What interests, if any, do women and other members of the owner's family hold in the land?

These kinds of relationships are all the subject of land tenure legislation, regulated either in the relevant code⁴³, in the civil law tradition, or in the other laws and on the basis of court decisions in the countries that follow the common law tradition. One way or another, such rules and principles have generally followed the spread of European concepts of land tenure.

³⁸ Forest legislation may in particular restrict or prohibit the acquisition of land tenure rights within forest areas.

³⁹ In the United States, for example, although most land in most states is privately owned, in the Western states the Federal Government owns approximately half of all land, with individual states themselves owning a smaller but not insignificant share. The Federal Government owns more than half the land of the states of Alaska, Idaho, Nevada, Oregon and Utah. Huffman, J.L. 'Land Ownership and Environmental Regulation' 25 *Ecology Law Quarterly* 591 (1999) pages 593 and 597.

⁴⁰ These terms are largely synonymous: the former being used in the common law tradition and the latter in the civil law tradition.

⁴¹ Strictly speaking, of course, it is the land owner who enjoys such a right. Such a right is not personal to him but incidental to his ownership. In the language of the civil law tradition, the parcel of land that is subject to such a 'servitude' is said to be 'burdened' by it, to the 'benefit' of the other parcel. The common law talks in terms of 'dominant tenements', which benefit from easements that negatively affect the 'servient tenement'.

⁴² Indeed a further layer of complexity may be found in common law jurisdictions by reason of the concept of the trust, whereby the legal owner of an asset, such as land or a land right, may hold that resource in trust for the benefit of another person. The interest of the latter, an 'equitable interest' may have important implications on how a formal land tenure right is exercised.

⁴³ In the French Civil Code, for example, life interests (*usufruit*) are addressed in articles 578-624, the occupation of land (*usage et habitation*) in articles 625-636, easements (*servitudes*) in articles 637-710, pledges (*nantissement* or *antichrèse*) in articles 2071-2091 and acquisitive prescription or squatters rights (*la prescription*) in articles 2219-2283.

2.2 Water rights

Modern water rights, by contrast, are not subject to multiple subordinate rights, even though the water that is the subject such rights is quite likely to be subject to multiple uses. But what are water rights?

The first point to emphasise is that 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.⁴⁴ Nor should water rights be confused with provisions contained in progressive constitutions such as the 'right of access to water' found in that of South Africa.⁴⁵

Instead water rights are concerned with the removal (and subsequent use) of water from the natural environment or its use in that environment. In essence a water right is a legal right:

- to abstract or divert and use a specified amount of water from a natural source;
- to impound or store a specified quantity of water in a natural source behind a dam or other hydraulic structure; or
- to use water in a natural source.

But water 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.

A 'natural source' includes a stream, river or lake, a reservoir created by the damming of a river, a swamp or pond as well as groundwater from a natural spring or a well. Historically, much of the focus of water law, and thus conceptions of water rights, has been based on rights to abstract and use water from streams and rivers, more specifically from the abundant and perennial streams rivers of Europe.⁴⁶ This, as will be seen, has had, and indeed continues to have, implications for the export of European notions of water rights to countries with vastly different climatic and hydrological conditions.⁴⁷ Furthermore, while groundwater is now commonly included in water rights regimes its particular features are such that it is considered separately below.

⁴⁴ 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. Food and Agriculture Organization of the United Nations *Agriculture, Food and Water* FAO, Rome (2003), Annex One.

⁴⁵ Article 24.

⁴⁶ For practical reasons water in streams and rivers has tended to play a more important role than water in lakes and ponds as far as water rights are concerned as the gradient of flowing water makes it easier and cheaper to abstract. Water from a lake or pond must generally be pumped as the surrounding land will usually be above the level of the lake surface.

⁴⁷ For example, apart from the rivers that form part of its northern, southern and north eastern borders, Namibia has only temporary rivers which may only last a few hours or days following periods of intense rainfall.

The main uses to which water abstracted on the basis of a water right is put are agriculture (for irrigation and livestock watering), industrial uses including its use as a coolant in thermal power stations, and for urban use including for domestic drinking water, household and commercial uses. Rights to impound water are either a precursor to abstraction (for example where water is held in a reservoir prior to its use for irrigation) or relate to the use of water for hydro-power generation.

As to their legal form, while in some jurisdictions (such as the western states of the United States of America in which the 'prior appropriation' doctrine applies⁴⁸) water rights are still created by operation of law, water rights are mostly now created on the basis of a legal instrument issued by the state agency responsible for water resources management (the 'water administration'). Such instruments are variously described in legislation as 'licences', 'permissions', 'authorisations', 'consents' and 'concessions'.⁴⁹

As to their substance, modern water rights are administrative use or *usufructory* rights. The question arises are they property rights? Arguably they are.⁵⁰ 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. A full discussion of this matter is beyond the scope of this paper. The key point to note is that although water rights are now generally created under public or administrative law on the basis of statutory provisions, they have, as will be seen, many but not all of the attributes of private property rights, such as land tenure rights. Indeed without such attributes, a water rights system simply would not be able to function effectively. Before looking at these features, in comparison with land tenure rights, several observations must first be made about water rights.

First of all, statute-based modern water rights are based on the concept of the hydrologic cycle, the notion that water in its natural state is in constant motion (see Box A). The effect is that water rights, in the sense described above, cannot be issued or regulated in isolation to other activities relating to watercourses.

⁴⁸ See discussion in Part Five below.

⁴⁹ 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. 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 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.

⁵⁰ Joseph Sax, in the context of American water rights, is of no doubt that they are property rights even when created by permit. Sax, J.L. 'The Constitution, Property Rights and the Future of Water Law' 61 *University of Colorado Law Review* 257 (1990).

Box A - The hydrologic cycle and the fugitive nature of water

With the exception of so-called 'fossil' groundwater, described below, water is in a complex interlinked cycle of continuous movement. To start at the top of the cycle, as it were, water falls over both the sea and land as rain, hail or snow. Water evaporates from any wet surface including the sea which covers about 70% of the planet. As regards the water that falls over land, snow melt and rainwater runs off the surface into streams and rivers and thence down to the sea or some other 'terminus' such as an inland lake.⁵¹

Throughout this process some water enters into the soil where it is held as capillary water and returns directly to the atmosphere by way either of evaporation from the soil or through absorption by plants and then by transpiration.⁵² Finally some water percolates down into the geological strata that are aquifers. This is mostly by rainfall excess to plant requirements. Some of this water flows slowly to springs from where it rejoins the flow of surface water, or directly back to the sea. In this connection it should be noted that most ground water sources are linked with surface water bodies above them. Some however are not. Parts of so called 'confined' aquifers pass beneath surface water bodies with which there is no direct physical link. Groundwater will be replenished provided the abstraction rate is not too fast.

While water may be temporarily removed from the cycle by human intervention – for the bottling of mineral water – sooner or later it is used and will flow as waste water back into a river, stream or sea.

The only real exception is so-called fossil ground water which is ancient water contained in aquifers that have no connection with surface waters. In its natural state such water is not in motion and as such is more similar to oil reserves: once extracted it will not be replaced. In some places particularly in arid regions a proportion of water contained in deeper aquifers can be thousands of years old, representing palaeo-recharge that occurred during past eras of wetter climates.

Thus a range of other activities that may have a negative impact on the quality and flow of water, and thus on existing water rights, are generally regulated either by the same water rights system, or in close co-ordination with it. These include:

- the diversion, restriction or alteration of the flow of water within a water course;
- the alteration of 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 a water course;
- the extraction of gravel and other minerals from water courses and the lands adjacent to them;
- the use of sewage water for irrigation;
- fishing and aquaculture;
- navigation; and
- the discharge of wastes or pollutants to water courses.

The use of water, or the undertaking of any of these activities, without a formal right in circumstances where this is required, invariably constitutes an offence that may be punished in accordance with criminal or administrative law (depending on the jurisdiction). Activities that do not involve the abstraction of water from a water course, such as navigation or the impoundment of water for hydro-power generation and, in general, all in-stream uses of water resources (recreation, conservation of riverine and lacustrine wildlife habitats, fishing) are frequently described as 'non consumptive uses', in contrast to 'consumptive' uses where water is abstracted and used off-stream, with limited or no return flows returned to the water course of origin. What is clear, though, is that a river may be simultaneously

⁵¹ Water evaporates from any surface.

⁵² McCaffrey, S., *op cit*, at page 23.

subject to numerous water and related rights much in the same way that an individual parcel is, even if the rights themselves are not formally affected.

In order to be able to establish this type of administrative rights regime, it is first necessary to bring a state's water resources within the control of the state. This is done through a variety of different legal techniques varying from a declaration of state ownership,⁵³ the inclusion of water within the public domain of the State,⁵⁴ vesting water resources in the President of the State on behalf of its people,⁵⁵ or bringing water resources under the superior use right of the state.⁵⁶ Usually, such state ownership or control applies to all of the water resources within a state's territory thus including both surface water, groundwater⁵⁷ and even rainwater. In contrast to land tenure rights, notions of genuinely private ownership rights over water have therefore now largely gone from most jurisdictions.

Nevertheless it should be noted that water legislation typically provides a range of exemptions for activities that would otherwise require a water right. Indeed sometimes such entitlements are described in legislation in terms of 'rights'.⁵⁸ Typically, this is either done by reference to the type of activity, the volume of water used or a combination of both.⁵⁹ For example, in Spain such uses are classified as 'common uses' and include the use for drinking, bathing, and other domestic purposes as well as livestock watering. In Canada (Saskatchewan Province) the exemption derives from the size of the parcel to be watered, while regarding current water law reforms in England and Wales an exemption for abstractions of up to 20 cubic metres per day is proposed.⁶⁰ 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.

This kind of *de minimis* exemption has no really direct equivalent in the context of land tenure regimes. The closest equivalent is probably a temporary licence or permission to cross or travel over state owned land, such as a highway or other public place.⁶¹ In any event such *de minimis* water rights are a curious type of residuary 'right'. While they may be economically important to those who rely on them, it is hard to see how they provide much in the way of security. This issue is considered in more detail below.

⁵³ As in Albania's Water Law of 1995.

⁵⁴ As in Argentina's Civil Code of 1869.

⁵⁵ As in Ghana's Water Resources Commission Act of 1996 and in Zimbabwe's Water Act of 1998.

⁵⁶ As in Uganda's 1995 Water Resources Act and Victoria's Water Act of 1989.

⁵⁷ Although Spain's recent water legislation omits fossil groundwater.

⁵⁸ 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...'.
⁵⁹ Nevertheless water legislation usually provides that such 'free uses' of water may also be subject to restriction in times of drought.

⁶⁰ In the draft Water Bill that is currently subject to consultation. Similarly, agricultural irrigation is exempt from permit requirements in Kentucky and Maryland (up to 10,000 gallons a day) Getches, D.H, *Water Law in a Nutshell* West Publishing, St. Paul, Minn (1997) at page 57.

⁶¹ Such a right would not, however, be characterised as a land tenure right.

3 LAND TENURE RIGHTS AND WATER RIGHTS REGIMES COMPARED

Having outlined in broad terms the nature of land tenure rights and water rights, the aim of this Part is to shed light on the rights interface through a comparison of the principal features of the two regimes. As will be seen, many of the differences arise from the obvious differences in the physical nature of the two resources: while land is fixed and immobile water is a fluctuating, fluid and ultimately fugitive resource. From a legal perspective, rights over land are far easier to conceptualise, establish and administer than rights over water.

3.1 Security

As already mentioned, a key purpose of both land tenure rights and water rights is to confer a degree of legal security on the right holder so as to create favorable conditions for investment in the resource or activities that involve its use.⁶² In this context a number of factors contribute to the relative degree of security created by a legal right, whether in respect of land or water.

3.1.1 Duration

A key issue is the duration of the right. At first sight the longer the duration of a right then *prima facie* the greater should be the degree of security. In this connection the key attribution of a 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 for as one commentator has observed, 'in situations where land users and the private sector are confident that the government will honour contracts, long-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.'⁶³ The key issue would appear to be whether or not the right is likely to be respected.

As regards modern water rights, while rights of indefinite duration do exist in a number of jurisdictions, the trend is clearly towards time limited water rights.⁶⁴ Such rights are, as described in the previous Part, use rights. As will be seen, the possibility of ownership rights over flowing water has never really been considered feasible in the European water law traditions. As regards the duration of water rights, the key issue 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 a return on the value of investments. Too long a period and future re-allocation of water resources is constrained.⁶⁵ Modern water rights typically last for

⁶² Such investments may be financial but also include investments in time and labour.

⁶³ Deininger, K. *Land Policies for Growth and Poverty Reduction, a World Bank Policy Research Report* The World Bank, Washington D.C. 2003 at page 54.

⁶⁴ In Texas, for example, administrative water rights are not time limited and nor are those introduced in England and Wales following the entry into force of the Water Resources Act of 1963.

⁶⁵ If, for example, 100 year water rights were to be introduced then the benefits of time limited rights would be largely lost: no re-allocation of water subject to such rights could take place until the end of that period without the payment of compensation.

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 hydro-power dam.⁶⁶ Thus in Spain an administrative concession may not exceed 75 years while in Mexico they last for between 5 and 50 years and in South Africa they may last for up to 40 years.

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. While at the end of that period the right holder may have an expectation that the right will be continued, s/he 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.⁶⁷

3.1.2 Enforcement against third parties

Apart from the duration of the right another important aspect of security is the expectation on the part of the right holder that his or her right will be upheld against both third parties, through the courts as necessary. On a practical level, as regards third parties, the situation is in many ways far easier as far as land tenure rights are concerned. The holder of a land tenure right is usually able to ascertain the identity of a third person who is interfering with his substantive enjoyment of that right and to take legal proceedings against that person.⁶⁸ In cases involving un-identified parties, such as illegal 'squatters', court procedural rules usually enable a plaintiff to issue proceedings against 'persons unknown'.

In the case of a water right, however, it can be much harder for a right holder to identify who is interfering with the flow of water and thus his water right.⁶⁹ 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. This issue is considered in more detail below.

3.1.3 Enforcement against the state

The other main possible source of insecurity as far as a land tenure or water right is concerned is the state itself. As regards land tenure rights, most jurisdictions seek to protect their citizens against arbitrary expropriation, often in constitutional provisions relating to the sanctity of private property. Article 545 of the French Civil Code, for example, provides that

No one may be compelled to yield his ownership, unless for public purposes and for a fair and previous indemnity.

The basic concept is simple. Only the State, as the guarantor of the respect of the right to property, can oblige an individual to cede or lose the ownership of his land tenure rights: only the public utility or interest can justify such an assault on a right that is recognized as 'inviolable and sacred'.⁷⁰ While the necessary powers are

⁶⁶ This is because it usually takes longer to make a return on larger water sector investments.

⁶⁷ 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.

⁶⁸ A possible exception relates to the effects of air pollution although the interference is not strictly speaking with the legal substance of the right.

⁶⁹ Not always of course. The impact on existing right holders of the construction upstream of, say, a major new dam would be quite evident.

⁷⁰ Conseil d'Etat, '*L'Utilité Publique Aujourd'Hui*' La Documentation française, Paris (1999) at page 15.

generally conferred on the state to expropriate land in such circumstances, the procedures are usually tightly regulated and subject to the payment of full compensation.⁷¹ If agreement cannot be reached either as to the necessity of expropriation or the level of compensation to be paid, legislative provision is usually made for such issues to be resolved by the courts.

As regards water rights the situation is a little different as the rights and duties of the water administration are usually spelt out in water legislation itself. 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. Such circumstances might include *force majeure* or the need, in the 'public interest', to re-allocate water for some other use in accordance with the applicable basin plan, an issue that is returned to below. The effect, at the end of the day, is broadly similar: rights may not be arbitrarily suspended or re-allocated by the state.

A major difference regarding the security of land tenure rights and water rights relates to the different nature of the resources themselves. A unique feature of land as a subject of legal rights is its immovability. The volume of water in a stream or river varies naturally, however, in accordance with climatic conditions and thus the limits of legal security are reached. A water 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.

3.2 Substance

No legal right is ever absolute and rights to natural resources such as land and water are no exception. Indeed both types of right are better characterised as bundles of both rights and obligations. The metaphor's image is a bundle of sticks in which each stick in the bundle represents a different right associated with property.⁷²

3.2.1 Land ownership rights

Of the types of right considered in this paper, ownership rights over land confer the fewest obligations on the right holder and the largest number of rights. In particular the civil law tradition follows Roman law in defining 'property' including 'immovable property' as the right to enjoy a thing and to dispose of it in the most absolute

⁷¹ But not always. Australian States (as distinct from the Commonwealth) have no constitutional obligation to pay compensation for the compulsory acquisition of private property. Clark, S.D. 'Reforming South African Water Legislation: Australian Examples in Food and Agriculture Organization of the United Nations *Issues in water law reform* FAO Legislative Study No. 67, FAO, Rome (1999) at page 7.

⁷² Arnold, C.A. 'The Reconstitution of Property: Property as a Web of Interests' 26 *Harvard Environmental Law Review* 281 (2002) at page 284. Arnold goes on to argue that the bundle metaphor is in fact inadequate and that consideration should be given to its replacement with an alternative: 'the web of interests'.

manner.⁷³ A number of CIS countries still penalize non-use of land even in the case of land that is subject to private ownership. This is unusual and as much as anything else probably reflects a distrust of market forces and a belief that bureaucrats can exercise better judgment over the use of land than private right-holders.⁷⁴

The common law equivalent, the freehold estate, confers almost as much freedom on the right holder, to use the land subject to the right, not to use it, to exclude others, to sell, mortgage, charge or otherwise dispose of it free from intervention by any third party, including the state.⁷⁵

In practice, however, a land owner usually does not enjoy total freedom as regards the use of a parcel of land. Restrictions on the type of activity for which the land may be used are increasingly found in land use planning legislation which may also restrict the right of the owner to subdivide the parcel as a precursor to sale. Public health legislation and environmental protection legislation also restricts or prevents certain activities being undertaken on the land parcel or dictates how they are to be performed.⁷⁶ And the fear of a compensation claim if the parcel is used in a manner that causes damage to the property of others may serve as a practical restraint on the type of activities undertaken.

The key issue to note, however, is that such restrictions arise out of other legislative sources and are not inherent to the bundle of rights and obligations that make up land ownership. Indeed, as will be seen below, this is one of the main differences between land ownership rights and water rights. Land tenure law generally conceives of the 'bundle of sticks' that comprise land ownership in the abstract without reference to the natural features of individual land parcels.⁷⁷ Thus while some obligations are inherent in land ownership, such as the right of support of neighbouring land (which may not be removed by, for example, quarrying), and various duties relating to water, including the duty to receive drained surface flow water from upper land, these apply equally to all land parcels within the jurisdiction.

3.2.2 Other land tenure rights

Leases, as already mentioned, are usually subject to a number of conditions relating to the use of the land and how that use is to be exercised, including a condition as to the payment of rent. Similar conditions, other than rent, are found in use rights. Such conditions are more likely to be specific to the parcel of land, but ultimately their scope and content will depend on the objectives of the owner of the land. These may range from commercial objectives, such as limiting the types of business that may be undertaken on the land parcel so that such uses do not compete with a business of the owner, to ecological objectives, such as requiring the land to be used only in a specific manner that reduces or minimises harm to the environment. Consequently both lease and use rights quite often require the land to which they relate to be used for a specific purpose. In a number of countries of the former Soviet Union, for

⁷³ The *dominium* of Roman law comprised both the legal title and the right of actual enjoyment. In other words *dominium* regarded as conceptually inseparable the owner's right to use, dispose of and exclude others from his property. Article 544 of the French Civil Code reflects this approach: 'Ownership is the right to enjoy and dispose of things in the most absolute manner, provided they are not used in a way prohibited by statutes or regulations.'

⁷⁴ Giovarelli, R, 'Land Use Regulation' in Prosterman, R. & Hansard, *op cit* at page 83.

⁷⁵ However, many early New England towns had laws forcing the owners of town lots to build on them or lose them. Hart, J.F. cited in Freyfogle, E.T. 'Ethics, Community and Private Land' 23 *Ecology Law Quarterly* 631 (1996) at page 640.

⁷⁶ Typically by requiring specified activities to be undertaken only on the basis of a permit which in turn contains conditions.

⁷⁷ Freyfogle, E.T. 'The Particulars of Owning' *op cit* at page 585.

example, use rights over agricultural land are conditional upon the land user continuing using the land for agricultural purposes. Similarly, a business lease of commercial premises might restrict the use to which those premises can be used for example by requiring them only to be used as offices. In such circumstances, use restrictions are an aspect of land tenure even though other restrictions may also be placed on the use of the land parcel through, for example, land use planning or environmental protection legislation.

3.2.3 Water rights

Conditions requiring continued use of the resource are commonly found in modern water rights: 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.⁷⁸ Indeed, in those jurisdictions in which the 'prior appropriation' doctrine applies (see Box B) the fact of use is not itself sufficient: the water that is subject to the right must be put to 'effective and beneficial use'.

