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Comment

Community Management of Groundwater Resources: An Appropriate Response to Groundwater Overdraft in India?


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Based on Research by

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Groundwater irrigation has burgeoned into a colossal anarchy in South Asia. Direct legal and regulatory responses to this challenge have not worked at all. Indirect policy instruments such as electricity pricing and supply policies too have not been readily accepted. Research shows that community management (Comman) is also unlikely to work unless communities [a] find new, stronger threats to their long-term livelihood security from groundwater depletion; and [b] can 'seal' their portion of the aquifer so that they reap some reward for their discipline.

The Comman report builds a case for adaptive livelihood diversification as a response to increasing groundwater stress.

COMMUNITY MANAGEMENT OF GROUNDWATER RESOURCES: AN APPROPRIATE RESPONSE TO GROUNDWATER OVERDRAFT IN INDIA?¹

IWMI-TATA COMMENT BASED ON A DRAFT REPORT TITLED: COMMUNITY MANAGEMENT OF GROUNDWATER RESOURCES IN RURAL INDIA

INTRODUCTION

Groundwater irrigation has burgeoned into a colossal anarchy in South Asia. The region draws over 200 km³/year of groundwater mostly for irrigation, using over 20 million diesel and electrified wells and tubewells. Managing this anarchy is one of the biggest challenges the region faces today. On the one hand, considering that over half of the region's population gains, directly or indirectly, from groundwater irrigation, the political economy surrounding the resource is vast. On the other hand, however, leaving such a huge economy virtually unmanaged—as it is at present—is a sure formula for socio-ecological disaster.

Standard response to this challenge—especially from government departments—is to make and enforce strict laws. Gujarat, notorious as a groundwater basket case, made a law as far back as in the early 1970s. Maharashtra promulgated a law during the mid 1990s trying to curb deep irrigation tubewells from destroying public drinking water wells. More recently, Andhra Pradesh has passed a Water and Trees Act. But the experience of enforcing all these has been disastrous, often because the culprits, victims as well as enforcers of the law have an ethical position somewhat at variance with the law (Phansalkar and Kher, 2003). Moreover, how does a society manage an economy in which millions of independent users scattered over a vast countryside can and do help themselves to a limited natural resource with complete abandon,

often assisted by perverse incentives? Finally, there are also fears that even if, by some supreme administrative effort, such law is enforced, it may produce unforeseen but invidious social dynamic as India's past experience with such legislative zeal has shown.²

This writer (Shah, 1993, 2003) has suggested that since direct regulation cannot work, a better strategy might be to try a toolkit of indirect policy instruments, such as electricity pricing and supply policies, subsidies or taxes on irrigation equipment, incentive mechanisms to align cropping patterns with water endowments of regions, and so on. This too has not been readily accepted; and the Comman report offers a critique of the indirect management thesis.

Conventional approaches to groundwater management in India are not making much headway because they are based on false assumptions: they pretend to draw upon scientific knowledge base, institutional capacity and political will for reform that are not present.

A third school has advocated local community-based groundwater management in the same vein as has been tried out in forests, watersheds and other natural resource management (NRM) contexts. Other than amongst NGOs and field activists, this school has not found much following likely because not much is known about whether this has worked anywhere in the world in the context of groundwater depletion. The

¹The research covered by this IWMI-Tata *Comment* was carried out by a group of organizations led by the British Geological Survey.

²India's efforts to institute land reforms through law were one of the earliest cases. But there are several others: the Gold Control Act, laws to regulate shroffs and moneylenders, and the forest laws. All these have aimed to keep people from pursuing what people thought were ethically acceptable livelihood activities. In hindsight, none of these produced the desired effect on a desired scale but generated vast social side effects.

present report by the British Geological Survey and partners is valuable and timely because it addresses precisely this issue: Is community-based local groundwater management an appropriate response to India's groundwater challenge. Section 2 summarizes key ideas and proposals in the report; section 3 offers a critique of the Comman analysis. Section 4 presents conclusions.

