
TANK BASED LIVELIHOODS AND COST EFFECTIVENESS – A STUDY

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CONTENTS

SECTION-I INTRODUCTION

Tank Systems and stakeholders
Need for reassessing the economics of tank resources
Objectives of the study
Methodology
Structure of the report

SECTION-II BRIEF PROFILE OF THE TANKS

Rayalacheruvu (Anantapur district)
Pedda cheruvu, (Dammannapet village, Warrangal District)
Yathalavank cheruvu (Neetiguntlapalli village, Chitoor district)
Pedda Cheruvu (Duribili village, Kurupam mandal, Vizianagaram district)
Komisettipalli Cheruvu (Komisettipalli village, Marpalli mandal, RR District)

SECTION III : TANK BASED LIVELIHOODS

Tank System and Stakeholders
Factors influencing stakeholder ship:
Mapping of different livelihood groups in sample tanks

SECTION IV: ECONOMICS OF TANK RESOURCES: INCOME FROM VARIOUS TANK DEPENDENT LIVELIHOODS

Assessment of Cost Benefit of tank systems
Cost Benefit and Cost Effectiveness
Methodology used for calculation of income from different sources
Income from various tank dependent livelihoods
Conclusion

LIST OF TABLES

TABLE 1: PROFILE OF THE TANKS
TABLE 2: DEPENDENT USERS IN NO. OF FAMILIES ACROSS SAMPLE TANKS:
TABLE 3: GROSS INCOME FROM AGRICULTURAL PRODUCE
TABLE 4: GROSS INCOME FROM LIVESTOCK
TABLE 5: GROSS INCOME FROM FISHERIES
TABLE 6: GROSS INCOME FROM SILT APPLICATION
TABLE 7: GROSS INCOME FROM AGRICULTURAL EMPLOYEMENT
TABLE 8: GROSS INCOME FROM VARIOUS TANK DEPENDENT LIVELIHOODS
TABLE 9: INCOME FROM AGRICULTURAL PRODUCE VS OTHER LIVELIHOODS

INTRODUCTION

The present study aims at understanding the wide range of stakeholders involved in a tank based system from the point of view of livelihoods. It also makes an attempt to quantify the benefits in economic terms that each stakeholder group is able to derive from the tanks.

Tank Systems and stakeholders

Tanks are a complex system constituting catchment, physical structure and canals as major components. Tanks have multiple uses and have a varied range of stakeholders who are dependent on the tank directly or indirectly. The variety of stakeholders directly or indirectly dependent upon these tanks include- farmers in tank ayacut area (with wells and without wells), farmers having wells/borewells outside the ayacut area but well within the area of influence of a tank, livestock owners, shepherds, toddy tappers, basket weavers, washermen, tank silt users and agricultural labourers. Tank systems have been serving as a source for irrigated agriculture. With the increased dependence of agriculture on ground water, the role of tanks has additionally become that of ground water recharge structures. Tanks aid in ground water recharge and this is tapped in the command areas by open wells and bore wells. Apart from the farmers in the ayacut of the tank, there are farmers with borewells and open wells outside the ayacut area but well within the area of influence of a tank. Landless labourers are also indirectly dependent on tanks as irrigated agriculture in the command area creates employment for them.

Tanks are a very important source for inland fisheries. Fisheries in tank systems is very much dependent on maintaining the optimum level of water. Often there is a conflict between the fishermen community and the farmers (both in the catchment and the command) over the timing of release of water from the tank and maintaining an optimum level of water in the tank.

Tanks are also an important source of water for important domestic requirements like drinking water for cattle, washing clothes and washing cattle etc. Women of the village are mainly involved in these activities. The tank foreshore area is important from the point of view of tree plantations and fodder cultivation for cattle. The fodder and firewood can be a good source of income for poor people in the village.

Thus it is important to understand that tank based livelihoods are not alone limited to agriculture alone but include a range of other livelihoods and stakeholders.

Need for reassessing the economics of tank resources

Traditionally, the Cost Benefit of tanks has been done based on the costs incurred while constructing the tank and then assessing the income that can be derived from agriculture in the command area based on a particular designed cropping pattern. The cost benefit approach considers agriculture produce related benefits alone. There are a range of other stakeholders and benefits that accrue from an irrigation tank as has been listed above. A newer and better approach needs to be adopted for assessing the cost and then comparing it with the resultant range of benefits. There are a range of benefits that can be classified as intangible benefits. These however need to be expressed in economic or monetary terms so that the total sum of benefits that accrue from a tank system can be rationalised thus increasing the benefits that a tank system offers.

There is a need for reassessing the economics of tank resources such that a more relevant and broad range of benefits are documented for a given tank. Listing the benefits that stakeholders in a tank system derive will help in understanding the value of a tank system. This documentation of the economics of tank resources will make it necessary to collect and utilise the required amount of financial resources for maintaining a tank system in proper condition.

The state has the highest number of tanks in the country that can be classified as Minor Irrigation tanks and Panchayati Raj tanks. There is however a scope to construct new tanks in hilly and tribal areas of the state. Understanding tank resource economics helps in assessing the contribution of tanks in the present economy and the need for new tanks in areas where there is a scope. Recognising the need for comprehensive study assessing the economics of tank resources Irrigation & CADA department, Govt of Andhra Pradesh has commissioned the present study.

OBJECTIVES OF THE STUDY

The main objectives of the study are

- To understand the wide range of stakeholders involved in a tank based system from the point of view of livelihoods.
- To quantify the broad range of benefits in economic terms that each stakeholder group is able to derive from the tanks.

Methodology

The data presented in this report is mainly based on primary data collected from different stakeholders from five tanks spread over different agro climatic zones of Andhra Pradesh. The names and location of the tanks are as follows. Peddacheruvu

(Dammanapet village, Warangal district), Komisettipalli tank (komisettipalli village, Rangareddy district), Yatalavanka cheruvu (Neetiguntlapalli village, Chitoor district), Rayalacheruvu (Rayalacheruvu village, Ananthapur district) and pedda cheruvu (Duribali village, Vijayanagaram district). For data collection PRA techniques like Transact walk, resource mapping, timeline analysis, focus group discussion with different tank user groups, semi structured interviews with individual farmers. The detailed methodology used for calculating income from different livelihood activities dependent upon tank is given in section four.

Structure of the report

The report is divided into four sections. The background and rationale for present study, study objectives, methodology is discussed in section one. Section two presents brief profile of the tanks selected for this study. Mapping out different users under tank and how they make use of tank is discussed in section three. In final section detailed economic analysis of different livelihood activities depending on tank is presented.

SECTION-II BRIEF PROFILE OF THE TANKS

Rayalacheruvu (Anantapur district)

The history of Rayalacheruve goes back to five centuries in the period of Sri Krishna Devaraya. The village Rayalacheruvu also came in to existence as a result of agricultural activities created by this tank. The tank is located two km from the village and the village itself is situated on the main road connecting Gooty to Tadipatri.

The bund of the tank is 1.8 km long with two waste weir and two sluices. The catchment area is spread to 112 km. The water comes to the tank through two feeder channels. The tank has a gross capacity of 625 MCM.

