

MANAGING THE INVISIBLE: THE GOVERNANCE AND POLITICAL ECONOMY OF GROUNDWATER

Summary of a report by the Water Partnership Program, World Bank, 2012¹

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■ This report forms part of the GEF-funded project on “Groundwater Governance: A Global Framework for Country Action” under the International Waters focal area, and includes partners from the FAO, GEF-IW, IAH, UNESCO-IHP and the World Bank. The project includes a broad review of issues, challenges and lessons drawing from national and transboundary case studies. The aim of this study is to analyze the impediments to better groundwater governance within a given political economy and propose recommendations to address key governance issues.

The Groundwater Challenge

Groundwater is playing an increasingly important role in domestic, industrial and agricultural water supply.

With the advent of the tubewell and driven by the rapid growth of demand for agricultural and municipal water, annual global groundwater extraction has rapidly increased in recent decades, from 100 km³ a year in 1950 to the current use of about 800 km³ a year. Today, 43 percent of global irrigation as well as more than 50 percent of the world’s drinking water supply and a large share of global industrial activity depend on groundwater. In addition, its capacity to answer growing water demand, groundwater also provides unique opportunities to cope with increased climate variability due to climate change.

This ever increasing reliance on groundwater has gone largely unnoticed but has become a vital input to our economies.

In a large number of countries, groundwater is the foundation on which agriculture, urban development, rural jobs and safe drinking water supply systems have been built; groundwater has become a major contributor to GDP. Indeed, access

to groundwater through private tubewells was a key factor in South Asia’s Green Revolution. This explosion of groundwater use has occurred in a largely unplanned and uncontrolled way, taking place almost unnoticed in many countries because of its decentralized nature.

In many places the unplanned and massive use of groundwater has resulted in serious and growing problems of depletion and quality deterioration.

In many locations, over-abstraction has resulted in sharp declines in the groundwater table and at times even to exhaustion of the resource. In other areas groundwater resources are gradually rendered useless as a result of pollution. Major sources of groundwater pollution are infiltration of untreated waste water under cities, pesticides and nitrates from agricultural activities, and effluents from industrial and mining activities. Probably even more dramatic is the loss of groundwater resources due to indirect pollution from geological sources that are the result of poor aquifer management. These include saline water intrusion in coastal aquifers and the gradual pollution of aquifers by toxic elements like arsenic, fluoride and radioactive isotopes.

¹ Summarized by Patrick Huntjens, Director of Water Partner Foundation, Co-author of the report.

² Full reference: Wijnen, M., Augeard, B., Hiller, B., Ward, C. and Huntjens, P. (2012). Managing the invisible - Understanding and Improving Groundwater Governance. Water Paper, June 2012, published by the Water Unit, Transport, Water and ICT Department, Sustainable Development Vice Presidency. World Bank, Water Partnership Program, Washington D.C.

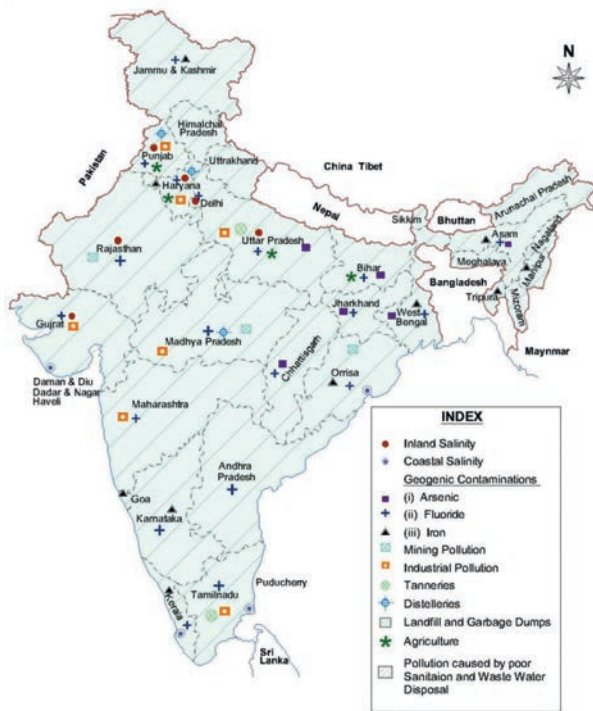


Illustration 1.

