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**TITLE : Traditional Water Management Practices and Water Sector Reforms in
South India – A Comparative Analysis of Three Systems and PIM Policy**

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Abstract

This paper deals with the comparative analysis of traditional water management practices in tank systems and water sector reforms carried out by Andhra Pradesh, Karnataka and Tamil Nadu in South India. The analysis on the one hand covers three cases of tanks selected from Andhra Pradesh, Karnataka and Tamil Nadu, which illustrate the cultural values in water management that ensures equity, efficiency and sustainability of tank institutions. On the other hand, the paper examines the Participatory Irrigation Management (PIM) exercise as a central element of water sector reforms in these States. The analysis reveals that the social values attached to water management is imbibed in cultural behavior internalized through socialization process and is deep rooted in the minds of the rural people. The managerial norms are evolved locally and have community sanctity. The PIM policy reforms adopted in Andhra Pradesh, Karnataka and Tamil Nadu have taken little cognizance of the existing cultural aspects of water management. These reforms are top down and lack the political will to empower water users to the extent that it fits best to the local communities. The case studies also reveal the confusion by these policies and its destabilizing influence on the existing tank institutions that have better track record of efficient functioning compared to other forms of institutions including government agencies. At the outset, it is well established fact there are certain weakness in traditional system of water management particularly in the society, which is influenced by caste and class structure. Moreover, we cannot push back our clocks by several decades to reinvent the traditional practices, but certainly one could learn from certain positive aspects of these cultural practices, which are still unchallengeable in some respects by recent reforms. An attempt is made in this paper to draw attention to such

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frameworks prevalent in tank systems that could help in more effective of future participatory irrigation management programmes.

Traditional Water Management Practices and Water Sector Reforms in South India A Comparative Analysis of Three Tank Systems and PIM Policy

This paper deals with the comparative analysis of traditional water management practices in tank systems and water sector reforms carried out by Andhra Pradesh, Karnataka and Tamil Nadu in South India. The analysis on the one hand covers three cases of tanks selected from Andhra Pradesh, Karnataka and Tamil Nadu, which illustrates the cultural values in water management that ensures equity, efficiency and sustainability of tank institutions. On the other hand, the paper examines the Participatory Irrigation Management exercise as a central element of water sector reforms in these States. The analysis reveals that the social values attached to water management is imbibed in cultural behavior internalized through socialization process and is deep rooted in the minds of the rural people. The managerial norms are evolved locally and has community sanctity. The policy reforms in Andhra Pradesh, Karnataka and Tamil Nadu have adopted Participatory Irrigation Management which has taken little cognizance of the existing cultural aspects of water management. This reforms are top down policy and lack political will to empower water users to the extent that it fits best to the local communities. The case studies also reveals the confusions created by these policies and threat to destabilize the existing tank institutions that have better track record of efficient functioning compare to other institutions including government agencies. At the outset, it is well established fact there are certain weakness in traditional system of water management particularly in the society, which is influenced by caste and class structure. Moreover, we cannot push back our clocks to several decades and repeal the traditional practices, but certainly one could learn from positive aspects of these cultural practices, which is still unchallenged in some respects by recent reforms. An attempt is made in this paper to draw attention on such normative framework prevalent in tank systems that would be helpful in designing participatory irrigation management programme more effectively.

1. Introduction

South India has a long history of rainwater harvesting through tanks and weirs. Andhra Pradesh, Karnataka and Tamil Nadu account for nearly 60 per cent of the tanks irrigated area. There are about 120,000 tanks in these states as against 208,000 tanks in the country (Vaidyanathan 2001). It is quite evident from the field research and the available literature that the tank systems are on declining trend in terms of performance. Although several reasons like deforestation, centralization of authority, poor catchment treatment, issue of private property, increase in population, agriculture transformation, unfavorable institutional framework and its capacity to handle the tank, etc. Institutional aspect is one of the primordial to address most of the problems if not all related to tanks. Thus efforts are being made by the States and Central Governments to bring in reforms to existing water policies.

The current trend in water sector reforms in South India is to promote participatory management i.e. either to involve water users to participate in the management of water bodies or to transfer the water bodies to users communities (Doraiswamy 2003, Mollinga, 2002, . These reforms have legislative back up either through enactment of exclusive Act that promotes water users participation in water management or have an amendment to existing irrigation Act. The enabling rules and regulations are formed to facilitate the formation of water users associations and implemented.

On the other hand there are several informal institutions that have existed from age old time with relatively efficient track record of delivering goods i.e. common property resources based on the general consensus which take into account issues like equity and other community priorities. These rules are internalized by the water users and some of them are even exist in the written document (Sakthivadivel and R. Doraiswamy 2004).