The designed Ayacut for this tank is 900 acres , whereas actual is 647 acres. The water is supplied through four channels, nine km in length, in the command area. Around 300 acres has the facility of wells and bore wells in the command area. The principal crops of this tank are paddy, sunflower and groundnut. Presently 249 farmers own land in the command area. The tank bed is also used for cultivation and an area of 50 acres is encroached. In the catchment area 22 check dams and one percolation tank has been constructed. According to the farmers the tank receives full water once in 4/5 years.

The tank is presently in a working condition. The tank bund is strong and well made. Out of two sluices one is in working condition and another is not functioning because of heavy silt accumulation. Waste weir are in good condition but need minor repair. The main feeder channel of the tank is heavily clogged due to which water flow is effected. The tank bed is found to be heavily silted up to a level of 24 feet. The heavy tree growth in the tank bed is another problem though it is presently providing significant support to the village livestock.

The WUA was formed in 1996 to manage the water distribution and take care of tank and solve its problems. The present president is Mr Uppara Sanjappa who was elected 2 years back unanimously in the last election held in 2005 April. The Ayacutdars elect the president as well as the T.C members. There are 6 TC members in the WUA and all are men.

The WUA has received a total of 17 lakhs since 1998 for construction, repairs and silt removal. There is still lot more to be done in the tank.

Rayala Cheruvu village where tank is situated is on the main road which connects Gooty To Tadipatri in Anantapur district. It has a total number of 1298 house holds with a population of 5885 members, out of which 2983 are male and 2902 are females. SC

population is 393,ST is 36 and muslims 750. There are 1845 male and 1118 female literates.

The village has a good infrastructure. Since it is situated in the main road so the transport facility is good. There are two high schools, six elementary schools, one drinking water tank, one primary health centre and five private hospitals. There are two AWC as well. Many petty shops exist along with few small industries. The village is also connected to the railway line.

Pedda cheruvu, (Dammanapet village, Warrangal District)

According to one villager the Pedda Cheruvu tank of Damannapet village belongs to Kakatiya times and according to another, it is two hundred years old. Most of the villagers were unable to trace out its history and every body says it is quite an old tank. In the recent history the tank was managed by village Panchayat with the support from the government. After the formation of new bodies like WUA, the water management systems are changed. The bund of this tank is one km long. The height of the bund is around 25 feet but it has a better carrying capacity. The catchment area is spread to 25 sq km. The water in the tank comes from three main feeder channels presently, though there were other channels which are blocked now. This tank has one waste weir and three sluices.

The tank's bund is in good shape but tank sluices need major repair. The waste weir also needs minor repair. The feeder channels are heavily blocked. The tank bed area of around 30 acres is heavily silted despite the regular desiltation work undertaken in the last four years. There is also a growth of trees in the tank bed which takes up around 20 acre.

The designed Ayacut of the tank is 223 acres whereas actual is around 300 acres. Three canals from the tank irrigate the command area. There are 10 kuntas and five borewells in the command area. The principle crops are paddy, cotton and chilli. In the command area most of the land belongs to Dammanapet villagers. Farmers from Rayapalli, Roopreddy palli, Rangaiah palli, Rekonda also possess land.

WUA was formed in 1997 according to the new rules of the irrigation department. Presently Mr Kesanna is the president. He was selected unanimously in the last meeting held in January 2006. Out of six executive members five belong to BC and one belong to OC. The WUA is actively involved in water distribution activity but feels difficulty in mobilizing the officials and the finances for the repair of the tank. As a result despite the desilting activity and other repairs the tank's sluices have not been repaired. The president was worried that if there is a good rain then a lot of water will be wasted.

Village: Damannapet village is situated in Renokonda mandal of Warangal district. It has 530 house holds with a population of 1841 individuals out of which 937 are males and 904 females. In the village 35 house holds belong to OC, 350 belong to BC, 130 are SC, 12 are ST and 3 muslims. In the entire population 290 house holds own lands and the rest are landless. As a result a lot of non agricultural livelihood sources are found in this village. There are toddy tapers, fishermen, washermen, grazers, barbers, weavers, blacksmiths, petty shop owners, agricultural labour and a few private employees. Around 250 house holds also own 350 cattle.

The infrastructure in the village consists of one primary school, one PDS shop, one water tank for drinking water and two AWC. The village is connected with a good road but the transport facilities are insufficient, also there is no hospital and veterinary centre.

Yathalavank cheruvu (Neetiguntlapalli village, Chitoor district)

The tank was constructed 25 yrs back around 1980 .before the present tank a small kunta existed which used to serve a very small need of the village . After the Construction of the new and bigger tank, it was named as yathalavank cheruvu. This tank is located at Neetiguntlapalli in Pungunuru Mandal of Chitoor dist .this tank Transformed the village economy in significant way by irrigating a large area of the available land.

The tank is having a bund length of 240 meters and a storage capacity for three months. The gross water level is 30 feet and the live capacity is 25 feet. The Catchment area is spread to 15 sq km. The water in the tank comes through 6 feeder chancels. It has only one sluice and one waste weir Water at present is spread to an area of 5 acres in the tank bed.

The tank is presently in good shape. The tank bund is fairly good. The tank sluice is clear. In 2000 the waste weir was repaired and in 2003 breach in the tank bund is filled by the Irrigation department by the spending 1,40,000 rupees in the same year 250 tractors silt removed.

The designed Ayacut of this tank is 113 acres and actual is 138 acres. In command area the water channel is around 2kms. There are 46 borewells found in the command area. Water tank management is done by Neeruganti. The principle crops are paddy and tomato in both Khariff and Rabi. In this command area, three villages holds a land. The main village i.e, Nethiguntlapalli possess 77 acres in the command area, where as Yerranguntlapalli posses 13 acres and Korravuru posses 48 acres.

A W.U.A exist in the village since 1997 to manage the tank and water distribution. Water distribution management is the main function of the W.U.A. The Neeruganti works in close association with W.U.A. Which inturn cuonults the village elders apart

from the members. Neeruganti and W.U.A becomes active when monsoon is good and there is water in the tank. There are totally 6 educated members out of which 2 are female (O.C) and 4 are male (B.C), the other members are 46 (Total 56+6=62). The last elections were held in February 2006 in which B.Srinivas elected as president unanimously.

Village: The village Nethiguntlapalli is situated 20 km from Madanapalli in the Punganur Mandal in Chittoor district. The population of the village is 317 out of which male are 159 and female are 158. The literate are 92 men and

Pedda Cheruvu (Duribili village, Kurupam mandal, Vizianagaram district)

The Pedda Cheruvu tank is located in the Duribili village, Kurupam mandal, and the village itself is situated 30 Kms from parvathipuram and 2 kms away from main road. The Pedda Cheruvu is constructed in 1973 by Girijan Development Agency.

The length of the tank bund is 300mts with one waste weir and one sluice. The catchment area is spread to 1.5 kms. Water comes to the tank through one feeder channel and from the hillocks. The tank has a gross capacity of ---.

The designed Ayacut for this tank is 102 acres, whereas actually it is irrigating 19 acres. The water is supplied through one channel in the command area. There are no bore wells and wells for agriculture purpose in the command area. The principal crop under the tank is only paddy. Presently 21 farmers own land in the command area. The tank bed is not used for cultivation. There are no constructions in the catchment area for water storage.

