



Historic Chandeli tanks of Bundelkhand – built by ruling Chandela kings a thousand years ago – were once glorious but are now steadily declining. If managed better, these can still matter.

Chandeli tanks are entrenched in low-level performance equilibrium because their stakeholder groups have conflicting interests which they pursue with abandon.

Strategies used by the Madhya Pradesh government have so far not worked; but an answer to poor management may lie in improvising intelligently on an institution widely believed to be dubious – of using fisher-folk to manage tank irrigation as well.

IWMI-Tata

# Comment

## Who Should Manage Chandeli Tanks?

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# Who Should Manage Chandeli Tanks?

## RESEARCH HIGHLIGHT BASED ON A PAPER TITLED:

### “WHO SHOULD MANAGE THE TANKS: IRRIGATION DEPARTMENT, USERS’ ORGANISATION, OR PRIVATE MANAGEMENT AGENCY ? A QUEST TO FIND A SUSTAINABLE SOLUTION”

#### RELICS OF HISTORY

Despite their dubious role in the agrarian history of feudal India, our *Zamindaars* and *Rajas* did to their subjects some small acts of kindness. One of these was building tanks, several hundred thousands of them that pepper the Indian landscape. Just three states – Andhra Pradesh, Karnataka and Tamil Nadu - had apparently over 100,000 on the eve of Independence. Besides countless tiny *johads* and *paals*, Rajasthan has 4500 minor irrigation tanks, each several times bigger than a typical tank in Tamil Nadu or Sri Lanka; South Bihar’s *Ahar-Pyne* systems and Bundelkhand’s *Chandeli* tanks are substantial and numerous structures bequeathed to local communities mostly by the erstwhile *Jagirdaars* and *Rajas*. So central have these been to village society and ecology that progressive regents like Sayajirao Gaikwad’s rural development programme for the erstwhile princely state of Baroda essentially consisted of giving each village a temple, a public library and a tank.

#### DECLINE

Today, India’s tanks lie in a state of disrepair. In the peripheries of towns, this loss of ‘social tank capital’ cannot be helped; all resources - including tank-beds - must eventually find their way to higher value uses. However, what is worrying is that tanks are in a deplorable state even in the hinterland, where their potential social value can be much higher, especially in view of growing water scarcity and the rise of irrigation-responsive farming technologies.

Opinions differ on why India’s tanks have atrophied - of, indeed, if they have atrophied at all. A popular view is that, feudal structures in pre-Independence India created and sustained local traditions of community management that eroded once the government took over the management of tanks. Whether this is true or not is difficult to say; but at

least one historian, Mosse, who waded through the archives of the Madras presidency concluded that, Tamil Nadu’s tanks were always in as bad a state of disrepair as they are today, so as far back into history archival records take us. If this is true, questions arise about a notion that has a powerful sway over discussion on tanks in India: that tanks would get managed better if only we revived traditional institutions for community management or mimic them in designing tank institution reforms.

#### TANKS IN TODAY’S CONTEXT

Regardless of whether tanks have or have not declined, last two decades have witnessed several large donor-supported tank rehabilitation programmes - in Tamil Nadu, Andhra Pradesh and now in Karnataka and Rajasthan - all aimed at ‘restoring tanks to their design potential for performance’ generally by desilting beds, lining of canals, and fixing of tank bunds and sluices. None of these should be required if tank users had been following a normal policy of preventive maintenance. That such programmes continue to be supported suggests the widespread belief that tanks can do a lot more to create rural wealth and welfare than they are doing now. That these programmes are not succeeding is evident in the fact that a few years down the line, rehabilitated tanks are ready for another round of expensive rehabilitation.

This suggests either of two things. First, tanks are destined to operate at a low level equilibrium and doing fancy things with them would be throwing good money after bad. Alternatively, if tanks are to create more wealth and welfare, there is need for a total rethink about how to get users involved in their management. This rather expensive, if trite, lesson has yielded a new battle cry amongst tank rehabilitators: first, form associations of flow irrigators in the command, then do brick and mortar, preferably with user participation and tanks will be OK.

