Rejuvenating Irrigation Tanks through Local Institutions

Recent attempts to modernise irrigation tanks with a focus on physical rehabilitation, but little institutional development to maintain and manage them, have resulted in a vicious cycle. With the lack of maintenance and upkeep, rehabilitated tanks soon fall into disrepair, necessitating a new round of externally-induced rehabilitation. Yet, there are many tanks under traditional local management operating at a high level of performance equilibrium. A study of 41 tanks from 22 districts of eight Indian states was taken up under the IWMI-Tata Programme to identify the characteristics of high performing local-managed tank institutions. The lessons learnt from the study can form the basis for an effective institutional protocol that can enhance the effectiveness of tank rehabilitation and modernisation.

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I Introduction

India's water resources potential and the country's agricultural economy hinge on the monsoon rains and its spatial and temporal variations. Nearly 40 per cent of India's land mass falls under semi-arid conditions with annual rainfall of 500-1,000 mm and normal rainfall is necessary for a good crop. Facing high spatial and temporal variability of rainfall since time immemorial, India's rural communities have followed a policy of conserving rainwater for subsequent use through innumerable tanks or small storage structures like ponds built, owned and managed by the local people through community organisations.

Tanks in the Indian context are inextricably linked to the socio-cultural aspects of rural life and have historically been an indispensable part of the village habitat, sustaining its socio-ecological balance. Tank systems, developed ingeniously and maintained over the centuries, have provided insulation from recurring droughts, floods, vagaries of the monsoon, and offered the much needed livelihood security to the poor living in fragile semi-arid regions. Of late, the importance of tanks is being realised even more, as the rapidly growing use of groundwater and large surface irrigation systems are proving costly and inadequate to meet the increasing demands for irrigation water. Conserving the tank eco-systems for multiple uses such as irrigation, domestic and livestock use and groundwater recharge is a way to provide a safety net to protect the livelihood of millions in a semi-arid India.

II Status of Tanks in India

Almost all monsoon countries in the semi-arid tropics have small water bodies like tanks [Sengupta 1985]. In India, the largest concentration of tanks is found in the three southern states of Andhra Pradesh, Karnataka and Tamil Nadu and the union territory of Pondicherry, which account for nearly 60 per cent of India's tank-irrigated area. Out of India's 2,08,000 tanks, these states have nearly 1,20,000, irrigating 1.8 million hectares of land [Vaidyanathan 2001].

The pre-eminence of tanks as a source of water storage and supply for multiple use was lost after independence due to a variety of factors: chiefly, the development of large-scale gravity irrigation systems, rapid spread of tube well technology, and decline in traditions of community management. As a result, a large majority of the tanks in the southern and eastern parts of India suffer from inadequate management and maintenance, some have become dysfunctional while others are even obliterated. In fact, even the exact number of tanks existing as of now and their status is not known [Pant 2004].

The decline in tanks is evident both in terms of the relative importance of tanks vis-à-vis, other sources of irrigation, as well as the decrease in the actual area irrigated by tanks. While at the all India level, the area under tank irrigation declined from 4.6 mn ha to 3.3 mn ha, the total area under tank irrigation in the three predominant states of Tamil Nadu, Andhra Pradesh and Karnataka together has declined from 2.4 mn ha in 1960-61 to 1.7 mn ha in 1996-97, a reduction of about 30 per cent [Narayanamoorthi 2002 and 2004; Janakarajan 1996].

III Tank Rehabilitation Programmes

In recent years, a variety of efforts has been made to improve the performance of tanks. One approach has been to seek external funds for the large investment needed to rehabilitate tanks systems and, thereafter, to encourage villagers to maintain it through the formation of tank water users' associations (WUAs). In Tamil Nadu, 569 public works department (PWD) tanks and 80 ex-zamin tanks (out of a total 39,200 tanks) were rehabilitated and modernised under European Union assistance, with financial outlay of Rs 179.39 crores. These tanks were supposed to benefit a command area of 73,161 ha and the cost of rehabilitation worked out to be Rs 25,000/ha. An evaluation of the tank rehabilitation project by Anna University indicated that the outcomes were neither fruitful nor were the returns commensurate with the cost of rehabilitation. Because of inadequate institutional development and the piecemeal approach used for implementing the tank rehabilitation, the tanks fell into the vicious cycle of "rehabilitation-poor maintenance-deterioration-rehabilitation" [CWR 2000].