The central question of this paper is

“How proper understanding of traditional tank helps formulate effective water policy reforms”.

1.1. Study Area

The study is carried out in tanks systems in South India namely Venkanna Cheruvu in Manigila village of Peddamandadi Mandal of Mahabubnagar District in Andhra Pradesh, Hirekere situated in Kandhikere village in Chikkanayakanahalli taluk of Tumkur District in Karnataka and Peyikulam in Thamrabarani basin in Tuticorn District in Tamil Nadu.

This paper is structured in four section: first section deals with the characteristics of the cases studied in Andhra Pradesh, Karnataka and Tamil Nadu, second section deals with the Irrigation Reforms in these states and formation of association process, third section deals with the top down and bottom up approach and political will to decentralize authority on tank systems and fourth deals with the lessons learnt.

General Problems in Tanks across South India

- Farmers in command area are deprived of water
- Accumulation of silt

- Poor maintenance of tank structures like bunds, catchment area, and command area
- Lack of management
- Number of tanks are huge for the Government to handle
- Lack of political will to decentralize authority to tank institutions
- Lack of capacity building and orientation programmes

2. Tank institutions

The three tanks covered in this paper have common features in terms of rule making and decision making mechanism and the history dates back to more than few centuries except Peyikulam tank association, which is an institution registered under Societies Act. The socialization process in India's rural scenario shows that the managerial rules and technique are internalized by the community as a process of socialization, which are deep rooted and time tested (Doraiswamy 2004, Diskshit et al 1993). Water conflicts can be commonly found in all types of bodies like tanks to interstate river water sharing. However, the water conflicts are less frequent in traditional tank institutions as we have seen in the case of the tanks discussed in this paper. Similarly, the tail end deprivation i.e. the inequity in water distribution within the localized area is not to be seen in these traditional tank institutions (Doraiswamy et al 2003)

Case studies

2.1 Hirekere Tank

Hirekere tank³ is situated in Kandhikere village in Chikkanayakanahalli taluk of Tumkur District. The mention in the State epigraphy regarding the collection of revenue and remittance to the Vijayanagar empire by local chieftain acts as an illustration to say that the tank was constructed during Vijayanagar empire in 17th Century (Maheshwaraiah 2000). This village consists of multi-religion and multi-caste with more number of marginal and small farmers.

Hirekere Tank has command area of 121.72 hectares of which the official localization pattern is 47.21 ha for garden and 74.51 ha for wet crops. The localisation particulars of the tank command are registered only in the government document and have no relevance to the people of Hirekere tank under present management practices.

Department of minor irrigation officially controls tank, but in practice it is managed by the local self-informal organisation. The command (atchkat) is divided in to three blocks for the convenience of irrigation in terms of sharing the resource in equitable basis.

³ Part of the information pertaining to Hirekere tank is taken from the study 'Tail enders and other deprived in irrigation in Karnataka' conducted by R. Doraiswamy and Dr. Peter Mollinga during 2002.

Table 2 Technical features of Hirekere tank.

Name of the tank	Hirekere
Catchment of tank	23.31 Sq kms Independent
Water Spread area	107.24 hectares
Live Capacity	MCft 53.40
Tank top width	1.83 mtrs
Tank Bund front slope	1½ : 1
Tank rear slope	2:1
Free board	1.21 mtrs
Tank maximum height of bund	9.23 mtrs
Length of Bund	1020 mtrs
Waste weir details type	Fluss
Discharge capacity in Cusecs	534
Length of Canal	LBC-170 kms
Proposed utilization in MCft	14.77
Year of Construction	N.A.
Cost of tank	N.A.
Registered atchkat in hectares	
• Semi dry	Nil
• Garden	47.21
• Wet	74.51
Total	121.72

Source: Doraiswamy and Mollinga, 2002

In Khandikere region during the monsoon season, farmers grow *Ragi* and Groundnut crop in rain fed areas as well as under tank. The tank water is used only during the rabhi/season that is January to April .

Hirekere tank de-jure is under the control and authority of State department. The state has taken over 36000 tanks in the State either well maintained or not (relatively) by the local institutions and allocated as per the size to the respective wings of state departments like Zilla panchayat and department of minor irrigation. In fact the tank water managed by village tank community.