Hot-spot states of groundwater pollution in India

Governance today also has to take account of the reality that in many locations “the cat is out of the bag.”

Once groundwater rights have been asserted ahead of a governance system that might have contained them, it is incredibly difficult to recover control. This is especially true in countries where all the incentives are in favor of development and abstraction, particularly where agricultural policy coincides with farmers' own motives to produce ever more. These external incentives are compounded by the powerful incentives inherent in the resource itself that lead farmers to prefer groundwater to all other water sources.

Despite the magnitude of the challenges and problems, groundwater governance has not been on the agenda of decision makers.

Groundwater has failed to feature prominently in water policy dialogue at the local, national or global level. As a result, its governance has not kept pace with increasing demands and technological advances. Analysis of the World Bank portfolio shows that despite the sound analytical studies and available expertise, there has been a decline in the number of groundwater projects financed. Moreover, of those financed few included a component on groundwater governance.

The aim of this report is, therefore, to help to put groundwater and its governance at the top of the agenda for decision makers and practitioners.

To that end, the report tries to answer the following questions:

- Why has groundwater governance failed to stop the emergence of very serious threats to the resource?
- What are the impediments to improving groundwater governance?
- What are the options to overcome those impediments?

Implicit in the report approach is recognition of the importance of groundwater resources in promoting developing country adaptation to predicted climate changes.

Need for Governance

New, more effective governance is essential to respond to the challenges outlined.

Governance – the operation of rules, instruments and organizations that can align stakeholder behavior and actual outcomes with policy objectives – has to respond to these serious problems. Essentially, governance frameworks are ill-adapted to control the sharp increase in the private exploitation of groundwater.

As a result of its defining characteristics, groundwater governance is inherently more complicated than that for surface water.

Unlike surface water, groundwater is easily appropriated simply by capturing it (the ‘law of capture’). Although like surface water it is a common pool resource, the fact that groundwater is not readily visible, combined with well technology, allows individuals to establish de facto rights to the water under their land. Also unlike surface water, there is no built-in need to cooperate within a governance framework. The individual character of groundwater frees the user from constraining governance or cooperation with neighbors. Finally, it is hard to measure this unseen resource, and it is difficult to manage what you cannot measure. All attempts to impose governance over groundwater and to bring groundwater within an integrated water resources management (IWRM) framework have to take account of these three characteristics.