Similarly, Karnataka has recently taken up a much needed initiative to rehabilitate 2000 minor irrigation tanks through the community based approach using World Bank funding. This project is under implementation for the last two years and yet to be evaluated, but a key emergent issue is the need to deal with competing interests of stakeholder groups. A recent study on Rajasthan tanks found that no commonality of interests exists amongst key stakeholders groups of rehabilitated tanks: command area farmers, tank bed farmers, fishermen and the village community as a whole. Shah and Raju (1999) argue that the complex reality of tanks in Rajasthan today is perhaps the dialectic of opposing stakeholder priorities, hence the low level performance equilibrium in which tanks are trapped today. They emphasised that a radical and effective institutional solution needs to be found to increase the performance of rehabilitated tanks. There is a prevalent notion among a section of researchers and policy-makers that the present method of rehabilitating tanks and creating water users' associations is not the right way to improve the gross tank product per cubic metre of tank water. A drastic change is needed in the thinking on, and implementation of tank rehabilitation.

IV
Why a Study on Tank Institutions?

Traditional tank institutions have undergone changes because of the vast increase in the number of irrigators, shifts in control of the land from a few to many landowners, changes in the attitude of farmers, and the spread of well irrigation in tank commands. A key question in today's changed context is: is it possible to create a new relationship between tanks and tank communities such that tanks play a more purposeful role of enhanced value creation for all stakeholders? [Shah 2003].

The overarching hypothesis of this research is that it is possible to build such a new relationship. Lessons for how best to do this can be gleaned by studying the experience of many tank communities with traditional institutions which still manage tanks effectively as common property, despite the presence of many or all of the external factors that have led to a general decline of tanks. It was in this context that a research study was taken up under the IWMI-Tata Programme to identify the characteristics of high performing local managed tank institutions which are able to adapt themselves to changes in water supply, groundwater development, changes in cropping pattern, and wider socio-economic changes such as changing landholding patterns, social structure, urbanisation and others. Specific objectives of this research were: (a) to identify preconditions for tank institutions to perform well; (b) understand the characteristics that a traditional tank institution should possess to perform at a high level of equilibrium; and (c) based on such understanding, to develop an institutional protocol for tank rehabilitation derived from the lessons learned from the case studies of high performing tank institutions.

As a part of this study, 41 tanks from 22 districts in eight states with command areas ranging from 50 to 1600 ha were studied. The tanks studied differed in their sources of water supply: rain fed (20), river fed (12) and rain fed cascades (9). They differed in their ownership pattern too by agencies such as zilla parishads, village panchayats, revenue department, PWD or minor irrigation department (MI) and village communities. At the time of the study, 27 tanks were used exclusively for irrigation; five tanks for fisheries; four for irrigation and fishery and five for other uses such as cattle drinking and groundwater recharging. The tanks studied were managed by a variety of institutions: traditional (10), traditional and registered (5), registered WUAs (17), fishermen cooperatives (5) and informal (4). These institutions were of different vintage: some were just four years old; some others had survived for more than 100 years.

V
Methodology and Framework for Data Collection and Analysis

The study used a twofold methodology. It relied on both secondary data obtained from official village records and primary information obtained from field visits. The field study made use of participatory appraisal techniques, especially, focus group discussions and unstructured interviews. The researchers interacted with community leaders, panchayats, WUAs and other relevant actors. Field researchers visited selected tank communities, stayed there for several days and collected both secondary and primary data. Information collected relates to water acquisition, water allocation, distribution, resource mobilisation, maintenance, decision-making, enforcement of decisions, conflict resolution and management of tank usufructs.

