



A review : Traditional Methods of Water Conservation



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Abstract:

Water conservation has been traditionally done by our ancestors through different techniques. Economical and most sustainable. Method of water conservation practised since time immemorable. Water conservation is needed due to stress on our limited water resources due to growing population, urbanization, industrialization, agriculture. Across India from North to South are one gets to see diversity and different techniques of water conservation.

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Introduction:

Water resources are in great stress due to increased population, industrialization & Urbanization. Only through sustainable methods of water conservation, water can be saved for present and future generation. Indian culture gives great reverence to Rivers, but still our country faces issues related to water. Since Ancient times our ancestors knew the technique of water conservation. They conserved water by collecting rainwater and flood waters and stored it for future use.

In India we get to see different harvesting structures or methods based on climate, rainfall, geography of the area, soil, local availability of materials used for making these structures.

1. Trans Himalayan Region :

Zings

Are structures seen in Ladakh. These are small tanks that collect melted glacier water through channels

2. Western Himalya :

a) Kul

Kuls are water channels found in precipitous mountain areas. These channels carry water from glaciers to villages in the Spiti valley of Himachal Pradesh. Where the terrain is muddy, the kul is lined with rocks to keep it from becoming clogged. In the Jammu region too, similar irrigation systems called kuhls are found.

b) Naula

Naula is a surface-water harvesting method typical to the hill areas of Uttaranchal. These are small wells or ponds in which water is collected by making a stone wall across a stream.

c) Khatri

Khatri is structures, about 10x12 feet in size and six feet deep carved out in the hard rock mountain. These traditional water harvesting structures are seen in Hamirpur, Kangra and Mandi districts of Himachal Pradesh. There are two types of khatri: one for animals and washing purposes in which rain water is collected from the roof through pipes, and other used for human consumption in which rainwater is collected by seepage through rocks.



c) **Kuhl**

Kuhls are a traditional irrigation system in Himachal Pradesh- surface channels diverting water from natural flowing streams (khuds). The system consists of a temporary headwall (constructed usually with river boulders) across a khud (ravine) for storage and diversion of the flow through a canal to the fields. The kuhl was provided with moghas (kuchchaoutlets) to draw out water and irrigate nearby terraced fields. The water would flow from field to field and surplus water, if any, would drain back to the khud. The kuhls were constructed and maintained by the village community.

3. Eastern Himalayas :

Apatani

This is a wet rice cultivation cum fish farming system .This system harvests both ground and surface water for irrigation. It is practiced by Apatani tribes of ziro in the lower Subansiri district of Arunachal Pradesh. In Apatani system, valleys are terraced into plots separated by 0.6 meters high earthen dams supported by bamboo frames. All plots have inlet and outlet on opposite sides. The inlet of low lying plot functions as an outlet of the high lying plot. Deeper channels connect the inlet point to outlet point. The terraced plot can be flooded or drained off with water by opening and blocking the inlets and outlets as and when required. The stream water is tapped by constructing a wall of 2-4 m high and 1 m thick near forested hill slopes. This is conveyed to agricultural fields through a channel network.

