

# Water Policy Briefing

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Putting research knowledge into action



## IWRM Challenges in Developing Countries: Lessons from India and elsewhere

**IWMI-TATA**  
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Converting a philosophy into practice is a challenge. Recent IWRM experiences in developing countries present a case in point. At the operational level, they take a rather narrow view of the concept and have largely tended to be introduced as a blueprint package. The key to successful IWRM implementation is integration—of the local resources and in the local context.

# IWRM Challenges in Developing Countries: Lessons from India and elsewhere

Developing countries like India are actively being encouraged to move from the traditional *supply-side orientation* towards *proactive demand management* under the broad framework of Integrated Water Resources Management (IWRM). Integrated Water Resources Management (IWRM) is a sound philosophy which is hard to disagree with. However, in developing countries, what usually gets passed-off in the name of IWRM at the operational level takes a rather narrow view of the philosophy and has largely tended to include a *blue-print* package including: [1] A national water policy; [2] A water law and regulatory framework; [3] Recognition of River Basin as the appropriate unit of water and land resources planning and management; [4] Treating water as an economic good; and [5] Participatory water resource management.

Several of these mark a significant shift from current paradigms and making this transition is proving to be difficult. Drafting new water laws is easy; enforcing them is not. Renaming regional water departments as basin organizations is easy; but managing water resources at basin level is not. Declaring water an economic good is simple; but using price mechanisms to direct water to high-value uses is proving complex. As a consequence, the so-called IWRM initiatives in developing country contexts have proved to be ineffective at best and counterproductive at worst.

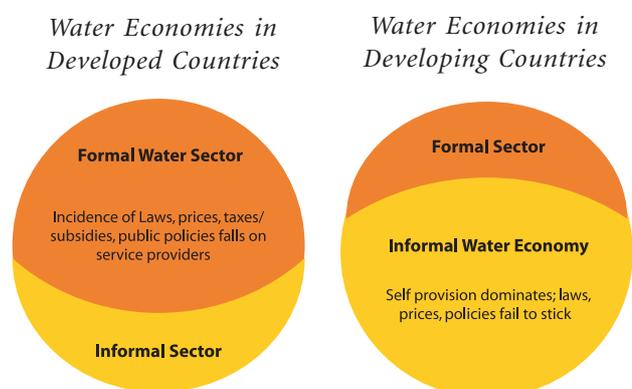
## The uniquely informal nature of developing country water economies

Water economies in developing countries are largely *informal* with little interface with any public institution. Reform efforts focussed mainly on direct regulation and management overestimate the capacity of legal provisions and formal institutions to influence water use patterns.

Water institutions that exist in a country or can be expected to be successfully catalyzed by external actors depend, among other things, on the stage of formalization of its water economy which in turn depends upon the overall economic evolution of that country. Water sectors transform from being highly informal in poorly developed economies to more formalized ones as the national economies grow. By formalization, we mean the proportion of the economy that comes under the ambit of direct regulatory influence.

In informal water economies like that of India, water users depend heavily on self-provision, informal exchanges and local community institutions that are not under the direct influence of formal public institutions. On the other hand, in highly formalized water economies of industrialized countries or, to some extent, in urban India, self-provision is marginal or completely absent as most users are served by public

or private service providers who form the interface between the users and the regulators or policymakers. Such highly formalized economies are amenable to direct policy and regulatory measures like volumetric pricing and allocation which become infeasible and impractical in largely informal water economies.



Several surveys (Box 1) have shown that India's rural water economy – both domestic and irrigation use – is predominantly *informal*. It is based largely on self-supply and local, informal water institutions. It has little connect with public systems and formal organizations through which the policies, laws and water administration typically operate in industrialized countries.

