Harvesting Water—The Traditional Way

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Suranga and Keni wells are cheap, effective, eco-friendly and sustainable irrigation technologies used in the southern part of India since a very long time. But these structures continue to disappear, taking along with them the valuable age-old traditional wisdom passed on through generations.

Ironically, in India where water has been harvested since antiquity, drought-like situations prevail in many parts of the country today. Our ancestors perfected the art of water management through various means.

Many water harvesting structures and water conveyance systems specific to the eco-regions and cultures were developed in India like Zing of Trans-Himalayan Region, Kul, Naula and Khatri of Western Himalayas, Bamboo drip irrigation of North-eastern Hill Ranges, Korambu in Eastern Ghats, Talab in Central highlands, Virdas in Western coastal plains, Katas in Eastern highlands, Kunds of Thar desert and Cheruvu of Deccan plateau.

In Kerala, two such distinct systems are the Panamkeni in Wayanad and Suranga in Kasaragod district.

Sacred Wells of Kurumas

The Mullu Kurumas comprise one of the native tribes of Wayanad in Kerala. “Panam Keni” is the special type of well used by Mullu Kuruma hamlets. These wells reveal the ancient knowledge and wisdom of the tribes of Wayanad in locating, preserving and sustainable utilization of perennial water sources.

Kenis are located on the edge or middle of paddy fields and near forests. Cylindrical in shape, they have a diameter and depth of around four feet only. The wall is of Toddy palm (Caryota urens) and some other trees. The mature wood of Toddy palm is strong, heavy and durable. The wood is also noted for its attractive appearance and extraordinary strength.

Some studies done at Sri Lanka have proved that the wood has the capacity to absorb heavy metals from water, thus purifying it.

Usually the bottom stem portion of large palms are used to make wooden cylinders after retting them in water for a long time so that the inner core gets rotten, degraded and the hard outer layer remains. The wooden cylinder is immersed in the spot where there is good ground water spring and that is the secret of abundant water even in the hottest summer months.

“We don’t know when these Kenis were made, may be about 500 hundred years back,” says Devaki, a kuruma tribal woman in her seventies, at the...
Pakam tribal colony near Manathavady, Wayanad. “Every family in the hamlet collects water from these wells daily and it is exclusively used for cooking and drinking purpose. We never use keni water for bath or washing cloth, so that the keni water won’t get polluted. Wearing footwear near kenis is even considered a sinful practice.”

During festivals and marriages it is a custom to wash and cook rice in Keni water. Keni is the property of the hamlet, not any one’s property. Being a shallow water body, a mud pot is enough to dip and collect water from it. More than thousand liters of water can be collected every day throughout the year.

“The present panam kenis are very old and the wood has started to decay. Now nobody has the expertise to make such kenis. In some places cement rings are being placed around the panam kenis, but we are against this,” says Vellan, another tribal at Pakam.

There may be around 200 kenis in Wayanad. As a result of some reports in newspapers about this degrading indigenous water harvest system, some initiatives were taken by the local self governments (Panchayats) for reviving these wells. The field staff of these panchayats approached the Ooru moopans (Chieftains) of the hamlets, but they were reluctant towards the initiative. On the other hand the local community is neither doing anything to protect these wells.

“We tried to renovate these panam kenis. But since these kenis are closely linked with the customs of Kurumas, they are reluctant to allow other people to do any renovation work,” says Karunakaran, Panchayath President of Pulpalli, where many kenis associated with Kuruma hamlets are still present. “They themselves also stay away from renovation of these water harvest structures because they are against using modern materials like cement for protecting keni walls. We have spotted about five kenis in the farm lands of settler communities and replaced degraded wood barrels with cement ring. Now under various schemes, individual open dug wells have been dug in many tribal homesteads and gradually they are getting less dependent on kenis except as part of rituals. So in effect, all these kenis, which are hundreds of year old, will gradually disappear from Wayanad.”

The newer generation, getting accustomed to modern lifestyles tends to neglect this valuable indigenous resource, which deserves to be protected and passed on to future generations.

Water from the Tunnel
Lateritic hills act as reservoirs of rainwater. This fact was realized by the farmers of south India long back, which resulted in the Suranga wells. Surangams are horizontal adit systems (a horizontal passage leading into a mine for the purposes of access or drainage) cut into slopes in order to extract ground water.

