WATERSHED DEVELOPMENT MANAGEMENT AND EVALUATION IN THE WESTERN GHATS REGION OF INDIA

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DEVELOPMENT OF OORAINS (TRADITIONAL WATER RESOURCE) AND RECHARGING OF WATER AQUIFERS IN RAMANATHAPURAM DISTRICT,TAMILNADU.

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Abstract: *Natural Resources Development Project, NARDEP is a part of the service activities carried out by Vivekananda Kendra, Kanyakumari. Traditional water source development for drinking water is one of the thrust areas of activity, which is being implemented, with the support of CAPART, New Delhi. Ramanathapuram district in Tamil Nadu, one of the project areas is known for frequent droughts and water scarcity as well as salinity problem. The administration has attempted various measures like setting desalination plants to provide assured and safe drinking water but the situation remains pathetic in many pockets.*

Madukulattur Block is one such area with brackish water sources only, where the Kendra has involved the local people in developing the traditional "Oorani" (surface water pond) for providing protected drinking water. The fenced and protected surface water source with draw well having filter bed channel to collect turbidity free water, recharge tube wells, directing rainwater and flash floods in new Oorani to improve the water quality of existing tube well source and the mass awareness campaign are the activities which proved successful. This has to be proved effective in controlling salinity and providing drinking water cost effectively.

The flash flood surface water collection and roof water harvesting provided fresh water surface at local areas. The recharge tube wells inside the pond is a milestone in storing the rainwater in underground and easy way of extraction. With scientific understanding of subsurface flow pattern, and active participation of people, more and more useful schemes can be implemented by government as well as by other voluntary organisations.

Introduction

Ramanthapuram District in Tamil Nadu is one of the drought prone areas of the country. " Acute shortage of drinking water - Rs 40 lakhs per day for drought relief work" may be the haedlines of the newspaper again and again over years. Rajiv Gandhi Drinking Water Mission under which Ramanathapuram was one of the "Mini mission area" was implemented by Govt. of India. Many sources were created for rural water supply including the desalination plants. However, even after trying and working on various schemes, the water supply in many pockets of the district is either inadequate and not sustainable or having high salinity. Number of piped water supply schemes from **Vaigai river bed** were implemented in the last few years by Govt and Kulandurai and Rajagambiram schemes envisages transporting water from the infiltration wells to number of villages covering over 40Km length. These schemes implemented with crores of Rupees have failed miserably due to shortage of water in the river alluvium of limited thickness, in summer months. Government has installed 14 desalination plants to convert brackish water into potable water. This is also not successful due to the problem in feed water source, lack of availability of suitable high quality membranes to treat water of very high salinity, high tech maintenance required and lack of trained persons available in this remote villages. After trying and working on various schemes, the government, the voluntary organisation and public have realised that the development of traditional sources like *oorani* (pond) and rain water harvesting are the realistic and viable solution to the chronic scarcity and salinity problem in this district.

Vivekananda Kendra in service activity

Vivakananda Kendra is one of the voluntary organisations engaged in a number of service activities in the country and our contributions in various fields of services are well know. Under the Natural Resources Development Project (NARDEP), Kendra carried out extensive survey on the water scarcity in Ramanathapuram district and interacted

with people to know their problems and preferences. We identified the selected villages in Mudukulattur block where the drinking water supply is very poor and the people's participation in planning and execution was assured.

Profile of Mudukulattur area

Mudukulattur town is a taluk headquarters in Ramanthapuram district (Fig .1) located 40km away from Ramanathapuram town. The nearest town is Paramakudi, 30 km north of Mudukulattur which is well connected by NH 49 and Rameswaram - Madurai section of southern Railways. The block is having a geographical area of 338 sq.k.m. with 155 hamlets under 48 Gram Panchayat. There are 36 revenue villages with a population of 85,329 (1991 census). There are 61 minor irrigation tanks, 42 PWD tanks connected with Vaigai river by a net work of supply channels. The rainfall of the area is around 650 mm in a year and the river is carrying flash flood water for few occasions in the year and many years will have dry spells.

Sedimentary rocks cover the area and the water quality is brackish in most of the villages. Shri. K.C.B. Raju and Shri. N. Varadaraj, (1987) CGWB have presented the detailed account of hydrogeological zones (Fig.2). They have also indicated the water quality inferred down to a depth of 1000 m and provided the feasibility report for creation of sources for the problem villages taken up under Technology Mission. The development of traditional sources for some remote areas was indicated as the solution.