Another key obligation, usually also contained as a condition in a water right, has traditionally been to use the water only on a specified parcel of land. Beyond these basic obligations, modern water rights are usually subject to a number of conditions of both general application to all water rights (and which are typically spelt out in the legislation) and of specific application to individual rights (which are usually spelt out in the instrument that creates the right).

Examples of the former include conditions requiring water users to return unused or excess water to the water course from which it was abstracted, to treat any waste water prior to its discharge, to pay charges for the use of water and so forth. Examples of the latter might include relatively specific details as to how water is to be used, measured or treated. 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. If properly applied they have the effect of making each water right separate and uniquely adapted to the resource to which it relates. In some jurisdictions the scope and content of water rights may be varied by the water administration after the right has become effective.

Finally, apart from the case mentioned above where water rights are modified or suspended through no fault of the right holder, water legislation usually also provides that water rights may be suspended or cancelled as a form of sanction in cases where the right holder fails to comply with applicable conditions contained in the water right or fails to exercise the water right, and thus use the water, over a specified (long) period. In such cases compensation is not payable.

3.2.4 Conditions and security

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. In this connection from a legal perspective the number of conditions to which the most secure water rights are subject means that they are inherently less

⁷⁸ For example, the German Water Law as amended on 23 September 1986 and the Spanish Water Law of 1985 (as amended). The issue of continued use arguably marks the borderline between the characterisation of water rights as rights over a commodity or rights over a 'public good'. One of the very few places in which the former characterisation holds is Chile, where, as described in more detail below, water rights are fully tradable.

secure than land ownership rights, although not necessarily that much less secure than lease or use rights over land.

3.3 Administration

Apart from the fact that both make use of registers in which to record rights, the administration of land rights shares little in common with the administration of water rights. In short, as a process, water rights administration is much more complex. This is because of the nature of both water resources and water rights themselves.

3.3.1 Measurement and monitoring

Measurement is a good place to start. To be effective both land tenure rights and water rights must be capable of accurate delineation or measurement in order to answer the question of precisely what, or how much, is the subject of the right. In the case of land tenure rights this is, relatively speaking, a much easier task. Apart from being immobile, a land parcel can often be described with some certainty by reference to its physical features, which may include boundary fences and marks. Greater certainty can be provided through the use of a plan and a formal survey. The location of the land parcel can be further clarified by reference to an existing survey map or through the use of satellite technology. Once recorded, apart from unusual natural phenomena such as earthquakes,⁷⁹ the boundaries of a land parcel are likely to be altered only by human intervention, such an encroachment by the holder of a neighbouring parcel.

Measurement in the context of water rights is a much more complex matter. First of all, as already mentioned, the level and flow of water varies in most watercourses primarily as a result of climatic factors. 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, it may also be necessary to monitor conditions in the high mountains.

The measurement of water rights themselves is also a relative complex matter requiring continued activity. If the flow of water in a watercourse is regulated (by a dam or a weir) a water right typically specifies the volume of water that may be abstracted and/or used. If it is not, then the 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 Victoria, New South Wales and Queensland, for example, annual

⁷⁹ Given the subject matter of this paper, two other examples of natural alterations to the boundaries of land parcels deserve mention. These are cases where sediment builds on the banks of rivers to extend the area of riparian land parcels and where rivers themselves alter course. Such issues are typically addressed in land legislation. Article 556 of the French Civil Code provides, for example, that deposits and accretions which gather successively and imperceptibly on the banks of a river or stream are called *alluvion* and that such *alluvion* benefits the riparian owner, whether it be a question of a river or of a stream. Article 559 provides that where a river or stream, 'removes by a sudden drift a considerable and recognizable part of a riparian field and carries it towards a lower field or to the opposite bank, the owner of the part removed may claim his property; but he is compelled to file his claim within one year: after that period, it will no longer be admissible, unless the owner of the field to which the part removed has been joined has not yet taken possession of it.' Both articles apply irrespective of whether or not the river or stream in question is navigable or floatable a distinction that is considered in more detail below. In the case of *alluvion* on a navigable/floatable river or stream the riparian land owner may be required to leave a footpath or towpath in accordance with applicable regulations.

allocations are announced each year as a proportion of the entitlement of each water right. This varies from year to year depending on the availability of water resources. 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.

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, whether 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 reduce the level of water quality in rivers, streams and groundwater formations, and thus the quality of water that is subject to water rights.

The continued monitoring of water quality, as well as enforcement and remedial action when statutory water quality standards are breached, are therefore also necessary tasks for a water administration in ensuring that effect is given to the substantive content of water rights.⁸⁰

3.3.2 The active role of water rights administrations

In short, apart from the need for constant measurement and monitoring activity, the picture that emerges is that, in contrast to land tenure rights, water rights are dependent on the active management of the resource. Furthermore, the trend as regards water administration institutions is increasingly towards taking a drainage basin approach. 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). This approach is entirely logical from a hydrological perspective given that surface water within the basin will naturally flow in a common direction towards that terminus. But it means that water resources management is undertaken over what can be a very large land area, one that often does not accord with administrative boundaries, and can thus become a rather complex and expensive process.

The complexity 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;
- an inspection by the water administration;
- the publication of the application in a local or national newspaper;
- a period during which objections may be filed by third parties (such as existing water users who may fear that their rights will be adversely affected by the proposed use as well as environmental non-government organizations);

⁸⁰ The quality of water in a watercourse is also affected by the quantity as one of the key attributes of water and the reason why societies continue to dispose of wastes to watercourses, is its ability to dilute pollutants and ultimately to regenerate itself.

- a review of the application by the water administration, which may include the holding of a public hearing if appropriate; and
- a decision.

The question arises as to the basis on which such decisions are to be made: how are water rights allocated?⁸¹ 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 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).⁸² Typically, the legislation also specifies the minimum content such plans.⁸³ The purpose of such plans goes beyond the simple allocation of water rights. They may set out 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. To what extent do such plans take account of land use and land tenure? The short answer is that land tenure is not usually a consideration, although the uses of land within a river basin are considered, primarily as regards their impacts on water quality but also as regards their potential impacts on water demand.

Nevertheless, such plans do generally set out priorities for the use of water. This is required, for example, by the Spanish Water Law (as amended) 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.⁸⁴ In the event that two applicants are competing for

⁸¹ In addition in the states of the western United States where the prior appropriation doctrine controls, continued beneficial use of appropriated water is a condition of the continued existence of a water right. See Part Five below.

⁸² Burchi, S. 'Water' in Food and Agriculture Organization of the United Nations *Law and Sustainable development since Rio: Legal trends in agriculture and natural resource management* FAO Legislative Study No. 73 (2002) FAO Rome at page 152. Other countries whose legislation requires the preparation of such plans includes 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 EU member states.

⁸³ For example the minimum contents of Spain's National Water Plan are specified in the law:

- Measures necessary for the co-ordination of the basin plans.
- Preferred option to possible alternatives re 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.

⁸⁴ Article 65 Water Law as amended. 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. It is to be noted that such priorities often reflect socio-political as opposed to strictly economic objectives.

the same water resources, the water administration is bound to have regard to and apply the relevant priorities for water use.

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

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;
- the establishment of water 'reserves', whereby specified volumes of water are set aside for priority purposes, including environmental needs;
- the creation of so-called 'in-stream rights' whereby a notional water right is created and held in trust by the state so as to reserve the water that is subject to that right for environmental purposes;
- the requirement for an environmental impact assessment; and
- the satisfaction of a test of public welfare.⁸⁵

Once allocated, details of water rights are usually recorded in official registers maintained by the water administration and it is the register, not the individual document held by the right holder, that is conclusive as to the existence and scope of each water right.

It is at this point, as mentioned at the beginning of this section, that the main point of similarity with land tenure administration is reached. In most jurisdictions, in order to have legal effect, land tenure rights, or more specifically 'real' or 'immovable' property rights, must be subject to registration. In other words, apart from ownership rights, various other types of land tenure right, including leases, use rights, charges and mortgages only have legal effect once they are registered.⁸⁶

3.3.3 The reactive role of land tenure rights administrations

The main task of a land tenure rights administration is to operate a country's land registration system. Such a system can be conceived of as comprising three main elements: (a) the land registration records; (b) the institutions (often called "registries") responsible for managing those records; and (c) the rules that specify how the system should operate. It also needs to deal with any later changes to that information, such as: (a) changes to the parcel, by, for example, subdivision or combination; (b) the transfer of rights, by sale, inheritance, reversion to the government, etc.; and (c) the addition of new rights or encumbrances that relate to the parcel such as charges, mortgages, etc. The aim of an efficient and up to date land registration system is to make it possible to tell at any time who has what rights to any registered parcel of land.

⁸⁵ 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*, page 141.

⁸⁶ In the common law such instruments may, however, have effect in equity but the scope and form such equitable rights is beyond the subject matter of this paper.

Although there are many different types of land registration systems in operation around the world, a distinction is sometimes made between a 'deeds registration system' and a 'title registration system'.

In a deeds registration system, what is recorded are documents evidencing transactions in land. For example, the buyer of a piece of property would record the deed he or she received for the land in a government deeds registry. In a well-run, widely-used deeds system, a search of these records should provide quite accurate and complete information. However, it remains the case that a deeds system is a system for registering documents, not for registering title to land. Thus the records do not offer any guarantee of the legal status of a particular piece of property. In other words, a deed does not by itself prove who holds a land tenure right but only records an isolated transaction. Many deeds systems are not compulsory, meaning that they may not present a complete picture because parties to a transaction may decide not to register the documents. In addition, although there are exceptions, deed registration systems have traditionally not been tied to cadastral or parcel maps. Thus, information is arranged according to the names of buyers and sellers, rather than according to a particular parcel of land. This makes it more difficult for users trying to learn the current legal status of any parcel.

In a title registration system, the unit of registration is the land itself, not a deed. Each parcel in a title registry is identified on a map, and a 'register' or parcel record for that parcel is prepared. That register will theoretically contain all relevant current legal information about: (i) the location and size of the parcel (including a reference to the registry map); (ii) the persons who hold legal interests in that parcel; and (iii) the nature of the legal interests held. When land is 'brought into' a registration system, a determination is made as to each of the three foregoing items and the information is written in the parcel register. Thereafter, each transaction or other event that changes any of those items is shown on the same document. This ensures that there is a comprehensive and up-to-date record of the legal interests in a piece of land set forth in one document. Unlike a deeds system, a title registration system purports to offer a 'snapshot' of the current legal status of a piece of land, with no need to 'go behind' the register and examine the entire transactional history of that land.

In practice, there are many variations of these two approaches, to the extent that it is sometimes difficult to distinguish between them. For example, in some title registration systems, such as that of Estonia and Germany, the record of land parcels is physically separate to the register of legal rights, the former being maintained by the land registry, the latter by the court. Furthermore, in a number of countries, including England and some US states, large areas of land remain unregistered. Instead title is proved on the basis of deeds that typically show a good 'root of title' stretching back to more than 15 years before.⁸⁷

In short, except during periods of systematic compulsory registration of land, as undertaken during certain types of land or agrarian reform, the administration of land tenure rights is, in contrast to water rights administration, largely a passive affair in that register entries are made following the conclusion of transactions involving right holders. Nevertheless, although the process of land tenure rights administration appears to be simpler than that of water rights administration,⁸⁸ the sheer number of

⁸⁷ In England and Wales between 35% and 50% of the land area, some 13 million acres in all is not, and has never been, recorded at the land registry. Cahill, K. *Plots of Money* *The Guardian* Wednesday 20 August 2003. It should be noted that title evidenced in this way is considered to be as good as title evidenced through the land registry records. Unregistered title is not defective title *per se*.

⁸⁸ This is probably something of an illusion given the technical aspects of land registration.

land tenure rights that are subject to registration and re-registration means that in practice a land tenure administration is more costly to fund than a water rights administration in the same country. Having said that, in developed countries land tenure registration systems are usually self-financing through the payment by rights holders of registration fees. Problems can arise, however, in developing countries where the volume of transactions is low making it difficult for registration systems to be self-financing.

3.3.4 Enforcement

Finally, one area in which there is a major divergence of approach regarding the tasks of the relevant administration body concerns enforcement. In addition to monitoring the use of water and the volumes used and abstracted by water rights holders, a water administration need to have the necessary powers to enter land to undertake inspections, to require the provision of information and to take enforcement action, including prosecutions, against those who illegally use water without a necessary water right (or who fail to comply with conditions contained in water right). This usually entails the provision in legislation for the appointment of ‘inspection officers’, a category that may involve those officials involved in environmental protection tasks as well as the police. While an individual might take action against a user immediately upstream who has taken ‘his’ water, in practice most enforcement action regarding water rights is taken by the water administration.

No equivalent enforcement measures are necessary or provided for by land tenure legislation: responsibility for dealing with breaches of land tenure rights lies with the right holder and usually no-one else.

3.4 Charging

3.4.1 Water abstraction and use charges

In recognition of the economic value of water, there is a general trend in water legislation to introduce charging mechanisms for water abstraction and use and to tie these to the water rights. A number of different criteria for setting the rate of charges are specified in water legislation. These include:

- the volume of water abstracted, the area in which it is used and source from where the abstraction takes place;⁸⁹
- the volume of water abstracted;⁹⁰
- the kind of use to which the water is put and the source of the abstraction;⁹¹
- the type of source from which the water is abstracted;⁹²
- the ‘profit’ made by the water user;⁹³
- the administrative costs of water rights administration relating to the issue and management of water rights,⁹⁴ and
- the kind of use to which abstracted water is put.⁹⁵

⁸⁹ France and Arizona in the United States of America.

⁹⁰ Victoria, Australia.

⁹¹ Germany.

⁹² The Netherlands.

⁹³ Spain.

⁹⁴ England and Wales.

⁹⁵ Italy and Mexico.

Prompt payment of such charges is usually a condition of a 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.

3.4.2 Charging mechanisms and land tenure rights

Similarly, as regards land tenure rights, the process of registration in a land register usually entails the payment of a fee to the relevant land registry, in addition to applicable legal fees such as the costs of notarisational as well as any tax payable on the transaction itself (such as a transfer tax or stamp duty). Whether or not land tenure rights attract other types of payments by the right holder will depend on the nature of the right. As described above, holders of leasehold rights are usually required to pay rent to the landlord. The holders of use rights may be required to pay charges to the owner of the land. On the other hand ownership of land does not of itself require payment of any type of fee.

However in the case of ownership rights, while the right itself does not attract a payment liability as a matter of tenure, the tenure itself may be subject to the payment of a tax, specifically a land tax. Indeed such an obligation may not be restricted to the owners of land and may include the holders of other types of land right. Generally speaking, such land taxes are recoverable at the local level by local and municipal governments.⁹⁶

Non-payment of such taxes may ultimately lead to the loss of a land right, but only if the entity to which the money is owed chooses to enforce the liability against the land right as opposed to any other property held by the right holder. In other words, non-payment of land tax does not usually directly affect land rights in the same way that non-payment of water charges can lead directly to the suspension or cancellation of water rights.

3.5 International law

3.5.1 Land tenure rights and international law

Land tenure rights, and their administration, are largely unaffected by international law. States have, in accordance with principles of customary international law, as (re-stated in Principle 21 of the Rio Declaration), sovereignty over the natural resources within their territory in accordance with their own development policies. This includes the land within their borders. As such states are effectively free to determine both how the land within their borders is to be allocated and under what type of tenure regime.⁹⁷ The relatively few 'soft law' obligations undertaken by states in the context of international agreements do not greatly impact on this basic position.⁹⁸

⁹⁶ Herrera, A., Riddell, J. and Toselli, P. *Recent FAO experiences in land reform and land tenure* (1997) FAO Rome at page 57.

⁹⁷ Exceptions include specific commitments under international law, for example as to the use of part of their territory as a diplomatic mission or a military base by a foreign power or the obligations of the member states of the European Union towards the nationals of other member states. See further Hodgson, S., Cullinan, C. & Campbell, K. *Land Ownership & Foreigners: A Comparative Analysis of Regulatory Approaches to the Acquisition and Use of Land By Foreigners* FAO Legal Papers Online, FAO, Rome 1999 <http://www.fao.org/Legal/default.htm> at pages 3-4.

⁹⁸ For example, the wording of article 14 of the 1989 International Labour Convention No. 169, does not create particularly strong obligations: the collective, 'rights of ownership and possession [of

3.5.2 Water rights regimes and international law

In contrast, water rights and water rights regimes are often strongly influenced by international law in so far as they relate to the use of the water of transboundary watercourses. This is not an insignificant issue: almost half of the earth's land surface lies within international river basins and some 263 rivers cross international borders. To be more specific, international law does not regulate the content of water rights or water rights regimes,⁹⁹ but it does restrict how states allocate the water of transboundary watercourses within their borders. For notwithstanding the content of Principle 21 of the Rio Declaration, states do not have absolute sovereignty over the waters of such rivers within their borders. In practice many of these rivers are subject to bilateral and multilateral agreements concerning the use and allocation of their waters as well as their protection from pollution. In the absence of such an agreement, and pending the entry to force of the only global instrument to address this issue, the 1997 United Nations Convention on the Law of the Non-navigational Uses of International Watercourses, it is necessary to look to customary international law. In outline, states have the right to the reasonable and equitable use of the waters of a transboundary watercourse coupled with the duty not to cause significant harm to other states through which that watercourse passes.

What this means in practice, as far as water rights are concerned, is that first of all there are limits on the amount of water within a state that can be subject to water rights relating to a transboundary watercourse as well as, potentially, the types of use to which that water may be put. Secondly, in the already complex process of administering water rights at the national level, the international dimension cannot be neglected in the case of transboundary watercourses. As regards land use and land tenure rights, another effect may also be to constrain the use of otherwise productive land, simply because water that is otherwise physically available for use on that land, for irrigation for example, may not be used because of obligations under international law.

3.6 Markets and tradability

3.6.1 Land tenure rights and markets

The reason why a land tenure administration can focus purely on the issue of rights registration is that in most jurisdictions land tenure rights are either inalienable, meaning that they are not capable of being transferred, or because land rights transactions are determined privately primarily through market forces. In other words land rights are sold, traded, gifted or mortgaged at the private discretion of the right holder. Following the end of the cold war as a result of globalization and increased

indigenous peoples] over the lands which they traditionally occupy shall be recognized'. Governments are required to 'take steps as necessary to identify' these lands and to 'guarantee effective protection' of the recognized rights'. But in any event, given that international interests are not seriously threatened by a breach of this type of commitment, what compliance action if any could realistically be expected in the event of such a breach?

⁹⁹ To the extent that treaties of the European Communities create specific obligations under international law among the member states, an exception to this statement is provided by the EC Water Framework Directive (Directive 2000/60/EC of the European Parliament and the Council of 23 October 2000 establishing a framework for Community action in the field of water policy OJ L 327/1 of 22 December 2000) which requires the prior authorisation of water abstraction or impoundment (article 11).

policy support for market based solutions, tradable rights are in many ways becoming the orthodoxy as far as land tenure is concerned. In addition to promoting the freedom of choice and initiative of land rights holders, land rights are seen by many as the optimal means of promoting the efficient use of land resources.¹⁰⁰ Another important role of markets is that they permit land assets to be used as collateral to raise credit.¹⁰¹

While a variety of legal rules may control how land rights are to be purchased and sold, for example the formalities of the relevant documentation as well as the procedures for title registration, land tenure legislation is by and large extremely permissive as regards the scope and content of land transactions, particularly as far as land ownership rights are concerned. This is not to suggest that unregulated or lightly regulated land rights markets exist everywhere. Particularly in former socialist countries, where concepts of individual rights to land, whether in ownership or use are still relatively novel, deliberate, in the sense of policy driven, and accidental formal impediments to the creation of land markets remain.¹⁰² And as will be seen below, ongoing reforms seek to remove such impediments and secure a future for market transactions.

3.6.2 Trades and water rights

This situation contrasts quite strongly with that of water rights. Trade in water rights *per se* is much rarer and of comparatively recent origin. Indeed, many jurisdictions do not permit the trade in water rights separately to the land to which they have been issued for. Where it exists, the trade in water rights tends to be quite regulated. Individual transactions are generally subject to the prior approval of the water administration. This is primarily to protect against adverse impacts on third parties, specifically other water rights holders, and on the environment.¹⁰³ 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 investigate all of the technical aspects of proposed transactions.¹⁰⁴

Only in Chile has an unregulated water rights market existed since 1981. For their supporters, tradable water rights offer a number of claimed advantages. 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.

Why, it may therefore be asked, is the trade in water rights not more widely practised? The answer is found in the title to this paper: the land/water rights interface. In short, notwithstanding the different approaches of land tenure rights and water rights regimes, water rights have generally been tied to a parcel of land. In

¹⁰⁰ It is, however, to be noted that attempts to convert land from one type of use, such as agriculture, to a more profitable use, such as for housing or commercial use, will generally be subject to land use planning restrictions.