Surangams are found mainly in southern Karnataka and northern Kerala in the foothills of the Western Ghats of South India. Their number is estimated to be around five thousand. The word surangam is derived from a Kannada word for tunnel. When water makes its passage through a tunnel, it becomes a horizontal well or surangam.

Studies have revealed the origins of the system at around 1900–1940 CE. The system is influenced by ancient Persian technology, because of the long established trade links with Persia and the Arabian Peninsula in the Malabar region. They have resemblance to ancient water structures used in Mesopotamia several millennia ago.

In appearance, they are quite similar to Qanats, which are still used in rural parts of Iran. Qanat technology originated in Iran and was used extensively in the dry, arid desert regions of the Middle East. Both these systems basically consist of underground tunnels that source the aquifer and use gravity to convey the water to ground level. In both systems, construction is undertaken by hand by skilled laborers.

The vital aspect of building these wells is identifying the source of water.
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The traditional Qanat builders, called muqannis, follow the water courses coming down the mountains and identify subsurface water sources. They dig a trial well to test the quantum and flow of water before beginning work on the Qanat.

Basically there are two types of surangams – one dug in the mounds for harvesting freshwater that seep through the lateritic mounds and the second type is dug horizontally at the bottom of the wells or ponds. This type may sometimes have branches. They start from a well and convey water to the desired points. Other than rectangular, circular and irregular shaped surangams also exists.

Complex geological features and interaction of water and its flow below the surface of the earth creates big subsurface holes especially in the valley portion of the hilly areas, which act as a natural surangam in such areas. It is locally known as “Maali”.

The landscape of this part near the Western Ghats is characterized by undulating upland topography that produces relatively small but steep sloping hills. The prominent soil type is laterite. Surangams are cut across the prevailing groundwater table in the area. They are usually rectangular in cross section, 50 to 80 cm wide and 0.90 to 1.5 m high and length varies between 3 to 300 m. The width is enough for a medium sized person to move inside.

In Kerala and Karnataka, laborers who conventionally undertook the digging of surangams, were people who were familiar with the slopes, soil structure, catchment areas and used their knowledge of local flora and fauna to identify water sources.

The skill involves the identification of suitable soil conditions at the point of excavation and indicator geo-botanical plant species that suggest a nearby phreatic water table that will provide the source of water. Key biological indicator species for phreatic water table include trees such as Vateria indica, Ficus virens, and Macranga indica. Termite hills on a row are also another indication of water near the the surface. Use of conventional water dowsing technique is also observed.

A Traditional Craft

Surangams are suitable only where there is hard lateritic soil. Surangams begin as a trench across the slope of the hill, which progressively transforms into a tunnel. Laborers make use of candles, coconut oil lamps, lanterns, torches, etc. to light inside of the surangam. While digging surangams, they also make use of available sunlight, if the work is done at daytime. For this, mirrors are used to reflect sunlight into the surangam.

Surangam digging is a craft that requires patience and some knowledge of water flow. Some skilled workers can detect the direction of flow of water by pressing their ears to the walls of the tunnel at midnight, which helps them identify the right path for excavation.

The surangam is dug in such a way that the seepage water is flown outside easily. Labourers have to work under risky conditions such as loose soil that may collapse during the construction process and presence of poisonous gases inside the tunnel. Crabs can also create menace.

Pick-axe is the main tool used for digging surangams and pick-axe shredding gives ornamental texture on the walls. During excavation of surangams, occasionally hard rocks like granites, gneisses or charnockites are found to obstruct the course. Then the skilled workers divert its course.

In addition, for increasing yield from the Surangams, workers construct sub branches for the main surangams. If the surangam is very long, a number of vertical air shafts are provided to ensure atmospheric pressure inside. The distance between successive air shafts varies between 50-60 m.

There is another type of surangam made by digging hills using galvanized pipes. It is called the ‘horizontal bore’. This has been successful in some parts where the vertical bore wells did not go well. It is only a bore well with a small diameter and it acts as a small surangam. Surangam can also act as conduit for the groundwater. In some cases at the end of the surangams people have constructed a well and even a bore well within the well and here they use surangam for transit of water.

The length of a surangam is measured in kolu. One kolu is 2.5 feet. There are surangams that stretch up to 150 kolu (375 feet). Farmers usually discard their efforts if water is not found after digging for about 50-60 m. Constructing multiple surangams on land holdings is common. The optimal height (about 1.9 m) and width (about 0.75 m) of a tunnel well are based on the space required for a person to work comfortably inside.