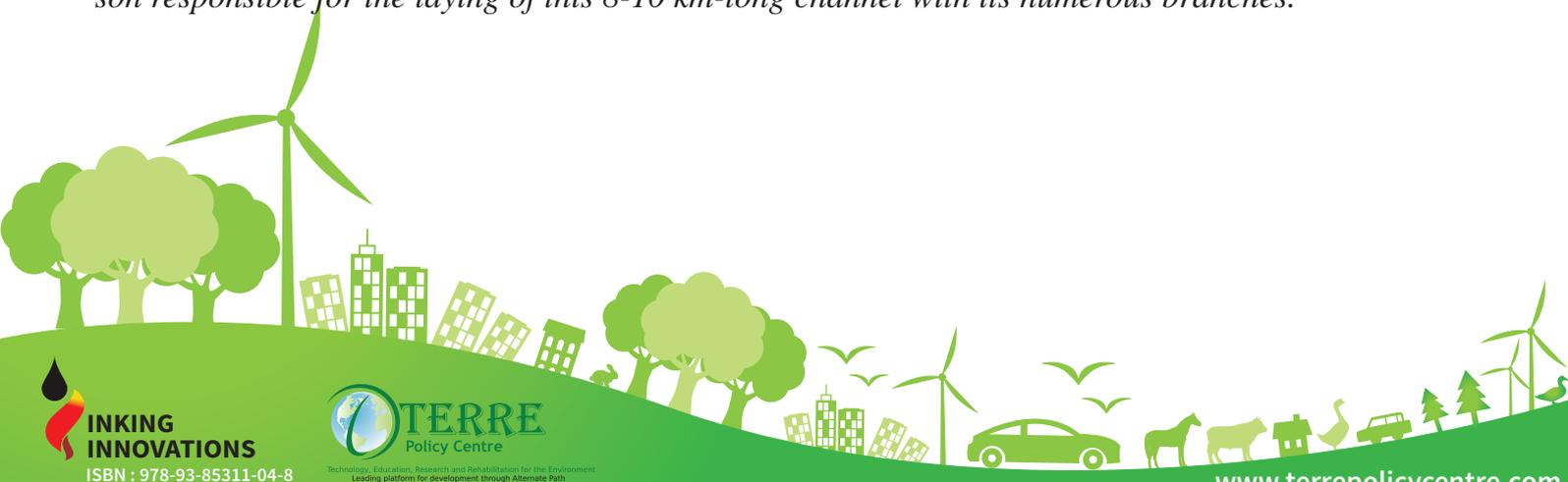
4. North eastern Hill ranges:

a) **Zabo**

The zabo (the word means ‘impounding run-off’) system is practiced in Nagaland in north-eastern India. Villages such as Kikruma, where zabos are found even today, are located on a high ridge. Though drinking water is a major problem, the area receives high rainfall. The rain falls on a patch of protected forest on the hilltop; as the water runs off along the slope, it passes through various terraces. The water is collected in pond-like structures in the middle terraces; below are cattle yards, and towards the foot of the hill are paddy fields, where the run-off ultimately meanders into.

b) **Cheo-ozih**

Seen in village of Kwigema in Nagaland. The riverwater is brought down by a long channel. From this channel, many branch channels are taken off, and water is often diverted to the terraces through bamboo pipes. One of the channels is named Cheo-ozih - ozih means water and Cheo was the person responsible for the laying of this 8-10 km-long channel with its numerous branches.



c) **Bamboo Drip Irrigation**

Meghalaya has an ingenious system of tapping of stream and springwater by using bamboo pipes to irrigate plantations. This 200-year-old system is used by the tribal farmers of Khasi and Jaintia hills to drip-irrigate their black pepper cultivation. 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. Bamboos of varying diameters are used for laying the channels.

5. **Brahamaputra valley:**

a) **Dongs**

Dongs are ponds constructed by the Bodo tribes of Assam to harvest water for irrigation. These ponds are individually owned with no community involvement.

b) **Dungs or Jampoies**

Dungs or Jampoies are small irrigation channels linking rice fields to streams in the Jalpaiguri district of West Bengal.

6. **Indo- Gangetic plains :**

a) **AharPynes**

This traditional floodwater harvesting system is indigenous to south Bihar.

In south Bihar, the terrain has a marked slope -- 1 m per km -- from south to north. The soil here is sandy and does not retain water. Groundwater levels are low. Rivers in this region swell only during the monsoon, but the water is swiftly carried away or percolates down into the sand. All these factors make floodwater harvesting the best option here, to which this system is admirably suited. An ahar is a catchment basin embanked on three sides, the 'fourth' side being the natural gradient of the land itself. Ahar beds were also used to grow a rabi(winter) crop after draining out the excess water that remained after kharif (summer) cultivation. Pynes are artificial channels constructed to utilise river water in agricultural fields. Starting out from the river, pynes meander through fields to end up in an ahar.



b) *Bengal's inundation channel*

Bengal once had an extraordinary system of inundation canals. The canals were broad and shallow, carrying the crest waters of the river floods, rich in fine clay and free from coarse sand, the canals were long and continuous and fairly parallel to each other, and at the right distance from each other for purposes of irrigation; irrigation was performed by cuts in the banks of the canals, which were closed when the flood was over.

c) *Dighis*

Made by emperor Shahjahan.. A dighi was a square or circular reservoir of about 0.38 m by 0.38 m with steps to enter. Each dighi had its own sluice gates. Steps to make the surface temperature map

d) *Baolis*

Baolis were secular structures from which everyone could draw water. Gandak-ki-baoli (so named because its water has gandak or sulphur) was built during the reign of Sultan Iltutmish. The water of this beautiful rock-hewn baoli is still used for washing and bathing.

