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One Water, One Health: Water, Food and Public Health in a Changing World

THEME V

How can science better inform public policy, governance and capacity building for water, food, and health?

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KEY POLICY MESSAGES

- Emerging technologies are changing how groundwater policy decisions are made, by expanding monitoring and communications.
- The science-policy interface is facilitated by these technologies but also remains a primarily political dynamic, underscoring the importance of communication and public understanding.
- The public should be better educated on groundwater management and related matters to enable more equitable facilitation of science-based policies.

Scientific research and knowledge are crucial inputs for policymaking, providing not only deeper understanding about ecological processes but also systematic guidance in how monitoring is undertaken and used by policymakers.

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KNOWLEDGE: ON-THE-GROUND AND UNDERGROUND

Advanced technologies enable forecasting and modelling to be executed in real-time as conditions evolve, helping align policymaking with on-the-ground realities. For example, evaluating the deterioration of groundwater quality across cyclical events like changing seasons and agricultural practices can inform the development of more adjustable and responsive policies, while GIS maps can help policymakers geographically target policy interventions at the source of groundwater pollution.

The role of scientific knowledge in policymaking is crucial in nearly all policy domains, particularly where laws and regulations need to account for complex activities, interdependencies, and contingencies. The interdisciplinary nature of groundwater management exhibits these complexities and connections, as it affects economic livelihoods, public health, and softer cultural aspects like identity and meaning tied to place. This interdisciplinarity calls for an understanding about groundwater that takes a broad view of practiced science, actual scientific realities, and their relationship to social and political systems.

Nevertheless, it is crucial not to take the legitimacy of science-policymaking link for granted, as it is mediated by often volatile political and power dynamics. The implication of this reality for groundwater management is that the best science-informed options for issues like depletion and quality deterioration may not be the ones that receive the most attention in the policymaking process. Political interests often prioritize non-scientific factors such as cost, equity and distributional concerns, and other incidental preferences. As political representation and, by extension, the mechanics of policymaking are often directly reflective of public sentiment in democratic settings, education is crucial for ensuring a productive science-policy interface.

PUBLIC AWARENESS: THE WELLSPRING OF POLITICAL FEASIBILITY

Better public understandings about impacts and risks related to groundwater management bear significant implications for science-informed practices and policymaking. Such awareness can compel users (e.g., individuals, households, and organizations) to adopt reformed practices that accord with policy goals, including practices that focus on preventing excessive withdraws and mitigating the effects where such withdrawals occur. Further, when communicated clearly, objectively, and accessibly, scientific evidence can support a collective vision for groundwater management that is objective, politically palatable across the ideological spectrum,

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Canada, 2020

and ensures the durability of public concern over political or electoral cycles. Ultimately, better public understandings about the science of groundwater management can lead to more informed political leadership and policymaking.

Given the connection of groundwater to multiple policy domains, as previously stated, improving its management holds the potential to positively impact quality-of-life in ways that are measurable and meaningful to the public. This can be a powerful political selling point. At the same time, however, the full potential of science-informed groundwater management is not realized without the analysis and distribution of data in ways that are understandable and usable by all parties.

Regarding public understandings, groundwater education should target audiences from a young age, including primary and secondary school students. Appropriate content includes how groundwater-friendly behaviors can be adopted in daily life, and the connection between those behaviors and the health of broader ecological systems. There are numerous approaches to what is called 'environmental education,' and situating these approaches within the immediate geographic and social context of the audience makes their lessons more relatable and influential. Continuing education is essential also for adults as both users and decisionmakers impacting groundwater practices; this audience includes government employees within and outside environment agencies, and employees of companies that rely on groundwater.

AT THE WATER'S EDGE: THE LIMITS OF TECHNOLOGY

The promise of the digital age, bound up with that of technocratic and rationalist governance, appears to be a promising moment for the promotion of ecologically sustainable practices. The development of technologies based on big data platforms not only helps improve policymaking for issues at the micro scale but also for information exchange across borders. In the context of water management, whether for groundwater or surface water, the issue of transboundary management is crucial. Technology provides the data to make informed policy decisions but is not the sole or even primary solution to transboundary problems. Discussions and negotiations must account for power imbalances among actors, including their resource endowments, geographic position relative to other actors, and other dimensions of influence or disadvantage. Technology can help articulate and quantify some of these factors but is no substitute for political will and diplomatic talent.
At the micro scale, the adoption of technologies that impact groundwater extraction (e.g., those that ostensibly make it more convenient, less costly, and less impactful) does not necessarily always lead to productive

There are numerous approaches to «environmental education».

Brahmaputra River, Jorhat, India, 2019
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outcomes – whether ecological, economic, or social. For example, low-cost pumps in India have enabled the more widespread extraction of groundwater, benefitting some water-stressed communities. However, this depletion has longer-term impacts that new technologies may not always keep pace in solving. In the case of India and other countries, the challenge of uninhibited groundwater extraction is exacerbated by weak regulatory regimes concerning issues like power generation, land use, and agricultural practices. As such, technology does not excuse governments from the hard work of designing better policies, reforming governance practices, and encouraging better personal habits.

A MULTIPLICITY OF ACTORS: SWIMMING WITH THE CURRENT

At a broader level, the integration of science into policymaking for groundwater management signals an opportunity to improve participation and equity in the policymaking process. The potential of science to inform policy is evident in the diversity of actors involved in policymaking. By involving experts from both the natural and social sciences, the policymaking process can solicit and integrate knowledge as a complement to political negotiations and ideological forces. Further, a multidisciplinary group of experts can assist in sharing and legitimizing ideas and facilitating partnerships in policy projects. At the same time, groundwater management is a participatory, and thus fundamentally political, process. Scientific input must be considered one input but not the only or even most important one. In some instances, scientists may need more room at the policymaking table to ensure an evidence-informed process; in other instances, the capture of policymaking by scientific or technocratic forces can crowd-out participation by other parties, threatening the democratic legitimacy of the policy process. Finding this balance is often more art than science; it must be politically decided and has no universal blueprint aside from high-level ideals like inclusion, equity, and sustainability. Science and policymaking should be viewed as complementary and not mutually exclusive. The goal is a science-policy interface that is practical, reflective, and considers an approach where scientific results are translated into readily usable knowledge. Like groundwater itself, the process of deciding what kinds of knowledge (including but not only scientific) to use in policymaking is often out of public sight but significantly impacts that public. Closing the gap between what scientists and the public know about groundwater management will make policy goals easier to achieve.

The way forward should be built around the three T's: transparency in data and policy processes, transition in individual and collective thinking and habits, and translation of complex scientific issues into information understandable by the public. These steps are essential as technology continues to develop and deepen its influence, and as ecological threats worsen.

Decisions on what kinds of knowledge to use in policymaking are often made out of public sight.

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