The tank is presently in a working condition. The tank bund is moderately dilapidated. Sluice is not working and need replacement. Waste weir is in good condition, but covered with silt. The feeder channel of the tank is heavily clogged due to which water flow is affected. The tank bed is found to be heavily silted. The heavy tree growth in the tank bed is another problem though it is presently providing significant support to the village livestock.

There is no WUA formed to manage the water distribution and take care of tank and solve its problems.

Village: Duribili is a tribal village and has a total number of 53 house holds with a population of 292 members, out of which 140 are male and 152 are females. There are 70 male and 60 female literates.

The village has the following infrastructure. Since the village is situated two kms away from the main road, so there is no transport facility. People have to travel two kms on

walk to catch the bus. There is one primary school, one Anganwadi School. Electricity is there, but having low voltage problem. There are two bore well for drinking water, but one is not using as the water is not good. There is one open well, which is using for drinking water and for other domestic purposes. In this village VISHWAS one organisation supported to this village in constructing toilets and latrines for each households. So every household has toilet and latrine. The same organisation has supported for constructing shed for cattle, 43 households have allotted cattle shed and remaining 10 households to be allotted. These cattle sheds were constructed with 50% of community contribution in labour form.

Komisettipalli Cheruvu (Komisettipalli village, Marpalli mandal, RR District)

Komisettipalli tank was constructed in 1986. The tank was constructed on a live stream to cater the needs of five villages. Komisettipalli village is one among them. The other villages are Bilcal, Tummalappali, Bodara and Ibrahimpur. This independent tank has relatively larger water carrying capacity. It has 1.4 Mcm gross capacity where as the live capacity is 1.05 Mcm. But according to villagers in 20 years of tank `s history tank reached its full capacity in 2005-06 year only. It is supposed to irrigate 1222 acres according to designed ayacut but currently it is irrigating only 358 acres. The catchment area is spread to 19.8 sq miles. The water comes to the tank through the main stream which is connected to other smaller feeder channels. The bund of the tank 1.4 km long with two sluices. Out the two oly one is functioning and the other is higher than the surface of the normal water storage so most of the time it is non functioning. The height of the bund is 11meters and dead storage capacity is also large with which farmers in the ayacut do not seem to be much happy and perceives that lot of water gets wasted. But households dependent on fisheries and livestock are satisfied. The command area is connected with a vast net work of water roots connected to the two main cannels. The functioning one is 8.4 Km long and supposed to irrigate around 800 acres where as the second canal 1.8 Kms long with a plan to irrigate around 400 acres. The tank is in good condition since it is newly constructed expect one non functioning sluice other parts of the tank are found to in good condition. Several farmers in tail end ayucut have digged borewells to irrigate their lands. The number of bore wells in tank command area in Bilcal village are more. The principal crops grown in tank command area include paddy, onion, tomato and turmeric.

TABLE 1: PROFILE OF THE TANKS

Particulars	Dammnapet	Duribili	Rayalacheruvu	Yatalavanka	Komsetty pally
District	Warangal	Vijayanagaram	Ananthapur	Chittoor	Ranga Reddy
Year of construction	200 years old	1973	1509	1980	1988
Type of Tank	Independent	Independent	Independent	Independent	Independent
Catchment Area	25 sq km	1.5 kms	112.57 sq miles	15 kms	19 sq km
Water Spread Area	30 acres	5 acres	450 acres	15 acres	30 acres
Designed Ayacut (acres)	223	102	900 acres	112	1223
Present Ayacut (acres)	223	19	647 acres	138	358
Tank Bund Length	1 kms	300 mts	1.8 kms	240 mts	1.4 km
No. of Sluices	3	1	2	1	2
No. of Waste weirs	1	1	2	1	1
No. of feeder channels	3	1	2	6	1
No. of Wells	5	0	0	0	0
No. of Bore wells	2	0	100	46	28
No. of Ayacutdars	150 (present)	21 (present)	249 (present)	62 (present)	256 (present)
Current Physical status	Sluice and waste weir need repair; feeder channel clogged; and heavily silted	Silted tank bed; Sluice not working; Feeder channel clogged	One sluice is blocked due to silt; feeder channel is clogged; and silted up tank bed	No problems	Field channel was silted heavily, left sluice constructed high so water doesn't reach to field. The waste weir constructed down level.
Principle crops	Paddy, Cotton, Chilli	Paddy,	Paddy, Sunflower, Ground nut	Paddy, Tomato,	Paddy, Onion, Turmeric.

SECTION III

TANK BASED LIVELIHOODS

Tank System and Stakeholders

Tank is considered as an important resource for rural people. It is not merely a physical phenomenon. It is a social object too, for it is at the centre stage of an agrarian and quasi-agrarian economy and society. Tank fulfils multiple livelihood needs in an area by supporting different users. A range of users, thus, depends on the tank either directly or indirectly. The stakeholders of tank therefore are not merely those owning land in its command area. Generally, the stakeholders are wider and tend to be more dependent if the tank is located closer to the village settlement.

From time immemorial the tank was considered as a property of the community. In village level consultations that were held, the tank in almost all the villages is seen essentially as something that concerns not only those owning land in the command, but also other dependent users. However, when the tank has fallen into disuse there is a narrowing down of stakeholdership. Just to illustrate the ideal sense of stakeholdership, we may list the following:

- The cattle herders in the past considered tank as a community asset. For, it was at the tank bund or the foreshore areas that village cattle were assembled in the morning, from where they would be led to the wasteland or the forest beyond the tank for purposes of grazing.
- The cattle herder had a customary right to collect the droppings and sell them thrice or four times a year to the highest bidder in the village.
- The tank served as the common most water point for all animals bound out of or into the village. Customarily, the tank had to maintain a dead storage of water to cater to the needs of the animals.
- Likewise, the potter, washer-man, and several other artisans in the village community depended upon the tank for their livelihood.
- There is varied dependence of command farmers based on (1) Those with alternative sources of irrigation and those without, (2) Those in the head, mid-or the tail-end region, (3) Those owing land in the high lying or low lying areas or the command, (4) Farmers with varying extent of land in the command, and (5) those engaged in tank bed cultivation.
- To the list of stakeholders, we may also women who may own land in the command, engage in wage labour, depend on tank for domestic use, etc. It was stated by women that more the duration of water availability in the tank, less is the burden on the women.

Factors influencing stakeholder ship:

Of the five tanks, the tank in Dammanpeta seems to have a wide variety of users. People have stated that availability of Tank would enhance other resources required for local livelihoods. For example, water and grass for cattle grazers, palm trees for toddy tapers as well as basket weavers and so on. Therefore, the nature and type of user dependency on tank is more related to resource base a tank could nurture. The role of people in enhancing resource base is also evident from Rayala Cheruvu (Anantapur). The plantation of trees in tank bed has larger impact on the livelihoods of small ruminant owners.

The vitality of tank is directly related to water inflow. This will in turn determine the user dependency. There is thus relation between water inflow and extent of dependence of different livelihood users. In the words of people– ‘tank should not be considered lying idle just because agriculture has failed in particular year. Even in such years, a number of other users make their living depending on tanks. Of course, there is variation in income of each user based on duration of water availability in the tank’. For example, in DURIBILI (Vijayanagaram) the livestock owners depend on tank for water through out the year. In this case even though the size of the tank is smaller than other sample tanks, it is supporting more number of livestock.