7. *Thar Desert :*

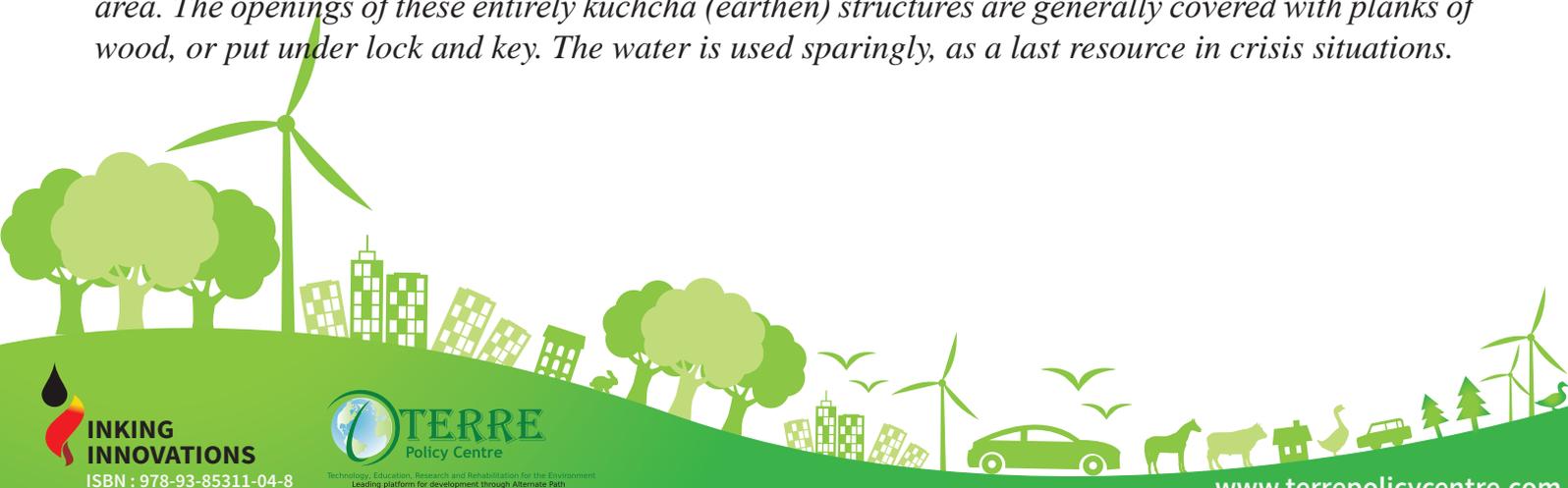
a) *Kunds / Kundis*

A kund or kundi looks like an upturned cup nestling in a saucer. These structures harvest rainwater for drinking, and dot the sandier tracts of the Thar Desert in western Rajasthan and some areas in Gujarat. Essentially a circular underground well, kunds have a saucer-shaped catchment area that gently slopes towards the centre where the well is situated. A wire mesh across water-inlets prevents debris from falling into the well-pit. The sides of the well-pit are covered with (disinfectant) lime and ash. Most pits have a dome-shaped cover, or at least a lid, to protect the water. If need be, water can be drawn out with a bucket. The depth and diameter of kunds depend on their use (drinking, or domestic water requirements).

b) *Kuis / Beris*

Found in western Rajasthan, these are 10-12 m deep pits dug near tanks to collect the seepage. Kuis can also be used to harvest rainwater in areas with meagre rainfall.