¹⁰¹ If the land cannot be sold, the creditor cannot realise the value of the land through a sale thus recover the loan and outstanding interest.

¹⁰² See, for example, Prosterman, R. & Hanstad, T. *Legal Impediments to Effective Rural Land Relations in Eastern Europe and Central Asia* The World Bank, Washington D.C.1999.

¹⁰³ Examples of jurisdictions that permit some trade in water rights include Spain, Alberta (Canada), the Philippines, Queensland, South Australia and Victoria (Australia) and Mexico.

¹⁰⁴ Perry, C.J., Rock, M. & Seckler, D. *Water as an Economic Good: A solution or a problem?* (1997) Research Report 14, International Irrigation Management Institute, Colombo at page 15.

many jurisdictions the only way to transfer a water right is to transfer the parcel of land to which it is attached. As discussed in more detail below, the implications of completely separating water rights from land tenure rights have potential implications for both types of right. But even in those jurisdictions where the unregulated trade in water rights is permitted there have been relatively few transactions as a result of physical limitations. In other words amendments to legislation to permit trading in water rights will not automatically result in such trades taking place.

3.7 Sector reform

The reform of land tenure rights and water rights presents a common legal challenge for states. Any change in legislation that has the effect of modifying, restricting or even terminating such rights will be *prima facie* liable to the payment of compensation. Consequently the legality of reforms to either land tenure or water rights risk legal challenge: the legality of the abolition of private waters in the 1985 Spanish Water Law was, for example, subject to an unsuccessful challenge to the Constitutional Court.¹⁰⁵

However, the objectives of reforms to land tenure rights and water rights are generally quite different.

3.7.1 The objectives of water rights reforms

As regards water rights, the main drivers for reform have related to concerns about the sufficiency of water resources having regard to existing water rights and current and planned uses of water, as well as land. Very often the basis for water law reform is quite technically biased in favour of the complex disciplines that make up water resources management. The effects include the introduction of new water rights regimes to replace those based on 'private waters' and riparian rights.

Over recent years concerns over the effects of large scale water abstractions on the environment have played an increasingly important role in water sector reforms that seek to promote the sustainable management and use of water resources. In this connection, key objectives for water management, which have been influential in guiding the shape of water sector reforms, including reforms to water rights, are the so-called 'Dublin Principles'. These were an attempt to concisely state the main issues and thrust of water management¹⁰⁶:

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;
Water has an economic value in all its competing uses, and should be recognised as an economic good.

These principles are sufficiently vague to allow widespread agreement while leaving their substantive content, in respect of which there may be wide disagreement, un-

¹⁰⁵ In a similar vein the UK water administration (the Environment Agency) recently received legal advice to the effect that attempts to time limit the statutory water rights of unlimited duration introduced with the 1963 Water Resources Act would breach human rights legislation. 'Legal advice alters Agency abstraction policy' *The ENDS Report* No. 322, November 2001.

¹⁰⁶ Solanes, M. & Gonzalez-Villareal, F. *The Dublin Principles for Water as Reflected in a Comparative Assessment of Institutional and Legal Arrangements for Water Resources Management* TAC Background Paper No. 3, Global Water Partnership Technical Advisory Committee 1999 at page 6.

stated. In practice, while the first two principles have had some indirect effect on water rights reform, the central role of women remains largely unrecognised as far as water rights regimes are concerned. The fourth principle, in many ways the most controversial, is reflected in the introduction of charges for the use of water that is subject to water rights, described above, and also in the ongoing debate about tradable water rights.

A key objective of water rights reforms in many countries has been to bring water under state ownership or control, as described above, and to regularise existing uses of water by bringing them within a newly introduced administrative water rights regime. Experience of this process shows the importance of developing sufficient administrative capacity, of encouraging existing water users to regularise their water entitlements through the use of incentives as opposed to the threat of sanctions, and of granting generous time deadlines for this as well as the need for extensive public awareness campaigns.¹⁰⁷

Generally speaking, water rights reforms have had fewer re-distributive or socio-economic objectives than reforms to land tenure rights. 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, land tenure reform and water reform are both necessary to right the injustices of the apartheid era.¹⁰⁸

One of the key features of the Water Act was the abolition of riparian rights¹⁰⁹ and its replacement with a modern administrative water rights regime. The implications of pro-poor water sector reform are considered in more detail below. 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 of the reforms.

3.7.2 The objectives of land tenure reforms

By way of contrast to reforms in the water sector, socio-economic considerations have been much to the fore in land tenure reforms¹¹⁰ although the precise objectives of reform have varied over time as well as the mechanisms for achieving these. Indeed land tenure reform arguably has a longer and more complex history than water rights reform (see Box B).

¹⁰⁷ Garduño-Velasco, H. *Water Rights Administration: Experience, Issues and Guidelines* FAO Legislative Study No. 70, FAO, Rome, 2001.

¹⁰⁸ Kirsten, J., Perret, S. & Van Zyl, J *Land Reform and the New Water Management Context in South Africa: Principles, Progress and Issues* (2000) Paper prepared for a seminar of the Natural Resources Management Cluster and Land Policy Thematic Group, The World Bank, Washington DC 27 September 2000.

¹⁰⁹ See Part Four below.

¹¹⁰ Some commentators differentiate between land reform, land tenure reform and agrarian reform. The first type, land reform, is said to relate to the physical re-distribution of land, while land tenure reform is said to be concerned only with modifications to the tenure regime under which land is held without affecting the physical size of land held under such a regime. Agrarian reform on the other hand is said to focus more on the means of agricultural production which include but are not limited to land.

Box B - Trends in Land Reform

Modern concepts of agrarian and land reform probably have their most direct heritage in the agrarian transformation that began in Denmark in the late 1700. Building on the ideas that were emerging especially in Britain but also in France and Germany, reformers such as the Counts of Bernstorff and Reventlow initiated a programme of consolidating their peasants fields, introducing new technology and selling the land to their peasants. Important for our current purpose is the observation that the framers of this reform also recognised that peasants turned land owners stood little chance of success without institutional reforms. Thus *inter alia* legal reforms were implemented.

The Russian revolution and a range of nationalist/populist regimes between World Wars 1 and 2 moved the ideology of agrarian reform in the Western world from a liberal economic process to a state-engineered way to redistribute land and achieve equity in rural areas. Most of the land reforms in Latin America, Asia and the Near East were derived from this model. By the mid 1960s there was a general consensus that land reforms were an important measure to achieve equity and economic growth in rural areas.

In the 1970s and 1980s the agricultural policies of many countries, particularly in the developing world, were mainly characterized by special agricultural programmes such as price controls, subsidized agricultural services and inputs, state intervention and regulations to protect domestic markets and land immobility through agrarian reform regulations which intimidated investments. Such programme proved to be unsustainable.

The current period, following the collapse of the Berlin Wall has seen a return full circle with the marketplace being considered to be the ultimate distributor of land. Coupled with the adoption of structural adjustment measures, and in the context of political and economic liberalization following the collapse of the 'statist', centrally planned and socialist political economy at the end of the 1980s, the role of the state is being redefined so as to create a comprehensive institutional network that ensures rights and security.

Source: Herrera, A., Riddell, J. and Toselli, P. *Recent FAO experiences in land reform and land tenure* (1997) FAO Rome

Governments typically have a number of objectives for land reform programmes.¹¹¹
These may include one or more of the following:

- poverty alleviation through land re-distribution;
- the recognition of customary or indigenous rights;
- strengthening land rights security;
- the removal of impediments to land markets;
- social objectives that seek to strengthen the rights of less advantaged sections of society such as women, racial groups, sharecroppers;
- the promotion of foreign investment in land;
- the promotion of economic development and agricultural growth.

While the more famous land reforms undertaken in the decades after World War II (in jurisdictions such as Japan, Korea, Taiwan, Brazil and elsewhere in Latin America, India etc) have generally focussed primarily on re-distributive issues¹¹², the era of radical re-distributive land reforms is largely over. Instead the current focus on market oriented land policies means that while the demand for re-distributive land reform is still present in many countries, 'market friendly' solutions are being sought.

¹¹¹ It is to be emphasized that on-going land reforms are not limited to developing countries and states in transition. Recent reforms in England and Wales, for example, in the form of the Commonhold and Leasehold Reform Act 2002, will see major changes in the manner in which leasehold residential property is both held and managed.

¹¹² Lindsay, J. 'Land' in *FAO Law and Sustainable development since Rio: Legal trends in agriculture and natural resource management op cit* at page 233.

Except in cases where land reform takes place in a revolutionary context involving massive political upheaval, compensation must otherwise be paid to those who own the land that is subject to redistribution. A variety of 'market friendly' land reform programmes are currently being promoted by the World Bank particularly in Brazil and South Africa. In the past such approaches have rarely succeeded in transferring much of a country's land, or have done so extremely slowly because of a lack of political commitment to provide the funding necessary to compensate land owners.¹¹³

3.7.3 Reform objectives compared

What is striking is just how different the objectives of land tenure reform are to water rights reform. While some land reform programmes may have secondary environmental benefits, such as reducing the population pressure on fragile land areas, the concerns of water rights reform, scarcity and sustainability, are quite absent from the land reform debate.¹¹⁴

In part this may explain why land tenure reforms and water rights reforms are so often ill-coordinated. Land and water reforms are currently ongoing in a number of Southern African countries, often with as little co-ordination or consideration of their eventual mutual outcomes. The reasons for this lack of co-ordination are explored in more detail below.

3.8 Concluding observation

Although land tenure rights regimes and water rights regimes share a number of similar basic purposes and features, the rights themselves and the basis on which they are allocated and administered are substantively quite different. The role of international law and markets and the objectives of sector reforms are other key areas of difference. This, as is described in the next Part, is in quite stark contrast to the historically close relationship between land tenure rights and water rights in many jurisdictions.

¹¹³ Deininger, K. *Land Policies for Growth and Poverty Reduction, a World Bank Policy Research Report* The World Bank, Washington D.C. 2003 at page 16.

¹¹⁴ *De facto* changes in tenurial relations have also occurred as a result of conservation programmes and, for example, in the case of the establishment of protected areas (national parks and reserves) as a result of which local people have been displaced or have had their resource restricted. *Qua op cit* at page 33.

4 THE 'LOST' CONNECTION BETWEEN LAND TENURE RIGHTS AND WATER RIGHTS

Throughout history, in many societies and legal traditions rights to use water and land have been closely inter-linked. Sometimes, particularly in arid areas, the right to use land depended on the application of water.¹¹⁵ More commonly, the right to use water depended on the use or ownership of land or structures built on such land. In a sense, this is not surprising as most water rights, apart from those relating to hydro-power generation, and so-called 'in-stream rights', relate to the use of water on land.

4.1 Roman law

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 in turn had a major influence on conceptions of water rights in the influential European legal traditions, prior to the introduction of modern water rights regimes. Indeed some of these influences can still be observed. For example, Roman law denied the possibility of private ownership of running water. The Institutes of Justinian published in A.D. 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.¹¹⁶ At the same time it was recognised that things in the negative community could be used and that the 'usufruct' or right to use the advantage of the resource needed to be regulated to provide order and prevent over-exploitation.¹¹⁷

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.¹¹⁸ Roman law, however, recognised the right of the government to prohibit the use of any public water and required an authorization for taking water from navigable streams.¹¹⁹

4.2 The historical approach of the civil law tradition

This distinction between public and private waters long retained an influence in the countries of the civil law tradition. Generally speaking, while an administrative permission was necessary for the use of public waters this was not necessary in the case of private waters. The distinction was maintained by the French Civil Code – the *Code Napoleon* – promulgated in 1804 after the French Revolution. Public waters were those which were considered to be 'navigable' or 'floatable' and belong to the public or national domain. Their use required a government permit or authorisation.

¹¹⁵ Historically, in the communities of the Ahaggar, in modern day Algeria, the right to possession of land was formed once an individual brought water there; the right so created applied to all of the irrigable land. The rights to land and water ran together and could only lawfully be determined with the permission of the original owner (right holder). From M. Maceau GAST *Naissance et vie d'une communauté saharienne* Page 9. Ramazzotti. M., *Readings in African Customary Water Law* FAO Legislative Study No. 58, FAO, Rome, 1996.

¹¹⁶ 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.

¹¹⁷ Getches, D.H., *op cit*, at page 16.

¹¹⁸ Since Roman law did not provide for involuntary servitude of access, it could to that extent be considered a riparian system.

¹¹⁹ Teclaff, L.A. *Water Law in Historical Perspective*, William S Hein Company, Buffalo, New York, 1985 at page 26.

Private waters, which were those located below, along or on privately owned land, could be freely utilized subject to certain limitations of a statutory nature such as servitudes, rights of way etc. The right to use such private waters, both surface and underground, derived from land ownership which recognized the right of the owner to use at pleasure the water existing upon his land without any limitation.¹²⁰ Similarly the Spanish Water Act of 1886 considered all surface waters that spring on a privately owned parcel, as well as rainfall on that land, as private property, but only for its use on that land parcel (or the estate of which that land parcel formed a part).¹²¹

4.3 The historical approach of the common law tradition

The distinction between public waters and private waters was not, however, followed in the countries of the common law tradition.¹²² The common law did, however, maintain the principle of Roman law that flowing waters are *publici juris* and in maintaining that those who have access to such waters may reasonably use them, thus privileging the owners of lands adjacent to watercourses.¹²³ From these basic principles, the doctrine of 'riparianism' developed in England and North America in the course of the nineteenth century.¹²⁴

What is striking in the context of the topic of this paper is that riparian rights were not considered to be subsidiary land tenure rights like an easement or servitude, but were instead an integral part of the right of ownership of the land in question.¹²⁵ As regards the substantive content of such a right, a riparian land owner 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. Where such uses of water were made, abstraction could be undertaken without regard to the effect which they had on downstream riparian land owners.¹²⁶

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 riparian land owners, above or below. The limits of extraordinary water use have never been precisely defined and are probably incapable of definition. But it is clear that they are subject to significant restrictions. Specifically, it was necessary for the use of the water to be reasonable, the purpose for which it was taken had to be connected with the abstractor's land parcel and the water had to be restored to the watercourse substantially undiminished in volume and un-altered in character. The question whether a particular extraordinary use was reasonable was a question of fact to be

¹²⁰ *Ius utendi et abudtendi*.

¹²¹ 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. Ruiz, J. J. 'Modernization of Water Legislation: The Spanish Experience' in Food and Agriculture Organization of the United Nations *Issues in water law reform* FAO, Rome, 1999 at page 112.

¹²² 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 (ie the state).

¹²³ To acquire a riparian right it was sufficient to own land adjacent to a watercourse although in a number of common law jurisdictions the land beneath non-tidal waters, the river 'bed', is owned to the median line by the riparian land owners.

¹²⁴ It should, however, be noted that the riparian doctrine which as 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, A. & Coustalin, G. 'The Evolution of Water Rights' 35 *Natural Resources Journal* 821 (1995) at pages 850-870.

¹²⁵ A the same time Riparian rights were considered to be interests in real property as opposed to personalty. Getches, *op cit*, at page 59.

¹²⁶ Howarth, W. *Wisdom's Law of Watercourses, Fifth Edition* Shaw & Sons, Crayford, 1992 at page 72.

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 it will be recalled are types of land tenure right, in accordance with relevant rules of land tenure.¹²⁷

4.4 The benefits and limitations of the historical approaches

The main advantages of these historical land-right based approaches to water rights were that they could be relatively easily stated and furthermore that they could be claimed and exercised by the land owner without the need for state intervention.

However, they shared a number of serious disadvantages. First of all, there was the issue of quantification. The use of how much water constituted a 'reasonable use' in the common law riparian tradition? In some jurisdictions more detailed rules were developed but none were much better than general principles, as competition for water increased over time.¹²⁸ Similarly, problems arose with competing claims over the use of private waters in the civil law jurisdictions which gradually saw more and more restrictions being placed on the exercise of such water rights.

Particular problems arose in the context of the reception of such doctrines into colonial jurisdictions. 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 (jurisprudence) 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. For a start, given that the riparian doctrine conferred rights only on the owners of riparian land, large swathes of otherwise productive irrigable land beyond the riparian parcels were effectively denied rights to water. For example, in Canada the riparian doctrine effectively prohibited irrigation on any large scale in the southern regions of the prairie provinces which had an arid desert-like climate with an average precipitation of 28 centimetres per year.¹²⁹

And finally, whatever logic it may have for lawyers, the concept of distinguishing private waters from public waters is something of a nonsense from a hydrological perspective. Several responses arose to the disadvantages of land-based water rights.

¹²⁷ A detailed description of this type of water right would involve the use of pure common law land tenure vocabulary. Such rights could be acquired: by grant, by prescription, by custom or by statute. The 'tenement' (or land parcel) in favour of which such a water easement (servitude) was created was the dominant tenement while that to which the easement is a detriment was the servient tenement. A legal easement of water as an incorporeal hereditament (a land right) could only be created or transferred by deed, and a verbal licence was insufficient. A prescriptive grant of a particular right to a watercourse could be claimed on proof of long use without interruption. As a matter of common law the enjoyment of the right must be shown to have continued since time immemorial, a date which is set at the limit of legal memory fixed at 1189. The inevitable difficulties of proving this led to the development of the presumption of lost modern grant though which in practice evidence of twenty years exclusive enjoyment of a right to water will provide a conclusive presumption of the existence of the right of the person enjoying the use. Howarth, W. *op cit*, page 104.

¹²⁸ Du Bois describes how in Swaziland the question of reasonableness was assessed in accordance with how much water was necessary for the efficient irrigation of a given land parcel rather than simply in proportion to its location or size relative to other parcels of land. Du Bois, F. 'Water Rights and the Limits of Environmental Law' 6 *Journal of Environmental Law* 1 (1994) at page 81.

¹²⁹ Percy, *op cit*, at page 5. After 'considerable unrest' the Federal Government passed comprehensive water legislation in 1894 in the form of the North West Irrigation Act S.C. 1893 c.30 in order to introduce a modern water rights regime.

In the western United States, the flexibility of the common law tradition enabled the development of a new, more appropriate water rights doctrine, the 'prior appropriation' doctrine, described in Box C. Perhaps a harbinger of future developments, that doctrine severed the linkage between land tenure rights and the acquisition of water rights, the latter being acquired on the basis of beneficial use rather than land ownership.

Box C - The Prior Appropriation Doctrine

The prior appropriation doctrine was developed to serve the practical demands of nineteenth century water users in the western United States. It originated in the customs of miners on the federal public lands who accorded the best rights to those who first used water. It was later extended to farmers and other users, even on private lands. Where it applies, 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:

- Intent to apply the water to a beneficial use;
- An actual diversion of water from a natural source;
- Application of the water to a beneficial use within a reasonable time.

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 early in time of appropriation (senior appropriators) will obtain all of their allocated water; those who appropriated later (junior appropriators) may receive only some, or none, of the water to 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.¹³⁰ Some states allow appropriators the options of applying for a permit or perfecting a common law appropriation by posting notice and diverting water. More typically state law requires a permit as the exclusive means of making a valid appropriation. While the prior appropriation doctrine has its criticisms, for example it tends to discourage water saving by senior appropriators, there appears to be little desire for substantive reform.¹³¹

The main response, however, has been legislative with the enactment of new water laws that have brought water resources within the state domain and introduced modern water rights regimes of the sort described above. The main legacy, such as it is, of land rights based approaches to water rights is found in those increasingly rare provisions in water legislation that restrict the right to hold (administrative) water rights to land owners and, as described at the end of the previous section, in tying the use of water subject to such rights to specific parcels of land including industrial, commercial or agri-business premises. Even these residual links are being lost. In a number of jurisdictions it is necessary for an applicant for a water right merely to be in possession of the relevant land parcel on which the water is to be abstracted or used or to have a legal right of access to the point at which water will be abstracted. The widespread introduction of fully tradable water rights would see the link finally broken.

In short, modern water rights regimes tend to be fully divorced from landed property and, as a direct result, represent a sophisticated response to the

¹³⁰ Getches, D. *op cit* at page 74.

¹³¹ A full discussion of the doctrine is beyond the scope of this paper. See further Tarlock, A.D. 'The Future of Prior Appropriation in the New West' 41 *Natural Resources Journal* 769 (2001).

growing pressures on water resources. Such regimes enable rational choices to be made about the use of water and permit users to acquire secure and substantive legal rights while at the same time maintaining sufficient flexibility to ensure that future water requirements can be met. As seen above, a range of statutory mechanisms including river basin plans, the setting of priorities, the establishment of statutory minimum flow requirements, the creation of water 'reserves' and 'in-stream rights', the requirement for water rights applications to be subject to an environmental impact assessment and to satisfy a test that they are in the 'public welfare' seek to guide the basis on which decisions regarding the allocation of water rights are made.

5 THE RIGHTS INTERFACE

The picture that emerges is of two quite distinct regimes with quite separate approaches to the allocation and administration of rights over land and water resources. As outlined in the previous Part, this divergence, or more accurately the development of specific regimes for the allocation of water rights separate to land tenure rights, has taken place for perfectly rational reasons.