KEY IDEAS AND PROPOSALS

The report outlines the results of the DFID-supported Comman Project that involved several collaborating partners. The key aims of the project were two: [a] assess the feasibility of applying local, user-based approaches to groundwater management as a means of mitigating, or avoiding, groundwater depletion problems in rural areas; and [b] provide guidance on how user-based strategies might be approached, and obstacles overcome. The report focuses on these aims and outlines to what extent these are achieved.

Chapter 2 of the report offers a competent assessment of the conventional response to the

groundwater challenge. In particular, it critiques the notion of 'sustainable yield' of aquifers that lies at the heart of conventional strategies for sustainable resource use. On the one hand, this implies fully exploiting livelihood and economic benefits where the resource is undeveloped. On the other, it means controlling overdraft to ensure that it “does not deplete the stock of groundwater in storage and thereby leaves subsequent periods (years or generations) with same levels of overall water availability” (p 6).

The chapter argues that conventional approaches to groundwater management in India are not making much headway because they are based on false assumptions: they pretend to draw upon scientific knowledge base, institutional capacity and political will for reform that are not present. Worse, there are conflicts of interest amongst stakeholders—farmers, bureaucrats, politicians, and conflicts of worldview amongst purveyors of ideas, such as the new mantra of IWRM. Add to this the inherent complexity of groundwater and the inability of modern hydrology to unravel all its mysteries, be it in San Luis Valley of Colorado or the Sabarmati basin in western India. As a

Communities Rally for Augmenting Groundwater Supply More Easily than for Restricting Withdrawals.



result, many conventional approaches—such as watershed development and recharge programs may be futile, misguided, or even counterproductive. Even if they were not so, the creation of new governmental regulatory organizations seems impractical at times when state governments are trying to downsize to make the two ends meet.

This makes indirect approaches—such as managing groundwater demand through power pricing policies—appealing; however, the report argues that largely because of the political opposition, “it is difficult to tailor these to meet the specific needs emerging in any given management area” (see Box 2.5 in the report).

That makes community management worth exploring. Chapter 3 undertakes a comparative analysis of four situations to explore “under what circumstances and conditions can groundwater users dynamically and positively shape economic and social institutions to arrive at local, cooperative solutions to resource use and allocation problems.” The four situations analysed are: VIKSAT's work in Satlasan village in North Gujarat, Tarun Bharat Sangh's work in the Arwari basin (Alwar district) in Rajasthan; Vikas Salunke's pani panchayats in Maharashtra, and two villages in Coimbatore district of Tamil Nadu, all examples of groundwater depletion. The analysis concludes, unsurprisingly, that communities rally for augmenting groundwater supply more easily than for restricting withdrawals; and that the latter is unlikely to happen unless communities [a] find new, stronger threats to their long term livelihood security from groundwater depletion; and [b] can 'seal' their portion of the aquifer so that they reap some reward for their discipline. The analysis concludes that, because of these, community management “will have difficulty controlling groundwater withdrawal, let alone groundwater access, through social pressure alone”.

Which throws the ball back in the lap of conventional approaches; but their key limitation is that they are resource-centered and therefore “most conventional approaches focus on the technical and institutional capacity to manipulate flows into and out of aquifers but do not address the evolving social context in which interventions

must fit.” Conventional approaches do not address the livelihoods systems from which the structure of demands on groundwater emerges and which are taken as 'givens'. These would not be taken as givens if groundwater management were to lean more on livelihood-focused adaptive approaches that the Report argues would more likely work.

In this direction of an 'expanded management perspective', the Comman report recommends:

- Building local capacity to diagnose and find points of leverage;
- Clarity in processes or protocols for external support to or partnership with communities;
- Adaptive intervention designs that can accommodate diverse approaches;
- Institutional structures that can work at diverse scales;
- Protection of domestic water supplies where threatened.

To develop these recommendations further, the report suggests: [a] research with a broader focus on capacity building, institutional structures, and livelihood diversification; [b] testing out replicable processes for responding to groundwater over-draft through experimentation on pilot scales; [c] improved monitoring and evaluation at programmatic levels, within coalitions of organizations and within communities and [d] developing local capacities for adaptively responding to groundwater overdraft situations.

