Groundwater Governance

An Overview of Groundwater Governance Issues: Points for Discussion

Preparing the ground for Regional Consultations and Global Diagnostic Report

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GROUNDWATER GOVERNANCE: A Global Framework for Country Action
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An Overview of Groundwater Governance Issues: Points for Discussion
(preparing the ground for Regional Consultations and Global Diagnostic Report)

Introduction

First, the project needs to formulate working definition of 'groundwater governance'. From a review of existing definitions a possible wording is suggested here as a starting point for discussion in the Regional Consultations;

Groundwater governance is the process by which groundwater is managed through the application of responsibility, participation, information availability, transparency, custom and rule of law. It is the art of coordinating administrative actions and decision making between and among different jurisdictional levels-–one of which may be global. (Adapted after Saunier and Meganck. 2007. Dictionary and Introduction to Global Environmental Governance).

Second, the project is predicated on the assumption that the state of groundwater and groundwater governance is not 'good' and needs improvement. However, this presumes that we can distinguish 'good' governance from 'bad' or 'indifferent' groundwater governance. While criteria for making such a distinction may be available for water governance as a whole, the formulation of specific criteria for groundwater will need advice from the project's Regional Consultations.

With this general provision on a working definition and criteria, ' groundwater governance' could be interpreted as the set of policies or decisions that impact groundwater use and groundwater protection. Governance can be distinguished from 'government' (who decides) and 'management' (what is done to implement decisions). In this sense groundwater governance is not 'fuzzy' but involves specific (and non-trivial) decisions about whether to turn on a pump, apply pesticides or manage waste etc. These are decisions that can be made day after day by water supply utilities and hundreds of millions of groundwater users and land use managers. But there may be many decisions, public and private, that fall outside 'groundwater governance' but which still impact groundwater use and groundwater protection."

A series of draft Thematic Papers (listed in Annex 1) and draft Synthetic Report on groundwater governance issues and prospects have been compiled to form a baseline for the project . At present these drafts are only available in English. This overview presents the overall results of the Thematic Papers and Synthetic Report in three short sections. 1) The facts: why groundwater governance matters now, 2) Enhanced principles of governance for groundwater and 3) Prospects for a way forward.

1. The facts: why groundwater governance matters now

The state of the earth's groundwater resources and the heath of the aquifers that supply human uses of groundwater are closely linked to the state of groundwater governance – the local arrangements that directly impact groundwater use and aquifer pollution. But the state of the shallow groundwater circulation in the Earth's crust, upon which we have now come to depend, is not 'good' by any measure. The sustained use of groundwater may simply not be a realistic prospect for many of our intensively exploited aquifers. Elsewhere, since the state of surface water bodies may also be severely degraded, the interaction between surface water and groundwater also needs to be taken into account. This begs a fundamental question of how we govern our use of groundwater, the protection of aquifers that host it and the surface water systems that transmit essential recharge.

Accelerating groundwater use

The widespread availability of energised pumping in the mid 20th century has prompted a dramatic rise in groundwater abstraction from the most accessible, shallow aquifers. The dominant user is agriculture, but local abstractions in and around urban areas for municipal supply can be even more intensive. The resulting loss of storage and groundwater quality is having direct social, economic and environmental impacts – but many of these are not recognised or defined carefully enough to bring about changes in human behaviour. Decisions to turn on a groundwater pump or to simply dispose of waste 'to the ground' appear to be difficult to regulate.