At the same time, however, as noted in the introduction, the resources to which the two rights regimes relate – land and water – are fundamentally inter-linked. The way in which land is used can, and often does, have a major impact on both the quality and the quantity of water resources¹³² and thus on water rights. Deforestation and poor agricultural practices on the slopes of upper watersheds are often blamed for an increased rate of run-off of surface water leading to cycles of flooding and low river flows, as well as increased sedimentation loads which can also affect such flows. In short nearly all uses of land have an impact on the hydrologic cycle of water and thus on water resources.

In recognition of the growing awareness of this inter-connection between the two resources Agenda 21, which was adopted at the United Nations Conference on the Environment and Development (UNCED) at Rio de Janeiro in 1992, stated that 'Integrated water resources management, including the integration of land and water related aspects, should be carried out at the level of the catchment basin or sub-basin.'¹³³ This call has since been echoed in an increasing number of legal and policy instruments at both national and international levels. The river basin approach to the management and development of transboundary water resources was recognised by the 1997 United Nations Convention on the Law of the Non-navigational Uses of International Watercourses and is increasingly influential in international and regional agreements.¹³⁴ As noted above, this approach is increasingly embraced in national water legislation and administration and the need to take an integrated approach to land and water linkages has been a frequent topic of published papers.¹³⁵

5.1 Formal and informal linkages

Given the importance of the relationship between land and water, what formal mechanisms exist in law to ensure a co-ordinated approach to the allocation and administration of land tenure rights and water rights? The answer, in short, is that few

¹³² Including groundwater resources.

¹³³ Agenda 21, Chapter 18, in *Earth Summit '92* at page 157. Having said that, Agenda 21 can also be criticised for having a dichotomous approach: the land use and freshwater chapters show little appreciation of water related phenomena as determinants of land use, or land use practices as determining water pathways, flows and water quality. Food and Agriculture Organization of the United Nations *Land and water integration and river basin management* Land and Water Bulletin No. 1, FAO, Rome, 1995.

¹³⁴ See for example, the European Community Directive 2000/60/EC of 23 October 2000 'establishing a framework for community action in the field of water policy' which requires the member states to take a river basin approach to water resources management.

¹³⁵ 'To avoid unexpected problems through land-water linkages, there must be an integrated approach to land use and water. The integrity of the water cycle makes the river basin or catchment the appropriate spatial unit for such integration as decisions on land use also effectively equate to decisions on downstream water resources, reflecting upstream-downstream dependencies.' Food and Agriculture Organization of the United Nations *Land and water integration and river basin management, op cit*, at page 16.

if any of such mechanisms exist. This is largely a result of the manner in which allocation decisions are made under the two regimes. In the land sector, as described above, the allocation and re-allocation of tenure rights has long been left to market forces in the so-called developed nations and current economic development orthodoxies see an increasing role for market transactions in developing and transition states. Also as outlined above, water rights have historically been seen as a subsidiary element of land tenure rights and as such have not merited specific consideration or a need to create specific linkages from a land tenure rights perspective.

The divergence and separation of water rights from land tenure rights through the creation of modern statutory water rights regimes has in many ways culminated in a reverse process in which land tenure rights are largely irrelevant. Modern water rights regimes are increasingly blind to the form and content of land tenure rights. It is increasingly rare for legislation to restrict the holding of water rights to land owners and frequently all that an applicant for a water right needs to show is that s/he or has access to the water source in question. Indeed modern water legislation increasingly provides for the grant of access to water resources to those who do not have direct access. The South African Water Act, for example, entitles a person who is authorised 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.¹³⁶

The divergence between land tenure rights and water rights is not, however, limited to the lack of formal linkages or mechanisms between the two regimes. The enactment of modern water legislation has led to the creation of water law as a distinct area of research and practice to land law.¹³⁷

As a result water rights are an aspect of water law and policy which is practised and studied by water lawyers and other water sector professionals, with their own concerns, text books and literature. In the same way land tenure rights remain an aspect of land law and policy a sector with its own agenda and a quite different set of professionals: land lawyers, of course, as well as surveyors and land economists in place of hydrologists, hydro-geologists and hydraulic engineers. The literature is equally distinct. As noted in the introduction, with few exceptions, the literature on land tenure rights tends to ignore literature and water rights and vice versa.

At a policy level, too, there is often an apparent disjuncture in respect of both governments and international agencies. For example the World Bank has recently published two major policy papers, one on land and land tenure,¹³⁸ the other on water resources.¹³⁹ Not only do they do not refer to each other, they do not even refer to the topic of the other.¹⁴⁰

¹³⁶ National Water Act, Act No. 36 of 1998, Chapter 13, Part Two.

¹³⁷ A process mirrored in those North American jurisdictions where increased pressure on water resources has led to the creation of increasingly complex common law water rights regimes.

¹³⁸ Deininger, K. *Land Policies for Growth and Poverty Reduction, a World Bank Policy Research Report* The World Bank, Washington D.C., 2003.

¹³⁹ World Bank, *Water Resources Sector Strategy: Strategic Directions for World Bank Engagement* World Bank, Washington D.C., 2003.

¹⁴⁰ This is not to single the World Bank out for criticism. In fact the World Bank, which is heavily involved in issues relating to land tenure rights and water rights, is one of the international organizations that is taking an increased interest in land/water linkages.

The next question that arises is does this divergence between land tenure rights and water rights as regards the integrated management of land and water resources matter?

Surprisingly, perhaps, the short answer is that to a large extent it does not. This in turn is largely a result of the nature of land tenure rights and in particular land ownership rights.

The essential point to note is that the law tends to conceive of land tenure rights in general, and land ownership rights in particular, in the abstract, with no regard to the location or natural features of the land parcel to which they relate. Freyfogle observes that the law conceives of the 'hypothetical 'Blackacre' and the abstract bundle or rights that its owner possessed'.¹⁴¹ In other words the bundle of sticks that comprise the ownership rights over a parcel of land in the middle of a large city are identical to those of a parcel of land in the middle of the countryside. In thinking this way the law generally pays little attention to the land itself, as if the natural features of a land parcel have no impact on the owner's land use options.¹⁴² The use of a particular parcel of leasehold may be subject to restrictions that take account of its natural features, but that is at the private discretion of the land owner. As regards state owned land, the state in theory at least has the potential role to influence the way the land is used. Huffman describes how by the late 1990s the management of federal lands in the United States had gradually shifted to focus on environmental preservation.¹⁴³

By way of contrast, water legislation typically requires each water right to be specifically adapted to time and place through the use of general conditions, that might apply nationally or within a given river basin, as well as of specific conditions unique to that water right. In this manner, the potential impact of that water right on other water uses as well as on land resources and other environmental goods can be taken into account. Some commentators detect a move towards an acknowledgement that land ownership rights should somehow depend on the natural features of the land parcel owned.¹⁴⁴ But this will be a slow and evolutionary process.

Instead as regards the objective of promoting a more integrated approach to the allocation and management of land and water resources it is necessary to look beyond land tenure rights and examine the relationship between water rights regimes and the legislation that regulates land use planning and permitting.

5.2 Planning the uses of land and water

The relationship between water rights regimes and land use planning regimes raises a number of important questions. Key among these are the jurisdictional scope of the regimes and the question of priority.

While plans and important water resources management decisions are typically made at the basin level, land use planning and decision making take place at both regional and local levels, within administrative boundaries. Such boundaries often do

¹⁴¹ All students of land law in the common law tradition are familiar with 'Blackacre' and its neighboring 'Whiteacre'.

¹⁴² Freyfogle, E.T. 'The Particulars of Owning', *op cit*, at page 585.

¹⁴³ Huffman, J.L. *op cit* at page 597.

¹⁴⁴ Freyfogle, E.T. 'The Particulars of Owning', *op cit*, at page 585.

not accord with the boundaries of river basins or sub-basins.¹⁴⁵ And, in practice the distinction between water resources planning and land use planning breaks down. All uses of land have water resources implications and vice versa. Because water is a basic human need, any land development for agricultural, residential, industrial, commercial or recreational purposes involves a diversion of water of suitable quality. Changes in the water regime – for example the construction of an impoundment for water supply, flood control and recreational purposes – have profound implications for land use in areas within the impoundment's zone of influence.¹⁴⁶ Another issue is how to bring groundwater into the equation. Changes in land can have significant effects on infiltration rates through the soil surface, on the water retention capability of soils, on sub-surface transmissibility, and thus on the production effect of rainfall.¹⁴⁷ Yet even if linked, the boundaries of aquifers frequently do not follow those of surface water basins, let alone those of the administrative sub-divisions of a state.

Another issue is which planning process should have priority, land or water? The European Community Water Framework Directive requires the preparation of 'river basin management plans' by the member states. Proposals to implement this duty in England and Wales require the relevant land use planning authorities merely to have regard to these plans. Scottish legislation, however, requires planning authorities to exercise designated functions 'so as to secure compliance with the requirements of the Directive' and thus the relevant river basin management plans. Furthermore, Scottish Ministers have made it clear that river basin management plans will override land use plans.¹⁴⁸ This, too, is an area that has benefited from relatively little in the way of research. A key problem is that in many countries land use planning regimes outside urban areas are weak, un-enforced or both.

An alternative, more ambitious, and in many ways more holistic approach is taken by New Zealand's Natural Resource Management Act of 1991. The purpose of the act is to 'promote the sustainable management of physical and natural resources'. It provides for the issue of resource consents on the basis of outcomes from a comprehensive multi-layered planning process. Such consents are necessary for the use of *inter alia* both water and land. But to what extent has this regime been effective and is it replicable elsewhere, particularly in developing countries? These are some of the issues that require further research.

5.3 The interface: the role and importance of land tenure rights

This does not, however, mean that land tenure rights should be disregarded entirely in seeking to improve integrated planning management of land and water resources. For a start tenure forms the basis from which land uses can be undertaken. Thus the rights of actors in land use planning will depend on their land tenure rights. Furthermore, the land/water interface is increasingly the subject of research and development projects that seek to recognise and build on land water linkages by making co-ordinated management interventions to both land and water resources. Such projects, commonly called 'watershed management projects' typically work with

¹⁴⁵ Indeed, rivers and lakes make excellent natural borders, often forming international frontiers and internal administrative boundaries.

¹⁴⁶ Goldfarb, W. 'Watershed Management: Slogan or Solution' 21 *Boston College Environmental Affairs Law Review* 483 (1994) at page 484.

¹⁴⁷ Food and Agriculture Organization of the United Nations *Land and water integration and river basin management* Land and Water Bulletin No. 1 (1995), FAO, Rome, page 49.

¹⁴⁸ DEFRA retreats in third consultation on water framework Directive' 343 *ENDS Report* at pages 45-46 (2003).

communities in both the upper catchments as well as those in the valley below to reduce erosion, prevent salinization and promote groundwater recharge.

What such projects generally do not do is to address issues of land tenure and water rights. This would in many ways appear to be serious omission as far as sustainability is concerned as often those who are the recipients of project assistance, for example people living on forest or marginal land in the upper catchments, have little or no security of tenure.¹⁴⁹ In the absence of secure tenure is it realistic to expect people to modify their conduct regarding the use of land with no immediate benefit to them? Apart from that those in the valley below, who benefit as water users from the management interventions may themselves hold only precarious water rights. The key difficulty, though, is just how to confer security, through the grant of land tenure rights and water rights, on such persons in order to meet such relatively narrow environmental objectives. The problem of conferring security is compounded by the fact that land reform programmes are often not designed to resolve the kind of environmental issues that such land/water linkages raise. In this connection further research into land tenure issues in connection with improved watershed management is called for.

For a start land tenure mechanisms, such as environmental easements or servitudes, whereby restrictions are placed on the use of land in the upper watershed for the benefit of land or buildings or even cities downstream, could conceivably play an important role in creating upstream-downstream linkages within river basins. Further investigation into the acquisition by New York City of such easements over land in the Catskill Mountains may reveal useful mechanisms that could be replicated elsewhere.¹⁵⁰

Wetlands, which are at the physical interface of land and water, play a vital role in maintaining water quality and water flows. In many countries, wetlands and their resources are classified as state property and water legislation often fail to provide security of tenure and access for local or indigenous peoples, even in areas where traditional land management has shaped and conserved high levels of biodiversity.¹⁵¹ As such this issue represents another aspect of the relationship between land tenure rights and water rights. In practice the banks and shores of rivers and lakes are home to a wide range of social and economic activities as well as a range of valuable eco-systems. Too often the bank or shore acts as the boundary between land tenure rights regimes and water rights regimes making it difficult to determine just which set of legal rules apply particularly in the context of flood plains.¹⁵² As described above, the construction (and use) of structures on land adjacent to water courses is usually subject to regulation under an applicable water rights regime even though such land may be subject to formal or customary land tenure rights. All around the world constructions and activities take place on the banks and shores of rivers and other water courses with

¹⁴⁹ See Swallow, B., Garritty, D.P. & van Noordwijk, M. *The Effect of Scales, Flows and Filters on Property Rights and Collective Action in Watershed Management*, Capri Working Paper No. 16, IFPRI, Washington D.C., 2001.

¹⁵⁰ See Food and Agriculture Organization of the United Nations *Land-water linkages in rural watersheds* Land and Water Bulletin No.9 FAO, Rome, 2002 at page 25. 'Water Settlement may not settle much' *The New York Times* 21 May 1998 at page A1.

¹⁵¹ Shine, C. & de Klemm, C. *Wetlands, Water and the Law* IUCN, Gland, Cambridge, Bonn (1999) at page 65.

¹⁵² See Hoggarth, D.D., Cowan, V.J., Halls, A.S., Aeron-Thomas, M., McGregor, J.A., Garaway, C., Payne A.I. and Wellcome, R.L. *Management guidelines for Asian floodplain river fisheries* FAO Fisheries Technical Paper 384/1&2 FAO, Rome, 1999.

little regard to either land tenure rights or water rights regimes. Further research into this aspect of the physical land/water interface is called for.

Beyond the objective of promoting integrated use and management of land and water resources, on a practical level the linkages between land tenure rights regimes and water rights regimes will probably only become stronger. Continuing pressure on water resources means that the importance of water rights is likely to increase not only in the abstract but also by reference to the tenure rights that relate to the land on which water will be used, whether for industrial, urban or agricultural purposes. Apart from the impacts of climate change, noted above, it is estimated that some 14 percent more water will be necessary for food production to meet the needs of the growing world population.¹⁵³ At the same time, however, population growth coupled with migration from rural areas is likely to increase the water demands of the major urban centres, the citizens of which will in turn need to be fed.

In other words water rights are going to become increasingly important both in general and in connection with the use of land and thus the exercise of land tenure rights. This is not to suggest that they will eclipse land tenure rights in importance or in number but increasingly the key to realising the value of land will depend on the existence and availability of water rights. In other words, the availability of water rights will become increasingly important to the value of land tenure rights. Those advising on or researching land tenure rights will need to take greater account of the water rights regimes.

In those jurisdictions where they are implemented modern water rights regimes enable society to make rational decisions regarding the allocation and use of water and to provide secure rights for water users. There are clear and workable mechanisms in place. And, as alluded to earlier, the availability of water rights is bound to impact favourably on the social and economic worth of landed property rights.

Conversely, in those jurisdictions mostly in developing countries and those in transition, that lack modern legislation on water rights or where the legislation exists on the statute book but is not effectively implemented the rights interface will manifest in a way that a general lack of secure water rights may negatively impact on land tenure rights discouraging investment in land by both rich and poor or their survival. Indeed while rich and poor may compete over the use of land resources, such struggles are generally resolved one way or the other relatively definitively (often it seems with the poor being expelled from the land). Competition over water can be equally fierce. At the local level people get killed fighting over water often because of its impact on their use of land. But conflict is not confined to the local disputes. Competition for water may take place between any two points within a river basin or aquifer and between different actors: a major multi-national corporation currently stands accused of putting thousands of South Indian farmers out of work through its use of the water that feeds their wells.¹⁵⁴

As described above modern water rights regimes are relatively complex and costly to implement. Developing and transition states frequently struggle to effectively monitor the state of water resources, usually a pre-requisite for the implementation of an effective water rights regime. Some have questioned the transferability of modern water management approaches, including water rights regimes and the river basin

¹⁵³ Bruinsma, J (ed) *World Agriculture: Towards 2015/2030 – An FAO Perspective* Earthscan, London, 2003 at page 15.

¹⁵⁴ Brown, P. 'Coca-cola in India accused of leaving farms parched and land poisoned' *The Guardian*, London, 25 July 2003.

approach to water resources management, which have also been largely from developed countries to developing countries.¹⁵⁵ On the other hand, as described in Part Three, simple water allocation rules such as those that relate to land tenure holdings are insufficient to deal with the range and variety of demands on water resources. In many ways the real issue here may be just how to successfully develop and implement water management regimes for developing countries, a question that is beyond the scope of this paper. But the simple point remains that the non-implementation of water rights regimes will impact on land tenure rights.

In this connection the lack of dialogue is disconcerting although in many ways quite understandable. For those working on design or reform of water rights regimes it is easier to treat either land or the water as 'the other' and, as already noted, the banks or shores of a watercourse becomes a jurisdictional limit, a conceptual barrier between land tenure rights and water rights regimes. At the very least a degree of dialogue is called for between those who work with land tenure rights and those who work with water rights particularly as regards the provision of technical assistance. Otherwise, given the fundamental linkages between land and water, there is a real risk that inappropriate advice will be given.¹⁵⁶

Beyond this general perspective there are a number of key aspects of the land tenure/water rights interface that raise significant questions about the nature of land tenure rights, water rights and their relationship. These are the irrigation sector, the management of groundwater, the role of customary law, the impact of tradable water rights regimes and the relationship between the two regimes and attempts to alleviate poverty. These aspects of the rights interface are considered in the next Part.

¹⁵⁵ See Winpenny, J. *Water Policy Issues* (1997) Occasional Paper No. 2, Department for International Development, London and Shah, T., Makin, I. & Sakthivadivel, R. *Limits to Leapfrogging: Issues in Transposing Successful River Basin Management Institutions to the Developing World* IWMI, Colombo 2000.

¹⁵⁶ A technical assistance report on land reform in North India reviewed during the preparation of this paper cheerfully recommended the sinking of more tube wells as an element of proposed land reforms. The hydro-geological basis for such advice was not recorded.

6 KEY ASPECTS OF THE RIGHTS INTERFACE

6.1 Irrigation

Irrigation raises a number of important questions about the land tenure rights/water rights interface. First of all, the importance of irrigation and its contribution to global food security cannot be over-emphasized. Some forty percent of world food production is currently produced on around 250 million hectares of irrigated land¹⁵⁷ an increase of some 200 million hectares over the course of the twentieth century. This increase is a result of huge investments in the sector¹⁵⁸ that have the effect that on average about 73 percent of all water abstractions are for irrigation, with an even higher share in lower income countries.¹⁵⁹ In India irrigation accounts for 93% of the gross amount of water used.¹⁶⁰

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, at least 55 percent more freshwater will be needed.

Like other water users, irrigators need secure water rights. In many countries irrigation is essential for crop production. Even in those countries where rainfall permits some level of production, supplemental irrigation is very often necessary to render agriculture profitable. For irrigators a lack of water security negatively affects the utility and thus the value of any land tenure rights they hold and vice versa. It is therefore perhaps surprising that irrigators in many countries lack secure rights to water, secure land tenure rights or both.

The lack of secure water rights is frequently the result of a number of factors including the form and design of irrigation schemes and the manner in which they are funded, designed and developed. The bulk of investments in irrigation, in richer as well as poorer countries, has been provided by states (even though the beneficiaries are usually private farmers). Such state funded schemes often involve the damming of major rivers and the construction of concrete lined canals that may run for many scores of kilometres. At the same time, many small-scale farmer-built irrigation schemes exist around the world, often comprising little more than an earth channel from a river to convey water to the land to be watered. Whatever its scale or source of investment funding, the construction, operation and maintenance of an irrigation scheme is usually a relatively costly affair.¹⁶¹

¹⁵⁷ Gleick cited by Salman, S. in Bogdanovic, S. (Ed) *Legal Aspects of Sustainable Water Resources Management* YuAWL, Novi Sad (2002).

¹⁵⁸ Since 1940 irrigation has absorbed over half of the total amount invested in the agricultural sector in Pakistan and Indonesia and for China the figure is over 80%. In India 30% of all public investment has been in the irrigation sector.

¹⁵⁹ 1992 World Development Report, Development and the Environment, The World Bank, Washington D.C. 1992 at page 100.

¹⁶⁰ The World Bank, *Water Resources Sector Strategy: Strategic Directions for World Bank Engagement*, *op cit*, at p 20.