The water supply position of the Modukulattur Block is only partial even after the completion of Technology Mission. There are 24 power pumps and 214 hand pumps in the Block, but only saline water is available. Many pumping schemes introduced in the sporadic shallow fresh water pockets have resulted in rapid upward movement of saline water. The problem and absence of deep-seated fresh water aquifers have curtailed the ground water development in the area.

Traditional Sources

"*Oorani*" surface water ponds, is the most common traditional drinking water sources of the Ramanthapuram district. These are the dug out ponds which collects the surface runoff and also the sub soil fresh water lenses at places. Nowadays these ponds have become increasingly disused because of

I) Reduced storage capacity due to silting and encroachments.
II) Absence of proper inlet structure/choking of existing inlets and.
Poor maintenance of side embankments and contamination due to lack of fencing

Remodelling of existing "Oorani"

In order to make use of the number of *Ooranis* existing in the block which are poorly maintained in comparison to the adjoining blocks in the district and well built structures in neighbouring Sivaganga district, the following steps were identified.

(i) Enhance the storage capacity by deepening
(II) Construct simple inlet & outlet structures
(III) Do pitching work on slopes to prevent soil erosion
(IV) Have grass turfing for protecting the slopes
(V) Have bunds & drains diverting runoff water towards the inlet of the pond
(VI) Have a filter trench connected to a draw well out side the pond to get clean water.

Constraints

In spite of the vast scope for repair & maintenance in general, there were also few constraints as given below.

(I) Sub soil water level & brackish ground water does not allow any appreciable deepening
(II) High rate of evaporation in summer which necessitates deepening rather than widening and increasing surface area of the pond

(III) Ooranis which are fed by the irrigation supply channel network of Vaigai river has poor inflow into them due to reduced supply into the tanks.
(iv) The lack of acitve participation of the local people in construction & maintenance in all places.

Remodelling of Oorains

In spite of all these limitations, our Kendra workers inspired the local people in Mudukulattur union with constant interaction for 6 years and by involving them, remodelled the following *Oorains* with the help of CAPART, New Delhi. And supplemented the drinking water supply for the rural population.

1. Thattankudiyiruppu (1991)
2. Sambakulam (1991)
3. Kottakudi (1994)
4. Mattiyerandel (1994)
5. Kannicheri (1995)
6. Selevanayagapuram (1995)

The plan and cross section of the *Oorani* at Thattandkudiyeruppu is shown in Fig. 3. the pitching by concrete blocks in Thattan Kudiyeruppu and Sambakulam *Ooranis* prevents soil erosion in sides. The grass turfing above the pitching area, fencing with *prosopis julieflora* plants and periodic cleaning of draw well and cleaning of sand filter bed are done.

Recharge structures in Oorani

After the successful remodelling of *Ooranis*, Vivekananda Kendra decided to go one step further in improving the drinking water sources by way of combining the Oorani with recharge tube wells. At the instance of CAPART, New Delhi, Vivekananda Kendra carried out detailed studied in consultation with Central Ground Water Board Officials at Chennai and Trivandrum and selected Selevanayagapuram and Merku Kottakudi villages in Mudukulattur panchayat union of Ramanathapuram district.

Recharging ground water at Selvanayagapuram

The village is having number of tube wells and a big irrigation tank but water quality is brackish. The villagers had a long standing dream of having water harvesting structure, which was taken up by Kendra and fulfilled with their involvement. 2.1 acres of land adjoining a stream were purchased by the villagers for construction of *Oorani*. Each family contributed SHRAMDAN by digging part of the *Oorani* totally worth Rs. 50,000. The amount was reimbursed and made as fixed deposit to use for village community welfare measures. The pit made by the villagers were deepened further using earthmovers to expedite the construction before the onset of monsoon in June 1997. The average length of pond is 83m and width is 70m while depth is 1.3m. Two recharge tube wells of 200 mm diameter and 36.37 m depth were constructed inside the pond. Then gravel packing is made in 1.2m diameter and 2m. depth pit around tube wells to facilitate the rainwater collected in pond to recharge into the sand layer occurring below 5m. Also a draw well of 1.8m diameter and 7.9m with concrete rings were constructed to collect the water for drinking water needs of the village. This project envisages the recharged water will get natural flow towards draw well in dip down side and give fresh water. The pond was filled in September 1997 and inflow into the tube wells could be visualised by the lowering water level in pond. The draw well is full with fresh water and the detailed picture of the structure is given in Fig 5.

