



Sustainable Groundwater Management: Concepts and Tools

Briefing Note 4

Groundwater Legislation & Regulatory Provision from customary rules to integrated catchment planning

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Why are countries legislating over groundwater resources?

- Many governments have introduced legislation to regulate groundwater development and to constrain activities that might compromise groundwater availability and quality. This trend reflects increasing competition and conflict between groundwater users, and increasing threat of groundwater pollution. Initially, this legislation was piecemeal, relating to specific water uses or problems as they arose. Subsequently, realization that negative impacts on groundwater may also affect surface water is bringing about the greater integration of legal provisions on water resources.
- Comprehensive water legislation offers considerable advantages, since it provides a legal basis for the effective and sustainable management of groundwater through:
 - guidelines for, and limitations to, the exercise of public powers
 - provision for the quantification, planning, allocation and conservation of groundwater resources, including, *inter alia*, water abstraction and use rights (**Briefing Note 5**)
 - a system of wastewater discharge licenses, helping to protect groundwater against pollution
 - definition of the rights and duties of groundwater users
 - protection of use rights, of the rights of third parties and of the environment
 - requirements for the registration and qualification of well drillers
 - possible administrative intervention in critical situations (aquifer depletion or pollution)
 - provision for cooperative interaction between water administrators and water users.
- It is important in the present context to note that the concept of 'legislation' differs from that of 'law' (Table 1). Legislation is written law, promulgated according to procedures enshrined in the constitution, while law covers both legislation and unwritten rules stemming from custom.

How has groundwater legislation evolved?

- Under Roman Law groundwater was the property of the owner of the overlying land. Until recently this rule was paramount everywhere that followed the tradition of the French Napoleonic Civil Code (including France, Spain and many African and Latin American countries). The land owner had an exclusive right to use the underlying groundwater, essentially subject only to similar rights of neighboring land owners.

Table 1: Summary of basic legal concepts and scope of water legislation

Customary (Unwritten) Law	custom is considered to be established by: <ul style="list-style-type: none"> • consistent repetition of a given conduct by many members of the community • conviction of the community that such conduct corresponds to a ‘legal rule’
Legislation (Written Law)	legislation, taking account of custom as accepted social behavior, encompasses: <ul style="list-style-type: none"> • the fundamental law or constitution of a country • laws enacted by the legislative body (parliament, national assembly) • subsidiary legislation (decrees or instruments adopted by the government executive) laws enacted by the legislative body may not repeal constitutional provisions, and in turn may not be repealed or contradicted by subsidiary legislation
Water Legislation	aims to regulate the relationship between persons (physical and legal) and between the people and the state administration on water resources; it includes all legal provisions on development, use, protection and management of groundwater resources, which may be either scattered in various enactments or integrated into a comprehensive water law

According to traditional English Common Law the holder of a land title also had exclusive right to use all underlying waters not flowing in defined channels. For groundwater in defined channels and surface water, use was subject to the ‘riparian doctrine’, by which the use right rests with whoever held title to the adjacent land, subject to certain consideration of downstream interests. These principles were inherited, sometimes with substantial modification, by those countries deriving their legal system from England.

- Thus in substance, both in countries following the Civil Code system and the Common Law tradition, the legal régime of groundwater largely depended on the legal régime of the overlying land, that is private land ownership equated to unlimited private groundwater use rights. Subsequently, however, more comprehensive legislation has been widely (but not universally) introduced (Table 2).
- In some Moslem countries, groundwater has been viewed as a ‘gift of god’ that could not be privately owned. However, given ownership of some surrounding land (*harim*), wells could be privately owned. The use of groundwater was governed by customary rules (*urf*) which were effectively enforced by the community. However, these rules were inevitably local and variable, and did not generally take into account downstream or broader aquifer interests.
- Given the problems created by growing water scarcity and pollution, legislation has been widely enacted to vest all water resources in the state, or to recognize the state’s superior right to the management of water resources. The declaration of groundwater as a ‘public good’ turns the former owner into a user, who must apply to the state administration for a water abstraction and use right. Once the state is the guardian or trustee of groundwater resources, it may (in addition to granting water rights) introduce measures to prevent aquifer depletion and groundwater pollution. Moreover, legislation tends now to require water resources planning at the level of an entire aquifer or river basin.
- In some instances, the ‘new’ legislation has been challenged in courts of law, because of alleged inconsistencies with constitutional provisions protecting private ownership and requiring payment of compensation when rights are compulsorily negated. But such challenges have usually been rejected on grounds that regulating groundwater abstraction arises from the need to safeguard the public interest.