Impacts are multiplying

The impacts of these stresses – the aquifer response to abstraction - are often invisible and unlike the monitoring of surface water systems there is no clear integrated measure. Indeed the guesswork is in the integration, the approximations that are made in time and space as individual geological and groundwater level observations are scaled up across an aquifer. Prior to any interference, groundwater heads determined by uplift, erosion and the shifting patterns of recharge and discharge. That configuration was not stable - as climatic zones shifted. With the advent of energised pumping in the 20th century, this dynamic equilibrium in the most accessible and mobile groundwater circulation was to change radically. But changes in local recharge and discharge had already started to occur on a large scale as land-use patterns changed through agricultural intensification, urbanization and de-forestation. Subsequent agricultural intensification, notably the application of inorganic fertilizers, was already impacting groundwater quality before the widespread adoption of pumping technology. These habits in relation to groundwater use and abuse have become deeply entrenched even if energised pumping is a recent phenomenon. Attempts to reverse trends in abstraction and pollution have not yet seen widespread adoption.

Governance of a public resource – but with a private interest

Despite most jurisdictions defining all water as 'public' (including groundwater), access to groundwater is perceived as an essentially private concern – but involves an identifiable set of users, those with access to a pump. Added to this is the largely uncontrolled application of chemical fertilizers and pesticides and the disposal of waste to the ground without collection and treatment. This involves everybody and arguably makes the protection of aquifers from surface pollution a more difficult issue to govern than groundwater abstraction. There are more examples of experimentation with governance of groundwater in rural settings where agricultural use dominates and incentives to get aquifer management 'right' are high. Evidence from peri-urban and urban groundwater users in effecting collective approaches to aquifer management are very few, even though the intensity of groundwater pumping and dependency can be higher.

Some aspects of governance relate to abstraction from very localised aquifers, but others relate to recharge processes and related land management over large areas and extensive aquifers. These present two distinct but not necessarily exclusive sets of governance and actors – from individual farmers to municipalities to national energy utilities. Determining who is implicated and who should be involved in conserving and protecting aquifers to maintain a set of groundwater uses is a key challenge for groundwater governance. Some are easy to identify and convene, some are not.

New horizons for governance

It is important not to lose sight of new trends and technologies that will have implications for groundwater governance. The disposal of nuclear waste is one extreme example, or the use of hydro-fracturing to mobilise shale gas. Others will include the storage of gas and the deeper encroachment of the built environment. These will continue to pose new governance challenges.

2. Enhanced principles for governance of groundwater

The inherent character of groundwater presents a set of quite unique governance challenges and it can be argued that attempts at influencing the millions of individual decisions to use or abuse groundwater have failed to take hold because these challenges have not been adequately addressed. Pasts attempts to regulate and manage groundwater as just another natural resource have informed us what not to do – and some indication of where to start. Some environmental reporting requirements are now prompting more inclusive assessments of groundwater status and risks to economic, social and environmental services derived from groundwater. But at the same time opportunities for conjunctive use and conjunctive management are being missed – as the necessary understanding of surface water- groundwater interactions has lagged and the structural role of groundwater in integrated water resource management has been ignored. In this sense, the explicit recognition of groundwater in water governance debates is hard to find. The emphasis remains centred on the surface water dominated 'hydraulic' administrations where investments are more supply driven, 'lumpy' and hence more visible.

Therefore, the basic water governance principles of accountability, transparency, user participation and the requirement to integrate assessments and management responses still apply but may need 'enhancing' to make them more applicable to groundwater use. In addition there are set specific principles of governance that relate to groundwater. At the centre of this is the notion that patterns and intensity of groundwater use will need to be sustained. In summary, these groundwater governance principles are listed below.

Sustainable use and groundwater response time
A general notion of 'sustainability' in terms of simple recharge and withdrawal budgets is not sufficient. A more informed appreciation of how governance arrangements can be used to manage or relax aquifers under pressure is called for. These will necessarily involve quite subjective criteria as to what social, economic and environmental consequences are acceptable for a particular system of groundwater supply and use. In addition, the time over which aquifers respond to development or become imprinted with pollution present a particular governance challenge when considering long terms sustainability of groundwater use.

Transparency: make groundwater visible
Make the invisible visible: more could be done to popularise groundwater information and groundwater dynamics. Basic aquifer system behaviour in relation to supply (recharge) and demand (abstraction) still has to be modelled to fully appreciate storage depletion in particular. But how these sophisticated message get across to groundwater users to the point where groundwater use is moderated remains problematic.