Recharge Tube well at Merku Kottakudi

The existing tube well used for villager's water supply is brackish and people were collecting water from far away sources for drinking purpose. The water quality improvement in the existing tube well was planned by executing a recharge structure. The small depression in the upstream side of the tube well is covered into a pond of 50m length, 30m width and 1.5m depth. A tube well of 200 mm diameter and 45.45m depth is constructed and the rainwater filled in the pond has effective ground water recharge into the same aquifer tapped by the production well. (Fig.6) The water quality of the tube well has considerably improved in the first year itself and further quality improvement

is anticipated which will assure drinking water supply for the village. Another tube well constructed in downstream side about 200m away will allow more extraction and induced recharge in the system.

Roof water Harvesting

The second way of water source improvement of the remote villages envisages the collection and storage of rainwater falling over the roof for the use in lean period. The roof harvesting was planned in areas where I) no *Ooranis* are existing, II) Ground water is saline and III) There are no adequate or sustainable water sources within reasonable distance.

The roof harvesting structure at Thattan kudiyeruppu (Fig. 4) has the following features;

I) The type of roof selected is tiled and not flat or thatched roof
II) Water collected from every roof pooled to a place through an underground pipe system
III) The pipe is connected to a tank at the end where the water received is filtered and stored
III) A hand pump is fitted for taking out water from the underground storage tank.

Highlights of the Project

The implementation of the works is unique and the highlights are listed below;

1. Villagers were motivated to assess the problem and the role they have to play under the project through films and group discussion.
2. Villagers actively participated in desilting work as a part of local contribution.
3. Weekly meetings were organised to discuss and sort out the problems.
4. Remodelled *Oorani* was inaugurated at Tahattan Kudiyeruppu by Deputy Director General, CAPART, New Delhi.
5. Check list for periodic reporting regarding maintenance of *Oorains* was given to the villagers for monitoring
6. Village level co-operative society was formed in both villages with a corpus fund for maintaining the Ooranis
7. They also further resolved to mobilise funds on a quarterly basis to augment the deposits.
8. Nearby villagers have come forward to take up the water harvesting work on similar terms.
9. Availability of drinking water has made them to utilise their spare time and energy for income generating activities.

Conclusion

The activities of the Vivekananda Kendra in Mudukulattur area of Ramanathapuram district have involved the local public for implementing traditional water resource development. The work has proved to be very successful in this drought prone and poor ground water quality area. The flash flood surface water collection and roof harvesting provided fresh water source at local area while piped water supply from distante source is not reaching the designed population due to technical and social problems. The recharge tube wells inside the pond is a milestone in storing the rainwater in underground and easy way of extraction. With scientific understanding of sub surface flow pattern and active participation of people, more and more useful schemes can be implemented by voluntary organisation in this type of problematic areas.