Performance evaluation to assess the sustainability level of a tank institution is not easy. Therefore, a set of indicators were developed – from among several variables identified to have some bearing on tank performance – that contribute to understanding the overall performance of tanks. Each indicator contains finer components of several variables and all are given equal weights. A subjective score in the four point scale (0 to 3) given by the field researcher is used for valuation of the indicator. Based on the six indicators, an overall performance indicator was also developed. The following six indicators are scored for each tank.

(1) *Institutional performance*: Measured by the structure and composition of the tank user's group; their decision-making process; effectiveness in augmenting tank storage; rules and tools for operation and maintenance; conflict resolution procedure; the institution's ability to make plans according to water availability so as to provide social safeguards against water scarcity; avenues of resource mobilisation, and interventions undertaken for improving the tank performance.

(2) *Tank contribution to livelihood*: Livelihood performance is assessed by people's dependency on the tank not only for irrigation, but also for other uses like fish rearing, cattle use, and domestic use. The use of the tank bed and adjoining 'poromboke' (wasteland) for vegetable cultivation, tree cultivation, fuel wood cultivation, cattle grasing and employment generation; women's representation in the institution; non-farm activities relating to tank use, and tank water scarcity forcing migration were considered.

(3) *Enabling conditions*: Factors such as the socio-economic condition of villagers, favourable hydrology to ensure adequate water to the tank, eviction of tank bed and supply channel encroachment, cooperative ethos within the community, infrastructure development and access to the markets, employment generation and reinvestment of net income in agriculture were collected and used for computing the enabling environment performance.

(4) *Agricultural performance:* The success of an irrigation institution depends on its capability to bring water, manage it effectively and distribute it equitably. To measure these functions,

the increase in agricultural production, increase in area irrigated, income generated and development of other associated non-farm activities were recorded.

(5) *Objective-based impacts*: The impact of the performance of an organisation is measured by the fulfillment of its objectives. Successful tank institutions strive to conserve water to enable multiple uses. The productivity per unit of water must increase. Successful agricultural practices were identified together with employment generation and the re-investment of net income in agriculture by the tank users. All these factors were measured to assess the impact performance.

(6) *Institutional sustainability*: The sustainability performance of a tank institution is measured in terms of leadership; adequate water supply; rules and tools and powers to impose sanctions; support from other development agencies including the government; conflict resolution process; and role of traditional village council.

Each of the 41 tank case studies taken up under this study were evaluated in terms of the above indicators for them overall performance and the results were analysed to identify high and low performing tanks and to explore the factors that explain high and low performance.

VI
Discussion of Study Results

Out of the 41 tanks studied, 17 were assessed to be performing well of overall. A score of 0.6 and above in a scale of 0 to 1 was assumed to signify high performance. In the following paragraphs, we discuss some 'best management practices' used by high-performing tank institutions with respect to some key functions.

Water Acquisition

Availability of water is one of the most important factors determining tank performance. Tanks get water from rain, jungle streams or river diversion channels. Tank water acquisition is considered the most important function of the traditional institution. The study shows that each of the best performing tanks has its own techno-institutional mechanism for water acquisition.

In high performing tanks, such as Parambu tank in Pudukkottai district of Tamil Nadu, Kasargatte Hosa Anakere in Bangalore rural district of Karnataka, it was made mandatory for all able bodied persons to participate in cleaning the feeder channels. Those who could not participate were required to pay the wages of labourers engaged as a substitute. In river-fed Rettaikulam tank in Thirunelveli district of Tamil Nadu, the village committee engages wage labourers and watchers to clean the feeder channel and bring water, and paid them from their common fund. In Pagadikulam tank in Dindigul district and Thamaraikulam in Theni district of Tamil Nadu, there are exclusive field level functionaries called the 'kaval' agents to bring water from the river. The 'ooru panchayat' (traditional village council) of Hirekere in Tumkur district of Karnataka negotiates frequently with upstream tank farmers to get water for their tank during times of scarcity. When the Kedar tank in Villupuram district of Tamil Nadu was rehabilitated during 1990-92 under an EEC project, the farmers of the upstream tank wanted the Kedar farmers to do repairs and improvement works for their feeder channel. To get reliable water for the tank, upstream tank channel cleaning is important; keeping this in mind, the Kedar farmers allocated funds for channel cleaning of the upstream tank curtailing some of the works in their own tank. The village committee in Katasunibandha tank in Dhenkanal district of Orissa created new channels to harvest more rainwater from the watershed through the 'shramdan' of the villagers.

