

Impact of Water Conservation and Restoration of Lakes on Multiple Livelihood Options in Rural Village of South India

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ABSTRACT

The hydrological characteristic of the Indian monsoon necessitated the creation of storage facilities to hold the rain water of the monsoon and utilize the same at a later date. With extraordinary Engineering, Managerial and Social skills an extensive system of rain water harvesting structures like tanks and ponds had been built and maintained by the people for centuries. Tanks are similar to lakes but it is an artificial one where a lower earthen bund constructed across the shallow valley to hold the rainfall runoff from its catchments area above. Tank may be either isolated or in cascade. After independence there has been wide spread recognition that the tanks are on a decline, there by a drastic reduction in area irrigated by tanks persists. Releasing the importance of tanks, South Indian states have started rehabilitating it in mid of 1980's under state funds as well as under external assistance. Initially the focus was only to maximize the net production which was favorable to farmers alone. Later, there are proponents who argue that tank rehabilitation is a must around, which livelihood options of the rural poor are to be built in view of the multiple use of tank water such as washing, livestock, drinking, duck rearing, brick making, silt as manure, fuel wood collection from tank bed and bund, fish rearing etc. Hence, while deciding any water resources development project to be sustainable, it is necessary to involve multi-stake holder's participation for decision making. This paper discuss about the impact of tank rehabilitation of Pelasur village, South India which has achieved an excellent betterment in livelihood options for both direct and indirect users. In order to attain the result a stratified sampling method was used to select farmers (direct users) and a detailed questionnaire survey was done. Collected data were analysed using SPSS 14.0. Also focus group discussion was done with landless group to understand their improvement in socio-economic status after tank rehabilitation. The expected results might give us the comparative statements of before and after rehabilitation of this selected rural tank which will be the representation of south Indian rural tanks.

INTRODUCTION

The irrigation tanks played a decisive role to guarantee the food production but

also in maintaining ecological balance, to control the floods, to prevent erosion, to recharge the water table and to limit the valuable water loss during the large rains. The presence of the tank allowed a favorable microclimate at local level. Moreover, without the tank, the development of rice cultivation, which is the staple diet of the people, would not have been possible. From the beginning of the 16th century, rivers were partially diverted to fill these tanks quickly, thus offering a greater guarantee to the food production. The first irrigation wells, operated by man or animal energy, then made their appearances. Indian farmers mainly depend on the rains for irrigation of their crops. Meager rainfall leads to drought while excess rainfall causes floods. Both droughts and floods may lead to large-scale damage of crops, a failed harvest, a huge loss and inflation. Tanks were properly maintained by our ancestors and started declining in its function in later stages due to various reasons. Only in mid of 1980's government realized to rehabilitate the existing tanks to its original conditions. Initially the focus was to maximize the production alone and later it turned to include non-forming communities in the rural village too.

METHODOLOGY

Selection of study area

In Tiruvannamalai district, Polur taluk, chetpet block a Non-system PWD tank called Pelasur Esa Eri had been selected as a rural tank for the study. This tank is rehabilitated in the year 2002-2002 with World Bank fund of about 60 lakhs. Tank capacity is 2.55 Mm³ and registered ayacut is 214 ha. Secondary sources of information were collected from various sources and the primary first hand information was gathered using qualitative data collection methods like focus group discussions and one to one interactions from landless, women and other vulnerable groups.

Detailed questionnaire was prepared and data were collected from 102 respondents which is 20% of the total house hold in Pelasur village. Land owning farmers are classified in to three groups viz. Marginal, Small, Medium whose land owning size are less than 2.5 acres, 2.5 to 5 acres and more than 5 acres. By and large it was observed that there is improvement in the livelihood status of the farming and non farming community during post rehabilitated period.