Political Economy

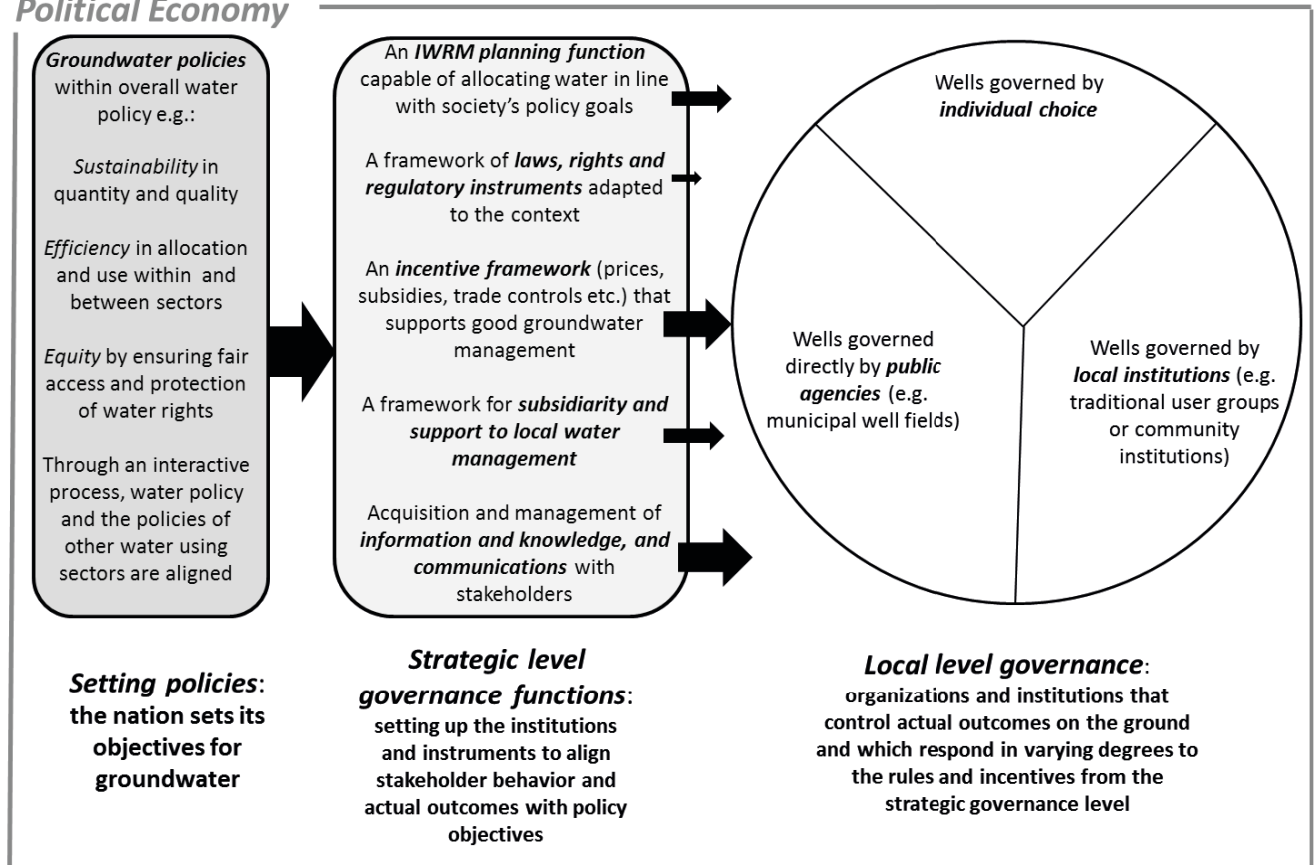


Illustration 2.

A Framework for Analyzing and Assessing Groundwater Governance

The analysis draws on country level experience in implementing global approaches to groundwater governance. This comprises in-depth case studies from five countries: India, Kenya, Morocco, South Africa, and Tanzania. Analysis of impediments to improving good governance and options to overcome them also includes best practice experiences obtained from an analysis of non-Bank international groundwater experiences.

Analytical Framework

The framework used for the analysis distinguishes three parts to the groundwater governance system: the policy level, the strategic level and the local level governance. Nations establish their groundwater objectives at the policy level. Strategic level governance is the stage at which a nation puts in place institutions and instruments to align stakeholder behavior and actual outcomes with policy objectives. Finally, local level governance involves the organizations and institutions that control actual outcomes on the ground, and respond in varying degrees to rules and incentives. The framework is sketched out in Illustration 2.

Case Studies of National Governance Arrangements

In all countries studied, groundwater development and abstraction have taken place ahead of governance arrangements, leading to depletion and quality deterioration.

The case studies provided a rich variety of lessons, many of which were shared by several or all of the countries. All countries studied were suffering depletion and quality deterioration of the aquifers to a greater or lesser degree. All five countries had policy frameworks in place, but groundwater policies were generally poorly articulated with those of the water-using sectors, particularly agriculture. Formal governance arrangements were largely top down, although there were some cases of decentralization to the basin level as well as some moves towards creating partnerships with local collective management organizations. However, in every case the rights and regulation approach to governance was proving to be not well adapted to the fast changing realities of the “groundwater revolution,” and everywhere implementation capacity fell far short of the ambitious regulatory provisions.

Information, knowledge sharing and communications were insufficient to support management or to foster good governance.