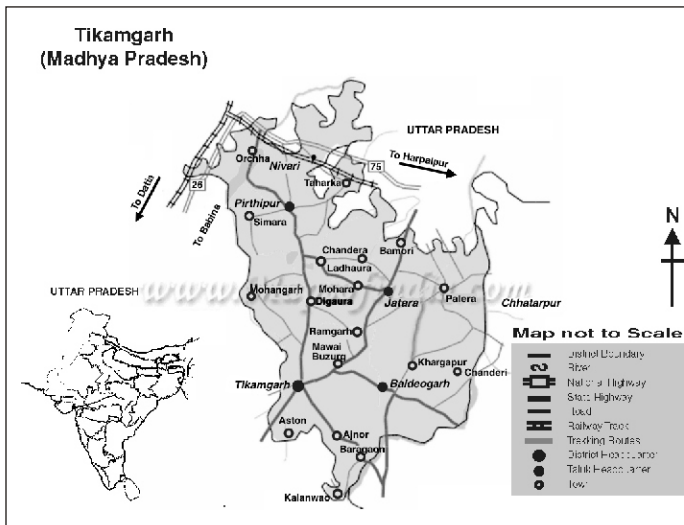
<sup>1</sup>The research covered by this IWMI-Tata *Comment* was carried out by Messrs Manas Satpathy, Arvind Malik, Ujjal Ganguly and Ved Arya of SRIJAN, New Delhi with the help of financial support from Sir Ratan Tata Trust, Mumbai to the IWMI-Tata Water Policy Research Program. The research paper can be downloaded from the IWMI-Tata Website <http://www.iwmi.org/iwmi-tata>.

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<sup>2</sup>However, the Gujarat High Court recently decided that the 200 odd heavily encroached upon tanks surrounding the city of Ahmedabad are essential to alleviating the cone of depression that has been forming underneath this city in recent decades owing to relentless pumping of groundwater. Acting on a PIL, the High Court directed the municipal corporation to submit plans for time-bound action to remove the encroachments and desilt the tanks. People and authorities in Chennai too have discovered anew the socio-ecological value of urban tanks.

<sup>3</sup>Mosse, David. 1997. “Ideology and Politics of ‘Community Management in Tank Irrigation in South India: Village Institutions, Resources and Power’”, Swansea, UK: University of Wales; also see, Mosse, David. 1998. “Making and Misconceiving a Community in South Indian Tank Irrigation”, paper presented at the Conference of the International Association for the Study of Common Property, Vancouver, Canada, June 10-14, 1998.

**Figure 1: Location map of Tikamgarh**



there are conflicting interests; those away from the bund gun for raising bund height; but those near the bund oppose it because it would mean their losing an entire cropping season.

**What kind of improved management a motley association of stakeholders with such directly conflicting interests might provide?**

What kind of improved management a motley association of stakeholders with such directly conflicting interests might provide? Clearly, the agenda it will most likely follow would be the least common denominator of the conflicting priorities of the stakeholders. The sad reality of tanks today is perhaps the rational outcome of this dialectic of opposing stakeholder priorities; hence, the low-level performance equilibrium in which we find tanks stuck may not be easy to improve upon.