The size and extent of dependency on tank can be better understood by looking into the following aspects.

- Tank size (storage capacity) would determine the command area. Similarly size of other users will depend on availability and quantum of a particular resource.
- It appears that number of dependent users on each resource of a tank would depend on size of particular occupational category. For example, existence of 100 toddy tapers in Dammana peta has resulted in sharing the palm trees among them.
- Overall income from a resource is directly related to productivity and quantity of a resource, while extent of household dependency on a resource is related to number of users in each user category. Thus a contractor has engaged two households from neighbouring village in Duribili tank for toddy tapping covering 30 trees.

The utility of tank is dependent on local community involvement in resource development, facilitation of civil society organisation and access to government programmes. There is a scope to improve utility of a tank in case of tank in Duribili (a tribal village located at foot of hills).

Mapping of different livelihood groups in sample tanks

Command Farmers

Command Farmers are important constituents of tank. It generally viewed that the tank as something that concerns only those owning land in the command. The dependency varies among farmers. Farmers with bore wells in command areas not only draw tank water, but also gain additionally from recharge of ground water. Farmers with bore wells in influence zone also benefit even though they do not have direct stakes in tank. Several farmers (mostly landless families) engaged in tank bed cultivation also depend on tank for their livelihoods. While framers in tail end with water shortage going for dry land agriculture, some others are sinking wells/bore wells for protected irrigation.

Table 2: Dependent Users in No. Of families Across Sample Tanks:

NUMBER OF USERS	DAMMNNAP ET	DURBLI	RAYALA CHERUVU	YATALA VANKA	KOMSETTYPALLY CHERUVU
Agriculture	150	21	249	62	350
Fisheries	18	10	12	6	60
Live stock	200 (300 cattle)	80 (350 cattle)	100 (200 cattle)	40 (82 cattle)	200 (400 livestock)
Sheep/goat	-	48 (300 cattle)	70 (2000 sheep and goat)	8 (700 sheep)	80 (5000 livestock)
Agricultural wage employment	150	10	200	60	250
Toddy tapping/ Toddy trees selling	100	2	-	-	-
Basket weaving	16	-	-	-	-
Washer man	30	-	-	1	-
Silt application	200	-	150	12	-
Service providers	5	-	-	1	-

KomsettypallyCheruvu has more number of command farmers (as well as more command area) followed by Rayalacheruvu, Dammanapet and Yatalavanka. Duribili (in tribal area) has just 21 command farmers; and the need here is to further develop feeder channel, tank bed and water spread area in order to improve tank utility. The productivity is lower in Duribili compared to other sample areas, where farmers belong

to tribal community. Whereas as command farmers in other three tanks belongs to different caste groups.

In the majority of sample tanks farmers are raising one crop. However, there was second crop in part of the command area under Dammanapeta tank during 2005-06. The farmers have also recently have agreed to cultivate 70 acres every year on rotational basis to cover all the command areas over a period of 3-4 years. Farmers have reported crop loses (even in Khariff season) due to late inflow of water into tank.

Fisheries activity

Fisheries activity was found in all the sample tanks. The dependent households on fisheries are more in Komsettypally Cheruvu followed by Dammanpet, Rayalcheruvu. We collected data for three years. Fishery was taken up for all the three years in Dammanapet and Duribili; and two years in Rayalcheruvu and one year in Yatalavanka. The productivity was found higher in Duribili and lowest in Rayalacheruvu.

Livestock (Bovines)

Livestock was an important activity that was observed across sample tanks. Though number of households depended on cattle is less in Duribili, it has highest cattle population among sample villages. It may be due to availability vast grazing areas. It means the tribals have more dependency on livestock; and milk is used for self-consumption. On the contrary the big tanks like Rayalacheruvu and Dammanpeta have less number of cattle depended on tank.

Small ruminants (sheep and goats)

There is greater dependency on tanks in Komsettypally Cheruvu, Duribili and Rayalacheruvu in relation to small ruminants. In Komsetty pally the dependency on tank for this activity is more where 5000 numbers of 9 villages are using water from this tank. In Duribili, the dependency on tank is for water, while in Rayalacheruvu it is for trees in tank bed during drought period. It is also evident that tanks act as important support system for small ruminants in drought affected areas.

Agricultural wage employment

Agricultural wage employment is an important source of livelihood in all the sample tanks. Increasingly agricultural operations are feminised. It means increase in number of women participating in different operations. They will suffer most during scarcity year.

Toddy taping

Taddy tapping was found in two tanks. Almost 100 households are dependent in Dammanpeta; and activity will go on for more than 8 months. In this viallge In case of Duridili Toddy tapping was managed by contactor by employing two households; and these households make living based on this for two month.

Basket weaving

Basket weaving was found in Damanpeta. At least 16 families work for over three months. The raw material will come from palm tree located in tank. During the rest of the time they engage in wage labour. The demand seems to be coming down over years for this product in local area.

Washer-man

Washermen dependency on tanks was found in Dammanapeta and to a small extent in Yatalvanka. In Dammanapeta 30 families and one family in Yatalvanka are dependent on tank. They depend on tank for seven months. When tank dries up, they travel 4 Kms for carrying out activity.

Silt application

Silt application was found in Dammanapeta and Rayalaeruvu. In case of Dammanapeta a large-scale investment was made by MARI and Bala Vikas. The practice of applying silt in dry land areas was found in both these areas. The total number of dependent households is 200 and 150 in Dammanapeta and Rayalaeruvu respectively.

Service providers

Farmers have been relying on Neerugnati for water management under tanks. During scarcity periods these families have to find alternative employment.

SECTION IV

ECONOMICS OF TANK RESOURCES: INCOME FROM VARIOUS TANK DEPENDENT LIVELIHOODS

In the preceding section an attempt was made to map out range of stakeholders dependent upon on tank from the point of view of livelihoods. The analysis clearly indicates that tank has a multiple uses and has a varied range of stakeholders who are dependent on the tank directly or indirectly. The present section aims at quantifying these benefits in economic terms that each stakeholder group is able to derive from the tanks.

Assessment of Cost Benefit of tank systems

Traditionally, the Cost Benefit of tanks has been done based on the costs incurred while constructing the tank and then assessing the income that can be derived from agriculture in the command area based on a particular designed cropping pattern. The designed cropping pattern is decided based on the availability of water in the tank and the area that it can irrigate. The benefits from a tank system traditionally only consider the benefit from agriculture which is based on the number of acres that will be irrigated per mcft of water available in the tank. Over a period of time this has resulted in enhancing the acres irrigated per mcft in order to show that the benefits from agriculture in tandem with the costs incurred. However, this may not be achieved at the field level. As a result there is a gap created in the area irrigated with the available quantity of water. As a result of this a gap in the irrigation potential is created between the designed ayacut and the actual ayacut.

Cost Benefit and Cost Effectiveness

The cost benefit approach considers agriculture produce related benefits alone. There are a range of other stakeholders and benefits that accrue from an irrigation tank as has been listed in the previous section. A newer and better approach needs to be adopted for assessing the cost and then comparing it with the resultant range of benefits. There are a range of benefits that can be classified as intangible benefits. These however need to be expressed in economic or monetary terms so that the total sum of benefits that accrue from a tank system can be rationalised thus increasing the benefits that a tank system offers.