Information on groundwater resources was generally

weak, although adequate for management approaches to be determined. Information sharing was poor in all the countries reviewed, and systematic communications programs scarcely existed. Public agencies were also under-financed and lacked the capacity to do an adequate job.

At the local level, there was generally a big disconnection between the regulatory regime and facts on the ground, and in some cases local collective management was substituting for more formal governance.

For example, rules on drilling and abstraction, on pollution and on protection of recharge zones were not always applied on the ground. Some initiatives to delegate management to the basin level appeared more promising. At the local level, there were a number of interesting examples of collective management and self-regulation, but these were weakly embedded and little linked to public sector support structures.

Constraints and Options for Setting Good Groundwater Policy

THE INFLUENCE OF CONTEXT

Groundwater is particularly challenging for governance, because millions of well owners have appropriated it, and they respond more to powerful economic incentives than to the rules governance would impose.

Groundwater is a common resource, but driven by strong economic incentives people have established de facto individual rights to groundwater. Moreover, they are competing with each other to extract as much as possible as quickly as possible with no inherent incentives to aim for sustainability. Governance is further challenged by the fact that groundwater, while it is part of the hydrological cycle, is largely unseen and even specialists are hard pressed to describe the resource and its interactions in sufficient detail to plan for and manage it.

Governance has to be adapted to the context and to capacity, and be tailored to the size and nature of the problem as well as to the objective targeted.

The challenge is increased by the local specificity of groundwater given that each area has its own physical, geographical and socioeconomic characteristics. Governance also has to adapt to the state of development and to the problems that past assertion of rights and abstraction behavior have produced. In some cases the problem is over-abstraction and depletion, in others water needed by fast growing towns is “locked in” to lower yielding agricultural uses, and in yet other cases the challenge may be compromised quality or recharge. Usually, these problems do not occur in isolation, but more than one of them will exist at the same time. All these features need to be taken into account in assessing governance options, which have to be adapted to the context and to capacity, and be appropriate to the problem at hand and the policy objectives targeted.

SETTING GOOD POLICY AND HANDLING POLITICAL ECONOMY FACTORS

Policy makers have little incentive to strengthen groundwater governance.

Although most national policies target sustainability, equity and efficiency, there is a gap between stated policy and what actually happens. Policy makers have short horizons and inadequate information, and they are reluctant to put forward policies that constrain the profitability of groundwater use because this affects powerful constituencies and often the poor, as well. Policy makers prefer high-profile surface water investments to the long and politically costly struggle to impose order on a largely ungoverned groundwater sector.

Champions of change need to choose their causes carefully, identifying the really critical issues, and preparing and presenting the options persuasively.

These options should, as far as possible, reconcile the incentives of decision makers and stakeholders with some approximation of good groundwater policy. A first step is usually to get the budget and the go-ahead for essential resource assessments and for establishing a reliable monitoring and reporting system.

Governance at the Strategic Level

IWRM AND CROSS-SECTORAL HARMONIZATION

Groundwater is the “poor relation” in water resources management and is often over-ridden by economic interests, particularly agriculture.

Although most countries have adopted policies and have set up organizations for integrated water resource management (IWRM), groundwater struggles for its place in integrated water planning. Governments often fail to provide the capacity and budgets needed for implementing the groundwater parts of these plans. Improving groundwater governance requires stronger groundwater agencies.

The case needs to be made for the integration of groundwater into planning, for policy harmonization and (if possible) for “multi-level governance.”

Governments need to align instruments and harmonize sector policies, planning and implementation at all levels, not only at the center. Some good examples of this multi-level governance for groundwater are emerging.

DEVELOPING AND APPLYING GOVERNANCE APPROACHES

The analytical framework above distinguished three governance approaches, some or all of which are found in most countries:

- A **rights and regulation approach** awards (or recognizes) legal water rights to users and then ensures that users are respecting the terms of the award through a regulatory system.
- An **incentives-based approach** uses positive and negative incentives that typically affect the profitability of water use to align pumping behavior at the wellhead with policy.
- A **subsidiarity approach** delegates responsibility for groundwater management to the local level, usually to stakeholder interest groups.