This Water Policy Briefing is based on research presented in *Issues in Reforming Informal Water Economies of Low-Income Countries: Examples from India and Elsewhere* by Tushaar Shah [In: Van Koppen, Barbara, John Butterworth, and Mark Giordano (Eds). 'Community-based water law and water resources management reform in developing countries', Oxford: CABI publishers]; and *Is India Ripe for Integrated Water Resources Management (IWRM): Fitting Water Policy to National Development Context* by Tushaar Shah and Barbara van Koppen [Economic and Political Weekly, Vol. XLI, No. 31, pp: 3413-3421].

## Box 1. Nature of India's Water Economy

A nationwide survey covering 78,990 households in 5,110 villages showed that less than 10 percent of survey households used water from sources owned and managed by the government. Further, less than 20 percent of rural households were connected with any public or community water supply system and only one in every 12 villages has any public or community water supply system. The rest rely on self-provision for their domestic water needs.

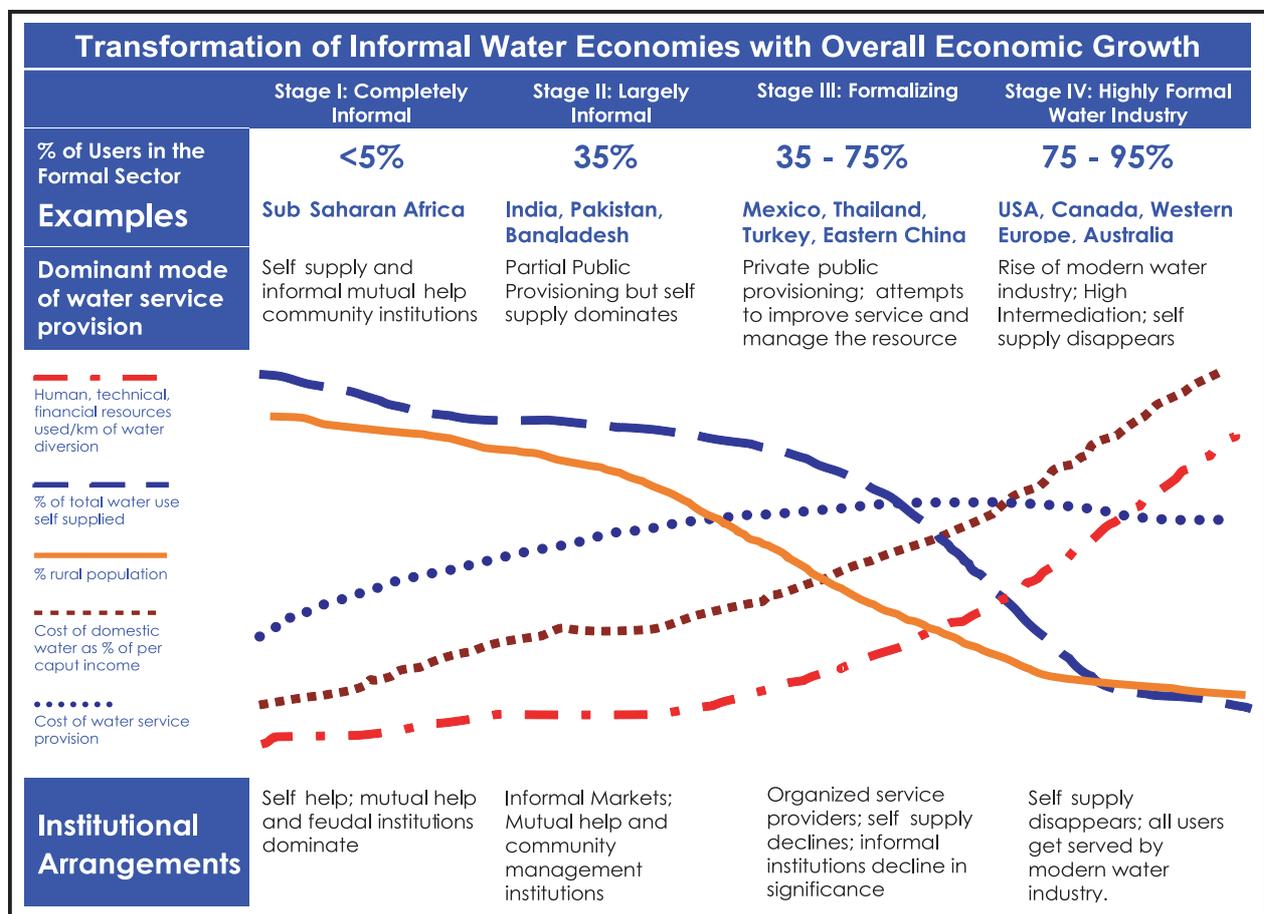
However, this evidence on domestic water supply was not uniform across the nation and a strong influence of economic growth could be seen. The proportion of villages with a public water supply system increases rapidly as we move from poor to richer states. In Bihar, one of India's poorest states, none of the 364 villages surveyed had a public/community water supply; in the somewhat richer state of Haryana, over half the villages surveyed had a public water supply system, and in still richer Goa, every village surveyed had a public water supply system.