Table 2: Progressive levels of groundwater resource regulation

REGULATION LEVEL	IMPLICATIONS	LIMITATIONS
Minimal Legal Control	no control over groundwater abstraction or wastewater discharge	reduction in natural aquifer discharge and/or progressive salinization and pollution
Local Customary Rules	groundwater rights defined at local level; mechanisms for local conflict resolution	controls limited and do not take account of status of (and impacts on) aquifer system, downstream users or groundwater quality issues
Specific Groundwater Legislation	well construction and groundwater abstraction controlled, but often by a specialist institution in limited contact with those regulating surface water	may result in lack of consideration of groundwater-dependent river baseflows and wetlands; unlikely to be much emphasis on groundwater quality protection
Comprehensive Water Resources Legislation	surface and groundwater resources subject to same legislation and inter-dependence fully recognized; both administered by same institution but quality aspects often under separate agency	much improved capability for water resources management but catchment vision and pollution control may still be deficient; also concerns of water-users may not be taken into account and their proactive support unlikely to be achieved
Fully-Integrated Water Resources Legislation*	catchment or aquifer approach with quantity and quality aspects integrated; more emphasis put on public awareness and water user/stakeholder participation (international nature of some aquifers and river basins recognized)	gives best chance of implementing a balanced and effective regulation policy

* perhaps the best example of comprehensive provision for groundwater is the new EC Water Policy Framework Directive, which is to be implemented progressively by the countries of the European Union during 2001–15

What are the components of modern groundwater legislation?

- Modern groundwater legislation must, in general terms, be flexible, enabling and enforceable. It is thus recommended that the basic legislation be restricted to fundamental powers and concepts, and that the detail is dealt with in associated regulations and implementation plans. It also provides a more unified vision of surface water and groundwater resources, but the particular characteristics of groundwater systems and their close relationship with land-use call for specific legislative provisions in different administrative areas and at different territorial levels (Table 3). Some of these specific provisions are discussed further below.
- **Groundwater Abstraction and Use Rights**
These are very important and are dealt with in detail in **Briefing Note 5**. Amongst other things, groundwater rights serve as the basis for abstraction charging, and in some countries may be traded.
- **Wastewater Discharge Licensing**
The licensing of wastewater discharges (especially those to the ground), which is subject to conditions on mode of discharge and level of treatment, is designed to protect groundwater against pollution. The ‘polluter-pays-principle’ is normally embodied within this area of legislation.
- **Sanctions for Non-Compliance**
Penalties may range from modest fines to imprisonment terms, depending upon the severity of impacts and the persistence of the offense.



Table 3: Facets of public administration requiring specific legal provision to facilitate groundwater management

ADMINISTRATIVE SET-UP (legal basis for)	
<ul style="list-style-type: none"> • national authority or inter-ministerial coordinating commission (integration of quantity/quality aspects) • provincial and/or basin agencies 	<ul style="list-style-type: none"> • procedures for interaction with local authorities • aquifer management organizations • water-user associations • licensing of waterwell drillers
(NATIONAL LEVEL)	(LOWEST APPROPRIATE LEVEL*)
STRATEGIC PLANNING	LAND-USE MANAGEMENT
<ul style="list-style-type: none"> • provision for aquifer resource/vulnerability assessment • design and implementation of national/regional/basin groundwater policies • definition of protection (conservation or control) area policy • mandate for drought or emergency actions • status of groundwater plans and use priorities 	<ul style="list-style-type: none"> • procedures for groundwater protection zones • provisions for aquifer recharge area conservation
	REGULATION OF WATER USERS
	<ul style="list-style-type: none"> • administration of abstraction/use rights • administration of wastewater discharge permits • promotion of user/stakeholders/associations • appeal and sanction procedures

* depending on size of country or other factors

● **Controlling Well Construction Activities**

Other provisions of groundwater legislation relate to the licensing of all waterwell drilling contractors, so as to ensure better relations with (and information flow to) the water resources administration, higher standards of well construction, improved reports on the hydrogeological conditions encountered, and reduced likelihood of illegal well construction. Water legislation may also introduce controls over the import of pumps and drilling equipment in an attempt to curb excessive groundwater abstraction.

● **Catchment or Aquifer Level Resource Planning**

Water legislation tends to provide for water resources planning with reference to surface water basins and/or aquifer systems. Based on the inventory of water resources and of existing uses, plans provide an integrated basis for the assessment of individual applications for water rights. They normally have a legally-binding nature, and decisions on applications must be consistent with their provisions.

● **Conjunctive Use of Groundwater and Surface Water**

Acknowledging the advantages of conjunctive water use, one permit may cover both groundwater abstraction and discharge of an effluent of acceptable quality to a surface watercourse, or surface water diversion and use coupled with recharge of an effluent of acceptable quality to the ground.