Rights and regulatory approaches are very demanding to implement and are usually resisted by stakeholders.

Rights and regulatory approaches are the most precise instruments for matching behavior at the wellhead to society's goals, but are usually impeded by massive institutional and operational problems. Rights and regulation approaches have run into problems of defining, issuing and regulating quantified rights. Where these systems have been applied, they have run into significant problems of organizational capacity and have usually received scant compliance from well owners. Also, like many systems that essentially recognize past appropriations of the commons, they tend to confirm inequitable patterns of resource ownership.

However, for bigger and formal sector users, rights and regulation approaches are more feasible and can be the best approach.

Designing and implementing such systems can be done in some circumstances, but it requires a realistic feasibility assessment, especially of the cost and benefits compared to those from an incentives or subsidiarity approach. Combinations of approaches may be possible, for example registering just the bigger, more formal users (who can also be obliged to pay for the privilege), while adopting a subsidiarity approach for smaller users. However, care will always be needed to protect the rights of the smaller users.

Adjusting the incentives structure is a mechanism that even a weak government can undertake, but adjustments are politically difficult and can have negative or unintended consequences.

Positive and negative incentives are very powerful determinants of behavior and, in the case of groundwater, governments are usually able to adjust them easily. Thus, they are attractive mechanisms, especially in a poor country with limited administrative capacity. Options include adjusting input prices like energy or output prices like farm produce; providing subsidies to encourage specific behaviors; or imposing bans on crops or on irrigation methods,

Requirements	Which approach may be the most effective?		
	Rights and regulation	Incentive structure	Subsidiarity
Is there a legal framework of rights and regulatory instruments that is adapted to the situation and which is implementable? If yes...	✓		
Is there a pattern of groundwater users complying with authority? If yes...	✓		
Is the approach administratively simple and low cost?	✓	✓	✓
Is there strong social capital and/or a history of agreed water rights and collective management at the local level? If yes...		✓	✓
Is inter-sectoral water transfer an objective? If yes...	✓	✓	
Is there a serious depletion problem? If yes...			✓
Is there a serious pollution or recharge problem? If yes...	✓		✓

Table 1.**Governance Approaches to Groundwater**

(including the requirements of each and when they might be the most indicated)

for example. However, all these approaches have also big disadvantages. Adjusting prices often produces unintended consequences and can be politically damaging. Subsidies are expensive and lend themselves to corruption. Bans often run counter to economic efficiency.

Delegating to local governance structures can produce good results, and a framework for encouraging subsidiarity should be in place.

In principle, subsidiarity (that is, delegating management to the lowest possible level) is attractive because it comes closest to the actual decision makers, the millions of individuals drilling and operating wells. In some cases, collective management approaches at the local level have demonstrated good outcomes, often in partnership between stakeholders and local public agencies or projects. In most countries, the enabling framework should certainly encourage such approaches.

A mix of approaches will normally be indicated. This requires flexibility, adaptation, and keeping an eye on equity.

Overall, there is no one right approach. In each context, one or more of the three approaches may be better. Flexibility, piloting initiatives, and learning and adapting as needed are likely to be good stances. Particularly important is to adapt approaches to implementation capacity. In all approaches, it is essential to keep an eye on equity considerations, as

there are powerful incentives pushing towards resource capture by the more powerful.

INFORMATION, KNOWLEDGE AND COMMUNICATIONS

Information, knowledge and communications functions are essential components of good groundwater governance.

Information on groundwater is very weak in most countries. This is due to high costs of collection, to prevalent capacity and skill gaps, and to lack of commitment and resources. Information is needed not only on aquifer characteristics but on uses and users, in order to understand behavior and trajectories. Once collected, information has to be available to managers and to all stakeholders through an open information policy.

It is thus vital to persuade governments to invest in information and knowledge.