Traditional Institution

Although, Hirekere tank is officially under Department of Minor Irrigation, Government of Karnataka, in practice it is managed by the traditional institution which has track record of more than 300 years.. This traditional village committee called as '*Ooru panchayati*' in Kannada consists of members from all caste group. Although, the village has families belonging to upper caste, this tank institution is democratic in the sense that this institution is headed by person belonging to shepherd (*kuruba*) community, a predominant caste in the village. This traditional village committee which manages the tank formulates the rules and regulations which is binding on all the members in the village. Any persons violating such rules will be punished through penalties ranging from serving the village to social boycott of the village.

The management rules and regulations on water management, operation and maintenance, release of water, crop pattern, negotiation with upstream tanks, etc are also found in written document called as *kere pustaka* meaning Tank Book. This document is available from 1939 to date and is kept with the head of the village institution called '*pradhana gunchidaaru*'. This tank book contains details like extent of command area, rotation schedule practiced, representatives from each block, quantum of water available and block irrigated.

Hirekere tank addresses social, economic, environmental and issues very systematically. The quantum of water in the tank directly decides the allocation for different sectors like environment, domestic and livestock and irrigation. The priority in using the water is given to domestic purpose, which includes drinking, cattle, washing and bathing. This is followed by brick making, fisheries, socio-cultural practices and irrigation. Prior to opening the gates of the tank, offerings are made to water god *Ganga* by doing pooja by entire village including Muslims.

The conversational interview and the analysis of the tank book shows that the tank water is for irrigation only in *Rabhi* season i.e. winter to summer that is from November/December to April. The villagers have identified their own measuring scale in the tank to indicate the quantum of water, waste weir and a measuring rock in the middle of the tank. Every year villagers through village *soudis* take stock of the water in the tank, when the tank is half, it is kept for domestic purposes. Paddy is the only crop grown under this command area. Only when water in the tank reaches the level of $\frac{2}{3}$ of the tank and above, it is used for irrigation purposes. If the tank is $\frac{2}{3}$ of the one block is fit to irrigate and when tank is full then the water is provided to two blocks. The three blocks namely *Dhalegadhe*, *Kalagadhe* and *Honebayalu* are divided based on the location, soil quality and area. These three blocks are irrigated in turn depending on the availability of water and as decided by the village institution. The water management is carried out through the help of water man called as *Soudis* appointed by the village institution.

Table 2.1: Rotation pattern of water management in Hirekere tank from 1939 to 2002

Sl.No	Year	Block I Dhalegadhe	Block II Kalagadhe	Block III Honnebayalu
1	1939	0	0	1
2	1940	1	1	0
3	1941	0	1	1
4	1943	1	0	1
5	1946	1	1	0
6	1952	0	1	1
7	1953	1	0	1
8	1956	1	1	0
9	1957	0	1	1
10	1958	1	0	0
11	1961	1	1	0
12	1963	0	1	1
13	1964	1	0	1
14	1965	1	1	0
15	1968	0	1	1
16	1969	1	0	1
17	1970	1	1	0
18	1971	0	1	1
19	1972	1	0	1
20	1973	1	1	0
21	1974	0	0	1
22	1975	1	1	0
23	1976	1	0	1
24	1978	0	1	1
25	1981	1	1	0
26	1982	0	0	1
27	1986	1	1	0
28	1987	0	0	1
29	1988	1	0	0
30	1989	0	1	0
31	1992	0	0	1
32	1998	1	1	0
33	2000	1	0	1
34	2001	0	1	1
35	2002	1	0	0

Source: Doraiswamy and Mollinga, 2002

The above table shows that since 1939, there have been several instances where the tank was full and could successfully irrigate only two blocks. The time series data for thirty-five years shows that there is no deprivation of any one section of the farmers. Even after department of minor irrigation taking over the tank officially there has not been any change in the practice that is followed since olden days.

In Hirekere tank, water management is carried out by *soudis*⁴ appointed locally by village committees. At present there are two persons working as *soudis* in this tank. Once the village institution takes the decision, the control over the water distribution is entrusted to *soudis*.

Maintenance

Hirekere tank village committee discusses issues like irrigation and maintenance and the outcomes are publicized through one of the village mass communication that is village drums. It is the task of *Soudis* inform that the landowners should clean the field channels beside their lands before the gate is opened on particular date. He also fixes a date for the main canal maintenance in which the entire block people has to participate. When there is non-cooperation from any members, *soudi* report to the *Gunchidaars* for appropriate action. The action taken by them is that the water will be stopped to such persons. It is reported that such situation has never occurred.

2.2 Venkanna Cherruvu

Venkanna Cheruvu is situated in Manigila village in Peddamandadi mandal of Mahabubnagar District in Andhra Pradesh. The tank being very old, people are unable to tell to which century it belongs. However, the general belief is that this could have been constructed during Vijayanagar regime. Tank water spread area is 62.82 ha and the command area is 89 ha (JalaSpandana and Consortium of NGOs, 2006).