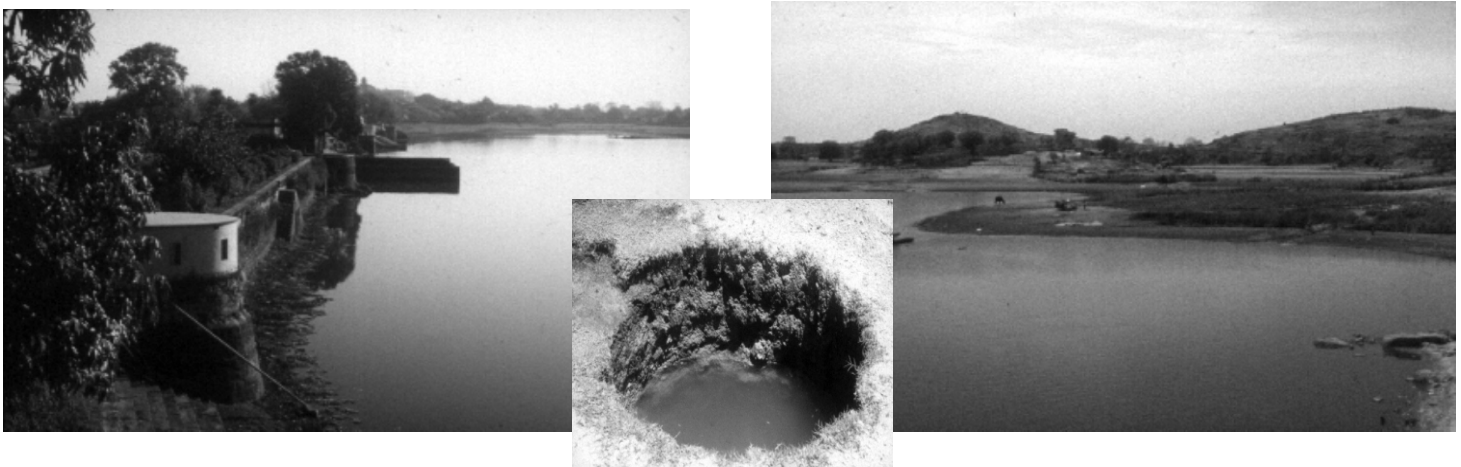
### TANK DYNAMICS

A new study supported by the IWMI-Tata Water Policy Program<sup>4</sup>, has investigated stakeholder conflicts in greater detail in the context of Chandeli tanks in the Bundelkhand region in central India (see figure 1). The handiwork of the Chandelas who ruled these parts some thousand years ago, a Chandeli tank typically has a huge bund strengthened by pitching large well-cut stones on the side of water storage (Figure 2). Originally built for recreation and domestic use, the British turned them into flow irrigation tanks in view of their huge storage. Chandelas were prolific tank-builders; Tikamgarh alone has 995 tanks, of which 146 large ones can potentially serve 29000 ha. Moreover, a good proportion of Tikamgarh's 43000 wells enjoy recharge from the tanks and canals. All in all, in this poor, mostly agrarian district, tanks matter; and managed well, they can matter even more.

### CONFLICTING STAKES

New IWMI research on tanks in Rajasthan suggests that this is easier said than done<sup>4</sup>. Conventional wisdom has it that a water user association - or any association, for that matter - would work well if its members shared a common interest; but the study found no such commonality of interests amongst key stakeholder groups of tanks. Farmers in the command area want water to be stored in the tank for irrigation through the entire kharif season. But farmers cultivating the tank bed (called *petta*, in local parlance) want the tank emptied as soon as possible so they can get on with the business of farming. And the fisher-folk want at least a meter-depth of water in the tank for as long during the year as possible so they can complete their fishing cycle. Surface irrigators prefer lining of canals; but well owners don't, lest it should impede recharge to their wells. Everyone favours desiltation of the tank bed but *petta* farmers oppose it bitterly. Even amongst *petta* cultivators,

