

## **SUSTAINABLE USE OF COMMUNITY BASED TANK WATER FOR COMMAND ARE AS ADAPTED THROUGH COMMUNITY BASED TRADITIONAL PRACTICES: A CASE STUDY IN KARNATAKA**

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**Abstract:** Traditional practices are declining fast due to modernization of agriculture. The issues are related to encroachment and lack of interest of young people to learn traditional knowledge from the old practitioner. Learning from traditional social institutions, the traditional management of tank provides an interesting system that ensured fair distribution of water to the land of all households, tail end of command area, promoted respect for different roles in society, and sought to resolve conflict between different parties in a manner as harmonious as possible. Much can be learned from them to build more effective and sustainable systems of community based tank management today. Water is released for irrigation after consultative meeting of council of elders in first and last week of December. During which, the council of elders with the assistance of waterman and other farmers estimate whether water accumulated in the tank is sufficient for a crop or not. A waterman, or often called as neeruganti, is a person appointed by the community to control and manage the distribution of water in the village or community tank in a just and equitable manner. In order to do this, he made use of very simple but creative methods to ensure that water was available equally to the whole community. The neeruganti was thus a highly appreciated member of the community and recognized for his high standards of justice.

**Keywords:** Community, Command area, Neeruganti, Traditional practice, Waterman, Water management system, Water tank.

### **I. INTRODUCTION**

Community based water tanks provide a realistic example of a storage technology that has traditionally allowed people in the semi arid tropics to deal with the characteristic rainfall variability of the region. Community water tanks are shallow water reservoirs ranging from a few hectares to over a thousand hectares and formed by constructing earthen embankments. Community water tanks are shallow water reservoirs that harvest rainfall and seasonal runoff in situ and that extend across the natural drainage flow. Community based Water tanks in

South India have been built for over 3,000 years, and the development of agriculture in the region seems to be linked to their expansion (Karnataka Community Based Tank Management Project Jalasamvardhane Yojana Sangha (JSYS), Website: [www.jsysindia.org](http://www.jsysindia.org).)

By impounding runoff water from the monsoon rains, tanks have been a critical technology supporting agriculture in the region. Besides their role in agriculture, water tanks have become a central element of local agro-ecosystems, providing a wide variety of other socio-economic uses (i.e., fresh water for domestic uses, fish, silt, grass) and ecological functions (i.e. contribute to flood control and runoff mitigation, provide protection of the biodiversity of the surrounding area, avoid erosion, recharge the water table) (Thippaiah P., 2006). Those multiple uses and functions benefit many different sectors of the society, including farmers and non farmers, with marginal sectors using tank resources in more diverse ways than other sectors of the population. As with other common pool resources, water sharing and the management of water infrastructures calls for cooperation and a set of managing rules within and between villages ( Raju, K. V., 2002).

The management of community based water tanks implies high coordination not only to achieve the equitable distribution of water between head and tail reach farmers and other beneficiaries. In South India has developed into a complex management system involving both local and state level institutions. Customary local institutions have typically managed tank resources (water, fish, grass, trees, etc.), whereas the tank infrastructure has typically remained under state authority (Vaidyanathan, 2001).

Farming under community based irrigation tanks constitutes one such farming system with high systemic risk uncertainty. In community based tank irrigation, the quantity of water available for irrigation depends on the inflows to the tank which in turn is dependent on the monsoon rains. Hence, the command area farmers of these irrigation tanks are uncertain about the quantum of water available for irrigation and in turn about the crop to be grown in command area. Therefore, this study is undertaken to study the management practices that the command area farmers of tanks adopted over the years in Chikkaballapura district of Karnataka state.

The water inflows to the tank and its availability for irrigation is available only after the monsoon has set in and thus leaving very short time to decide about the cropping pattern in the command area. This uncertainty returns back to the command area farmers, year after year. To deal with this uncertainty, it is essential for the command area farmers to evolve mechanisms that would be beneficial for all the concerned beneficiaries (Ostrom 1990). The

main objective of the study is to sustainable use of community based tank water for command areas adapted through community based traditional practices.

## II. MATERIALS AND METODS

**2.1. Study Area:** K. Raguttahalli is a small village of Chintamani taluk. The village consists of 100 households having a population of 450, out of which 57% is male and 43% are female. The total cultivable land is 482 acres out of which 236.5 acres are rain fed condition and 245.6 acres is in under irrigation. Out of the total irrigated land, 25 hectares is under bore wells. The village has agriculture and allied activities as main source of livelihood. The tank is situated in the main road of Chintamani-Choluru. Chintamani taluk is located in the southern region of the state and happens to be the eastern most taluk of the Karnataka State. Situated between 2° 46' - 13° 58' North Latitude and 77° 21' - 78° 35' East Longitude, though the agriculture is predominantly rain fed, the village has a small ZP tank system for catering its water needs. It has also a thin density of wells and bore wells, and main backbone for water needs is the lakshminarasimha tank system.