CRITIQUE

Managing the spillover effects of intensification of groundwater extraction is one of the critical natural resource and environment management challenges facing India. And yet, one finds very little research that focuses attention on action and policy alternatives. For that reason alone, the Comman report is a welcome addition to a small but growing body of work in this important field. However, there are several other strengths of this research that deserve to be noted:



First, the broad, interdisciplinary, problem-solving perspective that the entire research—and the present report—have adopted is valuable in itself, made more so by the paucity of such material in the sub-continent.

Second, the organization of the Comman research project in a collaborative format that enabled a geo-hydrology major such as the British Geological Survey to work on the one hand with grassroots agencies and on the other with a policy-oriented institution such as ISET has definitely contributed to the high quality of insights.

Third, the critique of the 'conventional approaches' is exhaustive and incisive, although there are aspects on which other researchers may have different perceptions. The rest of this note deals with some of these.

1. Who is the target audience? If it is the Central Ground Water Authority (and the state groundwater departments) which are responsible for overseeing groundwater resource use in India, the Comman's approach goes somewhat overboard because, leave alone community-based management, governmental organizations have not even explored indirect instruments, have just flirted with direct regulation (notification of the Delhi Jal Board, Maharashtra Drinking Water Act; Andhra Pradesh Water and Trees Act, etc) and are still totally focused on monitoring water level fluctuations. And if the target audience is NGOs

and donors, then, Comman results—especially, its emphasis on livelihood-focused adaptive approach—will need a great deal of mainstreaming; else, the debate will remain confined to a small elite group.

Leave alone community-based management, Government organizations have not even explored indirect instruments. They have just flirted with direct regulation and are still totally focused on monitoring water level fluctuations.

2. Scope of the research: The scope of the research has, in my reckoning, been unduly restricted by focusing on 'mitigating, or avoiding, groundwater depletion (or overdraft²) problems in rural areas' as the sole concern of the research. Depletion problems are no doubt important and critical in many areas; but these still account for less than 5 percent of India's land mass; even in these regions—such as north Gujarat or Tamil Nadu there is no sign yet of agriculture going out of business because of groundwater depletion. Without undermining the need to address depletion issues, I believe the objective of groundwater management in India has to do with much more than mitigating depletion. In that sense, the Comman report has restricted its scope unduly, and has therefore lost out on far-reaching responses—induced as well as autonomous—that groundwater intensification is engendering in the Indian countryside.

Equally limiting is the choice of community initiatives studied. One was hoping to see some new, fresh initiatives brought under scrutiny. The three included are indeed valuable; but Salunke's pani panchayats and Rajendra Singh's Arwari basin are already over-researched. Even if confined to community management initiatives, one would have expected the report to bring in lessons from many more grassroots projects than covered by it. The watershed development projects are in many ways a large-scale response to groundwater intensification; when implemented well, numerous studies suggest that watershed projects as well as recharge structures do enhance community capacity to cope with drought,

contrary to the line taken by the Comman report³. Regions like Saurashtra in western India have witnessed mass-based rainwater conservation and recharge movement as a response to groundwater intensification. Bringing these various responses into the ambit of the Comman project would have contributed to a more broad-based understanding of the limits of conventional approaches as well as of myriad ways in which communities adapt to groundwater intensification—of which the report focuses only on livelihood diversification.

3. The notion of community management:

The discussion on community management is somewhat stylized. The only mode of 'community management' the project is interested in is group self-regulation in response to overdraft. It almost presupposes that a community being mutually vulnerable and “mutually dependent because of the centrality of resource use in supporting livelihoods” will respond to groundwater depletion *only* through group self-regulation. It should be of no surprise at all that the project has found this notion “fanciful” because there is hardly any previous experience of any significant collection of communities anywhere in the world having responded to groundwater overdraft through group self-regulation using social pressure.

The failure of direct regulation has more to do with lack of logistical capacity to regulate the behavior of an incredibly large number of small groundwater users than the scientific capacity to understand and map the behavior of the resource.