METHODOLOGY USED FOR CALCULATION OF INCOME FROM DIFFERENT SOURCES

Income from Agricultural produce

Water is a critical input for crop production. For estimating the total value of agricultural output (crop and crop by products) from the lands in ayacut area getting water directly from the tank through surface or through wells/borewells situated in the ayacut area and area under tank bed cultivation first the break up details of crop wise ayacut area irrigated by the tank canal, area under wells/borewells in the command and area under tank bed cultivation were obtained. To get per acre average out put of different crops and market value of these crops a sample survey of four to six farmers located in different parts of command were conducted. After arriving at average income from each crop, the total income was calculated by multiplying crop area with average crop income. The total agriculture income for each year was obtained by adding income from different crops. Crop details and income for three years were obtained to calculate average agriculture income in tank.

Income from Livestock (Bovines)

In this case inputs received by livestock from tank in the form fodder, water, collection of green fodder from bunds and wages earned by grazers were taken into consideration. To arrive at cost of green grass we have obtained number people involved in collection of green grass, number of days and quantity collected by each person per day. In addition, the local cost of green grass per kilogram was also obtained. Wages of grazers were calculated by obtaining number animals and number of days animals taken for grazing and wages paid per animal per year. The cost of water was calculated by collecting data from people on water consumed per day by each animal, how much each animal drink at home and how much in tank. The time taken for fetching water to animal each time was calculated and converted into total time spent in a year. The time thus obtained was converted into wage days and by multiplying with local wages, we have obtained cost of water for each animal. We have obtained total water cost consumed by animals by multiplying water cost per animal with total animals depending on tank.

Income from small ruminants (sheep and goat) income

In this case we have calculated income per household per year in the form sales of animals. We obtained animals soled per household per year and cost per animal. It was assumed that 20 per cent of animals are soled every year from the total population of every household or population dependent on tank. The annual income from small ruminants was obtained based on total days these animals depended on tanks.

Income from Fisheries

After collecting number of families directly engaged in fisheries activity in the tank, overall investment made in fisheries activity was collected. The items included under

investment include seeds, net, labour and cost of watcher. Then details were also collected on fish yield per day, which was multiplied with number of days to arrive at total gross income. Income for three years was obtained to calculate average income from fisheries.

Income for agriculture labour

To calculate wage income we have obtained information for three year on area under different crops, total day of labour for each crop and wage rates for each operation were obtained. The labour cost per acre per each crop was obtained by multiplying total days of employment with wage rates. The total wages per crop was multiplied with crop area to arrive at wage income generated by each crop. The wage incomes from all the crops were added to arrive at total wage income per year. The average wage income was obtained from using three years information.

Income from toddy trees

To calculate income from toddy trees the following information was obtained: Total households depending on trees located in tank, total number of trees, average yield per tree per day and number days tree give toddy. To arrive at annual income from toddy the yield of toddy per day was multiplied with number of trees and with cost of toddy. Income from toddy for three years was obtained to arrive at average income.

Income from basket weaving

The total number of households depended on basket weaving and number of days in year they engaged in this activity were obtained. The number of basket weaved during the year was multiplied with cost per basket to obtain income per family, which was further multiplied with number of families to arrive at annual income. Income from three years was used to calculate average income of basket weavers.

Income for washer-men

To calculate income of washer community we have obtained information on number of households depending on the activity, number household they provide service, payment per household (both in cash and kind- food, paddy/ cash). The income for each household was obtained by multiplying number of households served with payment per household. To obtain income for washer community the income of each household was multiplied with total number of households depended on the activity (by calculating for number of days a family depended on tank). Using data of three years the average income was obtained.

Income for Service providers

To calculate income of Neerganti we have obtained information on number of households depending on the activity, number of farmers they provide service, payment per acre (both in cash and kind). The income for each Neerganti was obtained by

multiplying number of acres with payment per acre and with total number of Neerganti. Using data of three years the average income was obtained.

Value of silt applied on farms

Tank silt is considered as a valuable input (fertiliser) for crop production. It not only improves the fertility of the land and also enhances soil moisture. Based on the experience farmers reported that three tractor loads of silt (each tractor load is 2.5 cm) is equalant to fertilisers worth of Rs. 4000. If they apply 30 loads of silt to one acre of land it will reduce their fertiliser cost by 50% in first year and 25% each in second and third year. The per acre average expenditure on fertiliser is estimated as Rs. 4000.

INCOME FROM VARIOUS TANK DEPENDENT LIVELIHOODS

The analysis of gross total income from different livelihoods based on tank clearly indicates that there are variations from tank to tank and variations within tanks across the years. Three years data i.e 2003-04, 2004-05 and 2005-06 was collected for assessing the performance of tank in different water availability situations (good, average and bad year in terms of water inflows and availability of water) in supporting various types of livelihoods. The year 2003-04 was a severe drought year and water inflows into most of the tanks studied was very less. In contrast 2005-06 there was good rain fall and water inflows into tank were good. 2004-05 represents average situation. The below we present the data on income from different livelihoods based on tank across five different tanks for three years and explanation for variations observed between these tanks..

Income from agricultural produce

One of the key functions of tank is to provide irrigation water to the agricultural fields through surface channels and also recharging ground water which helps irrigation wells and bore wells to provide irrigation to the fields. Table 3 presents gross total income from agricultural produce (crop plus crop by products) in different tanks across three years. The gross total income from agricultural produce varied significantly between tanks and also within tanks across the years. The variations in income are due to factors like size of the tank, size of command area and cropping pattern. Except in the case of tank in Vijayanagarm the average income for three years from agricultural produce from all other tanks accounted for more than 40% of the total income from tanks (43.9% in case of Warangal tank 65.2% in Aanathapur tank , 79.5% in Rangareddy tank and 91% in Chittoor tank). The tank in Vigayanagarm is located in tribal area and has very small command area (21 acres). The productivity of crops in this tank also is relatively very low compared to other tanks. The proportion of income from agricultural produce is very high (91%) in Chittoor tank. The reason being the crops grown in this tank are high value commercial crops like tomato and sugarcane . Further tank has

received good inflow in all the three years as it has large catchment with out any obstructions.

Within tanks also there are significant variations in total income between different years. The income from agricultural produce is very low in 2003-04 compared to 2004-05 and 2005-06. 2003-04 being a severe drought year has adversely affected the crop out in most of the tanks. Water inflow into tanks was very less and no water was released for crops from the tanks in Ananthapur, Rangareddy and Warangal. No crop was cultivated in much of the tank command areas of these tanks. Only the farmers having wells and borewells in the tank command area could cultivate small area in this year. The only exception to the above pattern is tank in Vijayanagarm. Being a very small tank with good catchment area the tank in Vijayanagarm was not very much effected by drought.

In case of tanks in Rangareddy and Vijayanagaram there is greater scope to enhance the income from agriculture with small investments. Both these tanks have good catchment area and water inflows even during drought years is good but both of them are under performing (21 acres is irrigated out of 110 acres of designed ayacut in case of Vijayanagaram tank and 350 acres out of 1200 designed ayacut in case of Rangareddy tank) due to problems to physical structure. In both these tanks water is available in tank bed during most of the months in year but surface irrigation is restricted to short period and that to covering small portion of tank ayacut in head reach due to heavy siltation in field channels in Vijayanagarm tank and construction of sluice above tank bed level and siltation in filed channels in case of Rangareddy tank.

