

09 . Water harvesting and irrigation developments during different periods – water storage – distribution and relevance to modern agriculture.

The need for continuous supply of water for irrigation whether from canal, well, pond or lake is realized as the most important for agriculture in ancient period. It should be preserved by all sorts of efforts for the benefit of agriculture. The different irrigation principles adopted in ancient period are :

- ❖ Construction of large mud embankment on a stone foundation for diverting flood water from the river.
- ❖ Building of small tanks.
- ❖ It is also indicated that severe penalty was imposed when water is let out other than sluice gate.
- ❖ Extensive tank irrigation systems were adopted in Sri Lanka and later in South India. In Srilanka ancient kings practiced that not even a drop of rainfall should go to sea without benefiting man.
- ❖ The topography of Telengana region of Andhra Pradesh and Karnataka is ideally suited for the construction of tanks. A special feature of tanks in Telengana tank construction in series, by bunding the same valley at several points and surplus water from lower elevation and so on. Even now the tanks constructed by chola king in the same way exist today in Tamil Nadu.
- ❖ Every farmer emphasizes the efficient and skilful use of water.
- ❖ It is also suggested that preference of the use of water should be in the order of food crop, vegetables and flowers.
- ❖ For the maintenance of tanks, a committee of villages called 'eri- variyam' was appointed. The committee ensured repairs and de-silting tanks and distribution of

irrigation from wells.

Bullocks to draw water from wells for irrigation was practiced and pulled a leather bag with ropes. Persian well was used for drawing water from wells which was developed in North India.

HISTORY OF IRRIGATION DEVELOPMENT IN INDIA

	Period		Irrigation Development
1.	Ancient Period	2500 - 1000 BC	People settled near the banks of river / tanks for the purpose of getting water for drinking and irrigation.
2.	Chalcolithic	3000 - 1700 BC	Practice of irrigation to crops was evolved.
3.	Vedic period	1500 - 1600 BC	People employed craftsman to dig channels from rivers to their fields. Well irrigation through kuccha and puccha wells and were practiced
4.	Pandyas / Chola chera's Period	(1st Century 300 AD)	Irrigated rice cultivation started during this period. Dams and Tanks were constructed for irrigation.
5.	Medieval period	(1200 - 1700 AD)	Irrigated agriculture was developed during Mogul period. Canals, Dams and Tanks were constructed (e.g.)

			<ol style="list-style-type: none"> 1. Construction of western yamuna canal 2. Constructions of Anantara sagar.
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Methods of conserving rain water

In ancient days itself, people, especially Indians, know the methods of conservation of rain water. There are evidences that, even during Harappan period, there was very good system of water management as could be seen in the latest excavation at Dholavira in Kachch. During Independence period, the people use to manage water resources considering it as part of the nature which is essential for their survival. This could be seen from the rain water harvesting structures in the low rainfall areas of Rajasthan, harvesting springs in hilly areas and mountainous region and percolation ponds and tanks in southern India.

In Tamil Nadu, the ancient people stored rainwater in public, placed separately one for drinking purposes and another for bathing and other domestic purposes and called them as Ooranies. They also formed percolation tanks or ponds, for the purpose of recharging irrigation or domestic wells. They periodically clean the water ways so as to get clean water throughout the year. These are instances in the history that people constructed crude rubble bunds across river courses either for diversion of water or for augmenting the ground water. The various methods of rainwater harvesting are classified below under two category, Traditional and Modern methods.

Traditional rainwater harvesting, which is still prevalent in rural areas, was done in surface storage bodies like lakes, ponds, irrigation tanks, temple tanks etc. In urban areas, due to shrinking of open spaces, rainwater will have to necessarily be harvested as ground water,

Hence harvesting in such places will depend very much on the nature of the soil viz., clayey, sandy etc. The below listed are the various kinds of traditional rainwater harvesting methods.

The Modern methods of rainwater harvesting are categorised under two, they are Artificial Recharging and Rain Water Harvesting. The former is classified into Absorption Pit Method, Absorption Well Method, Well cum Bore Method and Recharge trench cum injection well. The later is categorised into Individual Houses and Grouped Houses which are further classified into Percolation Pit Method, Bore Well with Settlement Tank, Open Well Method with filter bed Sump and percolation Pit with Bore Method.