Acknowledgement

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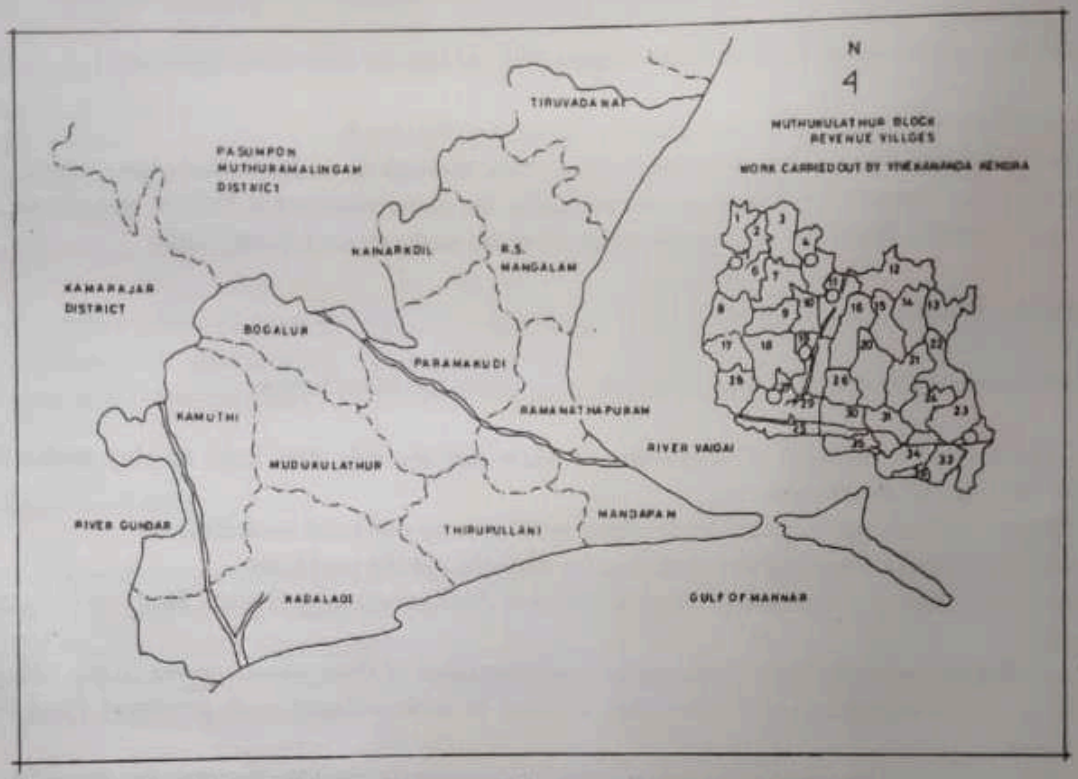