The villagers of Puseri in Ramanathapuram district of Tamil Nadu used to build a mud 'korambu' (bund of earth mixed with paddy straw) in the river to divert water through group effort for more than 50 years. In an attempt to help the villagers, the government constructed a bed dam at the offtake point. From then on, the villagers stopped korambu formation but the dam was not built to sufficient height to head up water. The lack of inflow of water into the tanks encouraged people to encroach into the foreshore areas of the tank bed. The supply channels were encroached, too. Only rain-fed cultivation is now followed. A similar situation is observed in Nanjure tank in Pudukkottai district of Tamil Nadu. The villagers had encroached everywhere including the feeder channels.

Since the encroachers either belong to the same village or family, it often becomes difficult to evict them and this has commonly led to the total neglect of supply channels in many tanks. Pudukulam's surplus course that feeds Nanjure tank has been encroached for 30 years. The villagers are unable to evict these resulting in poor inflows to the tank. When the community is unable to prevent or overcome encroachment of supply channels, the tank institution becomes inactive and dysfunctional.

Water Allocation and Distribution

Once the water is received in the tank it has to be distributed equitably to the satisfaction of all stakeholders. The village institution of Parambu tank in Pudukkottai district of Tamil Nadu has a slab system for distribution of water during scarcity. The system works in the following way:

(i) Farmers owning land up to one acre in the command area are permitted to cultivate their entire holding.

(ii) Farmers owning land between 1-5 acres in the command area are permitted to cultivate only half of their land holding area.

(iii) Farmers owning more than five acres in the command area are permitted to cultivate only one third of their extent of holding.

The slab system is strictly enforced from the nursery stage of paddy itself. Water from the tank will be supplied to meet the requirement of paddy crop within the slab limits. If the storage in the tank is very low even to plan the slab system, the association decides not to supply water for the season. In Kongudi tank of Pudukkotai district of Tamil Nadu when the tank has inadequate storage, farmers who own less than 33 cents of land will get irrigation for their entire land. Others get water in a fixed proportion to their landholding decided by the 'ambalams' (village leaders) in the meeting. It is ensured that each one gets adequate water to raise a paddy crop at least on a portion of their land so that nobody in the village goes without some harvest to sustain their livelihood. Like in Kongudi in Sardarnagar tank in Bhilwara district, Rajasthan, if the tank is not full, the entire command cannot be irrigated. In such a situation, water is given to each 'beegha' of land, irrespective of the farmer's holdings. Thus everybody receives minimum irrigation and food security is ensured. In the Hirekere tank in Karnataka, the command area is divided into three blocks based on the location, soil quality and area. When the tank is two-third full, only one block will get irrigation and when the tank is full, the water is provided to two blocks. At no time are all three blocks irrigated in a year

due to paucity of water. These three blocks are irrigated in rotation, depending on the availability of water and as decided by the village institution.

In Kedar, during the scarcity period, tank water is given only to those who do not have wells. In Sundarapandiapuram in Thirunelveli district of Tamil Nadu, when there was a drought for three years, only 'mettumadais' (elevated sluices) were opened and the ayacut under pallamadai (deeper sluices) had to depend on groundwater only. In Jetti Agrhara, in Tumkur district of Karnataka, only one crop is allowed to be cultivated normally. The remaining water is kept as dead storage for livestock. Paddy is the main crop. If the tank is half filled, only garden lands are given water by collecting a fee from farmers. In case the rain-fed paddy is already planted in the command area, one watering is given against a reduced fee.