Bamboo method of rainwater harvesting

In Meghalaya (one of the seven northeastern states in India), an ingenious system of tapping of stream and springwater by using bamboo pipes to irrigate plantations is widely prevalent. It is so perfected that about 18-20 litres of water entering the bamboo pipe system per minute gets transported over several hundred metres and finally gets reduced to 20-80 drops per minute at the site of the plant. The tribal farmers of Khasi and Jaintia hills use the 200-year-old system.

The bamboo drip irrigation system is normally used to irrigate the betel leaf or black pepper crops planted in arecanut orchards or in mixed orchards. Bamboo pipes are used to divert perennial springs on the hilltops to the lower reaches by gravity. The channel sections, made of bamboo, divert and convey water to the plot site where it is distributed without leakage into branches, again made and laid out with different forms of bamboo pipes. Manipulating the intake pipe positions also controls the flow of water into the lateral pipes. Reduced channel sections and diversion units are used at the last stage of water application. The last channel section enables the water to be dropped near the roots of the plant.

Kunds of Thar Desert

In the sandier tracts, the villagers of the Thar Desert had evolved an ingenious system of rainwater harvesting known as kunds or kundis. Kund, the local name given to a covered underground tank, was developed primarily for tackling drinking water problems. Usually constructed with local materials or cement, kunds were more prevalent in the western arid regions of Rajasthan, and in areas where the limited groundwater available is moderate to highly saline. Groundwater in Barmer, for instance, in nearly 76 per cent of the district's area, has total dissolved salts (TDS) ranging from 1,500-10,000 parts per million (ppm). Under such conditions, kunds provide convenient, clean and sweetwater for drinking. Kunds were owned by communities or privately, with the rich having one or more kunds of their own. Community kunds were built through village cooperation or by a rich man for the entire community.

Traditional Rain water harvesting

The traditional rainwater harvesting methods in North India is surface water harvesting methods are viz., Tanka, Nada, Nadi, Talai, Talab, Khadin Sar, Sagar and Samend. Depending upon rainfall, topography of area, type of soil, the water harvesting methods are different from region to region.

Tanka

It is one of the ancient, common and relatively hygenic methods of water storage. It is constructed of on farm, country yard and fort. The shape is normally circular / square. Dimension is 2 m dia. 3 m deep capacity 10000 lit. It is made on sloping land to arrest run off water in the farm; however in houses the construction is made on an elevated place to avoid entry of dirty water in to it.

Talai

Similar to Tanka, still deeper (2-3cm depth). Special attention paid for selection of location such that there is adequate flow of rain water into Talai. Care is also taken so that loose soil does not flow along with water stream.

Nada

In this method, low lying areas in between hillocks is excavated as pit and provided embankment to arrest rain water from these hillocks. The catchment area of Nada is 5 to 10 ha. The Nada is constructed on rangeland, barren land pastureland and agriculture field. It provides short-term storage of rainwater and mainly used for animals.

Nadi

Compared to Nada, the Nadi is bigger in size. A village or group of Villages uses the run off water collected in the Nadi. Depth is 6-8m, catchment area 10-150 ha. In the Nadi, water is available for whole of the year as a result it provides shelter for many wild animals and birds.

Talab

It is relatively shallow and spread over to more area compared to Nadi. It is generally constructed in rangeland. The catchment area of Talab is 480 ha, when it is filled its fullest capacity can last for many years.

Khadin

Accumulation of run off water in between hillocks is known as Khadin. Khadin means cultivation crops. The khadin water is generally used for crop cultivation and animals.

Sar, Sagar and Samand

It is used to harvest rainwater for irrigation purpose. Even today this structure provides excellent source of reservoir and also tourist spot.

Practices of irrigation and rainwater harvesting adopted in ancient period were more relevant in Indian agriculture today.

- Water is elixir or life and kingpin of successful agriculture.
- Priority to be given for water conservation for efficient use for agriculture and-for domestic needs.

- Sustainability of irrigation system was very much stressed where the tanks, wells or canals must ensure continuous supply of water.
- Avoidance of problems of salinization/alkalinization and water logging which become features of canal irrigation system of today.