STRIVER POLICY BRIEF

Strategy and methodology for improved IWRM
- An integrated interdisciplinary assessment in four twinning river basins

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IWRM and Traditional systems: Tanks in the Tungabhadra basin

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The STRIVER Policy Brief series translate the results from the EC FP6-funded STRIVER project into practical and useful information for policy makers and water managers

IWRM and Traditional systems: Tanks in the Tungabhadra system

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Abstract

Tanks are increasingly being recognized to play an important role in the water sector. However, tanks are often treated in isolation from other sources, and are seen mainly as irrigation sources and efforts at their rehabilitation do not adequately prioritize institutional and biophysical measures. The study of tanks carried out in the upper part of the Tungabhadra catchment showed that tanks are complex, multifunctional entities that provided livelihood support in a number of ways to the villagers. Their rehabilitation needs to be informed by an IWRM perspective that takes care of their multifunctionality as well as their relationship with larger sources.

Mainstay of livelihood assurance in the pre-British period

Every region in the world has evolved water systems well adapted to its social, geographical, geo-morphological and climatic particularities. While the perennial streams of North India have often led to systems based on diverted flows like the *kuhls*, in South India traditional water systems have been based mainly on tanks, and often an interconnected cascade of tanks in the lower parts of catchments. Over centuries, a sophisticated system of irrigation had evolved around them that incorporated regulated access and allocations between and within tanks and also provided for their upkeep and improvement. Though they were not free from the social inequalities that existed in the larger system, they nevertheless provided some minimum water assurance for those traditionally entitled to farming land.

With the advent of the British rule and subsequent developments centred on modern and large irrigation systems, tanks were slowly neglected. However, even in the immediate post-independence period tanks still retained their eminence as providers of water for various livelihood purposes. Thus, tanks accounted for 1,151,082 ha in 1960-61 (39.5% of net irrigated area) in Andhra Pradesh and 335,468 ha in 1957-58 (44.18% of net irrigated area) in Karnataka. For the districts comprising the Tungabhadra basin, the corresponding figures were, 108,829 ha (39.49% of net irrigated area) in the Andhra districts and 157,156 ha (53.36% of net irrigated area) in the Karnataka districts, showing that tanks provided irrigation for a significant area

The decline of tanks

As noted by several studies, tank systems declined in status continuously in the post-independence period.. By 2004-05 net area irrigated by tanks had fallen to 477,100 ha in 2004-05 in Andhra Pradesh (12.29% of net irrigated area) and 147,068 ha in 2003-04 in Karnataka (6.17% of net irrigated area). For the districts comprising the Tungabhadra basin, the corresponding figures were, 12,176

ha comprising a mere 2.88% of net irrigated area in the Andhra districts and 68,882 ha comprising only 9,82% of net irrigated area in the Karnataka districts. The decline in tank irrigated area is not just relative, but there is a massive reduction in absolute terms as well (to as much as 11.19% of its initial value in the Andhra districts and 43. 83% in the Karnataka districts in the Tungabhadra basin).

These figures also show that the advent of canal irrigation results in the neglect of tanks and the net result tends to be a *replacement* of tank irrigation by canal irrigation rather than an *addition* of canal irrigated area to tank irrigated area. This is strikingly evident in the Tungabhadra basin; in the Andhra districts of the basin now largely served by canal irrigation tank irrigation has been reduced to as little as 2% of net irrigated area.

Many studies have been carried out in respect of the decline of tanks. Their decline can be traced to a chain of events started by the takeover of community and *zamindari* tanks (private tanks) by the state. This led to an institutional breakdown and erosion of traditional arrangements in most tanks, irregular and poor collection of water charges, lack of maintenance and increasing encroachments on tank beds and feeder channels. The decline also led to decrease in recharge of groundwater and increase in flash floods and overspills and reduced capacities.

Tanks were also made redundant because of environmental degradation in upstream catchments such as deforestation, overgrazing, soil erosion and siltation. In addition, changes in land use pattern particularly in the catchment zones of reservoirs, aggravated soil erosion and subsequent siltation in tank beds. With the extension of rural agricultural community beyond the traditional sections, neo-farmers are yet to acquire proper agriculture and water management skills.

Tanks can play a vital role in equitable and sustainable IWRM

However, it has also been pointed out that tanks have enormous potential. For example, a study made by Raju (2003) estimates the potential of tank irrigation in Karnataka to be 690,000 ha comparable to the 743,383 ha irrigated by large canal systems in Karnataka in 2003-04. Similarly, it has also been pointed out that tank irrigation per hectare is less expensive compared to canal irrigation. For example, according to the data from the Ministry of Water Resources, Government of India, the cost of creating irrigation potential for one hectare during the Eighth Plan through large and medium irrigation projects was Rs 98,495 as against just Rs 10,051 for small irrigation projects (Guruswamy 2004). Tanks can play a vital role in livelihood assurance and poverty alleviation if they are rehabilitated and integrated into the larger system with an IWRM perspective and adequate attention is paid to their advantages and limitations.