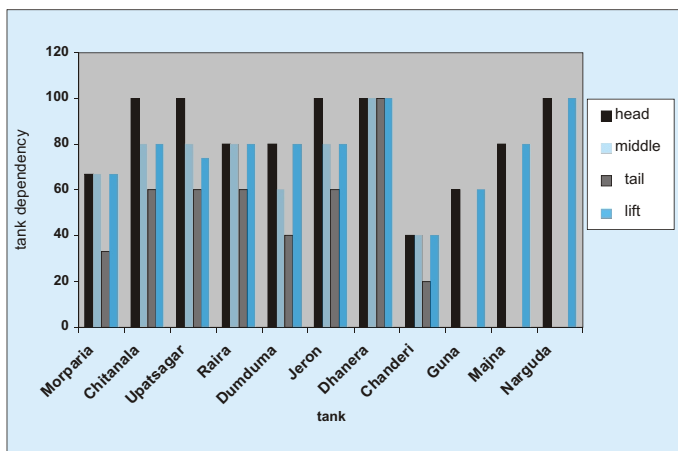
**Figure 2: If Managed Better, Chandeli Tanks can Still Matter**



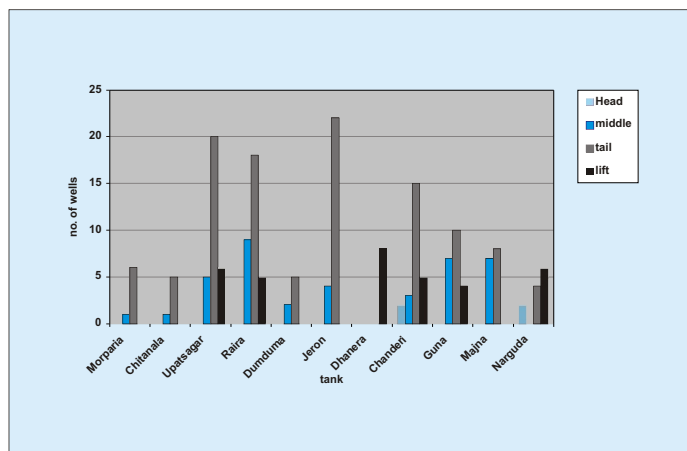
<sup>4</sup> Shah, Tushaar and K V Raju. 2002. Socio-ecology of Rajasthan's Tanks', *Water Policy*, Volume 3, Issue 6, 2002, Page 521. See also, IWMI-Tata Water Policy Briefing # 4.



**Figure 3: Tank-dependency in Head, Middle and Tail reach**



**Figure 4: Well Irrigation Expands from Head to Tail**



Unlike Mosse, the study has found that Chandeli tanks were in fact in a better shape 50 years ago than today. During the 1950's, these were apparently tightly managed to achieve design potential for performance by the Irrigation Department of the Government of Madhya Pradesh (GoMP) which even built some new ones. The head-tail inequity problem and the free-rider problems were addressed at once through a tail-end first system of water supply, known as *Payment-Parcha-Pani* system enforced on the ground by the government Chawkidaar. But things changed for the worse during the 1970's. The P-P-P system eroded after the government, strapped for cash, stopped paying the *Chawkidaars*. Decline in maintenance, silting of tank bed, unrestrained expansion of the command area, emergence of well irrigation and direct lifting of water from the tanks by aggressive farmers, unauthorized breaches made by farmers in the bund – all of these led to the decline. Result? Water scarcity, poor service quality, conflicts amongst users, unequal access, and in sum, lower 'gross tank product' than possible from Chandeli tanks.

In the 11 tanks they studied closely, the SRIJAN team found everyone complaining, some more bitterly than others. Tail-enders were on the bitter side naturally because 'tank dependency' – defined as the proportion of irrigation requirement served by the tank – declined sharply as farms got further away from the tank (Figure 3). Tail-enders have to make up by digging expensive wells and burning expensive diesel to pump water (Figure 4). The head-tail problem is not utterly unsolvable, however; the leader of one WUA intuitively arrived at the essence of a formula fancily called 'structured system concept': he would have all the canals lined to maximize their carrying capacity; that done, he wants water to be released to the entire command at full capacity for a fixed period of seven days when his fill.

everyone can have his fill. This would ensure some for all, rather than all for some and nothing for the rest.