The picture is similar in the irrigation sector. A 2002 survey of 4,646 villages across the country found that 76 percent of the villages reported some irrigation but only 17 percent had access to a *public* irrigation system; the rest depended primarily on wells, tube wells, tanks and streams. Two-thirds of all farmers in a large survey reported using irrigation for five major field crops cultivated by them. For half of them, the source of irrigation was the informal and fragmented pump irrigation markets which are totally outside the ambit of *direct* influence of the formal institutions.

## Transformation of informal water economies

The figure hypothesizes how the organization of a country's water economy metamorphoses in response to economic growth and the transformation of society that comes in its wake. Regardless of its water endowments, as a low-income economy climbs up the economic ladder, the organization of its water economy undergoes a transformation in tandem with the transformation of the society as a whole.

The foremost drivers of this transformation are urbanization and occupational diversification. As the proportion of rural and agrarian population declines, agricultural water demand eases. With urbanization and economic growth, self-provision of water is increasingly replaced by service providers. Along with these changes, water institutions too undergo profound change. In very poor societies, self-provision of water by households is ubiquitous. Countries at somewhat higher levels of economic growth witness limited local specialization in water services provision, in an



informal manner. As economies grow still further, local specialization and the informal institutions associated with these disappear and large, professionally run corporates (public or privately owned) take over the role of procurement, processing and retailing of water.

## Institutional environment *versus* institutional arrangements

The Institutional Environment (IE) refers to the 'three pillars' of formal water laws, water administration (including donors, academia and NGOs) and formal water policy. Institutional Arrangements (IA), in contrast, refer to the humanly devised rules-in-use, which drives the working of numerous informal institutions that keep a vibrant economy well lubricated. These would therefore include entities like groundwater markets, water user associations, urban tanker markets etc. The level of formalization of a country's water sector is best indicated by the limited interaction between its water IE and IA.

*Much analysis and interventions currently focusses on what governments, bureaucracies and legal and regulatory systems do. To be effective in developing countries, it should also include people, businesses, civil society institutions and religious and social movements.*

## Understanding the rules-in-use

An important question in understanding institutions is: 'Why do economies fail to undertake appropriate activities *even when they have a potentially high pay-off*?' India's water sector is replete with situations where appropriate activities can potentially generate a high pay-off and yet fail to get undertaken. In contrast, much of the water reforms being attempted or contemplated are unlikely to work in the current context because of high *transaction costs* (these include: [1] costs of search and information; [2] costs of negotiation, bargaining and contracting; and [3] costs of policing and enforcement of property rights, rules and laws).