Significance of tanks as Rural Infra Structure

As in many countries depending on monsoon, the average annual rainfall in most parts of India ranges from 700 to 1200 mm. Although the rainfall occurs mostly during the monsoon, its distribution is so erratic and varied that much of the rainfall may fall in three to fourth months of a year. If plant, animal and human life has to sustain during the rest of the year, water that is flowing during a few months in monsoon period must be conserved. Conservation of water by tanks involves two simultaneous processes. Firstly reduction of instant surface runoff through storage when it rains and secondly such

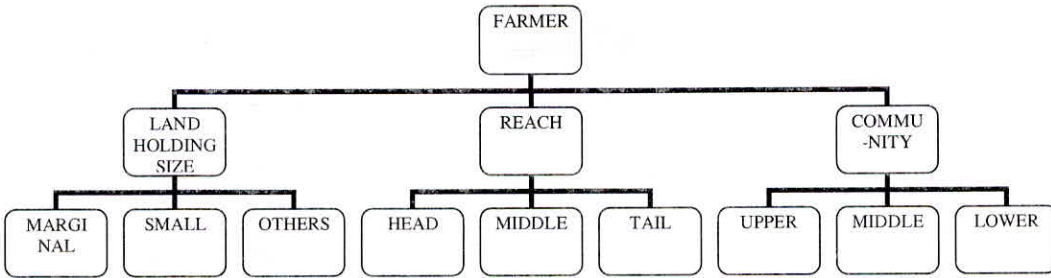


Fig. 1 : Methods and Tools for Data Collection.

stored water increases infiltration and percolation and ensures availability of water round the year through subsurface storages. While there are tanks found everywhere in the country, their use is more prominent in three South Indian states: Tamil Nadu, Andhra Pradesh and Karnataka.

Need for Tank Rehabilitation

India's water resources potential and the country's agricultural economy hinge on the monsoon rains and its spatial and temporal variations. Nearly 40% of India's land mass falls under semi-arid conditions with annual rainfall of 500-1,000 millimeters (mm); Normal and timely monsoon 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. Almost all monsoon countries in the Semi-arid tropics have small water bodies like tanks (Sengupta 1985). Rainwater for subsequent use through innumerable tanks or small storage structures like ponds built, owned, and managed by the local people through community organizations.

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. The number of tanks rehabilitated effectively is negligible compared to the total number of tanks. With limited water resources, vagaries of the monsoon, and looming water scarcity in many parts of India, the need for rehabilitating and restoring the tanks assumes significance. In south India from 1960 to 1996 30% total area under tank irrigation is reduced (Narayanamoorthy 2002 and 2004, Janakarajan 1996).

Critical functions of traditional irrigation institutions such as collective efforts in maintenance work system of water regulation and water sharing etc. is ignored and water markets come to thrive (Vaidhianathan, 1991). In many parts of the state there is a strong evidence to show that the excessive growth of wells has contributed to the decline in the actual performance of tanks (Palanisamy, 2001). Both irrigation as well drinking water wells are benefited through rejuvenating tanks (Niranjan2004).