When the Chandelas built irrigation tanks centuries ago, they did not factor in the diesel pumps and cheap electricity. Armed with these are the lift-irrigators who can pump from the tank or canals at will, and thus usurp a higher priority than even the head-reach farmers – who, at least, have to wait for the sluice gate to open. Lift irrigators reduce the notion of orderly flow irrigation to a farce. When they lift directly from tanks, their interest is to ensure highest water level so that the head is minimum; in Upatnagar, one of the tanks SRIJAN studied, they blocked the sluice gate with boulders to keep the water close to the FSL level to minimize their pumping costs. Fisher-folk are also in perpetual conflict particularly with lift irrigators. This conflict has intensified as tank-fishery has attracted powerful and influential people from far away cities like Gwalior and Lalitpur. According to the lease agreement, the dead storage belongs to fishery; however, the dead storage has come under increasing threat from aggressive lift irrigators. In small tanks, policing can be effective if someone with authority and incentive decides to check lift irrigators. But in bigger tanks – with perimeters of 3-6 km – it is well nigh impossible to check the 'hit-and-run' type lift operators. The collector of Tikamgarh even tried banning them in 2002 but to no avail.

Likewise with *petta* (or tank-bed) farmers who want the tank emptied in time for their sowing. In Chandeli, they simply broke the sluice. The government of Madhya Pradesh (GoMP) policy is to lease tank beds to the poor; but often, tank-beds are controlled by the local bigwig and the powerful. The water user associations (WUAs) – which generally have command area farmers as members – would like to regulate *petta* farmers' behaviour; but this is an uphill task.

<sup>5</sup> Satpathy, Manas, Arvind Malik, Ujjal Ganguly and Ved Arya. 2002. "Who Should Manage the Tanks? Findings from a Study of Tanks in Tikamgarh, Madhya Pradesh", Anand: IWMI-Tata Water Policy Program.

<sup>6</sup> See. Albinson, B and C.J Perry. 2002. "Fundamentals of Smallholder Irrigation: The Structured Systems Concept", Colombo, Sri Lanka: International Water Management Institute, Research Report No. 58.

According to a strictly legal-bureaucratic-historical perspective that sways the mindset of government engineers, irrigators in the command area are the primary, legal stakeholders in a tank; all the rest are illegal. But if, in today's changed context, a legitimate aim of improved tank management is to maximize gross tank product per cubic meter of tank water, this view may need to be reconsidered. *Petta* farmers are troublesome, but they create wealth from waste; tank-beds are probably idle for a good part of the year and, without them, would contribute nothing to gross tank product (GTP). Lift irrigators are illegal but they are likely to use water more efficiently and contribute more GTP per cubic meter than flow irrigators; likewise for well-irrigators. In fact, some NGOs working with tank communities in Andhra Pradesh's Rayalaseema region have promoted the notion that GTP/tank gets maximized when irrigation takes place only through lifting water either from the tank or the well and under complete cessation of flow irrigation.<sup>7</sup>

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## GOVERNMENT MANAGEMENT

If tanks are to contribute more to wealth and welfare, three tasks need to be performed better: water allocation and distribution; water fee collection; and infrastructure maintenance and repair. At present, none of these is performed fully, leave alone well. Under a thin veneer of order, allocation and distribution of water follows the laws of *matya-nyaya* (big fish eating small fish). Barely a quarter of water fee assessed is paid; and the assessment largely excludes lift and well irrigators. There was a time when the GoMP kept coughing up funds for the upkeep of tank infrastructure regardless of water fee collection but, with state coffers depleting, the upkeep of Chandeli tanks' infrastructure is taking a downward spin.

In the past, the GoMP tried several strategies to deal with this deepening vicious cycle. Following the UP model considered successful, it asked the revenue department to collect water tax while the irrigation department was confined to making a demand list. But this idea did not work, and was given up. In 1982, *Sinchai Panchayats* (Irrigation Councils) were formed; these did not work either, and soon disappeared without trace. In 1998, water fees were raised three fold at one go, and, in 1999, the administration turned the steam on lower level bureaucracy to improve collection. Salaries were stopped for some engineers and the collector even threatened retrenchment. Collection improved for the time being; but this will slide back once the pressure eases off, as it eventually must.