TABLE 3: GROSS INCOME FROM AGRICULTURAL PRODUCE

Item	Gross total income			Average for three years
	2003-04	2004-05	2005-06	
Tank (Warangal)				
	2003-04	2004-05	2005-06	
Income from agriculture produce	300000	978000	4491040	1923013
AG income % to total income	(6.77)	(41.4)	(70.8)	(43.9)
Tank (Vijayanagarm)				
Income from agriculture produce	81567	69977	7300	52948
AG income % to total income	(26.95)	(23.1)	(2.7)	(18.1)
Tank (Ananthapur)				
Income from agriculture produce	1775000	4378750	7672500	4608750
AG income % to total income	(48.57)	(62.19)	(73.0)	(65.2)
Tank (Chittoor)				
Income from agriculture produce	3163250	3658750	7946970	4922990
AG income % to total income	(93.41)	(89.7)	(92.84)	(91.61)
Tank (Rangareddy)				
Income from agriculture produce	4981900	5199760	7836000	6005887
AG income % to total income	(78.04)	(76.34)	(82.87)	(79.55)

Income from Livestock

The dependency of livestock (both big cattle and small ruminants like sheep and goat) on tank was observed across all the tanks. Tank is a source of drinking water for cattle and green grass available on tank bund and field channels provides fodder to the livestock. There is a greater dependency on tanks in Rangareddy, Vijayanagarm and Ananthapur in relation to small ruminants. In Rangareddy the dependency on tank for this activity is more where 5000 numbers of nine villages are using water from this tank. In Vijayanagarm the dependency on tank is mostly for water, while in Rayalacheruvu it is for trees in tank bed during drought period.

Table 4 presents gross total income from livestock dependent upon tank in different tanks across three years. The average income for three years from livestock accounted for 7.7% of the total income from tank in Warangal, 7.1% in Ananthapur, 13.9% in Rangareddy and 2.5% in Chittoor. In case of Vijayanagarm this proportion is very high i.e 55.9% of the total income from the tank. The dependency of livestock on tank is very substantial in Vijayanaram. The per family cattle population is found more in Vijayanaram tank and it is located in tribal area where livestock play an important role in the economy of tribal people.

Compared to heavy fluctuation in agricultural income in different years across the tanks as explained above the year wise fluctuations in income in case of livestock is very marginal. The dependency of livestock on tank particularly during drought period is very high. Though drought in 2003-04 severely affected the agricultural income it has made little impact on livestock income.

TABLE 4: GROSS INCOME FROM LIVESTOCK

Item	Gross total income			Average for three years
	2003-04	2004-05	2005-06	
Tank (Warangal)				
Income from livestock	115000	218000	425320	336773
% to total income	2.58	9.23	10.7	7.7
Tank (Vijayanagaram)				
Income from livestock	161182	161182	169364	163909
% to total income	53.1	52.1	62.0	55.9
Tank (Ananthapur)				
Income from livestock	414500	437000	660000	503833
% to total income	11.3	6.1	6.3	7.1
Tank (Chittoor)				
Income from livestock	121700	132250	150378	285113
% to total income	3.4	3.1	1.7	2.5
Tank (Rangareddy)				
Income from livestock	1007500	1007500	1131250	1048750
% to total income	15.93	14.9	11.9	13.96

Income from Fisheries

Tanks are a very important source for inland fisheries. Fisheries activity was found in all the sample tanks. The dependent households on fisheries are more in Rangareddy tank followed by tank in Warangal and Ananthapur. Fisheries in tank systems is very much dependent on maintaining the optimum level of water. The year wise variations in come from fisheries is partly due to water availability in tank but much of the variations is due to management problems. For instance in Warangal the income from fisheries increased from Rs 25000 in 2003-04 to Rs.91000 in 2005-06 (Table 5). In 2005-06 the fisherman dependent upon tank in Warangal decided to put some investment and brought fish seedlings from fisheries department and raised them in tank bed. This has improved fish productivity in tank and fishermen received additional income. It is observed that in all most all the tanks there is a scope for improving fishing activity and improve the incomes of fisherman families dependent upon tank. Currently much of the income from fishing activity in tanks is corned by middlemen contractors who advance loans to fisherman. Proving inputs in terms of seedlings and feed and marketing facilities can eliminate contractors and help fisherman to improve their incomes.

TABLE 5: GROSS INCOME FROM FISHERIES

Item	Gross total income			Average for three years
	2003-04	2004-05	2005-06	
Tank (Warangal)				
Income from fisheries	25000	35000	91000	50333
% to total income	0.56	1.48	1.43	1.15
Tank (Vijyanagaram)				
Income from fisheries	42000	52500	75000	56500
% to total income	13.88	17.35	27.45	19.3
Tank (Ananthapur)				
Income from fisheries	-	-	30000	10000
% to total income	-	-	0.28	0.14
Tank (Chittoor)				
Income from fisheries	-	60000	60000	40000
% to total income	-	1.47	0.7	0.74
Tank (Rangareddy)				
Income from fisheries		210000	100000	103333
% to total income		3.1	1.05	1.13

Income from silt application

Tank silt is considered as a valuable input (fertiliser) for crop production. It not only improves the fertility of the land and also enhances soil moisture and water retention capacity of the soil. Application of silt on farmlands is a traditional practice observed in all most all the tanks in the past but in recent years this practice has declined due to numerous factors (availability chemical fertilisers, lack of own transportation facilities-bullock cart etc.). Since late 1990s several NGOs like MARI and Balvikas in Warnagal, GVS in Chirttoor, Chitanya in Anathapur have been actively advocating for restoration tanks focusing on desiltation and silt application activities. The previous TDP government under NEERU- MEERU programme also supported desiltation of tanks and silt application on a large scale in many parts of the state. Silt application was found in three out of five tanks. The proportion of income from silt application to the total tank income constitute significant portion in both Warangal and Ananthapur tanks (three years average income is 27.5% in Warangal tank and 23% in Ananthapur tank. Silt removal and application involves huge investments. In case of Dammanapeta a large-scale investment was made by MARI and Bala Vikas supporting desiltation and silt application activities in 2003-04 and 2004-05. In Anathapur tank silt application activity was done under govt NEERU-MEERU programme in 2003-04. In both these areas there is tremendous response from the farmers to transport silt to farm lands. Farmers came forward in huge numbers and were ready to contribute full transportation costs and partially the expenses involved silt removal.

TABLE 6: GROSS INCOME FROM SILT APPLICATION

Item	Gross total income			Average for three years
	2003-04	2004-05	2005-06	
Tank (Warangal)				
Income from silt application	3325000	285950	--	1203650
% to total income	75.0	12.1		27.5
Tank (Vijayanagaram)				
Income from silt application				
% to total income				
Tank (Ananthapur)				
Income from silt application	1330000	1928500	1662500	1640333
% to total income	36.4	27.4	15.81	23.2
Tank (Chittoor)				
Income from silt application	9000	No	No	3000
% to total income	0.27			0.06
Tank (Rangareddy)				
Income from silt application				
% to total income				

Income from agricultural wage employment

The irrigated agriculture supported by tank provides an important source of wage employment for agricultural wage labourers. Table 7 presents gross total income from agricultural wage employment in different tanks across three years. The average income for three years from agricultural wage employment to the total tank income accounted for nearly 4% in all the tanks. Significant fluctuations are observed in gross income in different years which are directly linked to total cropped area under tanks in different years. The total income in 2003-04 is relatively very low compared to 2005-06 because the cropped area was very less in 2003-04 (expect in case of Vijayanagarm tank) because of the drought.