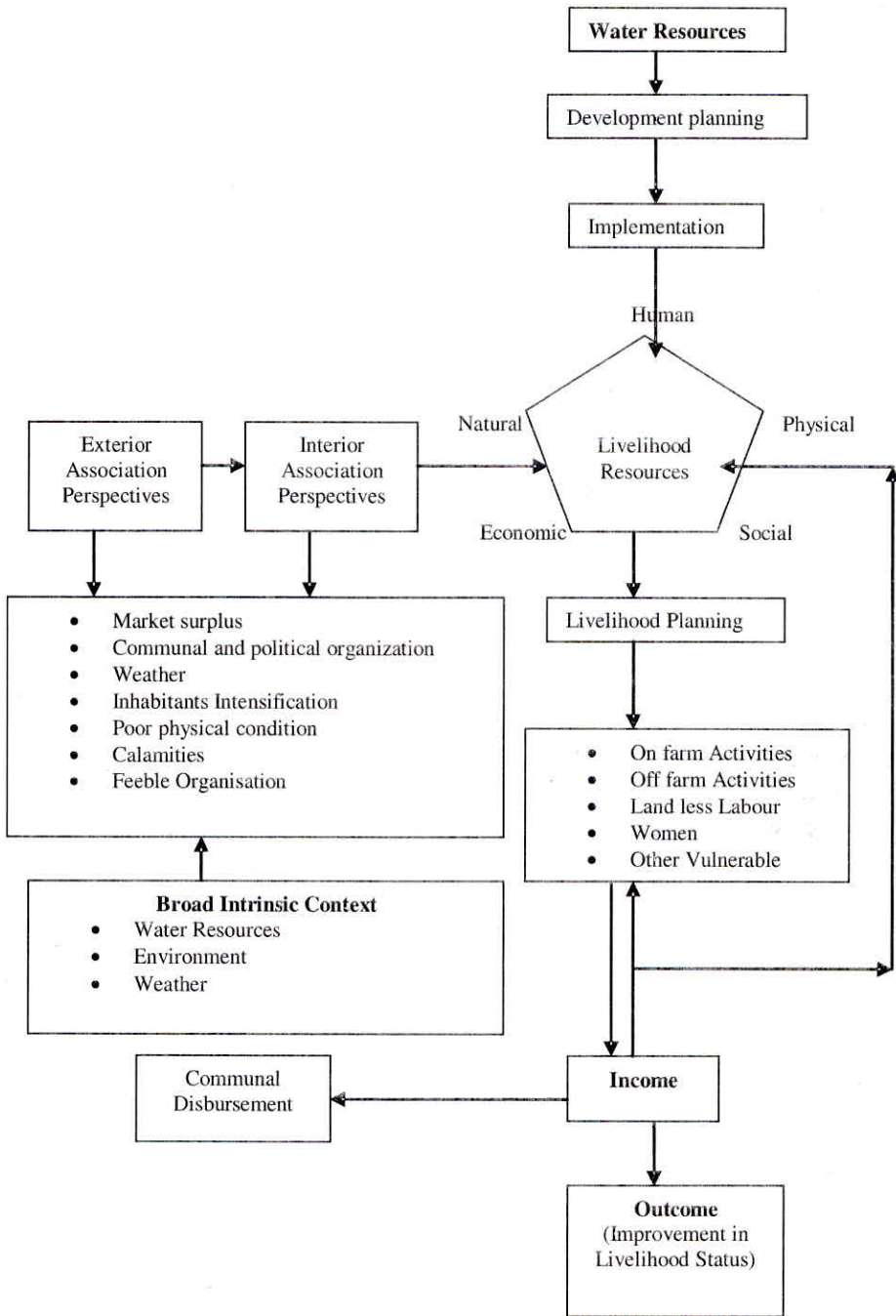


Fig. 2 : Frame work for Livelihood Enhancement

Rehabilitation of Irrigation Tanks includes not only restoring components to their originally designed standard, but more important is facilitating the efficient water management and improved cropping practice and shall also improve livelihood of small, marginal, landless group, women and other vulnerable groups.

Components of Tank Rehabilitation

Rehabilitation should comprise catchments treatment, foreshore plantations, and creation of dead storage for community and livestock use, improvement to supply channels, improvement to tank structure, on-farm development works, and provision of community wells. The multiple uses of tanks focus should also be on providing livelihood to all including the landless during off season and during drought. Conserving the tank ecosystems for multiple uses such as irrigation, domestic livestock, and ground water recharge is a way to provide a safety net to protect the livelihood of millions in a semi-arid India (Sakthivadivel, et al.,).

Table shows that before rehabilitation 52% of the total respondents were cultivated paddy as a first season crop (i.e from June to September) and 47.1% of them were not cultivating first season crop. But after rehabilitation this was even more reduced in to 42% of paddy cultivation and 57.8% of not cultivated paddy as a first season crop. In both the period cultivating groundnut as a first season crop is not in practice in pelasur village where as in second season 1% of the total respondents during before rehabilitation and 2% during post rehabilitation period was cultivating ground nut as a second crop, since these two respondents are having oil extraction machine and doing it as a side business. 41.2% of total respondents were cultivating paddy as a second crop and this was reduced to 35.3% during post rehabilitation period. 57.8% of the respondents were not cultivating second crop in pre- rehabilitation period has increase to 62.7% in post-rehabilitation period. 4.9% of respondents were cultivating paddy as their third crop and it was raised to 13.7% in post rehabilitation period. Also 95.1% of the respondents were

Table 1 : Impact of Tank rehabilitation for land holding farmers in Pelasur village