However, just because communities do not put into place means of collective self-regulation, it does not necessarily mean that communities do not respond in a collective fashion to the fallout of groundwater intensification. I would like to

suggest that sub-communities forming tubewell companies in North Gujarat to chase declining water levels is a perfectly valid example of community response to groundwater intensification. Equally good example is village communities building common property water harvesting and recharge structures by thousands in Saurashtra. Indeed, the tenacity with which Bharatiya Kisan Sangh, an association of farmers in Gujarat, has been, during recent times, offering a stiff fight to Gujarat's chief minister Mr. Narenra Modi's resolve to reform electricity pricing for agriculture in Gujarat is by far the best example of strong collective action at a supra-aquifer scale by a vast community of farmers who feel “mutually vulnerable and mutually dependent because of the centrality” of tubewell irrigation to their livelihoods.

Indeed, one might argue, that the Food Corporation of India can do much better job of forging a macro-level response to the imbalances in regional groundwater endowments and withdrawals than the Central Ground Water Board can.

The limited notion of 'community management' that lies at the heart of the conceptual framework of Comman report makes the study somewhat make-believe and normative in its tenor. Not finding evidence in support of a fanciful notion seems not reason enough to discard an otherwise useful hypothesis which should be: that communities that feel mutually vulnerable and mutually dependent because of the centrality of a resource in supporting their livelihoods will forge appropriate and matching responses to any *perceived* threat to their continued access to the resource. Communities may—and, in this case certainly do—perceive the threat differently from the way outsiders do; they naturally respond to the threat as *they* perceive it.

³One also felt that the report takes a lopsided view of the evidence on recharge activities and the watershed program, which in Box 2.3 appears in much poorer light compared to what many other researchers suggest. The Arawari basin has become world famous because Rajendra Singh's Johads provided better drought proofing than before. In Saurashtra, after they first started doing well recharge and check dams in 1988, communities keep doing it 15 years later, presumably because they think it is helping them fight drought. The Comman report ignores hundreds of studies—including one on Arwari, one of their research sites—that suggest that proper water harvesting and watershed development are helping them fight drought and resource depletion; but cites Bachelor *et al* (2000) to conclude that there is no evidence to suggest that these activities make 'villages less susceptible to the shock of drought'. If this is the truth, so be it; but, in my view, it must emerge from a balanced assessment of welcome as well as 'unwelcome' knowledge available.

4. The Common critique of indirect approaches : The Common report offers a comprehensive critique of the conventional approaches which it suggests would likely not work because: [a] lack of information and scientific understanding makes precise resource management strategies difficult to formulate; [b] lack of political will makes them difficult to implement even if such regimes were available; and [c] resource-strapped governments are unlikely to create the necessary management organizations that might implement such strategies.

These are valid arguments. However, the so-called conventional approach is largely a paper tiger. It is widely known that the Central Ground Water Authority and state groundwater departments are still largely in the water level monitoring mode and nowhere in South Asia has there ever been a serious attempt to proactively and tightly manage groundwater overdraft even using the conventional approach. In the Delhi Union Territory which is 'designated' by the CGWA now for nearly five years, results of conventional management approach are still obscure (if not an outright failure). In my perception, the failure of direct regulation has more to do with lack of logistical capacity to regulate the behavior of an incredibly large number of small groundwater users than the scientific capacity to understand and map the behavior of the resource.

I have a different perception about the potency of indirect approaches that work through economic incentives and disincentives. We need to first recognize that the toolkit of indirect instruments is larger than just electricity pricing policy. The Punjab Chief Minister's campaign to wean his farmers away from rice-wheat combination to orchard crops is driven primarily from the concern about groundwater depletion; already, in his first year, over 100,000 acres in Punjab have been shifted to orchard crops which he argues will use much less water than the rice-wheat combine. If India's food grain procurement system—which is at present focused on Punjab and Haryana—is reconfigured to do most of its procurement of rice and wheat from groundwater-rich Bihar, West Bengal, eastern UP, Assam and Orissa—as the Food Corporation of India is now trying to do

there is no doubt that patterns of groundwater use in agriculture throughout north and eastern India would undergo profound change in as short a period as five years. Indeed, one might argue, the Food Corporation of India can do a much better job of forging a macro-level response to the imbalances in regional groundwater endowments and withdrawals than the Central Ground Water Board can.