Fig:1 Location map of Ramanathapuram District

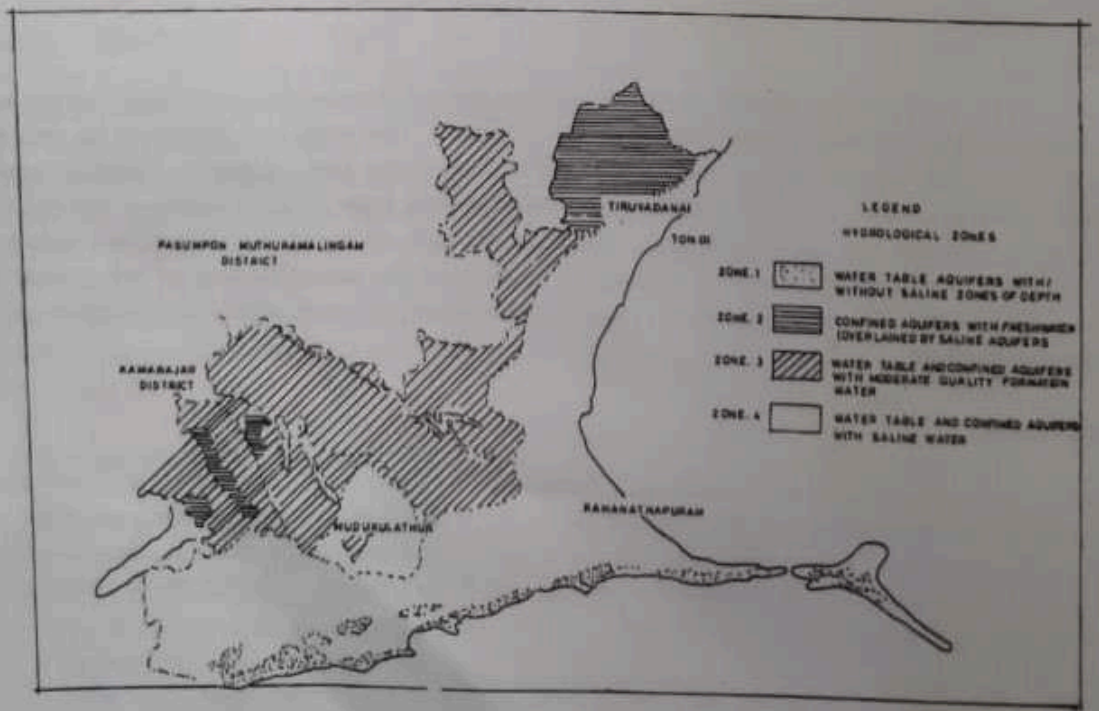

Fig : 2 Hydro Geological zones of Ramanathapuram District

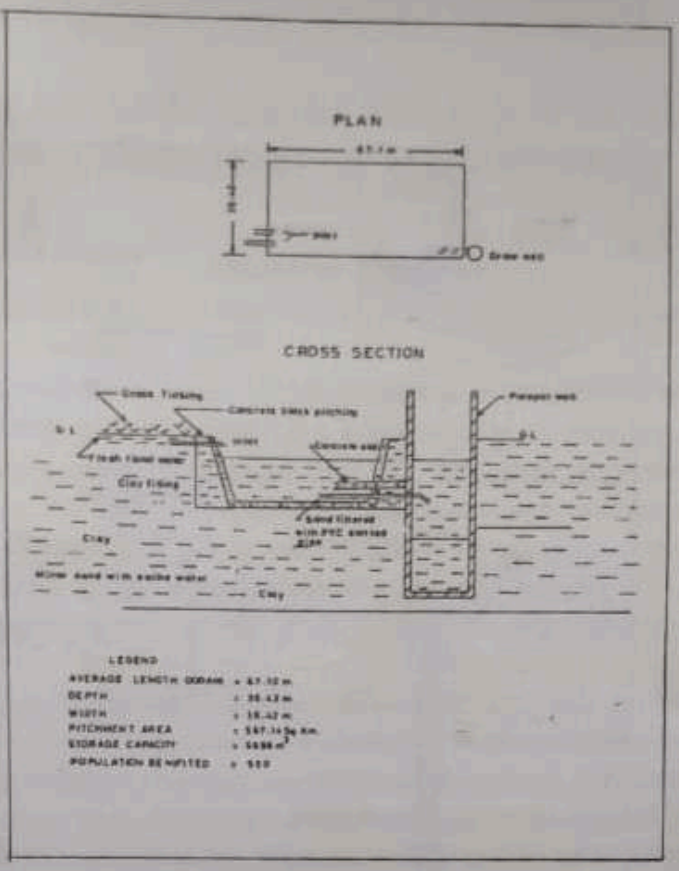

Fig: 3 Plan of Thattankudiyiruppu oorani

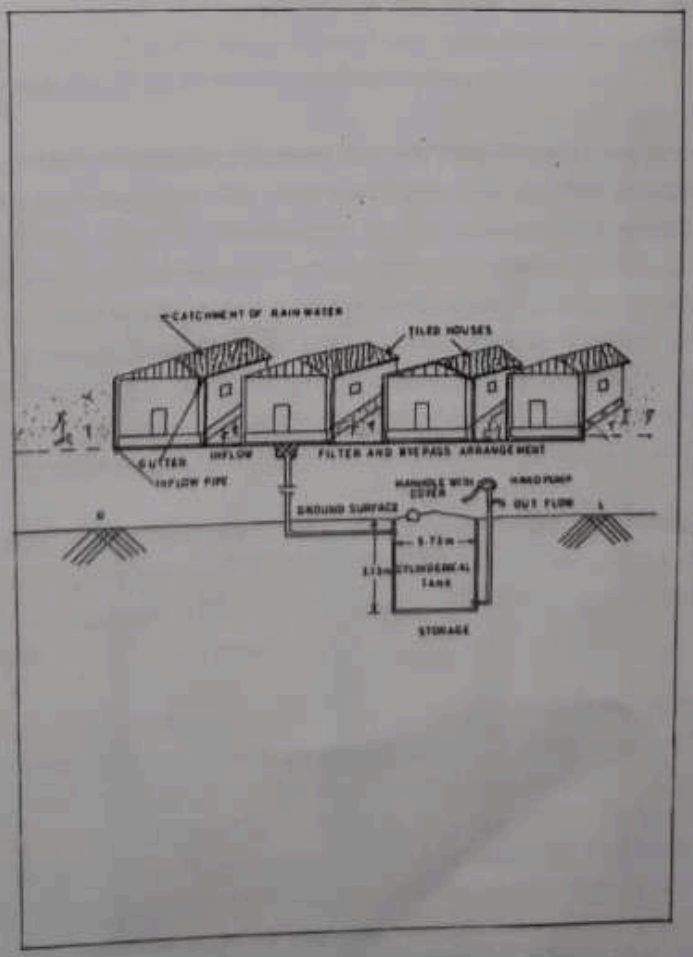