TABLE 7: GROSS INCOME FROM AGRICULTURAL EMPLOYEMENT

Item	Gross total income			Average for three years
	2003-04	2004-05	2005-06	
Tank (Warangal)				
Income from AG wage employment	30000	84000	397320	170440
% to total income	0.67	3.56	6.26	3.9
Tank (Vijayanagaram)				
Income from AG wage employment	12540	11780	10640	11653
% to total income	4.6	3.89	3.52	4.0
Tank (Ananthapur)				
Income from AG wage employment	134700	297000	486000	305900
% to total income	3.4	4.22	4.62	4.3
Tank (Chittoor)				
Income from AG wage employment	184960	222000	380560	262507
% to total income	5.3	5.44	4.45	4.88
Tank (Rangareddy)				
Income from AG wage employment	330112	330112	388890	349705
% to total income	5.22	4.9	4.11	4.65

Income from other livelihoods (taddy tapping , basket weaving etc)

Taddy tapping was found in two tanks (Warangal and Vijayanagarm). In Warangal this activity accounted for nearly 12% of the total tank income in in 2003-04, 26.9% in 2004-05 and 11.8% in 2005-06. In Warangal tank huge number of taddy and Eetha trees are available in tank bund, bed and foreshore areas. Almost 100 households are dependent on this activity in this tank and activity will go on for more than 8 months. In case of Vijayanagaram tank toddy tapping was managed by contactor by employing two households; and these households make living based on this for two month. The income from taddy tapping in this tank accounted for nearly 3% of total tank income. Basket weaving was found in Warangal tank. At least 16 families work for over three months. The raw material will come from palm tree located in tank. The income from basket

weaving in this tank accounted for 0.3% of total tank income. Washermen dependency on tanks was found in Wangal and to a small extent in Chittoor. In Warangal 30 families and one family in Chittoor tank are dependent on tank. The average income for three years from washing cloths accounted for 4.4% of total income in Warangal tank and 0.15% in Chittoor tank..

TABLE 8: GROSS INCOME FROM VARIOUS TANK DEPENDENT LIVELIHOODS

Item	Average gross income for three years (% to total income)					Average for five tanks
	Tank 1 (Warangal)	Tank 2 (Vijayanagam)	Tank 3 (Ananthapur)	Tank 4 (Chittoor)	Tank 5 (Rangaredy)	
Agriculture produce	1923013 (43.94)	52948 (18.1)	4608750 (65.2)	4922990 (91.61)	6005887 (79.9)	3502718 (71.13)
Fisheries	50333 (1.15)	56500 (19.3)	10000 (0.14)	40000 (0.74)	103333 (1.13)	52033 (1.05)
Live stock – Big cattle	166333 (3.8)	115909 (39.5)	67500 (1.0)	21442 (0.40)	333750 (4.44)	140986 (2.86)
Livestock-Sheep and Goat	-	48000 (16.4)	436333 (6.1)	113333 (2.10)	715000 (9.52)	262533 (5.33)
Ag. wage employment	170440 (3.9)	11653 (4.0)	305900 (4.3)	262507 (4.88)	349705 (4.65)	220041 (4.46)
Toddy tapping	640000 (14.6)	7800 (2.7)	--	--	-	129560 (2.63)
Basket weaving	16320 (0.37)	--	--	--	-	3264 (0.06)
Washer man	191527 (4.37)	--	--	8025 (0.15)	-	39910 (0.8)
Silt application	1203650 (27.5)	--	1640333 (23.2)	3000 (0.06)	-	569397 (11.56)
Service providers	14667 (0.33)	--	--	2667 (0.05)	-	3467 (0.07)
TOTAL	4376283 (100.0)	292810 (100.0)	7068816 (100.0)	5373964 (100.00)	7507675 (100.00)	4923909 (100.0)

AGRICULTURAL PRODUCE VS OTHER LIVELIHOODS

TABLE 9: INCOME FROM AGRICULTURAL PRODUCE VS OTHER LIVELIHOODS

Item	Gross total income			Average for three years
Tank (Warangal)				
	2003-04	2004-05	2005-06	
Income from agriculture produce	300000 (6.77)	978000 (41.4)	4491040 (70.8)	1923013 (43.9)
Other livelihoods	4127730 (93.33)	138500 (58.6)	8050580 (30.2)	2453270 (56.1)
Tank (Vijayanagarm)				
Income from agriculture produce	81567 (26.95)	69977 (23.1)	7300 (2.7)	52948 (18.1)
Other livelihoods	221022 (73.1)	232662 (76.9)	265904 (97.3)	239862 (81.9)
Tank (Ananthapur)				
Income from agriculture produce	1775000 (48.57)	4378750 (62.19)	7672500 (73.0)	4608750 (65.2)
Other livelihoods	1879200 (51.43)	2662500 (37.81)	2838500 (27.0)	2460066 (34.8)
Tank (Chittoor)				
Income from agriculture produce	3163250 (93.41)	3658750 (89.7)	7946970 (92.84)	4922990 (91.61)
Other livelihoods	223044 (6.59)	419980 (10.3)	612698 (7.16)	450974 (8.39)
Tank (Rangareddy)				
Income from agriculture produce	4981900 (78.04%)	5199760 (76.34)	7836000 (82.87)	6005887 (79.55)
Other livelihoods	1401112 (21.96)	1611112 (23.66)	1619890 (17.13)	1544038 (20.45)

Table 9 present gross total income obtained from agriculture produce and other livelihoods based on tank for three years i.e 2003-04, 2004-05 and 2005-06 for all the tanks. The proportion of income from agriculture produce and other livelihoods varied from one tank to another and significant variations are also observed in different years.

The major finding emerging from the economic analysis is that the income from non-agricultural produce like livestock, fisheries, silt application, toddy tapping etc is significant in most of the tanks, which is much higher particularly during water scarcity years. In Dammanna cheruvu the proportion of income from non-agricultural produce accounted for 90% in 2003-04, which is a water scarcity year, 62% in 2004-05 and 32% in 2005-06 respectively. In Rayalacheruvu cheruvu the proportion of income from non-

agricultural produce accounted for 51% in 2003-04, 37% in 2004-05 and 27% in 2005-06. The only exception to the above pattern is tank in Chittor where the proportion of income from non agricultural produce continue to be less than 10% in all the three years. The reason is that the crops grown in this tank are high value commercial crops. Further tank has received good inflow in all the three years as it has large catchment with out any obstructions.

The extent of benefits from other livelihoods depend on the resources available in and around the tank such as availability of duration of water availability, tree plantations in tank bed, bund, foreshore areas and productivity of these resources. For example, tank contribution to small ruminant population in Rayalacheruvu is significant due to availability of trees in tank bed. Similarly in Dammanapeta it was toddy trees that has contributed substantial income. .