The mouth of the pit is usually made very narrow. This prevents the collected water from evaporating. The pit gets wider as it burrows under the ground, so that water can seep in into a large surface area. The openings of these entirely kuchcha (earthen) structures are generally covered with planks of wood, or put under lock and key. The water is used sparingly, as a last resource in crisis situations.



c) **Baoris / Bers**

Baoris or bers are community wells, found in Rajasthan, that are used mainly for drinking. Most of them are very old and were built by banjaras (mobile trading communities) for their drinking water needs. They can hold water for a long time because of almost negligible water evaporation.

e) **Nadis**

Jhalaras were human-made tanks, found in Rajasthan and Gujarat, essentially meant for community use and for religious rites. Often rectangular in design, jhalaras have steps on three or four sides. Jhalaras are ground water bodies which are built to ensure easy & regular supply of water to the surrounding areas. The jhalaras are rectangular in shape with steps on three or even on all the four sides of the tank. The steps are built on a series of levels.

d) **Jhalaras**

Nadis are village ponds, found near Jodhpur in Rajasthan. They are used for storing water from an adjoining natural catchment during the rainy season. The site was selected by the villagers based on an available natural catchment and its water yield potential. The location of the nadi had a strong bearing on its storage capacity due to the related catchment and runoff characteristics.

f) **Tobas**

Tobas is the local name given to a ground depression with a natural catchment area. A hard plot of land with low porosity, consisting of a depression and a natural catchment area was selected for the construction of tobas.

g) **Tankas**

Tankas (small tank) are underground tanks, found traditionally in most Bikaner houses. They are built in the main house or in the courtyard. They were circular holes made in the ground, lined with fine polished lime, in which rainwater was collected. Tankas were often beautifully decorated with tiles, which helped to keep the water cool. The water was used only for drinking. If in any year there was less than normal rainfall and the tankas did not get filled, water from nearby wells and tanks would be obtained to fill the household tankas. In this way, the people of Bikaner were able to meet their water requirements.

h) **Khadin**

A khadin, also called a dhora, is an ingenious construction designed to harvest surface runoff water for agriculture. Its main feature is a very long (100-300 m) earthen embankment built across the lower hill slopes lying below gravelly uplands.



i) *Vav / vavdi / Baoli / Bavadi*

Traditional stepwells are called vav or vavadi in Gujarat, or baolis or bavadin Rajasthan and northern India. Built by the nobility usually for strategic and/or philanthropical reasons, they were secular structures from which everyone could draw water.

j) *Paar system*

Paar is a common water harvesting practice in the western Rajasthan region. It is a common place where the rainwater flows from the agar (catchment) and in the process percolates into the sandy soil. Kuis or beris are normally 5 metres (m) to 12 m deep. The structure was constructed through traditional masonry technology.

8. Central Highlands :

a) *Talab / Bandhis*

Talabs are reservoirs. They may be natural, such as the ponds (pokhariyan) at Tikamgarh in the Bundelkhand region. A reservoir area of less than five bighas is called a talai; a medium sized lake is called a bandhi or talab; bigger lakes are called sagar or samand.

b) *SazaKuva*

An open well with multiple owners (saza = partner), sazakuva is the most important source of irrigation in the Aravalli hills in Mewar, eastern Rajasthan. The soil dug out to make the well pit is used to construct a huge circular foundation or an elevated platform sloping away from the well.

c) *Johad*

Johads are small earthen check dams that capture and conserve rainwater, improving percolation and groundwater recharge.

d) *Naada / Bandha*

Naada/bandha are found in the Mewar region of the Thar desert. It is a stone check dam, constructed across a stream or gully, to capture monsoon runoff on a stretch of land.

e) *Pat*

Bhitada village, Jhabua district of Madhya Pradesh developed the unique pat system. This system was devised according to the peculiarities of the terrain to divert water from swift-flowing hill streams



into irrigation channels called *pats*. The diversion bunds across the stream are made by piling up stones and then lining them with teak leaves and mud to make them leak proof.

f) **Chandela Tank**

These tanks were constructed by stopping the flow of water in rivulets flowing between hills by erecting massive earthen embankments, having width of 60m or more. His earthen embankments were supported on both sides with walls of coarse stones, forming a series of stone steps. These tanks are made up of lime and mortar and this is the reason why these tanks survived even after thousand years but the only problem, which these tanks are facing, is siltation of tank beds.

g) **Bundela Tank**

These tanks are bigger in size as compared to Chandela tanks. These tanks had solidly constructed steps leading to water in the tank.

h) **Rapat**

A *rapat* is a percolation tank, with a bund to impound rainwater flowing through a watershed and a waste weir to dispose of the surplus flow.