In Bairwar tank in Tikamgarh district of Madhya Pradesh, one village functionary called 'amin' used to regulate the distribution of water from the tank. With the formation of a WUA, the distribution of water came into the hands of the command area farmers. Though the water distribution has to be collectively decided by the command area farmers, the decisions on water distribution are made by an influential WUA member. He opens the sluice only when he needs water. Only after he irrigates his field, other farmers are allowed to take water. Obviously the performance of Bairwar tank has deteriorated.

Decision-Making

The functioning of successful traditional institutions indicated a decision-making process which involved all the stakeholders and where the decisions made are accepted by all as fair.The Athoor Pattadhars Committee (Pagadaikulam) in Dindigul district of Tamil Nadu is functioning for the past 60 years; the tank ayacut and feeder channel are divided into 'kandams' (zones). The landholders in these zones belong to predominantly Christian, Hindu and Muslim religions. The office bearers of the farmers association are elected from these religions in rotation. The respective religious leaders also appoint irrigation functionaries from each zone.

In Kongudi in Pudukkottai district of Tamil Nadu, all major decisions are taken in a meeting where representatives of all the families are present. If any representative is occupied, he must inform village leaders and the meeting will be postponed. If anybody remains absent in a meeting without prior leave, the meeting gets postponed but the absentee pays a fine of Rs 100. Unless everyone attends no decision is taken. In Arumugamangalam tank in Thoothukudi district of Tamil Nadu, all important decisions are taken by the general body as a consensus decision. The executive committee looks after the implementation and day to day administration only. Many youth attend the meetings and actively take part in the Sangam's activities. The elders including the president and office bearers accept the views of the younger generation or try to convince them to arrive at a consensus decision. The Peikulam tank institution in Thoothukudi district of Tamil Nadu was started in the year 1872 and continues to function smoothly. People from 16 villages were the first members. The rules governing the working of the institution – which are elaborate and interesting – were printed in July 1913. For instance, representations to all villages and hamlets were given in the executive committee. This association has been maintaining minutes of its meetings since 1872. There are written documents of all its activities and are open to anyone who would care to go through them. This transparency and collective decision-making have kept the institution vibrant for more than 130 years.

Tank institutions that lack cohesiveness or are non-inclusive or faction ridden result in low performance. The Aralikkottai village council in Sivagangai district of Tamil Nadu has representation from all castes except scheduled castes (SC). The people belonging to SC are not involved in the decision-making process in tank related issues due to caste discrimination. Elders from each caste group form the power centre in the village council and they make all the decisions. The traditional association of Pappaiyanpatti village in Theni district of Tamil Nadu was virtually the big landowners association belonging to dominant castes of Naidus, Kallars and Vellalas, excluding others. These landowners still wield considerable influence in the affairs of the newly formed association. The dominant members take decisions and others are obliged to accept. In Dongargaon in Chandrapur district of Maharashtra state, three institutions are involved in the management of the tank: the Water Distribution Panch Committee (WDPC), fishermen's society and farmer community. They do not see eye to eye with one another; and none of them bother about augmenting tank storage while the cultivator community is plagued by factionalism. Obviously, Aralikkottai, Pappaiyanpatti, and Dongargaon tanks are not performing well.

Enforcement of Rules and Punishment of Violators

The rules once made have to be enforced and high performing tank institutions empower their agents to do this. There are two types of irrigation functionaries in traditional institutions. One is at a more supervisory level as a decision-making and an enforcing authority and, the other, at a lower level involved in implementing and monitoring. In some systems, there are exclusive functionaries to implement the decisions and monitor them. The first type is called Nattamaikar, Patel or Kavaimaniam. The second level of irrigation workers are known by many names, Neerkatti/Neergandi, Neerpaichi, Kanduvetti Kambukatti, Kavalar/Shena, Thotti, Shnbog and Soudi. In all the tank systems that we found high performing, no farmer is permitted to operate the sluices. This task is entrusted to functionaries appointed for irrigation management who may hold the post on a hereditary basis or temporarily for a period ranging from a month to a year.