For similar reasons, the role of electricity boards as strategic groundwater players must not be underestimated (Shah *et al*, 2003). If we focus on the macro-level supra-aquifer picture, it becomes clear that the existing configuration of the South Asian groundwater economy—as well as the behavior of individual actors—is a direct function of the way the energy-irrigation nexus has evolved, as we have recently shown based on a large-scale survey of groundwater irrigation in South Asia (see, Shah and Singh 2004). The survey showed, for example, that as change to flat electricity tariff in Pakistan during 1989 led to rapid increases in electric pumps in Pakistan Punjab and Sind; but return to metered electricity in 2000 has already begun to significantly increase the ratio of diesel to total pumps, as well as reduce average use of groundwater per hectare of

Crop Diversification is an appropriate Response to Increasing Groundwater Stress



All in all, while I agree with the cautious pessimism expressed by the Comman report about the potential of regulatory mechanisms, I think strategies for indirect management must not be written off without further exploration.

5. Adaptive approach : This is particularly so because the livelihoods based adaptive approach that the Comman report outlines is still sketchy and needs to be fleshed out. The advantages of a livelihoods-based adaptive approach over the 'conventional approach' are great; the former is elegant and holistic, and holds appeal to all those who recognize that the key unknowns in the groundwater game have less to do with water and how it behaves than with people and how they behave under different situations. We have three suggestions to improve and strengthen the adaptive livelihoods approach.

First, it needs to be recognized that farmers adapt to groundwater stress in far more ways than just livelihood diversification; all these need to be factored into the strategies of intervening agencies. I should tend to think that many more farmers suffering groundwater stress adapt by making different choices within existing livelihood systems. Numerous examples present themselves;

I cite just a few. In the Maikaal region in Madhya Pradesh, farmers invented a very low cost, disposable *Pepsee* drip irrigation system to provide first two irrigations to their cotton crop when their wells are empty or have little water. These are enough to ensure high germination before the onset of the monsoon, when they do away with the *Pepsee*. In Saurashtra, irrigation practices for groundnut and coconut plantations have changed with growing groundwater stress. In North Gujarat, farmers are increasingly turning to orchards and cumin. All these represent ways farmers adapt.

Second, it needs to be recognized that the livelihood-focused adaptive approach as developed by the Comman project does not emphasize sufficiently that a section of farmers diversifying their livelihood systems does not necessarily ease groundwater stress since little land is going out of cultivation or irrigation. Those who move to urban jobs or off-farm livelihoods sell or lease out their lands to other farmers who are now subject to groundwater stress. In Mehsana, many Patidaar families have moved out to towns and cities as a response to groundwater stress; but their lands are still under cultivation; and their tubewells keep getting pumped all the

Surface Water Systems are now Valued for their Capacity to make Groundwater Irrigation Sustainable



rice and wheat. In eastern India and Nepal terai, groundwater use needs to be stimulated to create new livelihoods; yet, thanks to poor electricity supply, groundwater use/ha for rice and wheat here is way lower than elsewhere in the rice-wheat system. Finally, it also emerged clearly from the survey that groundwater use/ha throughout western and peninsular India would decline by 23-30 percent if all groundwater users (of which over 80 percent use electric pumps) were to change to diesel pumps or if electricity were to be charged on a metered basis. Such evidence is useful to gauge the potency of a tool although the tool may not be used as such for political reasons.

However, we know that the issue of improving the viability of Electricity Boards has acquired a hype such that Chief Minister after Chief Minister has been staking his political career taking a tough line on farm power subsidies at huge political cost; sooner, rather than later, I would expect to see major changes in agricultural power pricing and supply front with profound impact on groundwater economy either way⁴. If recent experience of Andhra Pradesh, Tamil Nadu and Maharashtra—where Chief Ministers have declared free power to farmers—is any guide, changes will more likely be in the direction of power supply restrictions than in power pricing.