Economic assessments showing the value of groundwater and the cost of inaction may help persuade decision makers to invest in groundwater information and knowledge. Innovative ways of gathering part of the information through stakeholder participation or by using remote sensing technologies may lower costs. Increased attention is needed to getting to know uses and users, and to understanding motives and incentives local people face.

Communications with stakeholders is the key to developing governance systems with which stakeholders feel invested.

Very importantly, transparency, dialogue and interactive communications and learning are key to strengthening stakeholder ownership of governance, and to improving compliance and thereby outcomes.

CONFLICT AND CONFLICT RESOLUTION

Hitherto rare, conflict over groundwater is becoming more frequent.

Because groundwater extracted by tubewell was a new and abundant resource, the early stages of the groundwater revolution saw little conflict. In addition, because of the nature of groundwater, conflict has typically been much less than in the case of surface water. However, there are many potential sources of conflict now emerging due to over-abstraction, pollution, or changes in land use. Owners are often also in conflict with public agencies (for example, over regulation).

Furthermore, climate change is introducing costs and risks that are hard to manage, including increased demand for groundwater and reduced recharge, with consequent heightened risk of conflict. Disputes have also started to emerge between states over transboundary aquifers.

Although new dispute resolution mechanisms are being set up and old ones are being adapted, results vary.

Results are mixed regarding dispute resolution mechanisms. Traditional ones are difficult to adapt to the tubewell. Nevertheless, some are showing “adaptive capacity” and modern dispute resolution mechanisms are also being set up, sometimes alongside the old. Overall, dispute resolution mechanisms may be modern or traditional, centralized or local, but the key criterion is that they be accepted as fair by all parties.

The Role of Participation and Local Collective Management in Good Groundwater Governance

Empirical evidence suggests that participation and local collective management can be effective approaches to good water governance.

Participation appears to be effective in improving outcomes because it increases stakeholder ownership and because stakeholders often have access to information and can devise solutions better than or

complementary to those delivered from the top down. Perhaps the most important aspect of participation is that it can align government objectives with those of local people. This gives the local stakeholders incentives to manage the groundwater well, and can empower them by giving them influence over outcomes during the implementation process.

Participatory approaches to groundwater management range from consultation to fully delegated groundwater management.

The more ‘bottom up’ the approach, the stronger the participation and empowerment of local stakeholders. Clearly the level of participation will depend on the local context, with the need for skilled support increasing as participation moves towards local collective self-management. In all this, it is salutary to recall that, in practice, local stakeholders are already managing most of the world’s groundwater. In this sense, participation could be seen as much as participation by government agencies in local governance arrangements as vice versa.

Despite this potential there are many impediments to participation and local collective management.

Frequently, the legal and institutional provisions do not empower collective management institutions. For example, water user associations may be consulted over basin plans, but they rarely have any power to participate in decisions. At the local level, there is usually much more experience in collective management of surface water, and stakeholders are often very slow to adapt to the quite different demands of groundwater.

There is a risk that participatory approaches may reflect existing inequalities.

The more powerful may either dominate participatory deliberations or not participate at all. A further aspect of this asymmetry of power is that most people do not ‘own’ any groundwater, but they are nevertheless stakeholders. Ways to include and empower these people are often hard to negotiate,

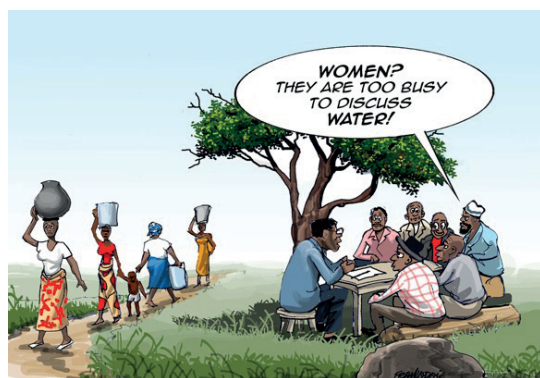


Illustration 3.

Illustration of participatory processes excluding minority groups

(Source: World Bank Water & Sanitation Program (WSP), 2012)

especially when there are social or cultural barriers. An equally challenging inclusion issue is how to get the participation of those who are not directly benefiting from the resource but who may be polluting or hampering recharge.