Participation: engage with groundwater users at aquifer scale
Engage with users at aquifer scale - monitor and agree drawdown limits or acceptable limits to pollution. The clear presentation of locally relevant groundwater information can be combined with participatory monitoring of aquifer state to agree acceptable levels of drawdown or groundwater quality.

Accountability: stress economic benefits and consequences of groundwater use
More can be done to stress the social and economic benefits of governance, but only alongside an account of the costs or consequences of use – including the impacts of poor drilling and borehole construction norms and standards. Determining who benefits and who stands to lose as a result of use is fundamental – along with a system of allocating groundwater use. More problematic is the identification of those who cause groundwater pollution but do not use groundwater. Recognition of a polluter-pays principle may work well for all water users, but not necessarily for those who change land-use or apply agro-chemicals.

Integration and water policy: learn to play with groundwater – and groundwater players
An explicit shift from conjunctive use to conjunctive management is expected to yield benefits where the buffering and storage advantages of groundwater can be realised across landscapes and economic sectors. In this sense groundwater management needs to become more expert in playing with groundwater use in conjunction with surface water supplies and wastewater streams through imaginative use of other instruments (such as payment for environmental services, wastewater re-use) and imaginative collaboration with other water sector players.

Assess and attribute groundwater risks
Beyond the basic dissemination of groundwater information, the use of groundwater information and knowledge to assess risks to groundwater depletion and pollution will be key in assigning levels of acceptable risk. In the case of groundwater (as opposed to surface water) it is essential to anticipate the evolution of groundwater quality and hydraulic state over time.

Protect recharge areas and processes

It makes sound economic and public health sense to identify and protect recharge areas - and recharge processes. It is hard to improve upon natural processes of recharge for introducing groundwater and improving water quality. Maintaining the integrity of the land-aquifer coupling, where possible, will be a key concern in a crowded world.

3. Prospects for a way forward?

This initiative is predicated on changing groundwater user and polluter behaviours in order to conserve the integrity of aquifers and sustain a set of socio-economic and environmental services. The definition of a set of enhanced water governance principles outlined above is a first step. Maintaining equitable, long-term access to groundwater of acceptable quality will necessarily involve highly localised, tailored solutions. This will necessarily involve appealing to individual users and polluters at the scale of individual aquifer systems. But it also involves a broader appeal to specific industry, agriculture and municipal players whose policies have direct impacts on groundwater use and pollution.

Overall, the work to date has highlighted the need to make a case for a global commitment to introducing and improving groundwater governance on the basis of some 'enhanced' principles or guidelines for implementation – but above all making the invisible visible. The regional contrasts and policy priorities will be significant, but overall this synthesis of groundwater perspectives on governance argues for a smarter, implementable approach to groundwater use and aquifer protection to sustain a set of critical aquifer services.

While many solutions to conserve aquifer services in the long term may have sound technical and economic rationale their application may run into barriers put up by rigid institutions, perverse incentives or ignorance. Therefore finding politically viable institutional arrangements will be more critical that simply fixing the broader institutional environment (through pure dependence upon legislation or resource pricing) or relying on supply-driven technological fixes. The relative perspectives of users, natural resource managers, regulators and legislators are all relevant, but the point of groundwater use and the act of pollution are behavioural responses that have shown themselves resistant to change - even when the consequences of our groundwater 'habits' are terminal.