The transaction costs of an intervention increase with an increase in the number of stakeholders. State agencies therefore regularly try to minimize transaction costs while designing and implementing institutional interventions. The new water law in Mexico (See Box 2), for instance, does not apply to anyone who stores less than 1030 m<sup>3</sup> of water. Australia's water law excludes users who irrigate less than 2 ha. Kansas water law exempts all who divert less than 15 acre feet of water. Water withdrawal permits in South Africa and many African countries exclude domestic users and stock watering. Including these small users would hugely increase search, information and enforcement costs involved in implementing the interventions. But if India or Bangladesh were to exempt those who irrigate 2 ha or

### Box 2. The New Groundwater Law in Mexico

Mexico's experience with implementing its new groundwater law is an interesting example of how transaction costs guide policy behavior, influence the institutional environment and determine the institutional arrangements.

Much like India and China, Mexico also faces the problem of groundwater over-exploitation in some parts. Its new Law of the Nation's Water provided for the registration of all groundwater diverters and issue of 'concessions' to each with an entitlement to pump a permitted quota of water per year. Nearly a decade later, the 'implementation efficacy' of this policy regime has varied across different segments of groundwater diverters.

The law was enforced quickly and effectively for industrial users and municipalities – large users in the formal sector; household wells – far too numerous, and each diverting small quantities – were wisely kept out of the ambit of the law. The reason was apparent – the high transaction costs of regulating them. As there are over 96,000 agricultural users, the real problem faced by Mexico's water bureaucracy is the impossibility of enforcing volumetric restrictions with limited staff and resources. Attempts to reduce policing costs by instituting peer monitoring systems – COTAS or Aquifer Management Councils – have also not worked. The enormity of the task can be imagined in India where a similar strategy would require policing more than 20 million private tubewell owners scattered over 600,000 villages.

Unable to police a large number of individual users through its water bureaucracy or through the COTAS, the government in Mexico finally enforced penal charges for electricity use by tubewells extracting groundwater beyond their allocation. This method reduced transaction costs since metered electricity use provides a good surrogate of water extracted.

less, a majority of their water users and water diversion would get excluded. And if these were included, the transaction costs of regulating would skyrocket.

When transaction costs of implementing an institutional intervention become prohibitive, players in IE give it up rather than enforcing it *at any cost*. In some cases, as in Mexico, state agencies come up with smart indirect approaches to reduce transaction costs. Economizing on transaction costs is thus a key determinant of the nature of institutional arrangements that evolve.

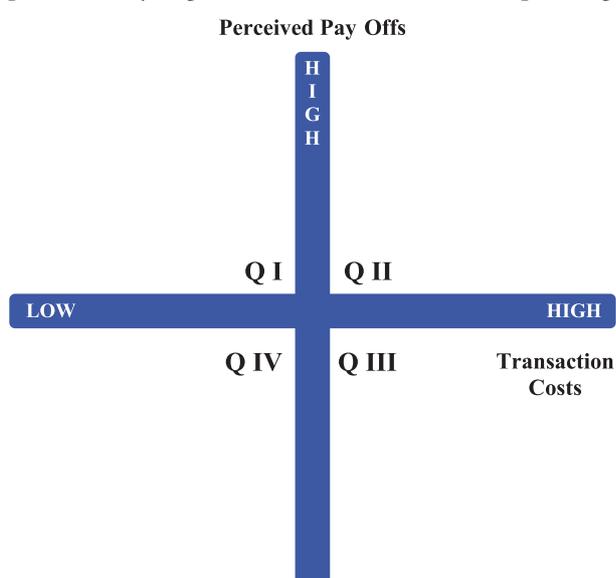
## Transaction Costs and Perceived Pay-Offs

Several kinds of institutional reforms tried or suggested in the Indian context have tended to have either entailed high transaction costs or low pay-offs or both. In contrast, institutional changes which have

quietly occurred because pay-offs are high *and* transaction costs low are either thwarted or, at least, ignored and not built upon.