¹⁶¹ Apart from the costs of operating a scheme, which may range from the operation of diversion structures, the costs of electricity when pumps are used, to the formation of temporary earth channels, a considerable amount of maintenance is invariably necessary to keep a scheme operational. Such maintenance may include the removal of silt and vegetation from canals through to the complete annual re-construction of earthen diversion structures in small schemes.

6.1.1 *Water rights and irrigation*

Although, as just noted, logic suggests that rights are as important for irrigators as for any other type of water user, water rights, of the type described in this paper, play only an indirect role as far as most individual irrigators are concerned.

This is because, as outlined in Part Two, water rights are concerned with the abstraction and use of water from natural sources. Apart from those (statistically relatively few) cases where water is abstracted and used on riparian land, the design of most irrigation schemes means that such rights are of secondary relevance. Typical irrigation schemes take water either from a reservoir on a dammed river or directly from such a river through some form of diversion structure (a so called run-of the river scheme). From the point of abstraction water may be conveyed for a large distance through so-called 'primary' irrigation canals. To complicate matters further such canals may feed storage reservoirs or receive additional water from subsidiary canals. After passing through smaller 'secondary' or 'tertiary' distribution canals or pipes, water is conveyed to the land parcel to be irrigated. Final application of the water to the land may be through temporary earthen canals or channels. In some countries water is conveyed through piped networks and, if placed under pressure, may be delivered to the land through spray, sprinkler or drip equipment.

In these circumstances the operator of the scheme will, subject to the applicable water legislation, usually require a water right to impound and/or abstract water from the natural source. But as irrigation canals and pipes are not themselves natural water sources, those whose land is adjacent to them (and who are supplied with water from them) cannot hold water rights in respect of the water that they contain. Indeed 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 of 'grant or arrangement'.¹⁶² Under the common law tradition, to take water from such a canal would probably amount to theft.¹⁶³ Indeed, as a matter of logic it is difficult to see how an ordinary statutory water right could be conferred on such a land holder as that person is not responsible for the abstraction of the water in the first place. A bare '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 an irrigation agency.¹⁶⁴

As such, therefore, the right is not only to a volume of water but also to a service, namely the delivery of that water and the operation and maintenance of the relevant irrigation scheme that enables such deliveries to take place. Irrigators typically enter into annual agreements with the relevant irrigation agency for the delivery of water in return for the payment of an irrigation service fee. In some countries rotational irrigation rules exist that reflect a mixture of customary and statutory law. What happens, however, if an agreed volume of water is not delivered at the appropriate time¹⁶⁵ is often left unspecified. Leaving aside the inequality of bargaining power between a state agency and an individual farmer it is clear that such arrangements

¹⁶² *Rameshur Pershaud Narain Singh v Koonj Behari Pattuk* in 1878 cited in Howarth *op cit* at page 115.

¹⁶³ This is because when once appropriated, the existence of a property right in the water has the consequence that it is capable of being the subject of theft. Howarth, W. *op cit* at page 14.

¹⁶⁴ Another complication for many irrigation systems in South Asia and parts of China is that they 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.

¹⁶⁵ The timing of a delivery of irrigation water is often as important as the volume: there is little purpose in irrigating crops that have withered due to lack of water.

fall far short of a water right in terms of the degree of security that they confer on the water user. In other words although irrigators in such circumstances need legal rights to water just as much as any other water right holder does, such rights to water are of quite a different nature to the type of water rights that are the focus of this paper.

The picture is often further complicated by ongoing programmes in many countries to transfer responsibility for the operation and maintenance of state irrigation schemes, in whole or in part, from irrigation agencies to farmer/irrigator operated 'water user associations', a process known as 'irrigation management transfer' (IMT). While the original objectives of IMT were to provide a better service to irrigators, as well as to increase the collection rate of irrigation service fees, the process is increasingly propelled by the need to reduce government spending and thus the funding of irrigation agencies.

While water user associations go by a variety of different names and may undertake a range of water management activities besides irrigation, they invariably operate on a not-for-profit basis and are controlled by their beneficiaries in a democratic manner, usually through a general assembly of participants and an elected management board. The water user association is not a new concept. In some parts of the world ancient water user associations still operate on the basis of customary law.¹⁶⁶ In many European and North American countries legislation regulating the establishment and operation of water user associations has been on the statute books for hundreds of years¹⁶⁷ and IMT programmes in developing countries and transition states have increasingly focussed on the importance of developing specific legal frameworks for the establishment and operation of water user associations as a specific type of legal entity, a *sui generis* legal person. Such legislation, backed up through the water user association's internal governing document (variously described as the 'statute', 'constitution' or 'by-laws') usually confers a number of rights on individual water user association participants including a right to a share of the water that the association receives.¹⁶⁸

Given the fact participants in a water user association are often effectively in competition for the same valuable water resources, the importance of robust and clear legal frameworks that provide for the establishment of water user associations with fair and transparent governance structures and which confer substantive legal rights on participants cannot be over-emphasized. Of course law is but one factor in the successful operation of water user associations, but unless substantive rights are clearly conferred on all water user association participants there is a real risk that socio-economic factors will lead to control over individual associations being captured by local elites. In this connection the existence of clear legal rights will at the very least strengthen the bargaining position of the poor and disadvantaged.¹⁶⁹

¹⁶⁶ Such as the *Subaks* of the island of Bali in Indonesia.

¹⁶⁷ For example, the formal regulations for the operation and maintenance of the Benacher and Faitenar irrigation canals irrigators in Valencia, Spain were drawn up on 29 May 1435 (cited in Ostrom, E. *Governing the Commons* (1990)). These rules codified earlier customary rules that dated from many hundreds of years earlier. The statutory basis of the Dutch *Waterschappe* or 'Water Boards' dates back to the twelfth century. See Hodgson, S. *Legislation on Water User Organizations – a preliminary comparative analysis* FAO Legislative Study No. 79 FAO, Rome 2004.

¹⁶⁸ See further International Water Management Institute-Tata Water Policy Program *Pro-Poor Irrigation Management Transfer* Water Policy Briefing No. 6, IWMI-Tata, Vallabh-Vidayanagar, 2003.

¹⁶⁹ Another issue that should be borne in mind is that, particularly in developing countries irrigation water may be used for a variety of purposes other than irrigation such as fish-farming. See Meinzen Dick, R. & van der Hoek, W. *Multiple Uses of Water in Irrigation Areas* draft of a paper to be published in a special issue of 'Irrigation and Drainage Systems' IFPRI Washington D.C.

The first question is, at the level of the individual water user association participant, is an entitlement to a fair share of the water received by the association equivalent to a formal water right? In some ways it is less secure because the water user association itself may fail for financial or other reasons.¹⁷⁰ Furthermore an individual water user association participant has only an indirect role in ensuring that the association does not lose any water rights conferred on it. The issue is bypassed in much of the property law literature because the share is not, legally, a water right.¹⁷¹ Nevertheless, the practicalities of the matter are such that conferring what are essentially organization rights on individual irrigators is probably the most realistic solution of providing a degree of water security.

The next question concerns the rights of water user associations. There would appear to be three basic scenarios. First of all, if it has direct access to a water source a water user association will hold a water right in its own name on behalf of its members. Water user associations in Europe and North America have done this for years.¹⁷²

In the second scenario the diversion structure and primary canal is operated by a federation of water user associations that also enjoys legal personality. In this case a formal water right is held by the federation with individual water user associations holding rights against the federation, including rights to a share of water. In the third scenario responsibility for the operation of the primary canal and diversion structure remains with the relevant irrigation agency which then supplies water to water user associations on a contractual basis, again usually on the basis of annual agreements. Such agreements create a kind of water right, in the sense of an entitlement to a specific quantity of water, albeit one that as a result of its short duration confers very limited security on the water user association. Curiously, discussion of this topic has been largely absent within the IMT literature.¹⁷³

Given the continued and growing importance of irrigation, research is needed into the basis on which secure water rights could be conferred on irrigation water users, particularly in the context of IMT programmes. Experiences from the United States of America and Australia may provide a useful point of comparison. In the United States, where such arrangements have existed for many years, the relevant state agency, the Federal Bureau of Reclamation, enters into long term contracts with water user associations for the supply of irrigation water. Such contracts typically last for some 25-30 years.¹⁷⁴ While on one hand such an arrangement appears to confer a greater degree of security on water user associations, no compensation is payable in the event that water is not supplied even if the agency is at fault.

The Australian approach is quite different. Within government irrigation areas, each land holding was initially granted a water right based on what the relevant irrigation agency thought it could supply in bad years. Each agency is obliged to supply farmers with domestic and stock water and irrigation water in every year. Irrigation water rights are registered in relation to land within an irrigation district, which is usually supplied from irrigation canals operated by the local irrigation agency.¹⁷⁵

¹⁷⁰ Scott, A. & Coustalin, G. *op cit* at page 940.

¹⁷¹ Scott, A. & Coustalin, G. *op cit* at page 941.

¹⁷² Indeed in Spain the Water Law requires the establishment of a water user association if two or more people take water from the same source.

¹⁷³ Meinzen Dick R. & Bruns B.R. 'Negotiating Water Rights: Introduction' in Bruns, B. & Meinzen Dick, R. *Negotiating Water Rights* ITDG Publishing, London, 2000 at page 37.

¹⁷⁴ In fact in accordance with the applicable legislation the Bureau may only supply water to water user associations as it is precluded from making supplies to individual water users.

¹⁷⁵ Clark, S. *op cit* at page 34.

6.1.2 Land tenure rights and irrigation

Quite often, however, a lack of secure rights to irrigation water is coupled by a lack of security, or at the very least a degree of ambiguity, regarding land tenure rights at the level either of individual irrigators and/or water user associations.

Lack of land tenure security for individual irrigators arises particularly in those cases where farmers and communities have been re-settled onto irrigation schemes that have been newly constructed or funded by the state. In undertaking such developments, the state, acting through an irrigation or development agency, often has its own objectives such as maximising food production in the interests of seeking national food security. Control over the land is often seen as the best way for the state to fulfil such objectives. Consequently access to land or to its exploitation is almost always defined as precarious and conditional: the state affirms itself as the owner of the irrigated land, and the irrigated parcels are distributed to users in a conditional manner for as long as they respect the rules of exploitation and fulfil the obligations defined by the framework (such as the payment of irrigation fees, contributions towards works of maintenance and the supply of information needed for hydraulic research etc). At the level of an individual scheme, irrigators are accorded only personal non-transferable use rights with the responsible state agency usually holding the necessary legal and administrative powers to expel those who do not conform with its objectives and rules.

Indeed particular problems frequently arise in cases where schemes have been built on lands that were formerly subject to customary land tenure rules.¹⁷⁶ On the scale of a regional development project, the conditionality of use and the suppression, as a matter of principle, of customary land tenure rights means that it is possible to attribute the developed lands (or to develop them in the case of concessions granted to private actors) to those who are judged most able to effectively exploit them even if they come from outside the area (or from abroad) and thus do not have any traditional rights over such lands.¹⁷⁷

Even though in many developing countries land within irrigation schemes remains under state control this is often only really the case at a formal level with informal land transactions taking place in any event. Nevertheless the uncertainties caused by the divergence between the *de facto* and *de jure* situation and the ensuing lack of land tenure security may deter investment in the land by individual irrigators who cannot use the land to raise capital and who may be afraid to lease irrigated land.¹⁷⁸ In itself this is not a remarkable observation: such are common consequences of land tenure insecurity.

However, in the context of irrigated land a key point to note is that in the context of IMT it may be unrealistic to expect that an IMT programme can be successful in the absence of secure rights both to water and land. Establishing and operating a sustainable water user association is a form of investment in itself and it is probably unrealistic to expect such investments to take place on the basis of insecure land tenure and water rights.

¹⁷⁶ Tiffen, M. 'Land Tenure Issues' in Morris, J. & Thom (Eds) *Irrigation in Africa* West View Press, Boulder, 1992 at page 407.

¹⁷⁷ Mathieu, P. *op cit* at page 66.

¹⁷⁸ Merrey, D.J et al 'Can irrigation management transfer revitalise African agriculture?' in Hilmy, H. & Abernathy C. *Private Irrigation in Sub-Saharan Africa* IWMI, FAO & ACP-CTA (2002), page 98. and footnote.

Another common area of legal ambiguity relates to the degree of land tenure security that water user associations enjoy in respect of the components of irrigation schemes that are transferred to them, as well as the extent of their rights to access land held by third parties for the purposes of operating and maintaining those components. Again this is an area that has been largely neglected in the literature and in practice. While some irrigation schemes are transferred into the ownership of water user associations, very often such transfers take place in use (with the association receiving only a use right). Transfers in ownership have a number of potential advantages: they demonstrate a clear and strong commitment to the process of IMT, they arguably confer a greater degree of security on water user associations and send a clear signal to associations that long term maintenance and ultimately the eventual renewal/rehabilitation of such schemes is their responsibility and not that of the state.¹⁷⁹ On the other hand states are frequently reluctant to transfer ownership of schemes that often represent significant investments and furthermore a transfer into ownership generally makes it harder for the relevant state agency to make sure that a scheme is operated and maintained correctly.¹⁸⁰ In any event, whatever form of transfer is undertaken it is likely to amount to a transfer of real or immovable property rights. Consequently in most jurisdictions such transfers must therefore be registered in accordance with the applicable land registration rules. Yet all too often such obligations of land tenure law are ignored meaning that rights held by water user associations are very often imperfect.

6.1.3 The effects of non-co-ordination

In designing irrigation projects both national agencies and foreign donors frequently fail to take the complexity of land tenure rights and water rights sufficiently into account, partly because their top-down approach in planning and construction of irrigation is considered as a mainly technocratic process, and partly because the socio-economic impact on families is insufficiently realised.¹⁸¹

What seems to be quite clear is that in the context of irrigated land it is necessary to take simultaneous account of both land tenure rights and water rights security particularly in the context of interventions by development agencies. There is also the risk of conflicting land tenure reform and water policies being developed and advocated in mutual isolation one from the other. Furthermore it is necessary to take account of all relevant aspects of both land tenure rights and water rights, including gender issues, an area which as will be seen below is usually neglected in the literature on water rights. A failure to do so can lead to a partial or complete failure in meeting the objectives of such types of intervention.¹⁸² The countries of Eastern Europe and Central Asia provide a fine example in this context (see Box D).

In short, at the very least, a greater dialogue is necessary between land tenure professionals and water professionals working on the area of reforms to irrigated and

¹⁷⁹ In other words a water user association that only holds a use right might rationally decide to defer maintenance on the basis that the ultimate owner, typically the state, will bear the eventual costs of renovation.

¹⁸⁰ Some states also oppose transfers in ownership on the basis that a transferred scheme could then be sold on to a third party, although generally speaking the market for second-hand irrigation schemes is rather thin.

¹⁸¹ Huibers, F. *Land tenure and irrigation development in the Senegal Valley* African Studies Centre, Leiden, 1999.

¹⁸² Barbara Van Koppen describes how *Operation Riz* projects in Burkina Faso took land and water rights from women, the primary rice producers, and re-allocated them to 'families', effectively to men. Van Koppen, B. 'Gender Water and Land Rights in Rice Valley Improvement, Burkina Faso' in Bruns, B.R. & Meinzen Dick, R. *op cit*.

drained lands.¹⁸³ While in most jurisdictions, land tenure legislation makes no distinction between irrigable and non-irrigable land, at the practical level such a distinction is essential if the land is to be used to its full potential. At the same time it is clear that more research, including field work, is necessary into the relationship between land tenure rights and irrigation water rights so as to ensure increased land and water security and the development of consistent policies. In the context of developing countries, and particularly in the case of long-established irrigation schemes, local customary rules regarding the use of both land and water may exist. Whether and how such customary rules should be integrated into, or recognised by, formal law is an issue that is considered below. However, in order for formal law to have a viable relationship with customary rights relating to land tenure and water it is essential that it has a conceptually viable and effective approach to offer.

Box D – Land and irrigation sector reforms in Eastern Europe and Central Asia

During the period of communist rule, major investments were made in the former socialist countries of Eastern Europe and Central Asia in the construction of both irrigation and drainage schemes designed to supply water to, and drain water from, the lands of the collectivised farms.¹⁸⁴ Such farms in turn generally had their own work 'brigades' to operate their 'on-farm' irrigation and drainage systems.

With the collapse of communism, reforms in the agricultural sector saw the break up of the collectivised farms and their land holdings with the aim of creating private farms that would function on market economy lines. Depending on the jurisdiction, land was either restituted to the former land owners or distributed, on an objectively equal basis by reference to parcel size and land quality, to the former collective farm employees and their families. New legislation was enacted to permit the establishment of ownership or long term use rights and the introduction of land markets coupled with investments in survey projects and the introduction of land registers. It is fair to say that this agenda was driven by notions of land tenure law by land lawyers and other land professionals. However, in the process irrigation and drainage were largely ignored.

This was no insignificant omission. In many transition economies, particularly in the countries of the former Soviet Union, irrigation and/or drainage is essential for agriculture. The collapse of the collectivised farms not only meant that there was no-one to run the on-farm irrigation systems but the fields themselves had been split up into tens or hundreds of small privately farmed parcels, each with different crops and thus watering requirements. The policy response has generally been to introduce water user associations - a process which is ongoing. However, as water sector reform has lagged behind land reform, few of these water user associations have any type of water security as they are still supplied with irrigation water on the basis of annual delivery contracts. While the ensuing disputes and delays in resolving disputes over the irrigation water delivery has not totally derailed land and agrarian reform, the piecemeal approach has certainly not helped achieve the original objectives of viable private farming communities.

What is really surprising, though, is the way in which land tenure issues relating to irrigation were frequently dealt with. In Moldova, for example, where around one third of the collectivised farms had irrigation systems installed at great expense and which had/have the potential to significantly increase yields, irrigation infrastructure was treated in the government's farm privatization programme as a non-land asset to be distributed among former farm employees alongside tractors and livestock! The same happened in the Kyrgyz Republic with the effect that in some places the ownership of valuable irrigation systems has been effectively lost to farming communities. Indeed it is not just a question of irrigation. In Estonia, where despite the fact that two thirds of the arable land area is covered with intricate sub-soil field drainage systems, designed to serve the collectivised farms, the provisions of the relevant land law are completely unhelpful in determining how such systems should be operated following the land restitution process: they simply repeat the classic civil law tradition principle cited above that the owner of lower lying land may not hinder the flow of drainage water from higher land.¹⁸⁵

¹⁸³ This would also prevent the situation whereby the otherwise excellent report on land tenure reforms in North India, referred to above, would, without any hydro-geological rationale, recommend increased use of groundwater for irrigation.

¹⁸⁴ Whether in the form of a 'collective farm' (*kolkhoz*), state farm (*sovkhos*) or co-operative etc.

¹⁸⁵ Article 163 Law on Real Estate.

6.2 Groundwater

The management and use of groundwater resources also raises a number of questions about the complexities of the land tenure/water rights interface. Groundwater is contained in aquifers beneath the surface of the land: an aquifer is a geological formation that has sufficient water-transmitting capacity to yield a useful water supply in wells and springs. With the exception of so-called fossil groundwater, which is de-coupled from contemporary discharge, it is part of the hydraulic cycle and thus in constant movement, following the hydraulic gradient of the aquifer under confined or un-confined conditions. The degree of confinement is determined by the properties and geometry of the geological strata through which groundwater flows (see Box A). There is arguably as much variation in the characteristics of aquifers as there is with surface water resources. While all have the characteristics of storage and flow, they vary widely in hydraulic properties (permeability and storability) and reservoir volume (effective thickness and geological extension).¹⁸⁶

The very nature of groundwater, hidden beneath the earth's surface, has implications for data collection: as a general rule in most countries the availability of data on groundwater quantity and quality is variable, certainly compared with surface water data. The main problem being that a single groundwater observation is only a sample and is not an integrated measure of upstream hydrology, as with a flow measurement made in a watercourse. Many groundwater observations are therefore required to characterise an aquifer and all monitoring wells have to be regularly checked to maintain a meaningful time series of groundwater change. This data requirement imposes a massive strain on groundwater agencies responsible for collecting groundwater data and they rarely have the commensurate resources. As a result, groundwater data coverage tends to be 'patchy' and of highly variable quality.¹⁸⁷

Irrespective of data quantity and quality, groundwater is a major source of water in many countries being used for urban water supply as well as to meet the needs of industry and agriculture. South Asia has in particular seen a huge increase in the number and rate of groundwater abstractions. In Punjab Province, Pakistan, the number of mechanised wells and tube wells has increased from barely a few thousand in 1960 to 0.5 million today. In Bangladesh the number of deep and shallow tube wells increased from 93,000 in 1982-83 to almost 0.8 million in 1999-00. India saw an increase in the number of mechanized water extraction mechanisms from less than one million in 1960 to almost 26-28 million in 2002.¹⁸⁸ The benefits of groundwater for farmers and irrigators are that the water is produced at or near the point of use, needs little transport, can be supplied 'on demand' and 'just-in-time'. In addition, 'because it entails significant incremental costs for lift, farmers tend to economize on its use, and therefore maximise application efficiency.'¹⁸⁹ The effect is that as much as 70-80 percent of India's agricultural output may be groundwater dependent.¹⁹⁰ Interestingly, most South Asian countries have active markets in

¹⁸⁶ Foster in Salman, S. (Ed) *Groundwater Legal and Policy Perspectives – Proceedings of a World Bank Seminar* World Bank, Washington D.C. (1999) at page 15.