Finally, one tool of indirect management of groundwater depletion is changing the way surface structures are viewed and managed. In many groundwater-stressed regions, role and uses of surface systems are changing rapidly. Many canal irrigation systems have in effect become groundwater recharge systems. A recent study in the Mahi Right Bank system in Gujarat, with a command area of around 250,000 ha, showed that more than 50 percent of the command area farmers receive only two irrigations per year from the canals. Predictably, over 150,000 tubewells have come up in the command area; it is these that really irrigate crops; canals merely recharge

Role of Electricity Boards as Strategic Groundwater Players Cannot be Underestimated



the aquifers. Similarly, it is groundwater depletion that is spurring new interest in improving existing tanks and building new ones. The conventional notion of conjunctive management of ground and surface water is that of promoting groundwater use in a surface system command. But this notion is now standing on its head: communities increasingly judge the value of existing and new surface water bodies in terms of their capacity to make groundwater irrigation sustainable. An important tool of indirect management would be to acknowledge these changing roles and recast the protocols for designing and managing surface water bodies for maximum impact on groundwater recharge.

The conventional notion of conjunctive management is now standing on its head: communities increasingly judge the value of existing and new surface water bodies in terms of their capacity to make groundwater irrigation sustainable.

⁴Digvijay Singh lost his chief ministership because he ignored electricity supply to farmers, besides ignoring roads. The current thorn in Narendra Modi's eyes is the Bharatiya Kisan Sangh which has been running a ceaseless campaign against his decision to up the power tariff. Ms Jayalalitha has already made the first move to abolish free power in Tamil Nadu; so did Amarinder Singh. Andhra Pradesh's Chandrababu Naidu already introduced metering of tubewells but had to hastily retrace in the face of massive farmer demonstrations. Now, the eastern states are cribbing that they cannot capture rural vote banks because they have no power to subsidize; so, there is talk of introducing subsidy on diesel for farmers! Any reader of Indian newspapers can see that the electricity-groundwater nexus is one of the top issues on the political battle field of many Indian states. In this situation, to underplay or write off the centrality of this nexus for the health of both Indian power as well as groundwater sectors is, in my view, simplistic.

time. In the western US, Spain, and Australia, livelihoods are diversified far more but groundwater overdraft continues apace.

Third, much adaptation is immiserizing. The smartest and the most enterprising tend to move out of farming when aquifers begin running dry; those who get left behind to bear the brunt are the poorer and less able to make the transition to newer means of livelihoods. Their choice is between suffering groundwater stress and adopting 'push' or negative diversification.

Finally, the supply of opportunities for what the report calls 'pull' or positive diversification are seldom a function of groundwater stress. It is a function more of larger macro-economic dynamic that shapes a local economy. Considering that Indian agriculture will stay the parking lot for the poor for the next 20 years at least, and that an overwhelming majority of Indian farmers will remain involuntary farmers, these opportunities are dreamt of by farmers regardless of groundwater abundance or stress. Finding jobs in the powerloom sector in Coimbatore or primary schools in Gujarat in large numbers for farmers suffering groundwater stress—as the Comman report suggests—would be somewhat like 'tail wagging the dog'.

CONCLUSION

The mark of effective research, advice and policy making is the capacity of those involved to know

the difference between what 'should' be done, and what 'can' be done. This can be expressed in another way as awareness of 'when' what 'should' be done, 'will be able' to be done" (Allan 2001).

By including this incisive quote, the Comman report has set itself a tough test for its advocacy of a livelihoods-focused adaptive approach as a superior strategy for responding to groundwater depletion. I agree with the general tenor of the report that the only way to ease the pressure on groundwater will be by diversifying livelihoods. The problem is two fold: [a] the solution advocated is much bigger than the problem when viewed in the larger societal perspective; it is therefore like asking to use a hammer to kill an ant, when one does not have the hammer; and [b] worldwide evidence especially of industrialized countries does not suggest that taking people off farming reduces pressure of agricultural demand for groundwater sufficiently for "mitigating, or avoiding, groundwater depletion problems..."

Which means, perhaps, that we need to keep working away at improving conventional approaches. Recognizing that these will work effectively only in the long run, indirect strategic approaches need to be brought into play in the interim.

Migration Does not Necessarily Reduce Agricultural Land Use



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Centrality of Resource will Forge Appropriate and Matching Response From the Community



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IWMI-Tata Water Policy Program

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IWMI-Tata Water Policy Program

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