Surangams tap groundwater by intercepting the water table in the area. It collects water seeping from different directions, which pipelines alone cannot tap. The water is further carried through a downward slope on the floor of the cave, lowering towards the surangam’s mouth. The extracted groundwater is stored in a tank in the lower reaches of the hillocks for various purposes by gravity flow. From the tank, farmers open the sluices to irrigate their gardens and also use sprinkler jets or drip. Water flows out without the help of a pump, which is a big advantage.

“Surangams are usually dug in lateritic slopes during summer months in order to avoid collapse of soil,” says Salve Disuse, a farmer in Enmakaje village in Kasaragod district. “Water springs from all the three sides as well as the bottom fills surangams with water. The flow of water is often pooled just before the entrance by building a small earthen dam. The water is then conveyed via a small diameter plastic pipe either into a farm pond or directly into an underground irrigation network. There can be multiple surangams supplying water into a single farm pond. Distribution of water from suranga and farm ponds onto crops is either by hand/bucket, flooding, hose, drip or sprinkler system. No pump sets, everything by gravitational force only.”

Salve Disuse has 1.5 acres of land in which he cultivates betel wine, areca nut, cocoa and pepper. Since there is no water shortage and cattle manure is available in abundance, he can make a good income from the good yield that these crops provide.

There is abundant water in these wells even in summer, enough for all needs including cooking, bath and irrigation of crops. Laboratory tests done by Centre for Water Research and Management,
Kozhikode, Kerala supports farmers' perceptions that suranga’s water is sweeter tasting and purer than that found in bore wells.

Abdul Sidhique has 15 acres of land in which he maintains three big ponds that are filled with water from surangams. Each Suranga is able to provide around 500 liters of water per hour, which is used for irrigation, as drinking water for cattle and for domestic use.

“I grow coconut, areca nut, pepper, rubber and banana in this land,” Abdul Sidhique says. “It is a multi cropping system. Fifty cows are there in the dairy farm. For all these suranga water is enough. Even though abundant water is there, I follow an economic irrigation pattern. I irrigate once in a week only and assure that water reaches the root zone without any wastage. Sprinkler irrigation and drip irrigation are adopted. I assure that each crop in this multi cropping system gets its share of water and cow dung slurry. Here we have a co-operative irrigation system. Suppose a farmer uses water from surangams for irrigating his crop. If water is there in excess after his requirement, he allows other farmers in the region to channelize the excess water for irrigating their crop. I get good crop yield amounting to 25 lakh Indian rupees per annum, and around 500 liters of milk every day. Fodder grass is grown in 2 acre land, which is irrigated with surangam water and fed with cow dung slurry.”

Three to four skilled and diligent workers are required to construct a tunnel well. The construction cost of a tunnel well is about one thousand rupees per feet length. Only one foot can be dug in a day. The main recurring expense related to tunnel wells is the yearly maintenance work, usually done before the irrigation season. For tunnel wells built on hard lateritic layers, maintenance work is essential only once in four or five years.

The cost of de-silting a well ranges from 1000 to 5000 rupees per tunnel well, based on the soil type. Annual maintenance work on the earthen tank costs around 4000 rupees. However, most skilled workers have moved away from agriculture to construction work. Mechanization may help to cut costs, but this is only possible for the initial 5 m; beyond that manual digging is only possible. Modern geological techniques or scientific techniques are still not used during the construction stage to ensure sustainable water supply from the tunnel wells.

These factors and the lack of awareness of the new generation of farmers about the importance of these perennial water sources have resulted in a decline in this traditional water harvesting system. Government agencies promote bore wells and open dug wells by giving subsidy, but there is no subsidy for construction of tunnel wells. Banks, except some co-operative banks, do not finance the construction of surangams.

This lack of institutional support may be due to the localized predominance of tunnel wells. Even though large farmers can afford the rising construction cost of surangams, the small farmers predominant in this area cannot. Some continue this tradition by employing family labor, but for how long is the unanswered question.

Suranga as well as Keni wells are comparatively cheap, effective, eco-friendly and sustainable irrigation technologies used in these regions since a very long time. Such technologies evolved through practice and perfection. The necessity to create awareness amongst people about the value of these traditional water harvesting structures is vital, as more and more of these structures continue to disappear, taking along with them the valuable age-old traditional wisdom passed on through generations.

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