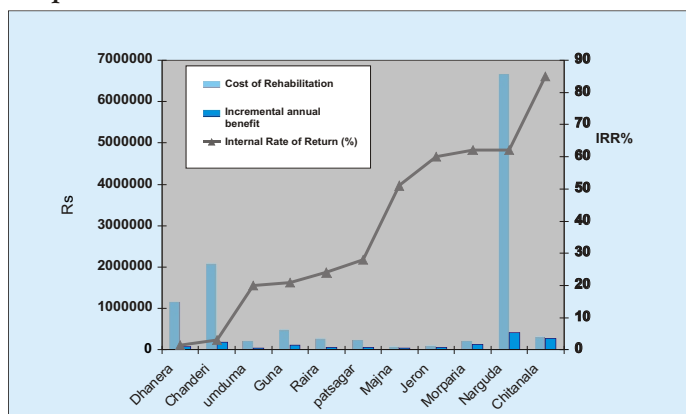
Under the new movement of participatory irrigation management styled after the Andhra Pradesh experiment, WUAs are formed around a cluster of 5-6 large and small tanks. Their command areas are divided into territorial constituencies, each of which has an elected representative of flow irrigators; but the president is elected directly by all user-members. WUAs are supposed to do a better job of performing the three essential tasks: water distribution, fee collection, and system maintenance. In reality, however, nothing has changed; most users do not even know they are WUA members. The government plans to channel funds through WUAs for repair and maintenance; but the funds on offer are far too little compared to the need. In any case, institutional reform for improved management entails much more than registering dummy WUAs as receptacles for government largesse.

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## SRIJAN'S ALTERNATIVES

If such is the GoMP's strategy of participatory irrigation management, its fate looks already sealed. The WUAs that include only flow irrigators and exclude all other stakeholder groups must go the way the *Sinchai Panchayats* took in the early 1980s. Bringing all stakeholder groups within WUAs may not help either; it may merely formalize the informal dialectics that led tanks to their low-level performance equilibrium in the first place. Yet, SRIJAN's calculations show that, under better management, fresh investments in improving tank infrastructure might actually be a bankable proposition, offering internal rates of return on investments ranging from 20 to 85 percent, barring a few isolated cases (see Figure 5).

**Figure 5: Tank Improvement may Well be a Bankable Proposition**



<sup>7</sup> Shah, Tushaar, R Seenivasan, C R Shanmugam and M P Vasimalai. 1999. "Sustaining Tamil Nadu's Tanks: Field notes on PRADAN's Work in Madurai and Ramnad", Anand: The Policy School, Working Paper 4.

So, what might work? SRIJAN's research offers three alternatives besides of course the present one, considered hopeless, in which lifeless WUAs manage tanks with departmental assistance: first, a better, real, empowered WUA manages the tank with support from independent irrigation management professionals whose costs are factored into the tank economics; second, a local commercial enterprise runs the tank as a business; third, such local enterprises form a holding company which can bring professionalism, competencies, improved technologies.

These are interesting and bold proposals, and may even work although tanks would have to generate a lot more wealth to support the professionals. But SRIJAN's alternatives imply that the central tank management problem is inadequacy of resource management talent; whereas their analysis suggests that it is the absence of authority - or clearly specified management rights - vested in a managing agent and the presence of perverse incentives that drive stakeholder groups to keep tanks entrenched in low-level performance equilibrium.

## COMMENT

There is nothing unusual about stakeholder conflicts; most economic enterprises involve multiple stakeholders with conflicting interests. What is unusual about Chandeli tanks - or tanks everywhere in India - is that all these can pursue their conflicting interests with abandon, subjecting tanks to open access management regime. Ideally, this should be replaced by a common property management regime; however, this is easier said than done.