The climate of the district is seasonally dry tropical savanna climate with four seasons. The dry season with clear bright weather is from December to February. The summer season from March to May and is followed by the south west monsoon from June to September. October and November constitute the post monsoon or retreating monsoon. The mean dry temperature is about 35°C in summer and 14°C in winter. The maximum percentage of rainfall occurs between July and October with a mean annual rainfall of 600 mm.

### 2.2. Water Management:

**2.2.1. Traditional Neeruganti System:** The neeruganti managed the water equitably as well ensured that the tank was maintained ensure uniform supply of water to all fields in the command area. Determine the type of crop to be grown based upon the water available decide on the dates and times for supply of water and cessation inform every body about the dates through beating of drums inform the farmers in case their crops were afflicted with pests or diseases ensure proper maintenance of the tank outlets decide upon a date to repair the tank canal arrange. The decision on the use of the water was made by the village leaders and the community in a joint process. The *neeruganti* had to follow the directions and implement the decisions taken by the elders regarding the use of water and the maintenance of the tank. Honorarium was paid in kind to the *neeruganti* through unique systems, each designed by the community. In addition, every farmer would give a portion of his produce or given as many stacks of harvested produce as they could carry at one time from the centre of the field to the

edge of the field to the *neeruganti* as per an agreement reached by the village elders.

### **2.2.2 Agriculture Crop Planning Pattern:**

Selections of crop based on the available water resources for cultivation are as follows:

Tank is adequate with water or full tank: General practice in command area is the cultivation of paddy, both in Kharif and Rabi seasons. This preference for paddy is due to the fact that paddy crop is most suitable in command area which would have higher soil moisture content and other crops would not grow well in such conditions. Apart from that, paddy would be a supplement for the fodder required for the livestock as well. Less than adequate or half filled: Various practices were observed during the field study and details are given below.

**Practice Adapted 1: In case of insufficient water for kharif crop:** Rain water inflows to the tank are inadequate during pre monsoon season in the current year. Farmers' assuming that similar trend of little water flows to the tank, command area farmers have decided to go for crops that could grow well with existing soil moisture and condition such as vegetables. Farmers kept the option for Rabi crop open to be decided later in month of October depending on the tank water status. For this event, command area farmers have not considered to cultivate paddy and replaced with vegetables such as chilies, brinjal, onion and potato in the command area (Table 1).

**Practice Adapted 2: In case of water is sufficient for part of command area:** During the initial stages, the tank water was sufficient for the parts of the command area, for the head reach and middle reach of the command area. Tail end of the command area, as the water is insufficient, need to go for paddy cultivation or other crops can be grown.

**Practice Adapted 3: In case of water is sufficient for entire command area:** Tank is adequate with water during the initial stages of agricultural planning was felt that sufficient to provide water for irrigation of paddy for entire command area and therefore, entire command area farmers opted for paddy cultivation.

**Practice Adapted 4: In case of water is sufficient for part of command area for second crop:**

Community tank water level is dynamic in nature due to evaporation, infiltration, use etc. During the month of October, during the harvest stages of kharif crop, farmers take a decision about the possibility of second crop cultivation. Based on the water levels, farmers would decide on the extent of command area that will be given cultivation. In case water is not sufficient for entire command area, then the tail end farmers need to cultivate vegetable crops.

**Practice Adapted 5: In case of water is sufficient for second crop for entire command area:**

Water levels are adequate to provide irrigation for second crop of paddy during kharif season, command area farmers will cultivate paddy.

**Practice Adapted 6: In case of tail end of command area:** A common problem faced by the *neeruganti* was in the use and spread of the water to the tail end. In order to extend the use and spread of water, the *neeruganti* decided to release the water in a way that the fields at the tail. At the lowest point of the command area and at the tail end, arrangements is made to collect the drained water from the fields on command area. The surplus from all these portions flows to the lowest point, irrigating a few fields. This collected water is then reused for irrigation purposes.

**Practice Adapted 7: In case of lean period:** The water level in the tank was more than quarter but less than half, the weekly system was brought into force under which, water was released only once a week. The *neeruganti* suggested to the farmers that during this lean period they should grow crops like finger millet and groundnut, which required less water.

**Practice Adapted 8: In canal lock method:** During monsoon season the *neeruganti* followed the canal lock method to prevent farmers from letting the water into their fields. In this system, after the quota of water was allotted to each field, a clay mound was created at the mouth of the canal. This acted as a seal and those who broke it would be treated as offenders.

**2.2.3. Encroachment issues:** This study is based on the primary as well as secondary data. The secondary data were collected from the government departments handling irrigation statistics and also from the literature on this theme. The primary data were collected from encroachers belonging to tank spread. Information on the extent of encroachment and names of encroachers was collected from the village community, viz. senior citizens, *neerugantis* (watermen) and village accountants. Six encroachers were interviewed randomly, as they were easily approachable and agreed to provide detailed information. A structured questionnaire was used to elicit information about their socio-economic background and details on encroachments. Conflict resolution decision making with regard to encroachment are largely guided by well-established patterns of behavior. The extent of encroachment was resolved in committee.