¹⁸⁷ FAO (2003) *Rethinking the approach to groundwater and food security*. FAO Water Report 24, Rome, at page 25.

¹⁸⁸ Mukherji, A. & Shah, T. *Groundwater Governance in South Asia: Governing a Colossal Anarchy* Water Policy Research Highlight No. 13 IWMI-TATA Vallabh Vidyanagar at page 2.

¹⁸⁹ Muckjerji, A & Shah, T. *op cit* at page 2.

¹⁹⁰ Burke, J. & Moench, M.H. *Groundwater and Society: Resources Tensions and Opportunities* United Nations, New York, 2000 at page 22.

pumped irrigation water in which tube-well owners sell groundwater to their neighbours at a price that exceeds their marginal cost of pumping.¹⁹¹

6.2.1 The risks to groundwater resources

Notwithstanding the continued abundance of groundwater in many parts of the world, as a resource it is quite fragile and one that is increasingly coming under threat. One of the main threats to groundwater resources is that of over-abstraction leading to a lowering of the water table. If the rate of withdrawal is greater than the rate at which an aquifer is re-charged from surface water intrusion, there is a risk of eventual exhaustion. Over-abstraction from aquifers in coastal areas has an additional risk, that of salt-water intrusion. The other main threat to groundwater resources concerns quality: threats to aquifers include anthropogenic pollution, pollution caused by excessive abstraction, well head contamination and naturally occurring contamination as a result of a change in relative acidity/alkalinity caused by minerals in the aquifer which may be exacerbated by excessive abstraction. Once polluted, the costs and the timescale for remediation of an aquifer vastly exceed those of surface water resources. Aquifers in many parts of South Asia, for example are under serious threat of depletion and degradation¹⁹² as indeed are some of those in North America particularly the Ogallala Aquifer, which crosses the boundaries of a number of Western States, and others in parts of California.

Groundwater use and over use can raise important equity issues, particularly in rural areas when, following increased consumption, the level of water tables has been lowered. Only the richer farmers or land owners can afford to sink deep wells and boreholes and to purchase the more powerful pumps necessary to abstract groundwater.¹⁹³ Those with access to such water have a captive market comprising those who do not. But it is not only among farming communities that equity considerations arise: cities and factories and other industrial sites also compete for groundwater against users in poorer rural areas.¹⁹⁴

The threats to groundwater resources are compounded by several different factors. First of all, it is only relatively recently that its nature has been understood. As already mentioned in many parts of the world data is either unavailable or of poor quality. Finally, and largely as a result of the two previous factors, the manner in which it has been regulated, its legal treatment, has lagged behind that of surface water resources.

At a theoretical level, rights over groundwater should serve the same basic purposes as rights over surface water and, for that matter, land. They should enable societies to provide for the orderly allocation of valuable resources while at the same time conferring the necessary degree of security on rights holders. The water rights/land tenure rights interface is one of the key reasons why this has not happened.

¹⁹¹ While such trades are sometimes used, generally by economists, as evidence of the efficiency of markets for water, it should be noted that such transactions are quite different to markets in water rights, an issue which is considered in more detail below.

¹⁹² Mukherji, A. & Shah, T. *op cit* at page 5.

¹⁹³ Rema- Devi, P. 'Groundwater Development and Legal Regulation' 33 *Journal of the Indian Law Institute* 614 (1991) at page 619.

¹⁹⁴ See also the case mentioned in footnote 153 *infra* in which a large multi-national corporation is alleged to have deprived farmers of the groundwater on which they depend.

6.2.2 The legal treatment of groundwater

As already noted in this paper, historically the principal focus of water law, and thus of 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 questions of groundwater management and use.

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

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.

While the approach of 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.¹⁹⁵ 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 even though the effect is to interfere with the supply of underground water to nearby springs.¹⁹⁶ Yet at the same time, the owner of land through 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.¹⁹⁷

In practice, once modern well drilling techniques and pumps were developed, neither the civil law tradition nor the common law could offer a viable means of effectively regulating the use of groundwater, although in some jurisdictions, such as the State of Texas, the common law rules described above, sometimes described as the doctrine of 'capture', still apply.

The most common legislative response has been first to vest groundwater in the public domain of the state,¹⁹⁸ or to bring it under state control through a statutory assertion of superior use rights¹⁹⁹ or a declaration of public trust on behalf of the people.²⁰⁰ In other words, groundwater is deemed to have the same legal status as surface water.

Next, various restrictions are placed on the use of groundwater. These include requiring well drillers to hold licences, that are issued in accordance with technical criteria relating to competence and experience, licensing the drilling of individual wells and boreholes and specifying minimum distance requirements between wells and boreholes. Finally, the abstraction and use of groundwater is typically brought

¹⁹⁵ *Ballard v Tomlinson* (1885) 29 Ch. D. 115. Howarth, W. *op cit*, at page 14.

¹⁹⁶ An exception is made, under the common law, for underground water flowing in a defined channel in which case the riparian doctrine applies. *Chasemore v Richards* (1859) 7 h.l. Cas. 349. See Howarth, W., *op cit*, at page 121.

¹⁹⁷ Howarth, W., *op cit*, at page 122.

¹⁹⁸ For example in Spain in 1985, Italy in 1994 and Morocco in 1995.

¹⁹⁹ For example Victoria, Australia in 1989.

²⁰⁰ Burchi S. 'National Regulations for Groundwater: Options, Issues and Best Practices' in Salman, S *op cit* at page 58.

into the same, or a similar, administrative regime to that for the use of surface water, through the creation of water rights based on administrative permits.²⁰¹ As with rights to surface water, such rights are generally subject to a variety of conditions relating to their duration, monitoring, the quantity of water that may be abstracted and so forth.²⁰² And as with surface water rights a ground water right may be lost through non-compliance with applicable conditions.²⁰³

Furthermore, as with surface water 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). Exemptions for small wells 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. Nevertheless, the sheer number of individual wells can ultimately have a major impact on the quantity and quality of groundwater and related surface water resources.²⁰⁴

From a hydrological, indeed hydro-geological, perspective it makes perfect sense to regulate groundwater and surface water under the same regime, after all the hydraulic cycle means that they are closely interlinked.²⁰⁵ Indeed increased pressure on surface water resources may well see greater use of conjunctive management whereby surplus water from precipitation and surface water bodies is captured and stored in aquifers for release during drier periods.²⁰⁶

6.2.3 The limitations of the regulatory response

In practice using the principles of surface water rights to regulate the use of groundwater is not always effective. The difficulties lie not in establishing the necessary regulatory systems but in monitoring and enforcement. While it is by no means cheap or easy to monitor abstractions from surface water bodies, it is at least relatively easy to identify the possible abstraction points – the banks and shores of streams, rivers, lakes etc. In contrast, unauthorised and illegal wells and boreholes may be located literally anywhere above a given aquifer and the sheer numbers involved will often make the monitoring of abstraction rates from authorised and thus legal wells virtually impossible. Legislative techniques to indirectly address the issue, such as imposing a duty on suppliers only to provide electricity to well owners who hold valid water rights, can themselves be avoided by illegal connections ('power theft') or the use of diesel pumps. And a further important problem is institutional. The regulation of groundwater rights is usually the responsibility of a groundwater

²⁰¹ As a result of being subject to the same regime as rights over surface water resources, rights to groundwater are recorded in a register and are usually subject to the same charging regime.

²⁰² Additional provisions may also apply to the issue and operation of groundwater rights. 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.

²⁰³ And as with rights relating to the use of surface water, undertaking an activity in circumstances where a licence or permit is required without such authorisation or in breach of its conditions is punished in accordance with criminal or administrative law.

²⁰⁴ See Drennan, J. 'Lassoing the Loophole: The Need to Rope in the Use of the Domestic Well Loophole by Subdividers in New Mexico' 37 *Natural Resources Journal* 923 (1997) and Caldwell, R.N. 'Six-Packs for Subdivisions: The Cumulative Effects of Washington's Domestic Well Exemption' 28 *Environmental Law* 1056 (1998).

²⁰⁵ Indeed it should be emphasized that groundwater resources and rivers are often intimately interlinked: the level of surface water abstraction can have a major impact on groundwater flows while at the same time excessive groundwater abstraction can impact on the flow of rivers.

²⁰⁶ Blomquist, W., Heikkila, T. & Schlager, E. 'Institutions and Conjunctive Water Management among Three Western States' 41 *Natural Resources Journal* 653 (2001) at page 654.

department of the relevant water administration. Given that the primary legal and institutional focus of water legislation has been on surface water, such a department often has a somewhat junior role. But what is more serious is that the powers of such a body are really extremely limited. What can be done about illegal groundwater abstractions even if they are detected? The usual regulatory response is to initiate criminal or administrative proceedings against the wrongdoer, a time consuming and expensive process which at the end of the day has no direct impact on the resources in question, the land or water. A wrongdoer may be fined or even imprisoned, the well may be blocked up, but a crucial instrument of the offence, and indeed the basis on which access is given to groundwater, namely his land, remains intact.²⁰⁷

As a result many states, including developing states and those in transition, struggle unsuccessfully to apply and enforce groundwater regulatory regimes. A number of North Indian states have debated groundwater laws for some 30 years with little progress as regards enactment. One exception is the State of Gujarat, the state with most severe groundwater overdraft problems. Shah *et al* describe how the legislative assembly passed a bill as far back as in 1974, but the Chief Minister refused to sign it into a law. His reasons were convincing. First, he was unable to see how the law could be effectively enforced against a million small private well operators scattered throughout a huge countryside. Second, he was certain that it would become one more instrument of rent seeking for the local bureaucracy.²⁰⁸

In any event does it make sense to try and regulate groundwater as if it is surface water when common sense suggests that it is part of, or at least closely integrated with the land above? If not, what is the solution? Placing the operation of wells and boreholes under state control is clearly unrealistic. Indeed experience in India with public wells has not been very encouraging as the cost of their operation has been relatively much more than private tube-wells, the maintenance poor, and the access of small and marginal farmers to the resource, disappointingly low.²⁰⁹

Providing for the seizure or confiscation of land on which illegal wells and boreholes are sunk would be a dramatic and largely undesirable solution. But perhaps the solution is to re-examine the relationship between land tenure rights and rights to use the water beneath that land.

Rather than expecting the state to regulate groundwater resources, perhaps it might be a better solution to confer management responsibilities on those who primarily benefit from them. This could possibly be done through the introduction of localised management of groundwater resources²¹⁰ based on the holding of land tenure rights given that it is those rights that confer access to groundwater. Re-connecting rights to groundwater with the land above that resource would enable those who hold rights to make decisions concerning the management and use of that groundwater or a fraction of it by reference to the size of their land parcels and the size of the aquifer. As already mentioned in the context of irrigation, there is after all a long tradition in the water sector of participatory co-management of natural resources.

²⁰⁷ By way of contrast a robber who uses a gun in the course of a robbery is likely to have that gun confiscated even if he lawfully owned it at the time of the offence. Similarly it is common for fisheries legislation to permit the confiscation of nets and gear as part of a punishment relating to the commission of a fisheries offence and similar provisions are found in other natural resource legislation.

²⁰⁸ Shah, T., Makin, I. & Sakthivadivel, R. *op cit* at page 11.

²⁰⁹ Rema Devi *op cit* at page 619.

²¹⁰ Rema Devi *op cit* at page 634.

Consequently one option might be to explore the extent to which the model provided by ground-water or resource management 'districts' found in a number of American states could be replicated elsewhere. The participants in such districts, which are a form of water user association, are the owners (and sometimes users) of land above and dependent on stressed aquifers. A key advantage of such an entity is that is self-policing with operating rules being determined and enforced by its participants.²¹¹ As a result of reluctance on the part of legislators to interfere with existing vested interests and vested rights the first groundwater management districts tended to play more of a co-ordinating rather than an enforcement or managerial role. Recent experiences have, however, been more encouraging and as pressure increases on aquifers it may well be that land owners and users will take a greater interest in playing an active role in the management of the groundwater below that land.²¹² Regulation of all groundwater resources may well be both impossible and unnecessary, economic considerations may encourage land owners and users to take a short term view as regards aquifer over-abstraction and in any event no legal or regulatory response can in itself provide a complete solution to natural resource management problems.²¹³ Nevertheless in certain situations a re-assertion of the land tenure/water rights link, possibly through the use of bodies like water user associations, may offer valuable legal means of contributing to improved groundwater management.

As described above, the other main threat to groundwater resources relates to their quality. As with surface water resources, however, land tenure rights are by their nature likely to play a relatively minor role in attempts to preserve and protect water quality. Instead it is necessary to consider the relationship between ground water resources and land use planning regimes and legislation as well as with specific legislative measures, often contained in water legislation, that seek to protect the quality of ground water resources. Examples include restrictions on development and agricultural activities within specified distances from wells and bore-holes or over groundwater re-charge zones. Integrating ground water protection with land use planning processes can raise similar issues regarding jurisdictional priority to those that arise in connection with the management of surface waters, as outlined in Part Five. Indeed the situation is further complicated by the fact that the boundaries of aquifers do not necessarily follow the boundaries of river basins just as they seldom, if ever, reflect administrative boundaries.

6.3 Rights created under customary law

A question that arises in many parts of the world is what should be the relationship between formal land tenure rights and water rights regimes and land tenure rights and water rights that exist under customary law. The issue can be put another way. In most jurisdictions the legal recognition of both land tenure rights and water rights depends ultimately on their inclusion in formal registers. Customary rights do not

²¹¹ The ability to sanction breaches of operating rules was shown by Ostrom to be one of the key design requirements of organizations like water user associations. See Ostrom, E. *op cit* at page 94.

²¹² Stephenson, K. 'Groundwater Management in Nebraska: Governing the Commons through Local Resource Districts' 36 *Natural Resources Journal* 761 (1996). Ongoing research into community based groundwater management approaches in India funded by the United Kingdom's Department for International Development may well shed valuable light on the merits and disadvantages of such an approach.

²¹³ This is not to suggest that all resource management decisions could be transferred down to the user level. Some form of aquifer-wide planning would be necessary for a start. Furthermore, as with surface water resources states have obligations under international law regarding their use of shared aquifers.

receive their normative effect on the basis of registration.²¹⁴ Should customary rights be recognised by formal regimes and if so how can this best be achieved? And if customary rights over, say, land are recognised how should this affect the recognition of customary rights over water?

6.3.1 *The background*

The influence of European concepts of land tenure rights and water rights was described in Part Two by reference to their 'reception' into colonial jurisdictions. If the impression was created that this was a smooth and uniform process within colonial boundaries then such an impression was false. For while the precise process of reception varied from country to country, the uniform application of European law was not one of the outcomes. Generally speaking, the influence of European law was strongest in cities and urban areas. Beyond those areas its influence was largely dependent on the level of settler activity. For example, European law applied to land tenure rights and water rights in the *latifundia* or large estates of Latin America because that was the law of the European estate owners. Similarly, European law was used and applied by settlers in African colonies to defend their new interests. In India colonial land law was accommodated with traditional land tenure patterns, sometimes transforming social relationships.²¹⁵

Land not subject to such types of transformation was typically declared to be state land and while notionally under state management, in practice it was often not. European influenced law had, and frequently continues to have, little formal impact on such land, either in those 'remote' areas in which 'indigenous people' live or, as in much of Africa, on state land where customary law applied. The situation is little changed in Africa where in many countries, the vast majority of land (more than 90% on average) remains under customary tenure.²¹⁶

A similar situation arises in many developing countries as regards water rights, either because water rights regimes have never really been systematically introduced or because those that do exist are ill-adapted to the need of water users. Research conducted in the Pangani River Basin in Tanzania in 1994 revealed that of 2,265 abstractions only 171 were subject to water rights.²¹⁷ A typical lawyer's response is to assume that all such abstractions are simply 'illegal'. In practice the majority are likely to be made in accordance with rights created under customary law. Indeed, sometimes the rights interface that is the subject of this paper can further complicate matters. To remain with the example of Tanzania, until relatively recently formal water rights could only be held by those who held formal land rights, thus excluding the bulk of the population.

An important point to emphasize is that, in contrast to the land tenure sector, there appears to be much less published research into the relationship between water rights established under customary law and the requirements of formal law. Indeed it would be useful to establish what, if any, have been the effects of the provisions in

²¹⁴ Although, as will be seen below, attempts to bring customary rights within a formal rights regime may eventually entail this.

²¹⁵ Under the *zamindari* system in Northern and Eastern India revenue collectors (*zamindars*) received full rights to land subject to delivering a fixed amount of revenue to the colonial power. The users of the land became the tenants of the *zamindars* often paying their rent in the form of a share of the crop proceeds. On the other hand in peninsular (Southern) India the cultivator-owner (*mahalwari*) system was recognised, which by contrast, vested land rights in village bodies, essentially establishing individual land ownership by producers.

²¹⁶ Deninger, K. *op cit* at page 2.

²¹⁷ Huggins, C., *op cit*, at page 17.

modern water legislation that assert state control over water resources, a process commonly understood as one of 'nationalization', on customary water rights, an issue that has been researched in connection with land tenure rights. But first of all it is necessary to consider just what is meant by customary law.

6.3.2 What is meant by customary law?

The meaning, nature and scope of customary law raises a number of questions that do not find easy answers. One commentator has suggested that in the context of land tenure it would be better to talk in terms of 'socially determined land-use rules' rather than 'customary' systems since the latter could suggest something traditional or ancient with roots in the past.²¹⁸ After all it is in some ways disingenuous to contrast traditional practices in Africa with official legislation as many communities have faced the latter for years since the dawn of the colonial era.²¹⁹

It is better, perhaps, to take a broader view and to clearly recognise the dynamic nature and adaptability of 'customary' rule systems. Indeed research on legal pluralism has challenged simple static ideas about 'customary law'. What may be recognized in formal legal terms as 'customary law' captures only a small, and often distorted, part of the complexity of 'local law'.²²⁰ For local rules are generally developed spontaneously by communities to allocate the use of important resources such as land and water, particularly in cases, where formal rules relating to their use are ill-adapted or simply not applied.²²¹ The vocabulary and insights of legal pluralism, which recognises the law as it is rather than as it should be, can shed important light on how such rules are applied and developed in practice and their relationship, if any, with formal law. Nevertheless, for the purpose of this paper the term customary law will be used but in a wide sense so as to include local law.

Another risk regarding customary law is that it is often taken to be inherently democratic, egalitarian, equitable and therefore to deserve support in contrast to formal law and regulations issued from distant capitals, which are not. This kind of romantic view is false. There is ample evidence that customary law frequently reflects unequal power relationships in local communities. Such relationships greatly affect the ways in which land and water are distributed and managed.²²² State law may often seek to confer more rights on the less advantaged members of a given

²¹⁸ Delville P.L. 'Harmonising Formal Law and Customary Law Rights in French-Speaking West Africa' in Toulmin, C. & Quan, J. (eds) *Evolving land rights, policy and tenure in Africa* DFID/IIED/NRI London 2000 at page 99.

²¹⁹ Delville P.L. *op cit* at page 102.

²²⁰ Also in those countries in which Islamic law was introduced, for example those of the Maghreb and Sahel, this did not cause the pre-existing customary rules to disappear. Instead such rules co-existed and indeed continue to co-exist with Islamic law. Bouderbala, N. 'Problématiques de la Transformation des Régimes Fonciers en Afrique Francophone: Reflexions Autour de Quelques Experiences (Burundi, Guinée, Maritanie, Rwanda)' page 9 in Bouderbala, N., Cavérvivière & Ouderaogo, H. *Tendances d'évolution des législations agrofocnières en Afrique francophone* Legislative Study No. 56, FAO, Rome (1996).

²²¹ Mathieu, for example describes how in a North African irrigation scheme local rules gave priority to the original users of a state built irrigation scheme over subsequent users. This was contrary to the intentions of the relevant irrigation agency and had no basis in formal law. But it was one of the rules of the original irrigators. Mathieu, P. 'Water rights, investments and meanings: conflict and change in a traditional irrigation system in northern Morocco' 1, 3/4 *International Journal of Water* 271 (2001).