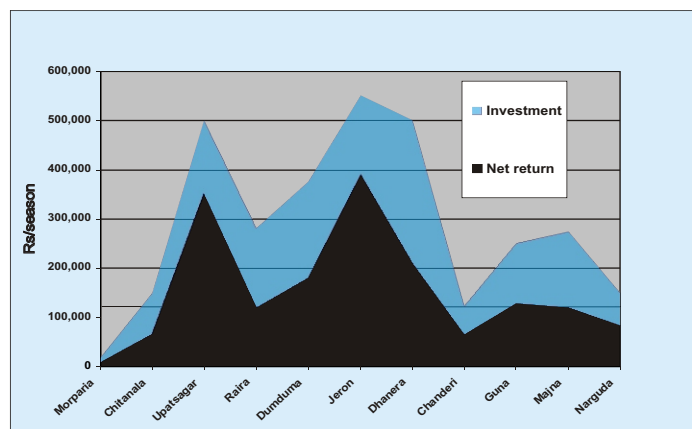
Who is likely to manage Chandeli tanks in ways that will maximize the gross tank product? Clearly, the stakeholder group with the 'right' incentive and requisite authority (or, the right to manage and become a residual claimant). The newly formed WUAs - and the long-defunct *Sinchai Panchayats* - could have the authority, and flow irrigators, their members, would as a class stand to gain substantially with better management, but it appears unlikely that they will structure incentives to offer tight management. Lift irrigators and well-owners are also unlikely candidates; their

interest in improved management is subdued since they are in the enviable position of keeping their cake and eating it too, therefore they have little or no interest in improving the state of the tank affairs.

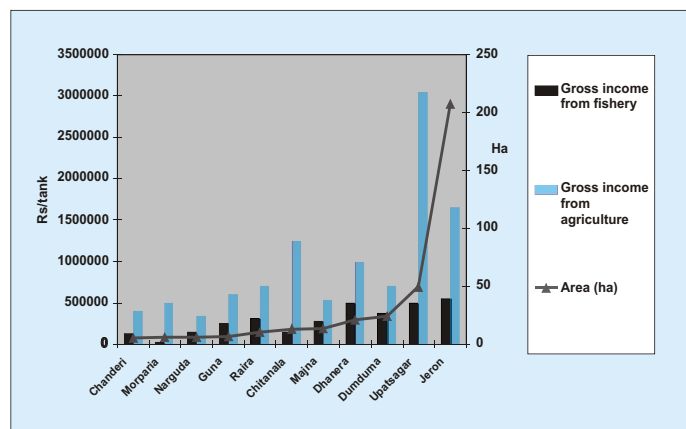
SRIJAN analysis seems to suggest that, of all the stakeholders, fishing contractors may well have the most appropriately structured incentives for improving tank management; but their lease contracts confer on them only attenuated rights to manage tanks. Conferred with fuller tank management rights, fisher managers might fill the bill best and manage them for maximum GTP. Returns to fishery in Chandela tanks are attractive (Figure 6); tank fishery turns out highest GTP/m<sup>3</sup> of *consumptive* water use; if they can sell irrigation, they would have incentive in desilting tank bed, fixing tank bund, and even in maintaining the distribution infrastructure (Table 1). Fishing seems to be nearly as big a business as irrigation (Figure 7); by way of lease amount, fisher-folk pay as much as—or even more - than irrigators for using tanks as an economic asset.