⁴ Soudi is a tank level functionary appointed by Department of Minor Irrigation and Local organisations for operating the sluice and canal. Local institutions also entrust the task of water distribution.

Salient features of the Venkanna Cheruvu

District	: Mahabubnagar		
Mandal	: Peddamandadi		
Panchayath	: Manigila		
Topo sheet number	: 56 L/3		
Year of construction	: 100 years back		
River basin	: Krishna		
Minor Basin	: Dindi River		
Sub Basin	: Lower Krishna (K7)		
Register no. of Tank	: Not available		
Longitude	: 77° 59' 00".		
Latitude	: 16° 25' 00".		
Type of tank	: Independent Tank (First tank)		
TBL	: 368.465 Mtrs		
MWL	: 367.400 Mtrs		
FTL	: 368.940 Mtrs		
Catchment area (Sq.Kms)			
Independent	: 5.90		
Nature of catchment	: Good		
Rainfall	:		
Water spread (Hac)	: 62.896 Hac		
Gross tank capacity (MCM)	: 1.02936		
Live capacity of Tank (MCM)	: 1.02936		
Designed atchkat	: 89.034 Hac		
Present atchkat	: Hac		
Cropping atchkat	a) Original	: Paddy	
	b) Present	: Paddy	
Tank bund length	: 801.00 mtrs		
Maximum height	: 6.442 m		
Waste weir	:		
	LBW	RBW	
	Type	Free overfall	Free overfall
	Length	17.80 mtrs	16.00 mtrs
	Crest Level	366.94	367.527
	Discharging		
Lining to canals	: Whether done or not		Yes
	Type of Lining		RR masonry
	Location	Type	Chainage
Sluices	: Right Bank Sluice	Pipe	773.00mtrs
	: Middle bank sluice	Pipe	617.30mtrs
	: Left bank sluice	Barrel	379.00mtrs
			Sill level
			363.790
			302.030
			363.790

Water management

The water management practices in this tank is being carried out informally from several generations without major changes. It is quite evident from the field research that the water management is combined with land and crop management, which is one step ahead of Hirekere in ensuring equity and entitlements to water. Although, land ownership is in the individual farmers name both in the command and non command area, resource utilisation redefine these land ownership informally. The water distribution in Venkanna Cheruvu is commonly called as '*Damoshi*'.

Dhamoshi system

As and when the water is less in the tank, it becomes impossible to cater to total command area of the tank. *Dhamoshi* means a system, in which the farmers of the command area take a decision to cultivate their lands proportionate to the water availability in the tank. If the tank has half of its capacity, all the farmers will irrigate half of their area. Further, in order to avoid losses out of seepage, transpo-evaporation, leakage, time, etc, they choose the area under irrigation near to the tank bund. The owner of the land near the tank bund spares half of this land to the tail end farmer to cultivate.

Maintenance

The tank has feeder channel which is about 5 kms and the cleaning of feeder channel in the past was carried out by villagers as an obligatory service to the tank. There are several instances of the breach of feeder channel bunds, which farmers have addressed.

2.3 Peyikulam Tank

Peyikulam tank is situated in Thuthucudi District (Tuticorn) falling in Thamrabarani basin in Tamil Nadu. This is one of the oldest tank which has registered association that has history of more than 130 years. The peyikulam tank association started in the year 1872 and all the land owners in the command area became the members of this association. In 1949 it was registered under Societies Act and is called as Peyikulam land owners association. The tank has command area of 2733 acres, which is said to be very big tank. This tank gets feeding from Thamrabarani river.

Salient Features of Peyikulam Tank Association

Name	: Peyikulam
Tatal ayacut area	: 2733 acre
Wet land	: 570.05.5 Ha
Dry land	: 86.69.5 Ha
Tank Capacity	: 71.5 Mcm
Total Catchment area:	6.4 S.K.M
Tank level	: 6.68 M
Tank Bund level	: 8.12M
Tank lenth	: 5.678 Km
Total Sluice	: 11
Total Weir	: 1

Water Management

The peyikulam land owners association has rules and regulations written down apart from the bylaws of the association. One of the significant features of this association is that it not only carry out water management activities but also crop and labour management. There are no farmers who are deprived from non availability of water in the command area.