²²² The flexibility of customary law is such that it is quite capable of re-inventing itself, as necessary, as well as adapting to new situations. Thus in Senegal, for example, share cropping arrangements are increasingly replacing labour tributes from landless farmers of slave castes. Tzeutschler, G.G.A. 'Growing Security: Land Rights and Agricultural Development in Northern Senegal' 43 *Journal of African Law* 36 (1999) at page 51. Tzeutschler also describes how higher castes have acquired a disproportionately large share of newly irrigated lands, contrary to the responsible agency's stated intentions as regards inter-caste equity (at pages 55-56).

community, on paper at least. This is one reason why it is important that legislation requires water user associations, which in the context of their internally adopted governing documents and operating rules develop and apply a form of local law, to have fair transparent governance structures and to confer clear and substantive rights on their participants. Indeed, recently concluded research over the use of land and water resources suggests that customary tenure acts neither as an obstacle to investment and increased productivity nor as an inalienable safety net for the poor.²²³

The relationship between formal and customary rights is complicated by the fact that the form and substance of customary rights generally does not accord with those of their European influenced equivalents which in the case of both land tenure and water are based on individual private property rights. A further complication is provided by the fact that customary law and customary rights are likely to vary quite substantially from community to community both as regards their substance and the extent to which they are still applied. Tanzania, for example, has over one hundred and twenty ethnic groups.

A full discussion of the scope and range of customary land tenure regimes is beyond the scope of this paper. Nevertheless to take the example of Africa, in broad terms customary land tenure regimes commonly confer a form of group right on a community with individual households holding long term rights to use specific land parcels that derive from that group right. Transactions regarding such household rights are often only recognised within the bounds of the community. Responsibility for decision making in connection with the allocation of household rights and the resolution of land tenure disputes typically lies with a community chief, perhaps guided by a council of elders.

As regards water rights, one commentator has claimed that there is a structural similarity manifested by pre-colonial water laws in parts of Africa inhabited by populations vastly different in culture and economic activity which create a pattern of stable core entitlements, rigidly protected from competition but circumscribed by rules enforcing a regime of sharing. In support of this claim the law and custom of the Tswana is cited. Water rights on pasture land belonged only to the tribal sub-group to whom the land had been allocated and those who had dug wells and made dams acquired private rights over them. Disregarding such entitlements constituted a punishable offence within the community and thus against other tribal sub-groups. Yet custom mitigated the exclusionary effects of these entitlements as outsiders who drove their cattle through the district had the right to water their cattle there temporarily as they went along without having to obtain permission from the local right holders. However a well owner could refuse water for another man's cattle but was bound to give him water for his personal needs. In contrast, at the oases of El Kasr and Tozeur in Tunisia absolute and freely alienable private property rights existed but which were tempered by the Islamic right of *Shafat* which entitles strangers and their animals to slake their thirst with water belonging to another. Uses which expressed a claim to an entitlement as extensive as that of the original right holder were prohibited whereas functionally distinct claims were not.²²⁴

Clearly these types of rights regimes and thus the rights that they create are quite different to modern land tenure rights and water rights regimes as described in this

²²³ Woodhouse, P. 'African Enclosures: A Default Mode of Development' 31 *World Development* at page 1717.

²²⁴ Du Bois, F. *op cit*.

paper.²²⁵ While the concept of common property is certainly recognised under the common law tradition, the rights to use a 'common', this concept was not received into colonial law.²²⁶ Rights of common were essential feudal rights and indeed the enclosure of the commons and their transformation into privately owned land was a key driver of radical socio-economic change in England, in its way every bit as dramatic as the industrial revolution.

6.3.3 What are the issues?

The key questions regarding the relationship between customary land tenure rights and water rights are first whether or not they should be recognised under formal regimes and if so how? As regards the first question, attempts by formal legal systems to ignore customary land tenure law are often largely ineffective as outlined above. Notwithstanding the enactment of formal legislation, customary law frequently remains the only type of 'law' that is applied at the local level. There is therefore, increasingly, recognition of the important role that customary land tenure rights continue to play as well as a realisation that in place of costly and frequently ineffective attempts to impose European influenced concepts of land tenure rights on peoples and communities some form of accommodation between formal and informal rights regimes is necessary. As regards customary water rights the situation is a little different. As already noted there is less published research into the relationship between formal and customary water rights and indeed there are fewer moves to give them recognition under formal law. In part this may be because the volumes of water that are subject to such rights are subject *de minimis* provisions on water entitlements, an issue that is returned to below.

The relationship between customary land tenure rights and water rights and formal rights is, however, somewhat complex. First of all, as noted in the previous section the type of rights recognised by customary law are often quite different to those recognised by formal law thus making it more difficult to accommodate them within formal rights regimes. At the same time formal law may in some circumstances be the best means of supporting the rights and interests of individuals who suffer from unequal power relationships within a given community.

What does seem quite likely is that the relationship between customary rights and formal rights will become more important over the coming years as a result of increased pressure on land and water resources.

Customary land tenure rights may, for example, operate quite effectively within a given community. As an accepted means of equitably allocating land resources they may confer the necessary security on community members within the ambit of that community. However, unless formally recognised by, or accommodated by, formal law such rights, whether held by that community or its members, may not survive

²²⁵ In Parts Two and Three.

²²⁶ Historically, rights of common are usually attached ('appurtenant') to the 'dominant' tenement (or land parcel) which they benefit. Confusingly, however, grazing rights can also exist 'in gross'. In this event they are not attached to a specific tenement and are a separate property right belonging to the rights holder. The most important rights, in practice, are rights to graze, to take timber for fencing or bracken for animal bedding and the right to take turf or peat for fuel. All rights are subject to registration under the Commons Registration Act 1965. Some 1.4 million acres of land are common land – over four percent of the land area of England and Wales. Sydenham, A. 'Managing Common Land for Environmental Benefit: the Difficulties After *Bettinson v Langton*' 4 *Environmental Law Review* 1 (2002). Many of the commons in England and Wales were seized by rich landowners in the eighteenth and early nineteenth century in a legal process known as 'enclosure'. The former right holders, the 'commoners' lost their rights to use the former commons in the process and many fell into poverty thus creating a new rural working class.

confrontation with formal land tenure rights held by outsiders: persons from outside that community. After all, such formal rights, which may be held by rich investors from urban areas or from overseas, are backed up by the state and its enforcement processes. Such types of dispute over land rights can and do happen.

Similarly customary rights to use water in a given water course may continue to work satisfactorily among the members of a given community. But they too are not likely to survive intervention by formal rights holding outsiders such as, for example, the construction of an upstream hydro-power dam constructed and operated in accordance with a formal water right. A conflict between customary water rights and formal rights may to some extent be hidden from view given the inter-connection between water rights throughout a river basin. But conflicts over land tenure rights may be equally hidden in cases where land is not permanently occupied or settled, the rights of pastoralists being a case in point.

In examining this issue further it is convenient to distinguish between the rights of pastoralists and those of settled populations.

6.3.4 Rights and pastoralists

It is as regards the common property rights over land and water customarily enjoyed by nomadic pastoralist peoples that formal land tenure rights and water rights regimes really struggle to have relevance. The fragility of the arid grasslands of sub-Saharan Africa is such that it is simply unrealistic to imagine (technologically as well as economically) moving from common property resource management to formally recognised individual private land ownership.²²⁷

The migratory patterns of pastoralist peoples who range over vast areas with their livestock offer the most sustainable and secure means of securing fodder. Such patterns are recognised by customary land tenure regimes: nomadic pastoralists do not own the land over which their cattle range either individually or by group. But their use and grazing rights are recognised under customary law. In this process water plays a vital role as the location of water sources influences pastoralists' choices of grazing areas, opens up new pasture areas and thus improving animals' nutritional status. Consequently water rights are the key to control and utilisation of arid and semi-arid areas.²²⁸ Here pastoralists are at a double disadvantage: holding no formal rights over land the law does not permit them to hold formal rights over water.

Indeed very often states have further weakened the role of pastoralists, through, for example bringing land under state ownership to the detriment of the customary rights formerly enjoyed by pastoralists. The same is true of development interventions such as the provision of water on rangelands and the irrigation of river margins. Whereas before customary rights holders controlled access to water, today 'public' water points are accessible to all. This has concentrated people and livestock in new locations and transformed traditional land use patterns that have led to environmental stress.²²⁹ Furthermore, declarations of state ownership over water resources have the effect of denying customary rights and permitting what is effectively open access to water sources.

In fact in many countries pastoralists may in theory have a formal legal entitlement to use water for stock purposes on the basis of *de minimis* water rights as described in

²²⁷ Herrera, A., Riddell, J. and Toselli, P., *op cit*.

²²⁸ Huggins, C., *op cit*, at page 12.

²²⁹ Lane C. *op cit* at page 9.

Part Two. Such rights are not, however, without their limitations. The essential problem is that a person who seeks to benefit from such an entitlement cannot lawfully prevent anyone else from also using the resource even if that use affects his own prior use/entitlement.²³⁰ Indeed the question arises as to whether or not they really amount to legal rights at all. The answer to this question probably depends on the legal tradition in question. The civil law tradition would probably answer that it is a legal right, albeit one that is difficult to enforce. The common law tradition, which has historically been more concerned with remedies than rights, might answer that it is not. Indeed the courts have held that if ‘.. a person has a legal entitlement to something that can be enforced and protected, he has a right. But if a person has a legal entitlement which the court will not enforce, then he does not, practically speaking have a right’.²³¹ Whatever the ultimate answer to this question may be, the simple fact is that water rights regimes almost invariably fail to recognise the specific needs of pastoralists.

Reforms to land tenure rights regimes appear to have achieved little more. Attempts to provide in law for the needs of pastoralists have not always been followed through in practice. For example in Nigeria, notwithstanding a 1965 grazing reserve law that gave regional governments the power to acquire land for reserves, a 1978 Land Use Decree that extended the scope of that law and a National Agricultural Policy of 1988 that specified that reserves should cover a minimum of ten percent of national territory (9.8 million hectares), by 1998 only 313 reserves covering 2.8 million hectares had been acquired by the regional governments, of which 52 had been gazetted. Conflicts are caused when farmers deliberately block access to pasture or water, cultivate next to water points, or deliberately leave crop residues unprotected.²³² The basic problem with the approach of creating reserves is that it fails to confer effective rights on pastoralists.

However, conferring individual rights is not without its problems either. In some jurisdictions, such as Botswana, private rights over rangeland have been conferred on individuals, elsewhere, as in the case of Kenya so-called ‘group ranches’ have been introduced. Such reforms permit rights holders to exclude others, including other pastoralists, from their land parcels. In neither case, however, does it appear that the full impacts on access to water have been fully thought through. Indeed there is a tendency towards increased pressure on the remaining ‘commons’, the open access rangelands, as the holders of private rights keep their own land in reserve until those lands are denuded. The Rural Code of Niger is an exception to this trend. It creates a principle of ‘priority rights’ to guarantee herders the right to control the use of the land that they had traditionally used. Under the Rural Code, while grazing

²³⁰ In the language of the ‘new institutionalism’ such water resources would probably be considered to be *common pool resources* as they are public goods which are used simultaneously or sequentially by different users because of difficulties in claiming or enforcing rights, or because they are so sparse and uncertain that it is not worth doing. When the rights and duties of groups of users in relation to these resources are defined and enforced, the resources become common property resources, as distinct from open access resources. In the latter, which Hardin famously confused with *common property*, rights and duties are not well-defined, and a ‘tragedy’ of over-exploitation is a possible, and likely, outcome. According to both legal and social science approaches to property, a fundamental feature of all regimes, including common property, is the possibility of excluding those without property rights. Cousins, B. *op cit*, page 158 As regards the case of entitlements created on the basis of *de minimis* water rights, the problem is that no-one has any right to exclude anyone else. Consequently it is hard to argue that they can even amount to common property rights.

²³¹ This statement, which may appear controversial but was recognized by the courts in the eighteenth century in the case of *Ashby v White*, 92 Eng. Rep. 126 (K.B. 1703). In that case, which concerned voting rights the court held that ‘want of right and want of remedy are reciprocal’ or *without remedy there is no right*. Scott and Coustalin *op cit* at page 824.

²³² Maina, cited in Cousins, B. ‘Tenure and Common Property Resources in Africa’ in Toulmin, C. and Quan, J. at page 173.

land is considered to be common property, herding groups are allowed to use the same mechanisms to establish priority rights that farmers may use to establish exclusive rights, in other words private property. The effective content of priority rights has not yet been established by implementing regulations or observed experience, however, so that the adequacy of the legal guarantee is as yet unknown.²³³

In short as far as the interests of pastoralists are concerned the interface between formal land tenure rights and water rights is at the same time both vital to their future survival – and largely irrelevant.

6.3.5 Non-pastoralists

Generally speaking far greater attempts have been made to recognise customary land tenure rights of non-pastoralist peoples through a variety of different legal mechanisms. These including the grant of individual titles, the establishment of land boards, devolution to village and local government units and the recognition of customary chiefs. Controversy rages as to the desirability and impacts of programmes to confer formal title, relating to such questions as the impacts on security and investment and the risk of elite capture, in a debate that is beyond the scope of this paper.

While water legislation has sometimes sought to recognise customary water rights held by members of settled populations and to bring them within the formal rights regime²³⁴ more commonly it has ignored them. In part this too may be because customary uses fall within the *de minimis* rights provisions already described. In general, though, further research is needed not just about the content of customary water rights but as to how they inter-act with formal water law, and how they could best be recognised if this is deemed appropriate.²³⁵ Indeed it should be noted that customary water rights are not an issue only for developing countries. They have been described as the ‘sleeping giant of water law in western and northern Canada’ as many of the older land claim treaties with native people did not address water rights.²³⁶

What of the rights interface? Both regimes share common questions such as how best to recognise customary rights and in particular community or group rights. As regards community rights this may be an area where the long legislative experience in the water sector of formally constituted community based water user associations that hold water rights on behalf of their members can offer solutions as regards both water rights and land tenure rights. Otherwise as regards the interface an important issue would appear to be as follows. What is the impact, if any, on customary water rights of the recognition of customary land rights? Indeed does customary law distinguish between land law and water law in the way that formal European influenced law does? In this connection, given that customary water rights are

²³³ Bloch, P. & Foltz, J *Recent Tenure Reforms in the Sahel: Assessments and Suggestions for Redirection* Land Tenure Center, Madison (1999).

²³⁴ The Japanese River Law of 1896 provided that ‘customary water use rights were to be deemed as permitted water rights’. Samnbogi, K. ‘Formation of case law and principles of watershed management’ in Bogdanovic *op cit* at page 409. In Indonesia, the 1974 Water Act and subsequent irrigation regulations recognise traditional system of irrigation water allocation and rights on the island of Bali. But that is in many ways an exception as Bali is after all an island.

²³⁵ In a sense the integration of customary water rights regimes into a formal water rights regime would appear to be more complex given the constant inter-action between all water rights in a given river basin.

²³⁶ Percy, D.R., *op cit*, at page 29.

generally based on the existence of customary land rights it would seem important to ensure that steps to recognise customary land tenure rights are not undermined by measures in water legislation that deny the validity of customary water rights

Finally, there is one aspect of customary land tenure that can frequently conflict, not with water rights as such but with water legislation, and that concerns the use of river-side gardens, depressions (*dambos*) and wetlands.

6.4 Tradable water rights

The widespread introduction of tradable water rights would have a number of implications not just for water rights regimes but also for land tenure rights. Is this likely and what would those implications be?

6.4.1 Background

As outlined above, few jurisdictions currently permit unrestricted trade in water rights. Indeed comparatively few permit any trade in water rights separate to the land to which they pertain. A number of commentators consider that marketing offers a way to increase the efficiency of water use and allocation and to allow resources move from lower to higher value uses.²³⁷ The approach is also increasingly supported by a number of large donor agencies and indeed it can be seen as complementary to the increased role envisaged for markets in land tenure transactions. On the other hand, not everyone is convinced that markets offer a real solution to issues of water allocation²³⁸ and 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.²³⁹ Yet to reduce the level of regulation would simply confirm other fears regarding speculation and hoarding.²⁴⁰ A full discussion of the claimed benefits and alleged disadvantages of tradable water rights is beyond the scope of this paper.

Nevertheless, at the present time, it seems quite likely that trade in water rights will increasingly be permitted by water legislation so as to provide existing right holders with an incentive to conserve water and to make more water available for cities in a way that does not involve the construction of expensive and often environmentally controversial dams, canals and pipelines. Ultimately, from a political perspective the introduction of tradable water rights will probably offer a relatively less painful and probably more efficient way of re-allocating water from less productive to more productive uses. So what will the implications be?

6.4.2 Implications for land tenure rights and water rights

Trades in water rights will inevitably have impacts on land tenure rights, in respect of those land parcels from which water rights are 'lost', or traded away, as well as those from which they are not.

²³⁷ Louks 201. See also Briscoe, J. *Managing Water as an Economic Good: Rules for Reformers*, The World Bank, Washington D.C., 1997.

²³⁸ See for example Dellapena, J.W. 'The Importance of Getting Names Right: The Myth of Markets for Water' 25 *William and Mary Environmental Law and Policy Review* 317 (2000); and DuBois *op cit*.

²³⁹ Bauer, C.J., *Slippery Property Rights: Multiple Water Uses and the Neo-liberal Model in Chile 1981-1995*.

²⁴⁰ And indeed such fears are to some extent confirmed by the Chilean experience as regards non-consumptive water rights. See Bauer C.J. *op cit*.

As regards land tenure rights of the first category, those that relate to a parcel of land from which water rights have been sold, the primary impact will most likely be a loss of amenity or value. In some senses this is not dissimilar to the situation when part of a land parcel is sold. Nevertheless, a number of additional questions will arise that also have implications for the land tenure rights that relate to that parcel. Take for example a parcel of irrigated land in respect of which all rights to water have been sold. How should the value of such land be assessed? It would not simply be a question of removing the value of the water as the effects of the loss of water on any irrigation infrastructure will also need to be considered. Without water, such infrastructure will arguably have no value. Similarly how would vineyards and fruit trees be valued without water? The assessed value of the land will depend on the answers to these questions.

Similarly what would be the position as regards any taxes payable on the sale or purchase of the land. Should they take into account the loss of the water right? And how would the position of lenders be protected? The value to the mortgagee of a mortgage over irrigated land might be worth a lot more than a mortgage over land in respect of which no water rights exist. How would the mortgagee's rights be protected? Normally, a land tenure rights system contains sufficient safeguards to a mortgagor regarding subsequent transactions that have the effect of reducing the value of the land parcel by, for example, requiring the consent of the mortgagor. But how could appropriate notice be given in respect of a trade of a water right?²⁴¹

The question of land valuation could potentially have major impacts on the land tax receipts of local and municipal governments. When the advocates of tradable water rights talk in terms of them enabling water to be transferred from low value to high value uses, there is no doubt which shift in use they have in mind: from irrigation to municipal/commercial/industrial use. In one sense this is not surprising, given the fact that agriculture is by far the largest water use sector. There is, however, concern that towns and cities, being richer, will be in a position to buy up water rights for their own ends to the detriment of rural communities: without water agricultural production will fall, as will receipts from local land taxes meaning that communities would be unable to pay for essential social services.

Many rural communities have opposed transfers of water to outsiders 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 un-weave as local residents sensing economic trouble, leave the area.²⁴²

The experience of Owens Valley in California, where the water rights were surreptitiously bought out by the growing and thirsty city of Los Angeles can only feed such fears. Apparently, the once fertile valley now has the appearance of the Bonneville Salt Flats and even hardy desert plants can no longer survive within it.²⁴³ This is no doubt a rather extreme example, but if the overall effect on the quantity of water used in agriculture would be small, it is conceded that local impacts may be

²⁴¹ Bjornland, H. & O'Callaghan, B. *Property Implications of the Separation of Land and Water Rights* Paper presented at the North Annual Pacific-Rim Real Estate Society Conference, Brisbane, Queensland 19-22 January 2003.

²⁴² Thompson, B.H. 'Water Law as a Pragmatic Exercise: Professor Joseph Sax's Water Scholarship 25 *Ecology Law Quarterly* 363 (1998) at page 380.

²⁴³ Reisner, M. *Cadillac Desert: the American West and its disappearing water* (2001) Random House, London, at page 101.

significant.²⁴⁴ In short trades in water rights could have a major impact on the value of land tenure rights within a community. At present in those jurisdictions where trades are evaluated, this is generally by reference to the impact on other water rights and water resources rather than land tenure rights.

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.²⁴⁵ Should water be treated any differently? Arguably it should, as it is a fundamental resource that once lost cannot be replaced. So should communities have a say in water rights trades, perhaps on the basis of a change of land use, from irrigated agricultural land to rain-fed agricultural land (or simply desert)? Should such approval be provided under land tenure legislation or land use planning legislation?

The widespread introduction of tradable water rights will also have a potentially significant impact on water rights themselves, particularly as regards their administration. As noted in the introduction, in many arid areas the value of land depends less on land tenure rights than on water rights. If tradable water rights are severed from the land the possibility arises of mortgaging them to raise credit. This would, however, raise a number of questions as to just how the mortgagee's interest should be protected.²⁴⁶ In short it might have a significant impact in the manner in which water rights registers are operated, either by including mortgage entries on the main register, thus effectively converting water rights registers into title registers or through the introduction of a Torrens type system of registered transactions rather than registered titles.²⁴⁷ Alternatively, would it be preferable to include such transactions on land tenure registers?