● **Land Surface Zoning for Groundwater Conservation and Protection**

In some countries, legislation provides for the water administrators to declare ‘special control areas’, where exceptional measures (such as restrictions on new waterwell drilling and/or groundwater abstraction rates) become possible in the interest of avoiding further aquifer deterioration. Land surface zoning may also be targetted to serve the purpose of protecting vulnerable aquifer recharge areas and/or



groundwater supply sources (**Briefing Note 8**). In the zones so-defined restrictions can be applied in relation to potentially-polluting activities (such as certain types of urbanization, landfill solid waste disposal, hazardous chemical storage and handling facilities, mining and quarrying, etc.). For the prevention of diffuse pollution from agricultural land use, the above approach has been only locally attempted, and it is more normal to introduce bans or import control mechanisms on certain pesticides and to promote the adoption of codes of good agricultural practices.

● **Facilitating Water-User and Stakeholder Participation**

The participation of groundwater users and other stakeholders in groundwater management (**Briefing Note 6**) is a matter of increasing concern to law-makers, who realize that implementable legal provisions are more likely to be defined when they have a say. In addition to local water-user associations, more widely-constituted 'aquifer management organizations' are needed:

- to discuss implementation of measures across user sectors and between water-user associations
- to agree on priority actions in areas with a critical groundwater situation
- to assist the water resource regulator generally in the administration of groundwater abstraction.

It is important to endow these organizations with formal juridical status and to integrate them into broader institutional mechanisms for groundwater resource management and protection.

● **Provisions for Groundwater Monitoring**

Groundwater legislation should provide for the monitoring of groundwater status (quantity and quality) and of water use, by assigning this task to the water administration at the appropriate territorial level. To be effective, this legislation should set realistic requirements that take into account existing resources and institutional capacity.

What is needed for successful implementation of legislation?

- Successful implementation of groundwater legislation depends on a number of factors including:
 - the administrative set-up and the level of training of water administrators
 - a clear understanding of the institutional roles and functions at all relevant levels (Table 4)
 - an adequate level of public awareness and acceptance of legal provisions
 - political willingness to promote and attain sustainable groundwater management.
- Groundwater legislation must prescribe an administrative set-up suited to national or state conditions:
 - **at national level**—management functions (covering both quantity and quality aspects) should be vested in a single authority or ministry or (where this is not considered appropriate) clear institutional mechanisms for coordination between the competent bodies must be established
 - **at river basin or regional level**—the specific situation may warrant the establishment of river basin agencies, especially for the performance of some planning and coordination functions
 - **at intermediate or local level**—it is important to pay careful attention to local institutional arrangements for water administration, the role of the local authorities in water resources management (since they represent local interest) and the establishment of intermediate institutions (aquifer management organizations) having juridical power in relation to specified aquifers and with adequate representation of different water-user associations, various water-use sectors and a clear-cut relationship with the water administration.



Table 4: Summary of key groundwater management functions and institutional roles

KEY FUNCTIONS	MAIN ACTIVITIES	INSTITUTIONAL ROLES			
		NA/RBA	LRA	AMOR	WUA
Strategic Planning	Resource Evaluation (quantity/quality)	●	X	X	
	Use Assessment & Socio-Economic Survey		●	X	X
	Development Planning	●	X	X	
Resource Regulation	Groundwater Rights Administration	●	●	X	X
	Wastewater Discharge Licenses	●	●	X	X
	Definition of Protected Areas	●	●	X	
	Emergency Situations	●	X	X	
	Licensing of Well-Drillers	●	X		
Monitoring & Enforcement	Groundwater Status (quantity/quality)		●	X	X
	Groundwater Use		●	X	X
	Conflict Resolution	●	●	X	

NA/RBA = national authority/regional or basin agency LRA = local regulatory agency AMOR = aquifer management organization WUA = water-users association
 ●, X indicate respectively responsibility for, and participation in, the corresponding management function, but the situation will vary somewhat from country to country depending upon their geographical size and political structure

Further Reading

Caponera, D. A. 1992. *Principles of Water Law and Administration, National and International*: Balkema, Rotterdam.

Salman, M. A. 1999. *Groundwater, Legal and Policy Perspectives*, World Bank Technical Paper 456: Washington D.C., USA

Burchi, S. 1994. *Preparing National Regulations for Water Resources Management, Principles and Practice*, FAO Legislative Study 52: Rome, Italy.

Foster, S., Chilton, J., Moench, M., Cardy, F. & Schiffler, M. 2000. *Groundwater in Rural Development: Facing the Challenge of Supply and Resource Sustainability*. World Bank Technical Paper 463: Washington D.C., USA.

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