Maintenance

This association regularly conducts General Body and Executive Committee meeting in which issues pertaining to water management, discipline of the water users, services of labors, maintenance of the tank structures like feeder channels, tank bund and canal network is discussed in detail. The decision is taken collectively on the extent of the repair works, labour and money contribution by each and every beneficiary and the assistance from government agency. Accordingly, the resolutions are passed and the information is passed on to every beneficiary in the command area to which members respond positively. It is said there are no violators of these rules.

3. Irrigation Reforms

As mentioned earlier, several States in India adopt Participatory Irrigation Management (PIM) as its major reforms agenda, which aims at involving farmers in the management of irrigation system. Andhra Pradesh, was one of the pioneers in enacting exclusive Act called as Andhra Pradesh Farmers Management of Irrigation Act of 1997, followed by Tamil Nadu which by and large adopted similar Act in 2000. Karnataka in June 2000 amended its Irrigation Act of 1965, which emphasizes on empowering farmers participation in irrigation management (Doraiswamy and Bhavanishankar 2000). As a result there are number of water users associations (WUAs) formed in these States (Sastry, 2006). Andhra Pradesh has more than 10,000 WUAs, Karnataka has about 3000 WUAs and Tamil Nadu has about 2000 WUAs, which also includes major, medium and minor irrigation systems.

These rules and regulations embedded with the above policies had certain prescription in terms of size of the WUAs, structure and functions. The size of the water users associations even for tanks was fixed to be 500 to 750 hectares with those landed in the command area are eligible to become the members. In Karnataka the membership fee was fixed to Rs. 106/-. These prescriptive rules created tension in the villages which have demanded for changes in these rules and regulations.

Although, PIM reform is welcome move by these Governments for the reason that it emphasizes on farmers participation in water management, these reforms were not appropriately conceived while formulation and implementation. As a result, PIM created problems in some of the existing traditional institutions. The problems are also due to the lack of political will to implement what is promised in the PIM policy. These problems can be summed up as follows:

- Split in the existing tank institutions and multiplicity of tank institutions due to the conditionality of PIM in terms of structure and functions and the area fixation for each associations.

- Weaken existing tank informal institutions in the rush to formalize the associations by insisting to form cooperative as contemplated in the PIM policy⁵.
- Operation and Maintenance is not transferred as a policy to all the tank institutions formed under PIM⁶.
- As in the case of Andhra Pradesh, the water tax collection is not handed over to tank users associations formed under PIM.
- The elections to tank users group is centralised and is decided by the State agency.
- There is not enough capacity building at least during the transition period i.e. from informal traditional practice to formal associations.
- Initially, PIM in Tamil Nadu created tank users associations pooling up few tanks to reach the fixed area.
- The younger generations were misguided and the whole tank users associations was taken as platform for moving up the political ladder and financial gains.
- Many associations formed under PIM exist on paper due to target oriented and top down approach.
- The comparative analysis from various literature available shows that the newly formed associations are not in position to handle deprivation and O & M issues.

⁵ In Karnataka, tank associations area was contemplated on par with large canal irrigation projects. This was challenged by the NGOs and farmers organisation and as a result, the cooperative system is relaxed in tank system.

⁶ In Karnataka, only those tanks identified under 'Community Based Tank Restoration Programme' with the financial assistance from World Bank gets the opportunity to execute the repair works.

4. Way forward

The centralised authority over the tank by the respective States have further weakened the tank informal institutions which performed relatively efficiently in terms of equity as defined by the village community. In South India, the number of tanks outnumber the capacity of the Government Department to manage, which was not realized while taking over the system. The collective action over common property resource conservation and utilisation have shown declining trend (Agarwal and Narain 1997).

Participatory management of water resources although is welcome step, the structural and functional design of the tank users associations and the implementation of the policy have created problems in terms of multiplicity and duplicity of tank institutions. There is clear lack of political will in all these states to transfer the management responsibilities with adequate powers to the newly created tank users associations. Thus creating series of doubts about the commitment of the government towards empowering tank users associations.

As a result, there are many tank users associations that exist only on paper and are not really effective in making significant impact in addressing equity, operation and maintenance and balancing the eco-system. The traditional tanks users associations studied stand as model in water management and offer several lessons like structure and functions of tank users associations, rule making mechanism, and users priorities to water resource conservation and utilisation.

The capacity building exercise that encompass indigenous knowledge should be carried out to all the tanks whether they are on the list of restoration or not. The discriminatory attitude of the state towards capacity building only in those tanks that are taken up under the financial assistance from World Bank and other Donor agencies. Oflate, the better approach in training programme is the Participatory Training Programme that requires sufficient time and budget. All the State governments should allocate substantial budget for the capacity building programme in building tank institutions.

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