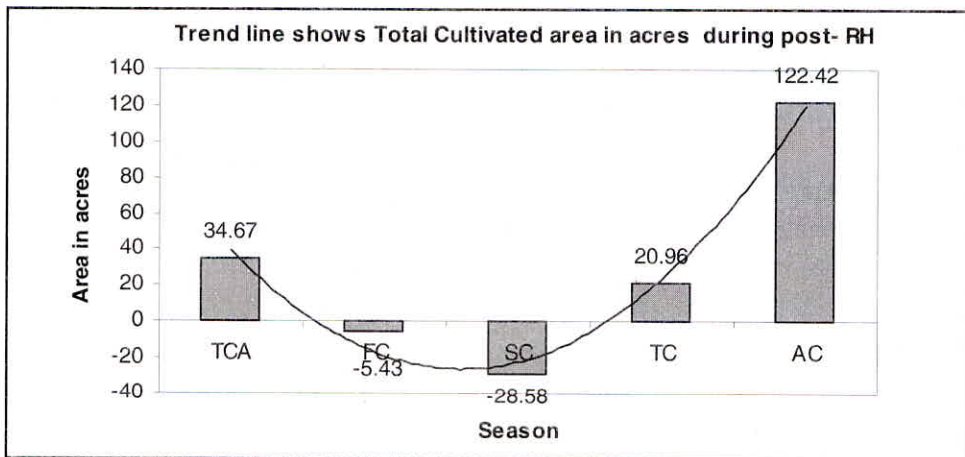
Season wise total cultivated area in acres				
S.no	Description	Area cultivated BRH in acres	Area cultivated ARH in acres	Drought
1	Total Cultivated area	450.39	485.06	90.1
2	First season	202.94	197.51	37.7
3	Second season	117.72	89.14	18
4	Third season	11.6	32.56	0
5	Annual crop	139.6	262.02	47.19

not cultivated paddy as their third crop has been reduced to 85.3% in post rehabilitation period. One person is cultivating ground nut as third crop who is involving in ground nut oil business to earn more than paddy. But annual crop scenario shows the positive impact of tank rehabilitation. Before rehabilitation 30% of the respondents were cultivating sugarcane as their major crop and this has been increased to 55% in the post rehabilitation period. It means almost the cultivatable area has been doubled in the case of annual crop in pelasur village. Only 45.1% of the total respondents are not cultivating sugarcane in post rehabilitation period which was 69.6% earlier.

Table 2 : Seasonal increase in cultivated area

Season wise increase in total cultivated area in Acres		
Pelasur		
S.no	Description	Increase in cultivated area in acres
1	Total Cultivated area	34.67
2	First season	-5.43
3	Second season	-28.58
4	Third season	20.96
5	Annual crop	122.42

Table 3 : Total cultivated area



Hence the overall circumstances show that even though the paddy cultivation was reduced during post rehabilitation period, there is a drastic increase in sugarcane cultivation as a major crop by pelasur respondents. Reasons behind it are listed as per mode are 1) Road facility available for loading and unloading sugarcane. Before rehabilitation it was very difficult for the tail end farmers to cultivate sugarcane, since it led to more number of labors during harvest period. But now with the availability of road

along surplus course till tail reach tempts them to cultivate sugarcane since it is a cash crop and profit will be more when compared to paddy. Also those who are engaged in some other occupation had gone for sugarcane cultivation, since it is not necessary to take much care as paddy. They prefer to cultivate crops that require less personal attention. Paddy being a short duration crop needed not only a Variety of timely operations but close personal attention also. Assured water supply throughout the year is also a main reason for the above.

Also some of the respondents quote that sugarcane is a cash crop and some of them revealed that there is a constant rate for sugarcane. Every year it keeps on increasing but never decrease in rate/ton. But for paddy there are ups and downs in bag rate even with in the season with respect to market surplus and market scarcity. Another reason quoted by respondents is less rat problem in sugarcane when compared to paddy. In southukani village near pelasur, soil is only suitable for cultivating sugarcane and not for paddy .This is also one of the reasons for the respondents who are cultivating sugarcane both before and after rehabilitation period. Sugarcane can able to withstand in any condition either flood or drought to some extent when compared to paddy. This is also a reason why farmers in Pelasur village are interested in cultivating sugarcane as their main crop.

Very few are cultivating sugarcane for three times (i.e 3 years) continuously and paddy for the fourth year. Their perspective is changing the crop pattern at regular intervals of time might help them to make soil nutritious and yield will be more for both the crops. Changes in the farming practice and cropping pattern in the neighboring area induce other farmers to adapt to the changes. In future sugarcane cultivation area is still more expected to increase with technological changes such as spread of high yielding varieties of crops, use of pesticides and fertilizers, substitution of men by machines, shortage of skilled workers etc. While increase in the area under cash crop like sugarcane helped to increase farm income. The change in cropping pattern has no way lowered the biodiversity in the rural area. The change in the cropping pattern cannot be seen as a phenomenon isolated from the changes in the farming system as a whole. In fact the changes in the cropping pattern are only a symptom of the deeper optimism. To understand the farming system it is necessary to examine not only crop productivity but other factors like ownership pattern, access to natural resources, employee – employer relations, livelihood strategies, farming practices and cultural practices as well.