In conclusion, the issue of tradable water rights will raise a number of profound questions about land tenure rights, water rights and their inter-connection for which answers will be urgently needed. Further research in this area is called for, particularly as to the practical, as opposed to theoretical, aspects of water rights trades.

6.5 Rights, poverty and gender

For the poor, securing access to land and water is often a key element of both survival and livelihood strategies. What impact does the interface between land tenure rights and water rights have on such strategies? Before considering the interface it is appropriate to consider the two resources separately.

Current livelihoods based approaches to understanding poverty and the actions that can be taken to its reduction focus on improving the assets and capabilities of the poor. ²⁴⁸ Since land is the primary means of both subsistence and income generation in rural economies, access to land and security of land rights are of primary concern to the eradication of poverty. In rural areas, land is a basic livelihood asset, the principal form of natural capital from which people produce food and earn

²⁴⁴ Briscoe *op cit* at page 11.

²⁴⁵ Thompson, B.H., *op cit* at page 381.

²⁴⁶ Bjornland, H. & O'Callaghan, *op cit* at page 13.

²⁴⁷ Clark, S.D. *op cit* at page 38.

²⁴⁸ Soussan, J. & Chadwick, M. *Legal, Institutional and Policy Issues Related to Water Resources* Stockholm Environment Institute at York University at page 1.

a living.²⁴⁹ It is with this understanding that reforms seek to strengthen the land tenure rights of the poor, supported by a vast literature.²⁵⁰

Generally speaking, the relationship between water rights, poverty and livelihoods has received less research. Many of the references in the literature regarding poverty and water relate to access to safe drinking water, which is not usually subject to individual water rights but more of a human right to water. 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.²⁵¹ A first step in seeking to remedy this research gap might be to use a livelihoods approach to identify the extent to which water rights, or their absence, constrain poverty alleviation.

And while, as described above, poverty alleviation is frequently an objective of land tenure reform it is less often a priority of water rights reform. Indeed the lack of co-ordination between land reforms and water rights reforms may frequently lead to missed opportunities to ensure pro-poor outcomes, recent experiences of reform in Zimbabwe and Tanzania being cases in point. Nevertheless, co-ordinated reform of land tenure rights and water rights is possible if complex, one example being the Chilean reforms of the 1960s.²⁵² More recently, the post-apartheid South African government has sought to co-ordinate water rights reform through the implementation of the recently enacted Water Act with the ongoing process of land reform²⁵³ as part of a programme to redress the inequitable apartheid era allocations of land and water.

Recognising that many of the poorer water users will fall within the *de minimis* exceptions to the need to hold a formal right, the South African Water Act creates a 'reserve' for each surface water course that seeks to ensure that sufficient water is available for such uses.²⁵⁴ Another approach taken by the act is to provide 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 black communities in the former homelands who operate in the 'informal' water sector in the reform process.²⁵⁵ Indeed the relatively complex institutional arrangements for

²⁴⁹ Soussan, J & Chadwick, M *op cit* at page 4.

²⁵⁰ See Deininger, K. *op cit*.

²⁵¹ In Uganda, for example, following the introduction of the 1995 Water Statute only some two hundred water users would require a formal water abstraction right. Garduno, H. *op cit* at page 70.

²⁵² The Chilean agrarian reform process of the 1960s sought to change the old agricultural structures characterized by the existence of huge, partially exploited estates accounting for 80 percent of the total arable land in the country, and the smallholdings owned by 80 percent of the peasant population accounting for 15 percent of the total arable land area. The Agrarian Reform Law was supposed to make it possible to expropriate agricultural lands that were not being properly exploited, subject to certain conditions, for re-distribution among the poor farmers who were normally farm labourers, sharecroppers and smallholders. Land was not the only subject of the reform – the Agrarian Reform Act comprised 336 sections of which 85 were devoted to modifying existing legislation on water. Manríquez Lobos, G. 'Transferability of Water Use Rights and the Case of Transitional Legislation in Chile' in *FAO Issues in water law reform, op cit* at page 62.

²⁵³ See page 29 above.

²⁵⁴ The Reserve consists of two parts: (1) the basic human needs reserve, which includes water for drinking, food preparation and personal hygiene; and (2) the ecological reserve, which must be determined for all or part of a water resource such as rivers, streams, wetlands, lakes, estuaries and groundwater.

²⁵⁵ Catchment Management Agency (CMA) Formation in Olifants, South Africa, Merrey (2000:9) writes: '...rural communities were unaware of the provisions of the new water law and the CMA process, despite the efforts to inform people and offer them opportunities to express their views. Small-scale farmers had not heard about the CMA. [But] the Irrigation Boards providing water to large commercial farmers were participating actively in the process.. A small number of large stakeholders

water resources management, which frequently must take account of a state's obligations under international law, coupled with trends in the water sector such as the introduction of charging schemes seem almost by their very nature to militate against the interests of the poor.

Further research on the implementation of ongoing land and water reforms in Southern Africa is necessary to evaluate the extent to which they are capable of successfully taking an integrated approach to land and water reform. This is not an easy task and it is reported that 'both programmes are facing a rather uncertain future as a result of major in-competencies within government and community structures to make those ideas work and to get it implemented'.²⁵⁶

Finally, on the basis of the research undertaken in the preparation of this paper, apart from the relative lack of research into the relationship between water rights and poverty and livelihoods, it is striking that while gender issues have received considerable focus as regards land tenure rights research and reforms it appears to have received very little consideration as far as water rights are concerned.²⁵⁷ This too would appear to be an area calling out for more research.

is easy to work with; the ballgame changes fundamentally once we have to deal with a huge number of tiny stakeholders.' Shah, T. *et al op cit* at page 10.

²⁵⁶ Kirsten *et al*, page 23.

²⁵⁷ The work of Van Koppen *op cit* was concerned primarily with rights to irrigation water rather than formal water rights as the term is used in this paper.

7 CONCLUSION AND RECOMMENDATIONS

In seeking to start the process of exploring the interface between land tenure rights and water rights, an attempt has been made in this scoping paper to provide answers to three basic questions:

- What are land tenure rights and water rights?
- How do the respective regimes compare?
- What linkages, if any, are there between land tenure rights and water rights and, if there are none, does this matter, either in general or as regards specific aspects of the interface?

A further objective of this paper is to identify the areas in which further research is needed. Such research may in turn enable the better provision of support to countries as systems of land tenure and water rights evolve or transition in order to avoid inequitable outcomes such as the marginalisation of specific users, communities or productive sectors.

As described in Part Two, land tenure rights and water rights are both types of legal rights and as such they are capable of being asserted in court against third parties including the state. They share the same basic purposes in that they permit society to make an orderly allocation of valuable resources while at the same time conferring sufficient security on rights holders to encourage investment. And, largely for historical reasons, both types of right are heavily influenced by European concepts of land and water.

As to their subject matter, land tenure rights regulate the legal relationship between people and land. Largely as a result of the European influence a key focus of many jurisdictions is the right of private land ownership. In other jurisdictions land is held in state ownership and individuals may hold use or lease rights. Beyond such rights, land tenure regimes are concerned with a range of rights over land including rights of mortgage, servitude as well as the rights of other occupiers or users of land.

While water rights, which must be distinguished from the putative 'human right to water', can also be characterized as property rights since they confer on their holders the right to abstract or impound and use water in a natural source such as a river, stream, lake or aquifer, such rights are administrative rights. In contrast to land tenure regimes, under which the resource itself may privately owned, water in natural sources typically remains under state ownership or control.

A comparison between the two regimes, contained in Part Three, showed few similarities. While the provision of security is an objective of both, in contrast to land ownership rights (which are generally of unlimited duration), water rights are increasingly time limited and in any event the fluctuating (and fugitive) nature of water resources creates a fundamental physical limit to security. As regards their substance, while the conditions that apply to water rights are individually tailored to time and place (so as to take account of other rights holders and the environment), land tenure rights, and in particular land ownership rights, are of a more generic nature. Ownership rights are subject to the fewest conditions and the conditions to which lease and land use rights may be subject are generally determined by the individual concerns of the land owner rather than any greater public good. Apart from the fact that both types of regime commonly make use of registers to record rights

there are few similarities as regards registration. This is largely as a result of the planning and other administrative procedures by which water rights are allocated. In contrast to land tenure rights, water rights are only formally tradable in very few jurisdictions (and under highly regulated circumstances). Instead, the economic value of water as a resource is increasingly recognized through the use of charging mechanisms that derive from the rights themselves. This contrasts to the situation regarding land tenure rights which, with the exception of lease rights, do not depend for their continued existence on the payment of money. While international law plays a role in the administration of domestic water rights regimes concerning transboundary water resources, it plays only a very minor role as regards land tenure rights. Finally the objectives of reforms in the two sectors are quite different: while a mix of allocation efficiency/equity concerns and environmental considerations condition water rights reform, land tenure reform tends to be much more focused on socio-economic matters.

The linkages that formerly existed between the two regimes, described in Part Four, whereby water rights were essentially a subsidiary component of land tenure rights, have now largely been lost with the introduction of administrative water rights regimes. Notwithstanding a growing recognition of the importance of the relationship between land and water resources (and the need to take an integrated approach to their management and use) there are few, if any, formal links between land tenure regimes and water rights regimes. As a result, modern water law has become a distinct discipline of its own. The question asked in Part Five was whether this matters. As regards the objective of integrated management it was concluded that, as a result of the largely abstract manner in which the law conceives land tenure rights, it would not appear to matter. Instead, an understanding of the relationship between water rights regimes (and their inherent planning processes) and land use planning and permitting regimes is necessary to move toward integrated land and water management. This does not mean that land tenure rights are entirely irrelevant to the objective of promoting integrated management of land and water resources. The existence (or otherwise) of land tenure rights can have a major impact on decisions as to how land is used and further investigation into their role is warranted both in respect of projects that seek to improve land use practices within watersheds and into their potential use as a means of securing a more integrated approach, through, for example, the use of conservation servitudes.

Beyond the objective of securing a more integrated approach to the management of the two resources, on a practical level increasing pressure on water resources will have the effect of increasing the importance of water rights regimes insofar as the use of land is concerned and thus the value of land tenure rights. In jurisdictions in which modern water rights regimes function satisfactorily, particularly in developed economies, this process can be expected to take place naturally – certainly in countries where sufficient checks and balances are in place and where the application to own land or acquire a water use right is not restricted and where subsequent ownership is protected. In developing countries and economies in transition where modern water legislation either does not exist or where it is not implemented, a lack of security as regards water rights will inevitably impact negatively on the worth and security of land tenure rights and the livelihoods of those attempting productive engagement with land and water.

How then, can we expect the shape and style of the interface between land tenure and water rights to evolve in the developing world where the engagement with land and water is fundamental – in terms of health, food security and productive livelihoods? Two broad areas can be identified. First, where customary law has prevailed, the need to clarify the status of existing arrangements and guarantee their

stability and transparency will be crucial to ensure that specific users and user groups are not marginalised (see section 7.1 below). Second, where there is a move away from a centrally planned economy, the need will be for progressive (more permissive) re-regulation of water use rights in support of decentralised irrigated land management (see section 7.2 below). In both cases, it could be argued that these systems will tend to converge on the developed country model in which there is ultimate separation of land tenure rights and water rights. Under such a model, the separation is assumed to free up the economic potential of land and water under an essentially permissive regime, but in fact planning controls and regulatory checks and balances ensure that the public interest is maintained and the rights of the individual user are protected. In addition, it is possible to identify a third area (see section 7.3) in which land and water will continue to be so tightly bound – the exploitation of groundwater – that separation of land tenure and water rights will be resisted. The groundwater dependant economies of the Middle East are a case in point.

7.1 Customary law – the fuzzy interface

In practice in many parts of the world customary or local law rules regulate the rights of individuals and communities to land and water. A question faced by formal land tenure rights regimes and water rights regimes is what, if anything, should be their relationship to such rules and if so, what form it should take. Particular difficulties are caused by the form and substance of rights created under customary law in comparison to those provided for in European influenced formal rights regimes. A literature review suggests that far more research into customary land tenure rights has been undertaken than into customary water rights and that the failure of water legislation to positively support the interests of pastoralists may be a result of *de minimis* entitlements commonly found in legislation. However, with regard to the non-pastoral rural dweller, attempts are underway in a number of jurisdictions to recognise customary land tenure rights.

One key question that is commonly faced is how to address the issue of rights held by communities or groups and the degree to which this collective asset can be recognised as collateral in applying for term finance to fund small scale water control infrastructure, for instance. Experience from the water sector in connection with the holding of water rights by water user associations, which has a long legislative tradition, indicates some of the possibilities. But this does not work both ways. The effects of conferring formal recognition of land tenure rights on customary water rights appears not to have been addressed. This highlights an avenue of applied research into customary water rights in which the precise impact of land title registration needs to be looked at from the perspective of both pastoralists and non-pastoralists and the extent to which *de minimis* entitlements positively support the interests of pastoralists.

While the importance of land and water to the survival strategies of the poor is clear, the relative importance of water rights as compared with land tenure rights is less well understood. Much of the literature focuses on the human right to water rather than on water rights *sensu stricto*. This may be because of the nature of water rights and in particular the provisions in legislation that exempt the users of smaller quantities of water from the need to hold a formal water right. Further research into the relationship between the poor and the issue of water rights is called for and in this connection a livelihoods approach may assist in identifying the key issues. Furthermore, while many land reform programmes have poverty alleviation as one of their objectives this is seldom the case for water rights reforms even though the

benefits of land reform programmes may be lost if land rights are not accompanied by water rights. Nevertheless, even in cases where sector reforms are relatively contemporaneous, collaboration between reform processes is seldom found. Research into ongoing land tenure and water reform processes, particularly those underway in Southern Africa, is called for to explore how such linkages could be strengthened. It is also relevant to ask how attempts at such legal reform avoid marginalising the sectors of the populations most at risk. Guaranteed access to land and water may, in sheer practical terms, be of much higher importance to women than men in certain cultural settings and the conferring the rights in access/use to male members of a family who are never there (or who are working elsewhere) to use the right can be of limited value.

Under these circumstances it is sensible to ask how the reform of existing customary regimes can be shaped to ensure more stability and transparency to protect, equitably, the interests of low intensity users while also freeing up the value of such protected customary rights for transfer to higher value uses. This would imply a shift toward a clear separation of land tenure and water use rights, but along a path that is well informed by relevant research and tests to ensure that vulnerable sectors of society are not marginalised and customary systems of agricultural production are not compromised where they continue to provide local food security and rural livelihoods.

7.2 Irrigation Management Transfer – moving beyond a rigid interface

When we move beyond the generally low intensity customary use of water in rural settings for and scale up to land tenure and water rights within formal irrigation schemes, the impulse to de-link land tenure and water rights becomes more apparent, particularly with the demise of central planning and command and control type water administration. As many medium and large scale irrigation schemes struggle to justify themselves in economic terms, the adoption of downstream controls to supply water to land on-demand (rather than receiving water at the discretion of the water service provider) is forcing a separation of the two regimes. Water is supplied not on the basis of the landholding, but simply to the demand of the individual farmer. However, notwithstanding its huge contribution to global food security and the sheer size of investments made in the irrigation sector over the last hundred years, many irrigators lack secure rights to water, land or both. In the case of water this is largely a result of the manner in which the law conceives of water rights, namely rights to abstract water from a natural source. In the context of an irrigation scheme what is needed goes beyond a mere volume of water but a right to have a volume of water delivered at a given time by the irrigation scheme operator. The importance of rights in this context is increased by ongoing 'Irrigation Management Transfer' programmes whereby responsibility for the operation and maintenance of irrigation schemes is transferred to irrigator run 'water user associations'. In schemes where the water user association has access to a natural water source and can hold a water right, the transfer does not pose any practical or conceptual problems. The issue of water rights for irrigators in circumstances where water continues to be supplied by the scheme operator has thus far been largely neglected. How secure rights to water should be created and conferred on water user associations and/or individual irrigators is an area in which research is urgently required as without sufficient water security is doubtful that IMT programmes can be successful over the long term. The relevance of this issue to land tenure rights is clear: without irrigation water, land situated within irrigation schemes is often of little economic value

The insecurity of irrigators is further complicated by the fact that in many countries those who irrigate land within state funded irrigation schemes frequently enjoy insecure land tenure, often a result of deliberate policies to try and control how land is used in order to try and maximise production (and thus the return on the state's investment). Not only is a lack of land tenure security undesirable at the level of individual irrigators, in that it will discourage individual investment, it is also likely to harm the success of IMT programmes which are also a form of investment. Further research into the impacts of land tenure regimes on IMT programmes is called for together with an assessment of how an appropriate balance can be struck between the interests of the state (which may continue to finance the conveyance infrastructure supplying/draining the irrigation schemes) and individual irrigators. Another aspect of the rights interface relates to the irrigation infrastructure that is transferred to water user associations – an issue of land tenure. The form of such transfers and the rights and obligations to which they are subject can have major implications on the relative degree of security conferred on water user associations and thus the choices they make. Research into the land tenure aspects of IMT programmes is urgently called for.

A key feature of such large scale irrigation structures, as compared to small-scale low intensity customary use, is the degree to which the water can be traded within the scheme (between farmers) and without (between other economic sectors). Intrasectoral trades may be highly informal or regulated, depending upon the number of users within the scheme or irrigation supply project and the degree of transparency that applies. However, transfers to other sectors beyond the individual scheme are normally the subject of regulation – the rare exception being Chile – and the existence of conveyance infrastructure to effect the physical transfer from irrigation scheme to urban utility, for instance. But to work effectively, both intra and inter-sectoral trades require land and water rights to be de-coupled and hence transferable. The widespread introduction of a degree of tradability as regards water rights is inevitable, not because it will lead to the creation of vibrant water markets as such, but more prosaically because it will provide a relatively less painful means of allocating water from lower value to higher value uses. Not only will this have significant impacts on existing water rights regimes, it will also have major impacts on land tenure rights and land tenure rights regimes particularly as far as valuation of such rights is concerned, the rights of mortgagees and other holders of security, the resource and revenue base of local communities and thus indirectly on land tenure rights. It may also be possible to use fully tradable water rights as a source of collateral to raise credit in which case there could be significant impacts on the manner in which water rights are recorded and registered. Further research is needed into the potential impact of tradable water rights on land tenure rights and land tenure rights regimes as well as on water rights regimes.

7.3 Groundwater – the tightly bound interface

The management and use of groundwater raises a number of key questions about the land tenure rights/water rights interface. An increasingly important resource, groundwater is relatively vulnerable to both over-abstraction and pollution and as a result is at increasing risk in many parts of the world. Historically regulated as a specific aspect of land law, attempts to bring groundwater within the administrative water rights regimes provided for in modern water legislation have not always been successful, not only in developing countries. The perception of groundwater as a private resource or, at the opposite end of the spectrum, as an open-access resource, irrespective of the legal regime under which it is exploited, appears to be so intense that an effective de-coupling of land and water seems impossible to obtain, even if an economic rationale applies. There would therefore appear to be

limited options for advancing reform and land tenure, particularly in arid and semi-arid countries where access to groundwater is the only means with which to bring land under production.

The land tenure/water rights interface operates on two main levels. At a functional level groundwater resources are vital to the use of land in many parts of the world and thus to the value and utility of the tenure rights that relate to that land. Continued unsustainable use leading to the overdraft of aquifers will thus have negative impacts on land tenure rights. At a conceptual level the direct relationship between land that is subject to tenure rights and the groundwater beneath it suggests it may be worth examining whether existing difficulties in trying to regulate groundwater with a similar basic regulatory approach as that used for surface water might not be better resolved, in part or in whole by taking greater account of the interest of holders of land tenure rights. Further research is necessary into the use of land tenure-based approaches to the management of groundwater such as experience with groundwater districts, a form of water user association and other land and community-based approaches to groundwater management.

7.4 Concluding Remarks

In conclusion, the interface between land tenure and water rights takes on a number of guises, fuzzy with respect to customary law, overly rigid in the case of large scale irrigation development and tightly bound in the case of groundwater. These 'clusters' may be just one way of looking at the interface. No doubt other clusters can be teased out from the literature. However, from the perspective of FAO, which is generally seeking to assist developing countries effect equitable and productive transitions in rural development and food security, they offer a first-pass typology which can be expanded or even revised.

The key question that remains is that with the gradual conversion of water rights into the public domain, does the adoption of an essentially European model of separated land tenure and water rights regimes becomes the ultimate solution toward which the various interface clusters converge? While the resistance from the groundwater dependant economies can be expected to remain, the trend toward separation is apparent from customary and centrally planned regimes. Whether this is a good thing or a bad thing is not at issue. What is of concern is that countries attempting land and water reforms are well informed and are helped along a path that avoids the pitfalls of socio-economic and environmental marginalisation. This initial research has attempted to bring several, otherwise, disparate threads of research together to examine an interface that is, by turn, vague, transient, jagged and rigid; and then argues for more clarity, stability and flexibility. It is not asking for the moon.

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