## Interventions with poor implementation efficacy (Quadrants III and IV)

International pressure and donor conditionalities sometimes oblige developing countries to initiate interventions without a local buy-in. There is a whole set of policy proposals widely espoused by researchers and donors and attempted by policymakers that have doubtful potential pay-off in a predominantly informal water economy like India because of the prohibitively high enforcement costs. When policing



and enforcement costs of an intervention are high, there is a tendency to design interventions as a token, without serious intention to implement them. The Government of India's Model Groundwater Law is a good example. It has found no takers for the last 35 years because of the virtual impossibility of reasonable enforcement. Also, if made into a law, it is likely to create a whole new rent seeking economy at the lower levels of bureaucracy without any benefit to water resources or its users. On the other hand, we frequently see updates on India's Water Policy (1987, 1992, and 2005) which are easily adopted because of their non-binding nature but scarcely change anything on the ground; where, for example, the difficult clauses like setting up of inter-state river basin authorities are generally ignored.

In Africa, several countries have, during recent years, experimented with demand management ideas – in the guise of IWRM – such as pricing of water, instituting water withdrawal permits, and restructuring regional water departments as river basin organizations. Although it may be too early to write a report on these, countries like Ghana are already having second

thoughts. The concerns are of four kinds: [a] most reforms have remained largely unimplemented, especially in the informal segments of the water economy that encompasses most of the users and uses; [b] implementation of reforms has disrupted customary arrangements for water management; [c] when zealously implemented, reforms – especially, water permits and water taxes – hit poor people in remote rural areas hard; and [d] 'demand management reforms' deflected policymakers from pursuing other important water-sector priorities, viz., improving water infrastructure and services.

## Promising but *transaction costly* interventions (Quadrant II)

Some interventions promise high pay-offs if successful; but their success is rare because they are based on institutional models with high transaction costs. A classic example is Participatory Irrigation Management (PIM), or its cousin Irrigation Management Transfer (IMT). There has been high enthusiasm for PIM driven by its communitarian ideal and a few examples of its successful implementation on an experimental scale. What is often overlooked is that success has always been a result of extraordinary levels of facilitation that cannot be easily replicated or upscaled. Yet the *islands of excellence* have been the basis for several large scale irrigation reforms programs over the past few decades.

A careful analysis of IMT programs across the world suggests that they work better where:

- The irrigation system is central to a dynamic, high-performing agriculture.
- The average farm size is large enough for a typical command area farmer to operate like agri-businessmen.
- Supply of water resources is just sufficient to meet the demand requirements in the given command.
- The farm producers are linked with global input and output markets.
- The costs of self-managed irrigation are an insignificant part of the gross value of the product of farming.

These are the conditions that increase the pay-offs and reduce transaction costs of community management of irrigation systems. We find these conditions in high and middle income countries like USA, New Zealand, Mexico and even among the commercial white farmers of South Africa, countries where most of the success stories of IMT come from. Command areas in India (and other low-income economies) have a large proportion of small and marginal farmers growing mostly low-value cereal crops. Even though irrigation is central to the

agrarian economy, large number of tubewells and booming groundwater markets reduce the farmers' stake in improving the public irrigation system. In addition, there are conflicts of interest between head and tail reach farmers. All these factors increase the transaction cost of community management. Relatively low value of produce and the fact that reforms often come with higher irrigation fee and greater management responsibilities reduce the potential pay-offs of farmers. No wonder, there exists little evidence of it having succeeded anywhere in India except on an experimental scale, that too with unreplicable facilitation.

## Vibrant but ignored institutional innovations (Quadrant I)

India's water sector is brimming with spontaneous institutional innovations that reduce transaction costs and create welfare but are largely ignored or even discouraged by the formal institutional players. Most of these institutions are *swayambhoo* (spontaneous) and have acquired large enough scale to allow generalization. These are enterprises to reduce transaction costs, improve welfare and raise productivity. They exist to serve the interest of their participants and not the overall society.