Conclusion

The important contribution of this study is development of methodology to analyse economics of tanks by looking into tank-based livelihoods. The economic analysis indicates that the income from non-agricultural produce like livestock, fisheries, silt application, toddy tapping etc is significant in most of the tanks, which is much higher particularly during water scarcity years.

The extent of benefits from other livelihoods depend on the resources available in and around the tank such as availability of duration of water availability, tree plantations in tank bed, bund, foreshore areas and productivity of these resources.

It is thus important to integrate livelihood promotion strategies in the tank rehabilitation process. While the study indicated dependency of a variety of users, tank seems to have higher relevance for farmers, agriculture labour, fishing community and livestock owners. As the sample of the study is small it is difficult to generalise above findings. Therefore, a large sample based study is required to make generalisations.

The large sample study is also required to fulfil the following operational requirements:

- To develop a criteria for selection and prioritisation of livelihoods in tank rehabilitation projects
- To further analyse issues related to livelihoods of different users dependent on tanks in diverse socio-economic conditions and agro-climatic zones.
- To identify disaggregated needs for planning livelihood interventions.

ANNEXURE -1

Table 1: DAMMNNAPET (WARANGAL)

GROSS INCOME FROM VARIOUS TANK DEPENDENT LIVELIHOODS

Item	No of families/persons dependent	Total income			Average for three years
		2003-04	2004-05	2005-06	
Income from agriculture produce	150 families	300000 (6.77)	978000 (41.4)	4491040 (70.8)	1923013 (43.94)
Income from fisheries	18	25000 (0.56)	35000 (1.48)	91000 (1.43)	50333 (1.15)
Inputs for live stock (fodder, water etc)	200 families (300 cattle)	85000 (1.91)	134000 (5.67)	280000 (4.44)	166333 (3.8)
Agricultural wage employment created	200 families	30000 (0.67)	84000 (3.56)	397320 (6.26)	170440 (3.9)
Taddy tapping	100 families	535000 (12.1)	635000 (26.9)	750000 (11.8)	640000 (14.6)
Basket weaving	16 families	12800 (0.28)	16000 (0.6)	20160 (0.3)	16320 (0.37)
Washerman	30 families	114930 (2.58)	191550 (0.81)	268100 (4.2)	191527 (4.37)
Silt application	200 families	3325000 (75.0)	285950 (12.1)	--	1203650 (27.5)
Service providers	4 families	-	-	44000 (0.6)	14667 (0.33)
TOTAL		4427730	2359500	6341620	4376283 (100.0)

TABLE 2: DURBLI (VIJAYANAGARAM)**GROSS INCOME FROM VARIOUS TANK DEPENDENT LIVELIHOODS**

Item	No of families	Gross total income			Average for three years
		2005-06	2004-05	2003-04	
Income from agriculture produce	15 families	7300 (2.7)	69977 (23.1)	81567 (26.95)	52948 (18.1)
Income from fisheries	18	75000 (27.45)	52500 (17.35)	42000 (13.88)	56500 (19.3)
Inputs for live stock (fodder, water etc)	70 (350 cattle)	121364 (44.42)	113182 (37.4)	113182 (37.4)	115909 (39.5)
Sheep/goat	48	48000 (17.6)	48000 (15.86)	48000 (15.86)	48000 (16.4)
Agricultural wage employment created	10	12540 (4.6)	11780 (3.89)	10640 (3.52)	11653 (4.0)
Toddy tapping	2	9000 (3.3)	7200 (2.4)	7200 (2.37)	7800 (2.7)
Basket weaving		--	--	--	--
Washer man		--			
Silt application		--	--	---	
Service providers		--	--	--	--
TOTAL		273204 (100.0)	302639 (100.0)	302589 (100.0)	292810 (100.0)

TABLE 3 : RAYALACHERUVU (ANANTHAPUR)**GROSS INCOME FROM VARIOUS TANK DEPENDENT LIVELIHOODS**

Item	No of families	Gross total income			Average for three years
		2003-04	2004-05	2005-06	
Income from agriculture produce	250	1775000 (48.57)	4378750 (62.19)	7672500 (73.0)	4608750 (65.2)
Income from fisheries	12	--	--	30000 (0.28)	10000 (0.14)
Inputs for live stock (fodder, water etc) big cattle	100 (200 cattle)	22500 (0.62)	45000 (0.64)	135000 (1.3)	67500 (1.0)
Small ruminants (Sheep and goat)	70 (2000 sheep and goat)	392000 10.72)	392000 (5.56)	525000 (5.0)	436333 (6.1)
Agricultural wage employment created	200	134700 (3.4)	297000 (4.22)	486000 (4.62)	305900 (4.3)
Toddy tapping	--	-	-	-	
Basket weaving					
Washer man	-	-	-	-	
Silt application	150	1330000 (36.4)	1928500 (27.4)	1662500 (15.81)	1640333 (23.2)
Service providers					
TOTAL		3654200 (100.0)	7041250 (100.0)	10511000 (100.0)	7068816 (100.0)

TABLE 4: YATALAVANKA (CHITTOR)

Item	No of families/	Gross total income			Average for three years
		2003-04	2004-05	2005-06	
Income from agriculture produce	62	3163250 (90.8)	3658750 (89.7)	7946970 (92.84)	4922990 (91.61)
Income from fisheries	6	--	60000 (1.47)	60000 (0.7)	40000 (0.74)
Inputs for live stock (fodder, water etc)	40	13700 (0.3)	20250 (0.5)	30378 (0.35)	21442 (0.40)
Sheep/goat	8	108000 (3.1)	112000 (2.74)	120000 (1.4)	113333 (2.10)
Agricultural wage employment	60	184960 (5.3)	222000 (5.44)	380560 (4.45)	262507 (4.88)
Washer man	1	4584 (0.1)	5730 (0.14)	13760 (0.16)	8025 (0.15)
Silt application	12	9000 (0.3)	No	No	3000 (0.06)
Service providers	1	No	No	8000 (0.09)	2667 (0.05)
TOTAL		3483494 (100.0)	4078730 (100.0)	8559668 (100.0)	5373964 (100.00)

TABLE 5: KOMMISSETTIPALLI TANK (RANGA REDDY)**GROSS INCOME FROM VARIOUS TANK DEPENDENT LIVELIHOODS**

Item	No of families	Gross total income			Average for three years
		2003-04	2004-05	2005-06	
Income from agriculture produce	350	4981900 (78.83%)	5199760 (77.1)	7836000 (82.87)	6005887 (79.9)
Inputs for live stock (fodder, water etc) big cattle	200 (400 cattle)	292500 (4.63)	292500 (4.33)	416250 (4.4)	333750 (4.44)
Small ruminants (Sheep and goat)	80 (5000 sheep & goats)	715000 (11.3)	715000 (10.6)	715000 (7.56)	715000 (9.52)
Agricultural wage employment created	250	330112 (5.22)	330112 (4.9)	388890 (4.11)	349705 (4.65)
Fisheries	60	-	210000 (3.1)	100000 (1.05)	103333 (1.13)
Taddy tapping					
Basket weaving					
Washer man					
Silt application					
Service providers					
TOTAL		6319512 (100.00)	6747372 (100.00)	9456140 (100.00)	7507675 (100.00)