Fig: 4 Roof harvesting at thattankudiyeruppu

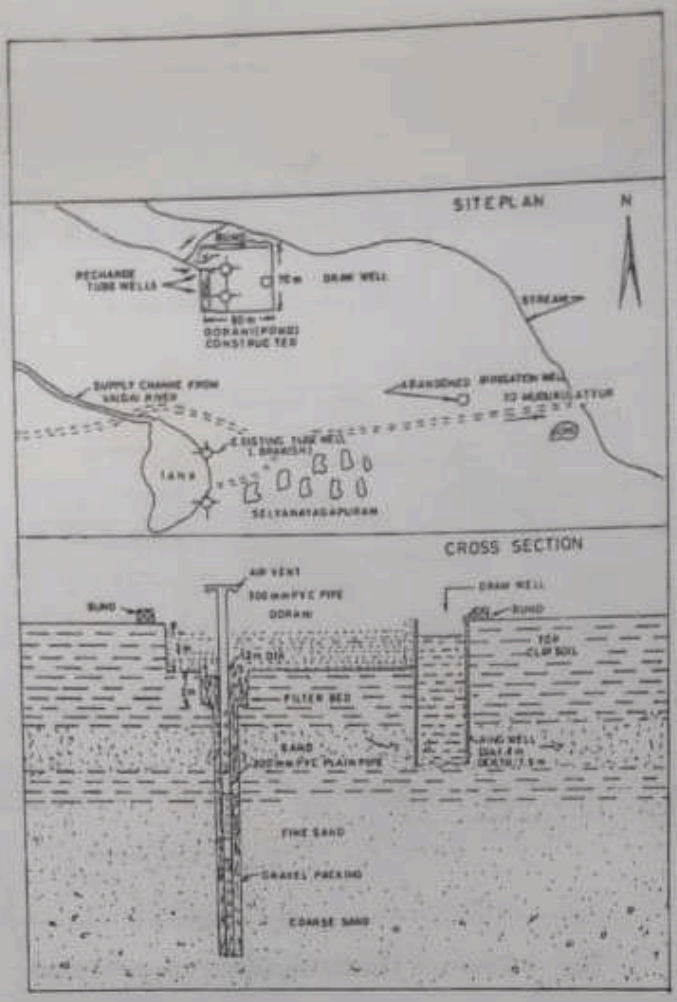

Fig: 5 Recharge tube well in oorani- Selvanayagapuram

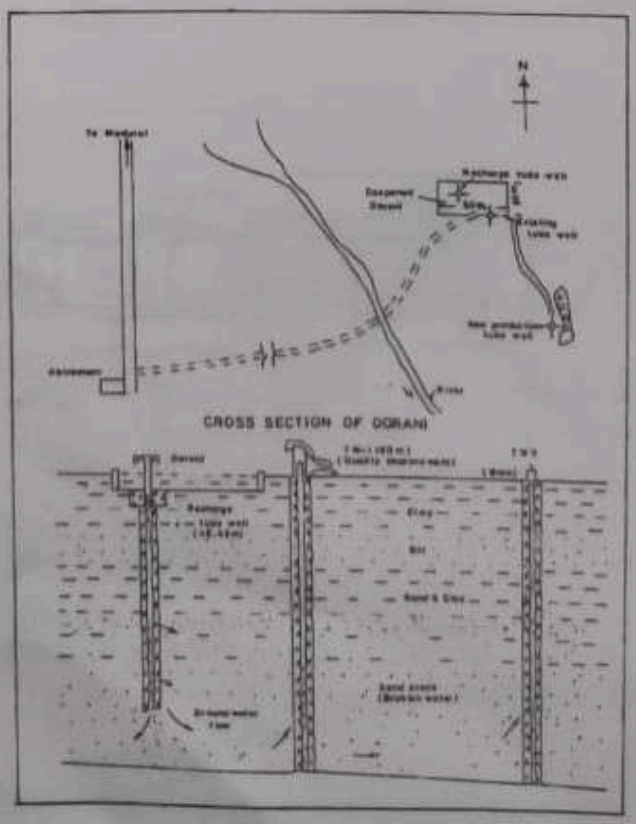

Fig: 6 Recharge tube well in oorani Merku kottakudi site plan