As groundwater problems intensify, incentives to participation and collective management grow.

User participation is complicated by the physical invisibility of groundwater systems, which make it harder to agree on the problems and on the responses and make monitoring more difficult. In fact, unless people agree there is a problem, stakeholders may not see the point of cooperating. However, crisis and the threat of climate change may change attitudes. Overall, a combination of social and physical conditions is likely to determine whether people cooperate. For example, settings where stakeholders are fewer and where resource dynamics are easier to understand are more conducive to cooperation.

Partnerships between local stakeholders and public agencies are an effective approach, but this requires long-term commitment on both sides.

Most successful collective groundwater management has not been done by local people alone, but in partnership with a public agency, which can provide knowledge, capacity building, and so forth. However, engaging in participatory approaches is costly and requires long-term commitment from public services and communities.

Experience yields some do's and don'ts: build on existing social capital, promote equity and inclusion, start in areas of good potential, go step-by-step, and learn lessons and adapt.

It seems that costs are less and outcomes better where participatory approaches build on existing social capital, and so interventions should be adapted to take advantage of it. Principles of equity and social fairness demand that the voices of the less powerful should also be heard, and this is something that public agencies can advocate. Interventions could start in areas with

potential for success and where intervention costs are lower, in the expectation of spontaneous replication.

There is a wide range of methods and tools available to support stakeholder participation.

Experience around the world has yielded a number of approaches and tools that can be adapted and replicated. A suite of interactive learning processes has been developed that provides a range of flexible learning-by-doing approaches to developing institutions for collective water management. As part of this study, a simple readiness checklist was prepared to test whether the conditions for effective collective management of groundwater are in place. Finally, in general it is not a question of either/or, both top-down rules and public services as well as bottom-up local collective management are needed for effective groundwater management.

GETTING STARTED TOWARDS IMPROVED GROUNDWATER GOVERNANCE

This report contains a perhaps bewildering set of issues and recommended actions. But every journey starts with the first steps. The following is a list of entry point activities on how to initiate help to countries to improve groundwater governance. Of course, not all these activities are applicable everywhere, but are offered as a menu of options:

- **Engage with the policy makers** to understand their concerns and constraints. Go outside the water ministry to seek harmonization and support from agriculture, planning, finance, and municipal development agencies. Carry out an economic analysis of key issues and present it persuasively. Recruit champions and try to come up with win-win agendas. Link governance reform to investment, if relevant.
- **Agree with policy makers on investment in groundwater knowledge**, and offer technical and financial support if needed. Focus not only on resources but on uses and users, identify hot spots. Draw on the results to persuade policy makers of the need for action. Link the results to an analysis of governance needs.

■ **Help government to chart a reform path towards better groundwater governance.**

Assess the needs and constraints to good governance, following the methodologies in this report. Identify what approaches are best indicated (rules and regulation, incentives, subsidiarity) and work out a reform path over time, as well as an actions and investment plan.

■ **Help build strong groundwater organizations/departments/agencies** to ensure groundwater's place in IWRM planning and to strengthen their support to the governance approaches chosen. Match their capacity to the tasks decided upon. Dialogue with government to ensure that the organizations have adequately resources, including skills and budgets.

■ **Identify the scope for collective management, and devise ways to support it.** Work at the project and local level, in tandem with agriculture colleagues and those involved in decentralization or local level government. ■

SAMENVATTING

Dit rapport is onderdeel van het GEF-gefinancierde project “Groundwater governance: A Global Framework for Country Action”, in samenwerking met de FAO, GEF-IW, IAH, UNESCO-IHP en de Wereldbank. Het rapport biedt een breed overzicht van problemen, uitdagingen en geleerde lessen uit nationale en grensoverschrijdende case studies. Doel van deze studie is een analyse van obstakels voor beter bestuur van grondwater binnen een bepaalde politieke economie, en daaruit voortvloeiend aanbevelingen om de belangrijkste governance-kwesties aan te pakken.