**2.2.4. Ganga Pooja:** For inspire the blessings of the god for plentiful water in the tank, the village people of K. Raguttahalli worship the Goddess of the tank and pray to be saved from

drought and epidemic diseases, good rain in kharif season and for the well-being of pregnant women. The celebration involves building a temple of bamboo in the middle of the tank bund. The people known locally as Ganga, is one of the fourteen prime deities worshipped in this region. The festival is popularly celebrated throughout the village after the tank was full with adequate run-off people worship the tank. On this occasion, irrespective of communities' peoples from neighboring villagers assemble on the banks of a tank. After this they build a temporary temple in the middle of the stream, also made out of bamboo, and hold celebrations reverently. Goats are sacrificed to the gods, in the belief that through such offerings the gods may use their power to prevent epidemic diseases. Another purpose of the festival is that the gods are reverently asked to ensure the well-being of pregnant women.

**2.2.5. Tank Civil Activity:** Firstly, to remove weed and desilt the canals regularly in each season prior to the release of water, secondly, to attend to major repairs like breach in the canal or strengthening the canal bund with additional reinforcement, etc. To attend to regular weeding and desilting during each season, through informal consultations, the *neeruganti* collects the opinion of several farmers, especially those who hold land on a large scale, and fixes the day for weeding and desilting. Normally, the day fixed will be a Monday as no farmers engage animals for any activity in the field on that day as a custom. All canals are weeded out and desilted in each season from top to bottom with the collective participation of all the farmers served by that canal. A person failing to participate in the desilting and weeding activities without prior permission is liable for punishment. Punishments are decided by the council of elders based on the complaint filed by the *neeruganti* and identified for the respective canal. The council of elders has the right to stop the supply of water to the fields of offender. In some cases, release of water may be delayed in order to exact a change in behavior, although.

**Table 1. Seasonal wise Crop rotation in command area**

| Sl. No | Crop grown in Command area | Kharif    | Rabi          | Alternative crops Grown                         | Fertilizer Quantity used/kg/ha |        |                   |                             |
|--------|----------------------------|-----------|---------------|-------------------------------------------------|--------------------------------|--------|-------------------|-----------------------------|
|        |                            |           |               |                                                 | DAP                            | Urea   | FYM               | Tank silt                   |
| 1      | Main Crop grown            | Paddy     | Finger millet | Chilies<br>Tomato<br>Brinjol<br>Onion<br>Potato | 40-50                          | 80-100 | 1000<br>-<br>2000 | 4000<br>(Alternative years) |
| 2      | Irrigation source          | Bore well | Tank          | Tank                                            |                                |        |                   |                             |

### III. RESULTS AND DISCUSSION

The result shows that Paddy is the main crop during kharief season followed by finger millet and vegetables. Farmers kept the option for Rabi crop open to be decided later in month of October depending on the tank water status, command area farmers have not considered to cultivate paddy and replaced with vegetables such as chilies, brinjol, onion and potato in the command area (Table 1). The *neeruganti* managed the water equitably as well ensured that the tank was maintained ensure uniform supply of water to all fields in the command area. Determine the type of crop to be grown based upon the water available decide on the dates and times for supply of water. The decision on the use of the water was made by the village leaders and the community in a joint process. The *neeruganti* had to follow the directions and implement the decisions taken by the elders regarding the use of water and the maintenance of the tank. The *neeruganti* suggested to the farmers that during this lean period they should grow crops like finger millet and groundnut, which required less water. At the lowest point of the command area and at the tail end, arrangements is made to collect the drained water from the fields on command area. The surplus water from all these portions flows to the lowest point, irrigating a few fields.

### IV. CONCLUSION

The traditional community based knowledge systems and local institutions could be important complements to science, research and technology in creating successful adaptive strategies to protect and sustainable use of water, in command areas of semi arid tropics and elsewhere. Improve community based tanks, rehabilitation, as requires little additional investment compared to traditional tank rehabilitation with its exclusive focus on technical interventions. One prerequisite is the availability of local organization that can disseminate the required knowledge on crop specific irrigation water requirements and water supply to tail ends of command areas of community based tanks.

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### References

[1] Interco operation in India (2005) Tradition meeting modernity: A case study on the management of Mudiyanur tank, Kolar District, Karnataka Working Paper 2 Inter cooperation Delegation, Hyderabad, India.

- [2] Karnataka Community Based Tank Management Project Jalasamvardhane Yojana Sangha (JSYS), Website: [www.jsysindia.org](http://www.jsysindia.org).
- [3] Ostrom, E. (1990). *Governing the Commons: the Evolution of Institutions for Collective Action*. Political economy of Institutions and decision Series. Cambridge: Cambridge University Press.
- [4] Raju, K.V. (2002). *Participatory Irrigation Management in Andhra Pradesh: The Way Forward*. In Rakesh Hooja, Ganesh Pangare and K.V. Raju (eds.). *Users in Water Management*. New Delhi: Rawat Publications.
- [5] Thippaiah, P., 2006, Encroachment of water spread area of tanks in Karnataka: Magnitude causes and consequences. *Agril. Econ. Res. Rev.*, 19: 11-38.
- [6] Vaidyanathan A (ed.), 2001. *Tanks of South India*. New Delhi: Center for Science and Environment.