Above all, fishing contractors are the only group that has assiduously sought management rights. No irrigator has chosen to take over the management of a tank using a *Sinchai Panchayat* or a WUA as a front, like scores of fishing contractors have done. The fishing contractors also seem the only group which has tried to defend their management rights. This was evident in the silted-up Baldeogarh tank, where, in 1997, a powerful fishing contractor promptly enforced a ban on lift irrigation from dead storage and stopped all waste of water in flow irrigation. This was not an isolated case; SRIJAN found: "Everywhere the [fishing] contractors involved stop[p]ed irrigators from lifting water from the tank once the last 5 feet of water was left. They invested in fish production; and now were making sure they get their money's worth." Empowered to sell water for irrigation, chances are that fishing contractors will improve irrigation service and charge a higher price for it compared to the 'tax' irrigators are now paying to GoMP for an indifferent service. They would likely bring lift irrigators and well irrigators to book; they would invest in improved water distribution, and bring free-riders under control. At present,

**Figure 6: Investment and Net Return in Tank Fishery**



**Figure 7: Water Spread Area, Fishery Output and from Output Created by Tanks**



**Table 1: Incentives of Different Stakeholder Groups as Managing Agents of Chandeli Tanks**

	Fishing Contractor with Water Sale Rights	Flow Irrigators	Lift Irrigators	Tank-bed Farmers	Well Owners
Maximize GTP/m <sup>3</sup> of consumptive water use	+++	+	++	+	++
Maintain dead storage	+++	--	+	---	++
Invest in tank bed desilting and bund repair	+++	++	++	---	+
Improve conveyance and distribution system	++	+++	--	-	---
Recover consumption-based water fee for surface water	+++	---	---	--	+
Financial incentives in sustaining tanks	+++	++	+	+	+

Note : + indicates positive incentive; - indicates negative incentive. Number of + and - indicates the strength of positive or negative incentive.

without rights to sell irrigation, fishing contractors maximize only their fishing interests; armed with such rights, they will strike the best trade-off between preserving enough water to maintain fishery and selling irrigation to raise crops. This would help maximize GTP/m<sup>3</sup>.

In principle, fishermen's cooperatives should deliver as well as do contractors. However, SRIJAN's analysis suggests that the reality may be different. Tikamgarh is a highly stratified, caste-ridden society with *dhimers*, traditional fishermen, at the bottom rung of the social hierarchy. It may be long before a *dhimer* cooperative may muster courage to take on high caste irrigators. Moreover, labour cooperatives are not known for concentrating incentives on proactive members that lead it to success; else, we would have seen more labour-managed businesses in this age of privatization.

In sum, improvising and building upon some aspects of the existing arrangement of fishery contracts may well offer the easiest and the quickest way of substantially raising the GTP per Chandeli tank. All it might entail is a reform of the existing fishery lease contract by: (a) formalizing the existing informal arrangement of leasing tanks – small as well as large – to fishing contractors (which may include cooperatives); (b) replacing the present fishing contracts by comprehensive tank management contracts – that include rights for fishing as well as selling water for irrigation; (c) making such contracts secure for at least five, but preferably 10 years so that contractors have incentive to invest; (d) awarding such contracts to the highest bidder through an open, transparent auction and (e) stipulating specific contractor obligations for repair and upkeep of the tank infrastructure.

If such a reform were to be tried out on an experimental scale, a valid and critical role to be played would be of managing, overseeing, regulating, and monitoring the

variegated impacts of this institutional transition. This could be played by the GoMP, but would be played much better by a professional NGO acting on behalf of the GoMP to ensure that overall objectives of reform are achieved.

**Figure 8: Fishing is Nearly as Big a Business as Irrigation**





## IWMI-Tata Water Policy Program

The IWMI-Tata Water Policy Program was launched in 2000 with the support of Sir Ratan Tata Trust, Mumbai. The program presents new perspectives and practical solutions derived from the wealth of research done in India on water resource management. Its objective is to help policy makers at the central, state and local levels address their water challenges – in areas such as sustainable groundwater management, water scarcity, and rural poverty – by translating research findings into practical policy recommendations.

Through this program, IWMI collaborates with a range of partners across India to identify, analyse and document relevant water-management approaches and current practices. These practices are assessed and synthesised for maximum policy impact in the series on Water Policy Research Highlights and IWMI-Tata Comments.

The policy program's website promotes the exchange of knowledge on water-resources management, within the research community and between researchers and policy makers in India.

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