SANDEE
South Asian Network for Development and Environmental Economics

POLICY Brief

Number 2-04, June 2004

Tank Degradation and Poverty Reduction – The Importance of Common Property Resources in Sustaining the Rural Poor

Tanks are one of the oldest sources of irrigation in India and the mainstay for the livelihood of many poor households. However, there has been a rapid decline in the maintenance and upkeep of tanks over time. Government incentives of cheap loans and electricity have augmented other sources of irrigation, but what about the poor who do not have access to such options and are crippled by ambiguities related to ownership of common resources? A recent SANDEE study looks at the degradation of irrigation tanks in Tamil Nadu and assesses how the poor fare.

The study reveals the importance of tank irrigation in the lives of poor households and suggests that the poor may bear the bulk of the burden from tank deterioration. Tank-based agricultural income makes up close to one-third of total household income for poor households. Poor households, much more so than the non-poor, use tanks for other livelihood reasons such as fuelwood and fodder collection, and water for livestock. Further, the poor expend double the amount of labor towards tank maintenance relative to the non-poor and have less access to alternate livelihood opportunities and sources of irrigation. All of these factors suggest that maintenance of tanks could make an important contribution to poverty reduction in the rural South.

R. Balasubramanian and K.N. Selvaraj study the degradation of tanks in Tamil Nadu and in the district of Ramanathapuram, in particular. They examine the interconnections among poverty, private coping mechanisms and collective action for tank management based on field data from 30 tank systems.

Tank irrigation as a socio-economic activity in India dates back to the 5th century. Tanks account for approximately one-third of the area irrigated in the Southern states of Tamil Nadu, Karnataka and Andhra Pradesh. However, recent decades have seen the contribution of tanks to irrigation decline from about 40 percent in Tamil Nadu in 1955 to less than 25 percent in 2000. Further, most tanks are in disrepair due to poor maintenance, population pressure, break-down of traditional management institutions, and development of alternate sources of irrigation.

Tanks have many positive attributes. First, they are relatively less capital intensive to build and maintain. More importantly, they provide several ecological benefits - from recharging ground water and moderating floods, to serving as habitat for wildlife. For a resource which provides many livelihood options (farming, fishing, forestry, etc), irrigation tanks have met a sorry fate in the state of Tamil Nadu.

This policy brief is based on the SANDEE Working paper, No 2-03 titled 'Poverty, Private Property and Common Pool Resource Management: The Case of Irrigation Tanks in South India', by R. Balasubramanian and K.N. Selvaraj. The full report is available at www.sandeeonline.org

STUDY AREA

The study focuses on Ramanathapuram within Tamil Nadu because of the predominance of tank irrigation in this district. Two blocks within the district are studied at the micro level:

- Paramakudi is the poorer region and is dominated by agriculture.
- Rajapalayam is comparatively industrialized, has non-farm employment opportunities and a greater number of private wells.

Decadal trends for the district reveal that the share of tanks in the total area irrigated by all sources has declined from about 88 percent during the 1960s to 75 percent during the 1990s. What is interesting is that the presence of saline aquifers and a loose soil structure in the district constrains the expansion of private wells. Moreover, there is no land under canal irrigation. For a district in need of steady irrigation, if tank degradation is not stemmed, this could very well spell trouble for rural communities.

Balasubramanian and Selvaraj assess factors that influence tank degradation and collective action by studying 15 tank systems in each of the two blocks in Ramanathapuram. Their analyses are based on data collected at the tank or community level as well as household level. Household data were gathered from 10 farm households and five non-farm households associated with each tank. They use this data to estimate the determinants of collective action to maintain tanks, to assess the contribution of collective efforts to maintain tanks on rice production, and to assess the dependence of the poor on tank irrigation.

Several problems have beset irrigation tanks in recent decades - from inadequate operation and maintenance investments and disintegration of traditional irrigation institutions responsible for managing tanks, to private encroachments in tank command areas. Tank degradation is rooted in factors such as weakly-defined ownership rights for tank command areas and greater access to alternate labor opportunities such as migration to cities. Government subsidies for private irrigation in the form of cheap loans and electricity have made investments in private wells more attractive relative to time and resources spent on 'common resource' management. Tanks are solely dependent on catchment run-off during the monsoons for water. Thus, inadequate and uncertain tank water supply has also contributed to dis-investment in tanks.

TANK DEGRADATION OVER THE YEARS

Balasubramanian and Selvaraj develop a statistical model to identify the determinants of tank degradation at the state and district level. The authors hypothesize that tank degradation is likely to be influenced by the boom in well irrigation, population pressure, rainfall, and technical progress in rice production (which could serve as an incentive for tank maintenance).

The results derived from the statistical analyses bear out the hypotheses put to test. The most important result is the relationship between private assets i.e. wells, and common property. The study reveals a U-shaped relationship between the number of private wells and tank degradation both at the state and district level. This suggests that the number of private wells has a negative impact on tank degradation up to a certain threshold number for wells, following which the behavior reverses. This is because a smaller number of wells initially complement tank water supply. However, after crossing a certain threshold, investment in private sources of irrigation takes precedence over collective interest in maintaining common pool tanks (possibly because even non-well owners become water buyers at this stage). Thus, increased access to private wells is partly to blame for the deterioration of an age-old commons resource. Private wells today are almost indiscriminately dug – this analysis suggests that the issue of optimal number of private wells requires additional attention.