The Jetti agrahara village in Karnataka has a unique system of nominating the Ejaman Panakara ('patron') to coordinate the water distribution from the tank and its operation and maintenance on behalf of the grama sabha and Achukattudarars – or the ayacutdaars. It is an honorary post to which appointment is made by a grama sabha representing all villages in the tank command (two persons from each village). The individual's skills in managing the communities is the key criterion and not the caste or landholding he posses. The appointment is an honour and imparts to the appointee a special social status and gives him the confidence to strictly enforce rules without fear or favour. Ejaman Panakkara has to mobilise achukatudarars, maintain the attendance for shramadan and take note of the absentees. He has to maintain records such as the area covered under de-silting. A wide range of penalties attend the defaulters – from stern warnings to imposition of fines and, in the extreme, to stopping water supplies all together (Parambu, Kedar, Sundarapandipuram

tanks in Tamil Nadu). More than the amount of fine imposed, it is the social stigma attached to the punishment – the shaming involved – that acts as a powerful deterrant.

Mobilising Financial Resources

Mobilising financial resources is an important activity in sustaining the working of any institution. All the institutions we studied collect subscriptions through the sale of fishing rights, sale of usufructs, and fines and fees from members. When these funds are inadequate to meet the operating cost, successful tank institutions manage additional funds through innovative methods. The Rettaikulam tank in Thirunelveli district of Tamil Nadu exemplifies a variety of such innovative ideas. They levy 'Ayacut Vari' (tax on area commanded) a tax based on landholding and depending upon the extent of repair and maintenance work and the deficit in the fund, the tax rate per acre is decided. Five years ago the whole inlet channel to the tank was de-silted and the Ipomea (locally called 'Kattamanakku') weeds were cleared. This work was completed in 36 days with an expenditure of Rs 2.75 lakh. For this work, a tax was collected from all the well owners at Rs 500 per well. This fund was collected not only from the owners of wells in the ayacut area but also from those in the non-ayacut area. The well owners in this village had the conviction that unless the tank got water their wells will go dry and, therefore, they were willing to pay the tax.

All agricultural products are sold through a commission agent. This commission agent is selected through an open auction by the committee. Farmers cannot sell their products to others and no other agent can make procurements from this village. From this auction the Rettaikulam Committee receives around Rs 2 lakh per year. Another innovation is the appointment of the milkman. Most households keep cows to produce milk for household needs as well as for the market; milk is collected twice a day for procurement by the milk cooperatives. As each household cannot have a standard measuring vessel, there were many quarrels and conflicts. The committee decided to appoint a milkman and provided standard measuring vessels approved by the government authorities. For each litre of milk collected, the households have to pay the milkman Rs 0.20. And through the auction of the annual right for milk collection from the village, the committee received Rs 89,000.

Lessons Learnt

The important functions of any irrigation institution as stated above are: water acquisition, water allocation and distribution, resource mobilisation, operation and maintenance, decision-making, enforcement of decisions and conflict resolution. An organisation must be vibrant and energetic to perform these tasks. How these functions are performed, who plans and who implements decisions, what rules and tools are used to plan and implement set the high performing tank institutions apart from the rest.

In the case of water acquisition, the case studies indicate that successful local institutions adopt many ways to augment water supplies for their tanks. Hence, wherever the organisation is able to ensure water supplies to the tanks by utilising the collective effort of villagers or by the functionaries of the organisation themselves, they perform well.

High performing tank institutions have well-defined norms, evolved over a long period of time, about allocation of water to various segments and special rules in times of scarcity. Tanks are common property of the village, and whether the institution makes provisions during a scarcity situation to enable economically weaker sections and the landless to sustain their livelihood, is an important factor in obtaining cooperation from all villagers. Though based on custom and tradition, they are clear, specific, detailed and accepted by all ayacutdaars as fair. There are a wide range of allocating rules, which focus on ensuring livelihood to the marginal and poor.

Traditional institutions often exert control over crops grown and the area cultivated to match water availability. This is not merely distributing scarcity among all, but a prudent way of ensuring social justice. By such planning, all the farmers are sure of harvesting a successful crop at least in part of their land. The maximisation of crop production during good years and minimisation of losses in bad years are ensured by the collective decision made by traditional tank institutions.