A leading example is that of shared tubewells. Thousands were built across the country, often with World Bank support, to provide affordable groundwater irrigation to small farmers who could not afford a pump of their own. Most of these proved to be *white elephants* costing a fortune for providing an indifferent service to a fraction of their design command areas. Efforts to transfer their management to user cooperatives failed to take-off for decades because transaction costs were much higher compared to the pay-offs. At the same time, farmers in north Gujarat were building and operating thriving tubewell groups that allowed them to chase groundwater to the bottom of the abyss. Their operating rules and ownership structure were designed to minimize transaction costs of cooperating on a sustained basis. The whole dynamic of tubewell transfer program changed in Gujarat when a new set of rules removed the requirement of transfer only to a registered cooperative and allowed small, informal groups of major stakeholders to assume the role of tubewell managers and residual claimants. Within three years, more than half of the 3000 public tubewells were transferred with all round positive impacts.

Opportunism is not the sole driver of *swayambhoo* institutions. There are large scale examples of people's institutions driven by complex motives including long-term collective self-interest. Saurashtra recharge movement is a good example of such an institution. The movement was first catalyzed by stray experiments of 'barefoot hydrologists' to modify open wells to collect

monsoonal flood waters. Early successes fired the imagination of people and religious leaders of sects like *Swadhyaya Pariwar* and *Swaminarayana Sampradaya* ennobled this work in their public discourses by imbuing it with a larger social purpose. The gathering movement generated enormous local goodwill and released philanthropic energies on an unprecedented scale, with diamond merchants offering cash, cement companies offering discounted prices, and communities offering millions of days of voluntary labour. The movement was multi-centric, unruly, spontaneous and wholly self-funded until 1998, when the Government of Gujarat piled on and proceeded to rid the movement of its quintessentially *swayambhoo* and voluntary character by announcing a subsidy program. Like most *swayambhoo* institutional developments, this one also met with condescension from the scientific establishment for its use of popular hydrology that paid scant regard to the established tenets of how recharge structures should be built and used. While there continue to be serious doubts from the scientific community about the effectiveness and sustainability of the recharge structures built, the movement remains popular and has spread to new areas.

These are examples of high pay-off, low transaction cost institutions that are often looked down upon by governments, NGOs, donors and research establishments. As a result, instead of recognising the potential of these institutions to the larger social goal, the dominant approach has been to ignore and discourage them.

## Lessons from Swayambhoo Institutions

The *swayambhoo* institutions of the kind discussed above are therefore much better templates for what kind of institutional change should be promoted because they have a more natural, enduring and scalable way of reducing transaction costs evident in their spontaneous growth and self-propagating nature. These ignored institutions offer six useful lessons about how to make institutional change work in developing country water sectors.

1. *Instrumentality*: Institutional arrangements that thrive serve the purposes important to the agents involved. Otherwise participants withhold their participation or even work to defeat the change process. Therefore the importance of incentive structures cannot be over-emphasized in designing institutional change. Expecting popular cooperation for institutions that require participants to compromise their interests is naive.
2. *Incentive Diffusion or Perversion*: Even institutions promising high pay-offs will fail to emerge if transaction costs are concentrated in a few stakeholders while incentives are diffused over a

large group. It has been shown both theoretically and empirically that only a small fraction of the surplus created by management improvement needs to be concentrated in the manager to make it work.

3. *High Cost of Self-Enforcement*: Institutional setting depends a great deal on quality and effectiveness of enforcement. The transaction cost of institutional change increases with increase in difficulty of enforcement. Enforcement of rules and norms can occur through self-imposed codes of conduct (first-party enforcement), due to fear of retaliation against transgressions (second-party enforcement) or with the help of societal sanctions or coercive powers of state (third-party enforcement). Of the three, the second-party enforcement is the most difficult and costly for change managers.
4. *Structures of Incentives and of Sanction*: Getting incentives right so as to entice entrepreneurs to undertake high pay-off activities is important but not enough for catalyzing and sustaining desirable institutional changes. It is equally important to create a community sanction or authority structure that enforces the rights of the service provider and disciplines him at the same time. This protects users and the service provider from the tyranny of each other.
5. *Institutional Environment*: While the institutions we discussed are self-promoted, self-supported and autonomous, they are influenced – both positively and negatively – by workings of water policy, laws and administration. The formal elements of the IE affect both the kind of institutions that emerge and their impacts. How well actors in the IE understand extant and potential institutions, their net welfare and productivity impacts and their backward and forward linkages determines how much they can influence or manage them.
6. *Path-dependence*: Institutional change is inherently incremental and path-dependent. Therefore transposing institutional models that worked elsewhere in a different context seldom works. The notion of ‘path-dependence’ has particular relevance to popular institutional notions, such as the Integrated River Basin Management, which have worked in highly formalized water economies in recent years. It is doubtful if such models would work in the same way in the informal context unless the local contexts are well understood and accounted for.