SUGARCANE CUTTING PELASUR

In Pelasur tank, people migrate in groups as contract labourers to different places for sugarcane harvesting apart from their own village work. They are registered as a group in sugar mill. Age ranges between 15-55 years old. Since Pelasur is homogenous in cast group members might belong to one family. Working hour is between 6:00 a.m.

to 1:00 p.m. and this accounts including cutting time, loading and unloading of sugarcane bundles. In the middle, they take about 20 minutes for breakfast. After lunch they will return back home. Each group consists of 15 members and out of which six should be compulsory females. The reason behind this is a type of weed called "Aadu thinn pallai" can be cleaned only by ladies. During summer even school going children of the household join the group. All 15 labourers together could cut 1 acre of sugarcane within four days if yield is good (40 tons). They have regular job at least 20-25 days per month within the village or outside the village. If area to be harvested is less, labour surplus will be there and labour charge will be less and if area is more it needs more labor to harvest sugarcane which makes contractors to demand high labor charge. Since they registered in sugar mill landowners approach sugar mill to get laborers for sugarcane cutting and laborers were provided with ID cards and bank account number and the charge will be directed credited to their account every 10 days. A group can earn Rs. 170 per ton during surplus laborers and deficient work. A group can earn Rs. 240 per ton during surplus work and deficient laborers. So for 40 ton per acre the total amount they can get is Rs. 6800 to 9600 per acre. This amount will be equally divided among the group members irrespective of the gender. So, each one will get Rs. 500-640 as wage within four days. The same way if they prefer paddy labor work they can get maximum of Rs. 250 for the same 4 days. This is the major reason why they prefer sugarcane contract labor work. Apart from this they are also given 0.75 kg of rice and Rs.5 each as a daily allowance. One among the group is allotted for cooking food and taking care of the other laborers children. She is given an equal share in their income. Approximately each member in the group get 3 kg of rice for 4 days that is $3 \times 15 =$ Rs. 45 so total $500 + 45 + 28 = 573$ to $640 + 45 + 28 = 723$ for one acre of land. Suppose if they go outside the village as a contract labor they get even high wages of about Rs. 1000 per acre within the same 4 days. When they go outside the village usually they prefer a large area of 10-15 acres at a time which gives them job security for a whole month. Moreover the last day they will be provided non-veg food, dresses etc.

Before rehabilitation, even though this mini-contract labor system was prevailing it was not successful as after rehabilitation period since the sugarcane cultivation area was very less in Pelasur. They had to migrate to outside villages where woman might not involve much, but now since the group becomes stable inside the village they are allowed to go outside to do work. Parents are also sending their unmarried son or daughter because their children not only gain confidence but get extra income also. Construction of the road till tail reach is also a major reason for the change in the cropping pattern in Pelasur village. With availability of road most of the farmers turned from Paddy cultivation to sugarcane cultivation which leads to increase in contract labor group in Pelasur village. Before construction of road loading and unloading was very difficult and tractor cannot go nearer to the field which has to be stopped in the main road itself. So it needs extra laborers to bring sugarcane bundles to the tractor. In that case each ton cost Rs. 7 extra

charge i.e. 70 X 40 ton per acre = Rs. 280 for farmers per acre. Even though laborers were getting extra amount their health gets spoiled due to heavy load. So, creating an infrastructure development within the village helps both farmers as well as laborers. Not necessarily a gang leader should be a male. In Pelasur a female gang leader name Mrs. Muniamma of 55 years old is maintaining a group of 15 members from the same village. Among 15 members only 3 are male and remaining 12 are female. Sometimes she is getting help from her husband as one of a male member in her group when she goes for outside harvest work. She said loading of sugarcane into tractor is usually done by female in her group.