The direct involvement of tank users in major collective decisions is important to ensure that the decisions reflect their interest and needs. One way to achieve this is to allow all the tank users to get involved in major decisions concerning the tank and its water resources. The decision-making process in the best performing institutions is characterised by transparency, involvement of all, accountability, fairness and equity, and avoidance of conflicts. Even the election process of the office bearers ensures the participation of all members. Wherever transparency, involvement of all in decision-making and accountability are absent, the performance of the tank is poor.

After making decisions it must be ensured that they are fully implemented and that free riding is prevented. But, individuals would have little incentive to comply with rules unless they believe their non-compliance will result in substantial penalty. In many tank systems, specialised monitors have been appointed to enforce rules. The tank institutions that have a mechanism of enforcing the rules and who penalise the violators create confidence among members. There may be some special cases where the rules have to be flexible, but agreed upon unanimously.

Traditional institutions are quick to grab any opportunity to adopt new and innovative methods of fund mobilisation. There are no fixed rates at which contribution from members is raised; and the rate varies depending upon the maintenance needs. The revenue collected is generally more than sufficient to manage the affairs of the institution and it also used for village development activities. The villagers willingly contribute and defaults are rare.

Office-bearers vested with special prerogatives in rule formulation and enforcement are in a position to misuse their powers by framing and interpreting rules to their own advantage. Opportunistic behaviour by office-bearers is curbed by appointment of office-bearers through voting by water user's thus making these office-bearers answerable to water users. The best performing tanks have either a fixed tenure for their office bearers (in many tanks studied) or have recall powers for office bearer or functionaries.

Concluding Remarks

Despite several state-sponsored tank rehabilitation programmes in many states, the number of tanks rehabilitated effectively is negligible as compared to the total number of tanks. With limited water resources, vagaries of the monsoon and the looming water scarcity in many parts of India, water conservation and use by medium and micro water retaining structures have assumed

greater significance. In this context tank renovation and rejuvenation with peoples' contribution is looked upon as cost effective, equitable and powerful tool to alleviate rural poverty. Restoring the physical conditions of tanks through rehabilitation and modernisation is of course the necessary condition for doing this; but equally critical is to find ways and means to keep the modernised tanks in good conditions, on a sustainable basis. Maintenance is the responsibility of both the government and the farmers. Without a well-defined programme to ensure this, the huge amount spent on physical rehabilitation will become fruitless after some years. An evaluation of the outcome of tank rehabilitation projects indicates that the importance given to structural improvements overshadows the institutional development [Sakthivadivel 2004]. Very little has been spent on institutional development. Tank performance cannot be improved by mere physical rehabilitation alone. For effective rehabilitation, the results of this research indicate that certain pre-conditions and requirements are to be met; these conditions and requirements then form the institutional protocol for future tank rehabilitation. They are briefly stated here:

Ensuring hydrological adequacy: As water is the main concern of tank users and institutions, the availability of adequate water supplies to the tank is a pre-condition for taking up rehabilitation.

Ensuring the presence of enabling conditions: External agencies – particularly from the government – have to provide a supportive environment, including help in removal and eviction of encroachment in the tank bed and supply channels. Encroachment of the tank bed and supply channels is the prime enemy of high performance of tanks in many parts of India.

Establishing institutional pre-conditions: The lessons learnt from the case studies indicate that successful traditional tank institutions have certain characteristics and traits with regard to carrying out water management functions, which makes them effective. These traits have to be present in the institutions if rehabilitation is to succeed. If they are absent, institutions with such traits have to be crafted and promoted before taking up physical rehabilitation. This requires that physical rehabilitation works are preceded by an institutional protocol to ensure that institutional pre-conditions are created that will help the tank community to move to a higher trajectory of tank performance on a sustainable basis.

Institution building is a long-term process requiring investment of resources and extensive trial and error. Tank communities should be made to perceive that the institutional changes contemplated will bring more benefits to them than potential costs. Only then there will be credible commitments and long-term cooperative relationships within the community. EPW

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