Government of Karnataka has taken up restoration of minor irrigation tanks (with area of < 4 Ha and not > 2000 Ha) through establishing a separate institution – Jala Samvardhana Yojana Sangha – with a community-based approach. Its main objective is to improve rural livelihoods, reduce poverty through management of minor tanks through an integrated approach. The three districts of Chikkamagalur, Davangere and Shimoga in the upper portion of Tungabhadra basin are well covered under this program.

Multi-purpose community resources

Tanks: Space for women to wash clothes and water source for cattle, Heere Mygalkere tank, Davanagere district. (Photo: K. J. Joy.)

It is important to move away from the conventional WUA approach that sees water mainly as an irrigation resource. When we take into account the various uses that tanks have from an IWRM perspective: a) direct uses - irrigation, drinking water, water for domestic use and sanitation, water for bathing, drinking water for cattle, water for washing and bathing cattle, washing clothes, fishing, recreation, worship, silt and seasonal tank bed cultivation and b) indirect uses – basically ecosystem services that regenerate the environment recharge and replenish ecosystem resources and potentials, we need to broaden the concept of water use and water users and look at tanks as multi-purpose community resource.

The recent study of tanks in the Upper catchment of the Tungabhadra basin corroborates this aspect (see box). In fact, this is true of all reservoirs at all scales, even though the weight given to irrigation increases with scale. The first step thus is to have an integrated view of tanks as multi-purpose resource.

More dispersed and more equitable sources

Studies also show that unlike large centralised command systems organised almost exclusively around irrigation, tanks serve dispersed areas at various scales, their management systems are likely to be more in the reach of the local poor and they are likely to provide more equitable access to the service they provide. For example, almost 80% of the tanks serve areas less than 20 ha, so that their commands are more likely to be dispersed and reach the poor.

A census survey of all families from five villages in the Upper catchment of the Tungabhadra served by four tanks showed the following tank uses:

Type of use	No. of HH	Per cent HH
Drinking water (directly from tank)	23	1.37 %
Washing clothes	1,264	76.35 %
Bathing	146	8.82 %
Drinking water for cattle	673	40.68 %
Washing cattle	673	40.68 %
Fishing	22	1.33 %
Swimming	229	13.86 %
Worship	236	14.26 %
Tank bed cultivation	18	1.11 %
Silt for farm land	56	3.36 %

Total no. of HH = 1655 from five villages; Indirect tanks use for drinking water through drinking water schemes existed in all the villages

Moreover, IWRM does not only require basin level IWRM institutions but also requires nested institutions at various scales. At the bottom most level the tanks serve as appropriate units of organisation and IWRM because they combine local hydrological and associated ecosystem uses and users and bring together the many uses of water in a local ecosystem.

Tanks, therefore, have great potential of taking us towards IWRM and widely dispersed livelihood assurance provided we have a suitable policy aimed at realising this potential. To this end the following suggestions emerge from the study.

Need to go beyond PIM

In Karnataka, all tanks with commands of less than 4 ha are owned by the *Gram Panchayat*, between 4 to 20 ha by the *Zilla Panchayat*, between 20 and 200 by the Minor Irrigation Department and above 200 ha by the Major Irrigation Department. In Andhra Pradesh, tanks with greater than 400 ha are completely with the Department, Panchayat raj institutions maintain tanks below 40 ha in Telangana and below 80 in the rest of Andhra Pradesh with joint charge for those in between. Things have changed after the advent of participative irrigation management (PIM). Andhra has gone much farther than Karnataka in respect of PIM experience and legislation.

Discussion with Irrigation Department officer at the sluice gate. Savlanga tank, Davangere district. (Photo: K. J. Joy.)

However, our study indicates that there is a need to go beyond the prevalent PIM concepts in respect of tanks, if not for all larger sources as well. At present Water User Associations (WUAs) formed under PIM practice and law are restricted to irrigation users and within that, only to those who own land in designated commands. A major institutional implication of our study is the need to move from participative irrigation management to IWRM approaches in the governance institution for tanks. This implies that users and membership of WUAs must not be restricted to landowners in designated commands but must embrace the entire community that inhabits and utilizes the immediate ecosystem that the tank comprises. Also, governance institutions should be based on a representation from the irrigation users as well as the community that effectively uses the tank which may be a habitat, ward, village, or groups of villages according to the size and situation of the tank. It is also important to maintain a link with the relevant PRIs.