FISH REARING

Fish rearing is possible during the month March-April to May- June with available dead storage in tank near deepest sluice where sluice should be completely closed. Auction will be taken by the own villager by paying Rs.7000/- to Panchayat which will be used for minor tank repair works, whereas panchayat will pay Rs. 1500/- to government. No initial investment will be spending for fish rearing, since fish originates by its own during runoff. Self control of villagers prevents theft and damage to fishes as a result no special expenses have to be allotted for safety. Normally types of fishes reared in somangalam tank are Viral, Keluthi, Kendai, Katla and Jelabi. Expect Friday (auspicious day for Hindu religion) all the 78 days he catch fishes and sell it. Since he has his own family labour the entire benefits solely goes to him. On an average every day he can sell 3 kg of viral for Rs150/kg, 4 kg of katla for Rs 60/kg, 6 kg of Kendai for Rs 60/kg, 6 kg of Keluthi for Rs 20/kg. So gross income comes around Rs 86000/-. Some times he may have to give fishes to friends, relatives and higher officials at free of cost which makes to reduce 5% of his gross income. So net gain for the period of 3 months is Rs 80,000/- ie, 27000/month in post rehabilitation period. In pre-rehabilitation period since dead storage was available only 11/2 to 2 months his net income was only half the amount what he is getting now.

LIVESTOCK

Our country is predominantly an agrarian economy with more than 75% of the population in villages depending on agriculture, animal husbandry and allied activities for their livelihood. In fact Indian agriculture is an economic symbiosis of crop and livestock production and cattle is the foundation of Indian agriculture. It provides livelihood to 65% of the State's population and contributes 62% of employment generated in the State. Bullocks provide draught power and organic manure, which augments the crop production. Animal husbandry contributes significantly in supplementing the income of small, marginal farmers and landless labourers and in generating gainful employment opportunities especially self-employment to a substantial number of rural and urban population many of whom are women who play a major role in the care and management of livestock. It

serves as a vital source for providing nutritious protein rich balanced food in the form of milk, egg, meat and value added products. Moreover, they are also intricately associated with the social, cultural and traditional values of the region.

Support for Biomass development gives farmers the following benefits :

- Promote Organic farming,
- Raw material for Vermi-composting which is also a Micro Enterprise Development activity,
- Reduction of application of Agro chemicals,
- Humus creation in the lands,
- Supplementing food security,
- Moisture retention,
- No wind erosion,
- Last but not least drudgery reduction for women.

Droughts lead to drying of even healthy tanks. While agriculture is affected, the worst affected are farm animals that are dependent on these tanks for water. The first casualties of drought in India are farm animals. Farmers, unable to ensure drinking water to their animals go in for distress sale of animals including, cows, oxen, and sheep. Most of the cattle are headed for abattoirs, depleting a valuable source of milk, draught power and manure.. Although the number of tractors in rural India have increased manifold, cattle continued to be the main motive power for transporting people and produce in rural India, particularly in areas of acute poverty. Farm animals make a large contribution to family food security in small and marginal farming families. A major problem arising out of such depletion of cattle wealth is that farmers are forced to turn to tractors for tilling and transporting farm produce. This adds to the farmers' cost and makes their agriculture operation costly. Second, tractors are an avoidable luxury in petroleum –importing country like India that buys petroleum products worth tens of thousands of crores in a year. Third, the rising number of tractors also damages the environment in rural areas. Fourthly and crucially, depletion of cattle means less availability of manure, that force farmer to depend more on costly chemical fertilizers, making the agriculture unsustainable. Rejuvenating tanks would be the ideal answer to the problems stated above, and it can offset the effects of droughts in semi-arid areas. But this is an extremely costly and time consuming exercise.

CONCLUSION AND SUMMARY

Tanks in the Indian context are inextricably linked to the socio-cultural aspects of rural communities especially and are considered an indispensable infrastructure of each and every village for sustaining the socio ecological balance. The tank system, which have been developed ingeniously over a period of several centuries have provided insulation from recurring droughts and floods and vagaries of monsoon, and provided

the much needed livelihood avenue to the marginal and poor people living in the fragile semi-arid tropics.

The importance of tanks is being realised more and more, as the continued use of ground water and other large-scale water resources system is proving to be costly and inadequate to meet the increasing demands. So, the tank ecosystems have to be conserved to provide a safety net to the livelihood of millions who depend on these systems. The conservation of tanks has to be done considering the multiple uses such as irrigation, drinking water for people and animals and for recharging ground water. The tank systems also provide fuel wood and timber, fodder, silt, water for rearing fish, and animals and bio-diversity complex for flora and fauna.

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