9. Eastern Highlands :

Katas / Mundas / Bandhas

The *katas*, *mundas* and *bandhas* were the main irrigation sources in the ancient tribal kingdom of the Gonds (now in Orissa and Madhya Pradesh). A *kata* is constructed north to south, or east to west, of a village. A strong earthen embankment, curved at either end, is built across a drainage line to hold up an irregularly-shaped sheet of water.

10. Deccan Plateau :

a) **Cheruvu**

Cheruvu are found in Chittoor and Cuddapah districts in Andhra Pradesh. They are reservoirs to store runoff.

b) **Kohli Tanks**

The *Kohlis*, a small group of cultivators, built some 43,381 water tanks in the district of Bhandara,





Maharashtra, some 250-300 years ago. It is still crucial for sugar and rice irrigation.

c) Bhanadaras

These are check dams or diversion weirs built across rivers. A traditional system found in Maharashtra. Where a bandhara was built across a small stream, the water supply would usually last for a few months after the rains.

d) Phad

The community-managed Phad irrigation system, prevalent in north-western Maharashtra, probably came into existence some 300-400 years ago. The system starts with a bandhara (check dam or diversion-weir) built across a rivers. From the bandharas branch out kalvas (canals) to carry water into the fields.

e) Kere

Tanks, called kere in Kannada, were the predominant traditional method of irrigation in the Central Karnataka Plateau, and were fed either by channels branching off from anicuts (check dams) built across streams, or by streams in valleys.

f) The Ramtek model

It has been named after water harvesting structures in the town of Ramtek, Maharashtra. A scientific analysis revealed an intricate network of groundwater and surface waterbodies, intrinsically connected through surface and underground canals. A fully evolved system, this model harvested runoff through tanks, supported by high yielding wells and structures like baories, kundis, and waterholes. This system, intelligently designed to utilise every raindrop falling in the watershed area is disintegrating due to neglect and ignorance.

11. Western Ghats:

Surangam

Kasaragod district in the northern Malabar region of Kerala is an area whose people cannot depend directly on surface water. The terrain is such that there is high discharge in rivers in the monsoon and low discharge in the dry months. People here depend, therefore on groundwater, and on a special water harvesting structure called surangam. The word surangam is derived from a Kannada word for tunnel. It is also known as thurangam, thorapu, mala, etc, in different parts of Kasaragod. It is a horizontal well mostly excavated in hard laterite rock formations. The excavation continues until a good amount of water is struck. Water seeps out of the hard rock and flows out of the tunnel. This water is usually collected in an open pit constructed outside the surangam.



12. Western Coastal plains :

Virdas

Virdas are shallow wells dug in low depressions called jheels (tanks). They are found all over the Banni grasslands, a part of the Great Rann of Kutch in Gujarat. They are systems built by the nomadic Maldharis, who used to roam these grasslands.

13. Eastern ghats:

Korambus

Korambu is a temporary dam stretching across the mouth of channels, made of brushwood, mud and grass. It is constructed by horizontally fixing a strong wooden beam touching either banks of the canal. A series of vertical wooden beams of appropriate height is erected with their lower ends resting firmly on the ground and the other ends tied to the horizontal beam. Closely knitted or matted coconut thatch is tied to this frame. A coat of mud is applied to the matted frame. A layer of grass is also applied carefully which prevents dissolution of the applied mud. Korambu is constructed to raise the water level in the canal and to divert the water into field channels.