Positive solutions – where they can be identified – have derived from direct engagement with groundwater users. This tends to confirm the overall observation that 'good' groundwater governance is likely to commence with 'socialisation' of users in ways that reveal their common interest in a particular aquifer. These interests may have nothing to do with long-term sustainability as such, but are more likely to be linked with health and livelihood concerns. Will our children be less ill in the future, will we be able to rely on this aquifer next year? Those whose livelihoods directly depend upon access to groundwater are making many complex but essentially private decisions over their use of the resource and the technology to abstract it. At the same time industrial, agricultural, land-use policies may be setting incentives for development that may destroy the very aquifer services upon which they depend. Hydrogeology is also complex and a perfect solution that manages to solve all hydraulic, social and economic equations is unlikely. For these reasons, the practice of groundwater management has to be straightforward if it is to shift the set of human behaviours and the relevant policy environment to bring about 'good' governance.

4. Conclusions

The set of Thematic Papers that the project will continue to develop will serve as a basis for a Global Diagnostic and Framework for Action to influence human behaviour in relation to groundwater use and aquifer protection. The need for improved groundwater governance to meet expanding human demands is emphasized. But it is also accepted that groundwater opportunities have already been foreclosed through neglect. Other groundwater development may expand if we can learn to 'play' with groundwater responsibly - in conjunction with surface water management and in tune with the political realities that overlie aquifers. Governance arrangements are fundamental in building this flexibility.

5. Recommendations

There are no hard dos or don't in promoting groundwater governance. The application of the enhanced governance principles outlined above will help. The physical and institutional diversity of the Latin American and Caribbean region alone will present specific challenges and opportunities. In order prompt discussion at regional level, four key recommendations emerge from the current 'stock taking' prepared by the project.

- *Be imaginative in the presentation of groundwater messages.*
  Groundwater theory may be complex, but good practice has to be simple and straightforward if it is to be adopted at scales that will make a difference. Can more be done to first arrive at scientifically robust groundwater assessments and then get the essential technical messages across before it is too late?

- *Determine who is really implicated in applying principles of 'good' groundwater governance.*
  The overall institutional environment, including national legal frameworks for water management may or may not be sufficient, but the local institutional arrangements tend to determine governance outcomes. Before adjusting the former, has enough been understood about the latter?

- *Account for the benefits and costs of groundwater development.*
  If groundwater itself is 'invisible', then the groundwater economy is likely to be even more so. A clear account of how groundwater quantity and quality allow a national economy to function is a fundamental requirement in making a case for groundwater governance. Equally important is an account of the social and environmental impacts of development – the externalities associated with groundwater drawdown and pollution.

- *Innovate in the application of technical groundwater management and the inclusion of the real groundwater players.*
  The managers of groundwater could do more to innovate in the use of groundwater storage and aquifer services – from conjunctive use to maintain municipal water supplies to the safe use of natural remediation properties in aquifers. However, they also need to be equally innovative in collaborating with public and private institutions to obtain more leverage for groundwater governance. Industry, agriculture, municipalities and major manufacturing sectors can be guilty of aquifer depletion and degradation – but they can be key in reducing stresses. This should be a strong incentive for groundwater managers and policy makers to be more pro-active in their engagement with national integrated water resource management and with the preparation of forward looking investments related to strengthened groundwater governance.

Annex 1:

Thematic Papers

IAH lead:

1. Trends in groundwater pollution; trends in loss of groundwater quality and related aquifer services (inc. ecosystems);
2. Conjunctive use and management of groundwater and surface water.
3. Urban-rural tensions; opportunities for co-management.
4. Management of recharge/discharge processes and aquifer equilibrium states.

UNESCO lead:

5. Groundwater Policy and Governance
6. The legal frameworks for sustainable groundwater governance: at local, national, regional and international levels

FAO :

7. Local groundwater management institutions/user partnerships.
8. Social adoption of groundwater pumping technology and the development of groundwater cultures.
9. Macro-economic trends that influence demand for groundwater and related aquifer services.
10. Governance of the underground space and groundwater frontiers

World Bank

11. Governance of the underground space and groundwater frontiers
12. Water and Climate Change: Impacts on groundwater resources and adaptation options

(http://water.worldbank.org/water/publications/water-and-climate-change-impacts-groundwater-resources-and-adaptation-options)