The authors also estimate the importance of collective tank maintenance and its impact on rice yield. Interestingly, this enquiry reveals that collective action to maintain tanks has a positive impact on rice productivity. Thus, even though farmers resort to supplemental sources of irrigation, tank irrigation continues to be a significant input into farm production.

POVERTY – THE REASON FOR CONCERN ABOUT TANKS

Should the government be concerned about tank degradation and invest in tank maintenance? Or, should it continue its current policy of supporting private well creation through cheap loans and electricity? To answer these questions, Balasubramanian and Selvaraj seek to understand the dependence of poor (income below INR 18000 p.a.) relative to non-poor households on tanks, and, the distribution of the burden of maintenance and upkeep of tanks among user-groups.

Their analysis is very revealing:

- Tanks contribute approximately 29 percent of the total income of poor households.
- The poor are much more dependent on tanks relative to the non-poor for agriculture (more than 90 percent of the poor versus 67 percent of the non-poor), fuel wood (49 percent versus 21 percent) and livestock needs (87 percent versus 24 percent).
- The poor set aside a greater amount of tank income towards tank maintenance (over 40 percent) relative to the non-poor (23 percent).
- The total amount of labor expended by poorer households for tank maintenance is almost 100 percent more than that spent by non-poor households.
- The poor have fewer 'farm' and 'non-farm' income earning options (sale of water, white and blue collar jobs, non-farm businesses etc.) relative to the non-poor.
- The non-poor fare better in terms of their access to capital and viable land holdings. Poor households are severely constrained in their access to such options and end up buying water (20 percent of poor households have their own wells, while almost 60 percent of the non-poor own wells).

Table 1: Household Dependence on Tanks

	Poor households	Non-Poor households
Complete dependence on tanks for agriculture (%)	92	67
Complete dependence on tanks for fuelwood and grasses(%)	49	21
Complete dependence on tanks for watering livestock (%)	87	24

Table 2 : Income from Agriculture and Non-Agricultural Sources

	Poor	Non-Poor
Total income from agriculture (Rs/year)	22960	34256*
Total non-farm income (Rs/year)	22620	59877*
% of agricultural income to total household income	50.37	36.39*
% of tank-based agricultural income to total household income	28.63	19.64*

Note: ** indicate that the values are significantly different between the two groups of households at the 5 % level.*

Access to alternate opportunities operates against community interests when it comes to tank maintenance. The non-poor have the ability to access these alternate opportunities and take advantage of government support for private well creation. The poor, however, have fewer options, and are much more dependent on tanks. Thus, to support the poor, the State's largesse towards irrigation needs to be aligned more closely with tank investments.

WHAT INFLUENCES COLLECTIVE ACTION TO MAINTAIN TANKS?

Tank maintenance is often ad hoc with no systematic effort to manage problems. Labor and capital-intensive activities such as removal of encroachments and silt in tank water are rarely done. Thus, if further investments are to be made in irrigation tanks, it is very important to understand the factors that influence people to come together as a group to manage tanks. Balasubramanian and Selvaraj examine the factors that contribute to collective maintenance efforts.

They show that collective action is influenced by asset ownership and wealth inequality, the size of the tank command area, the role of traditional institutions (*neerkatti* or the common irrigator), the number of private wells owned by households and the share of non-farm income to total household income. There appears to be a U-shaped relationship between inequality and cooperative behavior to maintain tanks. Thus, as the disparity between the rich and the poor increases, collective action is likely to decrease first and then increase. Further, as tank size increases, collective action tends to decrease, suggesting that the increase in beneficiaries has a negative effect on incentives to cooperate. In some cases, remnants of traditional system of tank institutions with a role for *neerkatti* or common irrigators remain. The presence of these traditional managers contributes to collective action efforts. This suggests that efforts to increase collective management can build on existing traditional institutions.

POLICY WATCH

The multi-level analyses in Balasubramanian and Selvaraj's paper suggest several important policy options:

- Private wells and tanks are complementary to some extent, and, are both required for agricultural growth. However, the current imbalance in irrigation investments, with subsidies for private wells and gradual neglect of tanks, needs to be rectified.
- Stricter implementation of *existing* rules related to optimal number of wells and well-digging would go a long way in decreasing the imbalance between government support for private wells versus public tanks.
- Ongoing watershed and wasteland development programs should be linked to tank up-gradation to promote integrated water harvest and management regimes.
- Ambiguity in defining community rights needs to be carefully addressed to stem tank degradation and to resolve problems of private encroachment.
- Traditional institutional roles such as that of the common irrigators need be revived as this seems to have a positive effect on tank maintenance.
- The poor are very dependent on tanks. It is appropriate therefore to consider tank productivity as an integral part of the government's poverty reduction efforts, and, to invest in various aspects of tank maintenance.

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This policy brief is an output of a research project funded by SANDEE. The views expressed here are not necessarily those of SANDEE's sponsors.