14. Eastern coastal plains:

a) *Eri*

Approximately one-third of the irrigated area of Tamil Nadu is watered by eris (tanks). Eris have played several important roles in maintaining ecological harmony as flood-control systems, preventing soil erosion and wastage of runoff during periods of heavy rainfall, and recharging the groundwater in the surrounding areas.

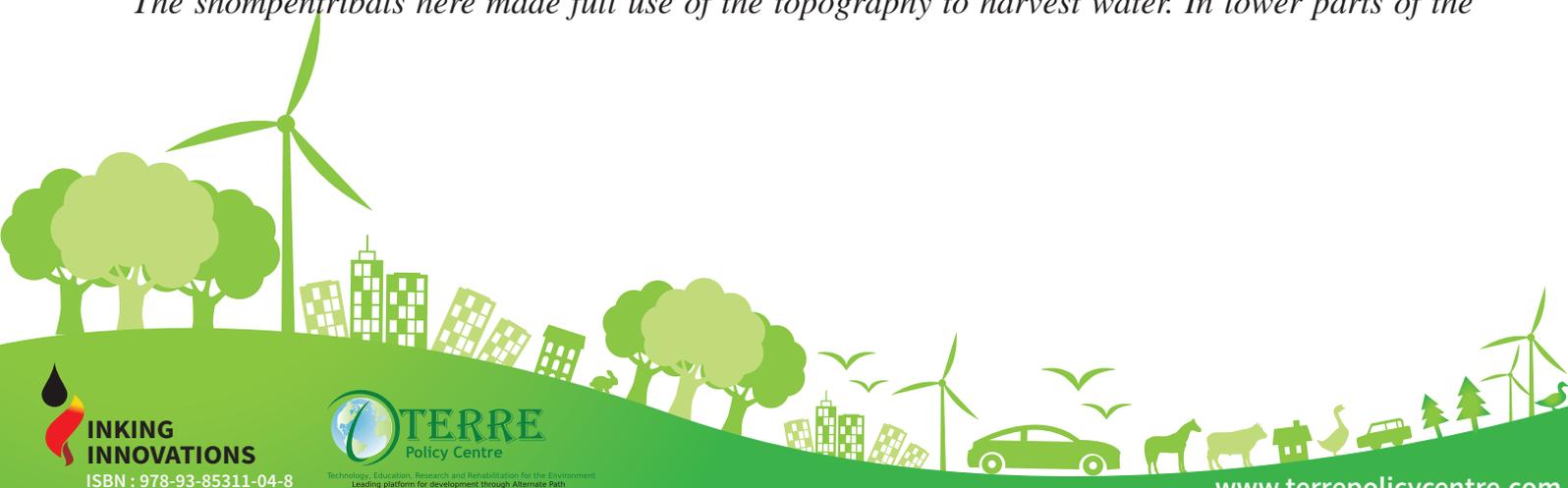
b) *Ooranis*

The tanks, in south Travancore, though numerous, were in most cases oornis containing just enough water to cultivate the few acres of land dependent on them. The irregular topography of the region and the absence of large open spaces facilitated the construction of only small tanks unlike large ones seen in Tamil Nadu.

15. The Islands:

Jackwells

The shompentribals here made full use of the topography to harvest water. In lower parts of the





undulating terrain, bunds were made using logs of hard bullet wood, and water would collect in the pits so formed. They make extensive use of split bamboos in their water harvesting systems. A full length of bamboo is cut longitudinally and placed along a gentle slope with the lower end leading into a shallow pit. These serve as conduits for rainwater which is collected drop by drop in pits called Jackwells.

Reasons of for decline in traditional water harvesting system:

1. Neglect of policy makers towards traditional existing structures , lack of innovative methods to deal with water related issues
2. Growing use of subsidised energized system (subsidised electrical powers) to exploit deep aquifers
3. Lack of interest on community in participation in preservation of traditional structures
4. Some tanks have been encroached for farming, sand mining, expansion of city, waste dumping , industry etc
5. Pollution of water due to sewage and industrial waste

Conclusion

Given methods above are suitable methods of water conservation in specific region of India. By reviving traditional methods of water conservation we will save on economy as well as precious resource water. Suitable methods of water conservation are essential and related in current situation.

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www.rainwaterharvesting.org





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