Policy guidelines

The following policy guidelines may be suggested in this respect:

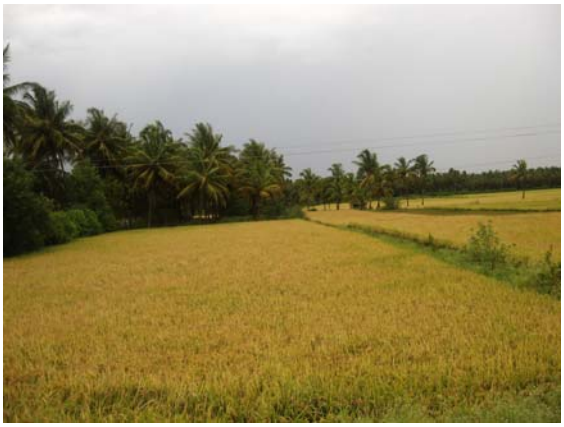
a) All tanks with a net irrigated area up to 200 ha should be governed by the tank related IWRM institutions (because this is the order of size of the traditional tanks),
b) Service area and/or a users list should be worked out for each tank on the basis of its multi-functionality,
c) Adequate representation should be provided to non-irrigation users of tanks, especially those who may not own land in the designated commands (this would ensure a representation from all groups within the villages served by the tank),
d) Adequate representation should be provided for PRIs (because PRIs largely do and should deal with the other water use related programmes, see below),
e) Governance and management of tanks is integrated with other water uses (drinking water, sanitation, fairs, water for cattle) and managed in an integrated manner, and

f) Rehabilitation should go beyond desiltation and must ideally precede the transfer to participative institutions. This aspect is crucial in the social sustainability of tank rehabilitation, especially in respect of groups that were excluded from tank benefits in traditional systems.

Prioritising rehabilitation

In our study, farmers reported four main reasons for poor performance of tanks: a) Lack of repair and maintenance of tanks, b) Excess water drawn by farmers at head reach, c) Encroachments on tank area that reduced storage and d) Crop pattern in which too many people grow water intensive crops.

In rehabilitation measures, the first priority should be to clear encroachments, first, on to the feeder channels and supply channels as well as overflow weirs if present, and secondly, on to the tank bed. Next should be cleaning of gates and channels, repair of walls and embankments, provisions for facilities and sites for washing clothes, collecting drinking water, separate sections for animals for drinking and washing, and proper drainage from these sites. Prevention of desiltation through filters and catchment treatment comes next, and desiltation comes at the end. It is important to build source protection into tank rehabilitation. It is also important to tackle equity issues, head-tail reach issues, issues of political will to remove encroachments as well as issues of regulation or co-ordination of crop pattern.



Poyential of tanks: Well served paddy fields under tanks in Shimoga district, upper part of Tungabhadra basin. (Photo: K. J. Joy.)

Tanks should receive stabilising supplements

Many studies show that rainfed tanks show good performance for years with better rainfall, but may not perform very well in bad years. Also, studies (Vaidyanathan, 2001) show that the performance of system tanks in Tamil Nadu (tanks which receive regulated supplements from larger systems) is better than other tanks.

STRIVER study of tanks in the Tungabhadra basin also shows that farmers in villages served by rainfed tanks reported between 3 and 5 years out of every 10 years as shortage years, those from villages served by balance reservoirs (tanks that serve as buffer storages for extending canal reach, though not operated as system tanks) reported less than 3 years of shortage. In short, it may be assumed that tanks that receive supplements from larger systems tend to be more reliable and perform better.

This is a larger issue of IWRM in respect of the relations between tanks and between tanks and the larger systems. However, there is enough evidence that there is a need to provide tanks with supplements from larger systems. These supplements play a number of roles. Firstly, since water from larger systems has a greater dependability of supply, such

supplements can go a long way towards stabilising tank supplies for various uses. Secondly, since tank commands are more dispersed, these supplements provide greater dispersal of water access and use for the larger systems and mitigates the `island' effect they are often criticised for. Thirdly, if availability of such supplements is made dependent on augmentation and protection of local resource and good performance, it can become an incentive and instrument for ecosystem improvement and sustainable productivity enhancement. Such integration of tanks into larger systems will go a long way towards dispersal of water access and poverty alleviation.

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This STRIVER Policy Brief is based on the following research reports and scientific literature:

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About STRIVER
STRIVER- Strategy and methodology for improved IWRM - An integrated interdisciplinary assessment in four twinning river basins is a three year EC funded project 2006-2009 under the 6th framework programme (FP6) coordinated jointly by Bioforsk and NIVA. The point of departure for STRIVER is the lack of clear methodologies and problems in operationalisation of Integrated Water Resource Management (IWRM) as pointed out by both the scientific and management communities.13 partners from 9 countries participate as contractual partners in addition to an external advisory board.

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Front-cover photo: The water spread of Savlanga tank, Davangere district. (Photo: K. J. Joy).

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