## Opportunities for policy action

All the things that a Secretary of Water Resources at the state or federal level is enjoined to do by the current discourse to promote improved demand management – imposing price on water resources (rather than water service), enforcing a groundwater law, making water the property of the state and stopping unlawful diversion from nature, instituting water withdrawal

permits and assigning water entitlements, managing water at river basin level – would be almost impossible to implement in any meaningful scale in a predominantly informal water economy. Instead, governments of low-income countries should focus their effort on areas where they *can* produce significant impacts:

1. *Improve water infrastructure and services*: This already is a high priority and will remain so for a long time even as opinion is turning against investments in certain kinds of water infrastructure such as irrigation projects. There are several issues to be addressed such as mobilizing capital, improving the coverage of user households especially from poorer classes, cost recovery, and so on. The point of attack, however, is the performance of public systems, which has tended to be abysmally low, be it irrigation systems or water supply and sanitation systems.
2. *Institutional reforms focused on incentive concentration and transaction cost reduction*: Public system performance often responds strongly to demand for better performance not from users but from administrative or political leadership; however, such performance gains are transient, and get dissipated when demand slackens. To achieve sustainable performance improvements, institutional innovations are needed that restructure incentives and reduce transaction costs.
3. *Honing and using indirect instruments and strategies for achieving public policy objectives*: In its enthusiasm for *direct* management of water demand, the current discourse is overlooking numerous opportunities to achieve comparable aims using *indirect* instruments. For instance, Electricity Boards can play a key role in groundwater demand management through pricing and rationing of electricity to tubewells.
4. *Undertake vigorous demand management in formal or formalizing segments*: Finally, pricing and full cost recovery, tight water law and regulations, and water rights and entitlements are definitely indicated in the predominantly formal segments of the water economy. These are to be found in cities, excluding the slums and shanty towns; and in the industrial sector where users are large and easily identifiable.

To summarize, *cookbook* style replication of successful models from developed and formal economies is unlikely to work in the largely informal, developing country water economies. Such mindless replication, besides being ineffective, diverts policy attention and scarce public resources away from the real issues. The key to successful IWRM is integration – of the local resources and in the local context – which requires a thorough understanding of how the local context is different from more developed water economies. The policy challenge, therefore, is eschewing initiatives that are unimplementable and fitting policies to their context.



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## About IWMI

IWMI is a non-profit scientific organization funded by the Consultative Group on International Agricultural Research (CGIAR). IWMI's research agenda is organized around four priority themes covering key issues relating to land, water, livelihoods, health and environment:

- Theme 1: Basin Water Management: *understanding water productivity*
- Theme 2: Land, Water and Livelihoods: *improving livelihoods for the rural poor*
- Theme 3: Agriculture, Water and Cities: *making an asset out of wastewater*
- Theme 4: Water Management and Environment: *balancing water for food and nature*

The Institute concentrates on water and related land management challenges faced by poor rural communities in Africa and Asia. The challenges are those that affect their nutrition, income and health, as well as the integrity of environmental services on which food and livelihood security depends. IWMI works through collaborative research with partners in the North and South to develop tools and practices to help developing countries eradicate poverty and better manage their water and land resources. The immediate target groups of IWMI's research include the scientific community, policy makers, project implementers and individual farmers.

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