Sand bores

A low-cost alternative to borewells

Renuka Manjunath

A sand bore is a simple and economical rural technology through which farmers utilize water available at lesser depths. Sand bores were commonly used before the advent of borewells. As they utilize water that is available at a depth of less than 30 feet, sand bores do not affect groundwater.

In earlier times, man looked skyward when faced by drought. Rain and rain bearing clouds were once the source of water. Now he looks downward and digs deep down into the earth. Today, groundwater is regarded as the answer.

Groundwater was first discovered in excavated wells. While most of these wells existed within houses and served as traditional water sources, wells were also used for cultivation in plantations and fields. Since this was the only source of water, people were economical in its use, and were careful not to drain the sources.

Wells have today been replaced with the invention of the machine which has taken groundwater to dangerous levels. With the search for groundwater becoming more serious, the use of borewells has created serious problems for agriculture, environment and the livelihood of small farmers.

Records reveal that the first borewell was dug in the country in 1954. At that time, about two months were required to drill upto a depth of 100-120 feet. The high-speed drilling machine that was first used in 1971 enabled digging of upto 300 feet a day. While this helped to support the Green Revolution, it also hid the ugly fact that the inner layers of the earth were drying up.

This method of using groundwater also caused immense harm to social and familial values. In earlier days, a joint family was quite content with a water level of 10-15 feet in excavated wells. With the excessive demand for water and the invasion of high-speed borewells, commercial exploitation of water increased. Today, the wells have gone dry and selfishness has made way for dissatisfaction.

What is a sand bore?

A sand bore is a partial solution to the problems created by the borewells. It is a water source that does not harm the environment, and is a friend of the farmer. A sand bore does not have the negative impact of borewells as it does not allow either, overuse or encroachment of water.

It is said that sand bores were employed by solders on the move to draw water from river basins. This system has various names in local dialects, though in English it is called sand bore, jack well, hand pump, in-well ring etc. Geologists call it filter point. Also known as sand sucker-well in some countries, sand bore is probably the most appropriate name.

Sand is the core ingredient for a sand bore. Sand is deposited by running water on either banks of rivers, rivulets, canals, streams and tanks. In addition, when rivers change course, they create canals where they deposit sand. Sand deposits that rise 15-20 feet above the surface are capable of retaining groundwater. In order to use the water thus retained, the sandy soil is dug up by using a manual soil borer. After fitting filter pipes, the water is drawn with the help of an ordinary diesel pump or a low horsepower motor. Sand bores get filled up with water automatically and generally provide sweet water. These are simple and economical devises as they draw water from depths of just 30 feet, and do not exert any adverse effects on groundwater.

The sand bores of Karnataka

Sand bores are in use across Karnataka and in a limited way, support the lives of small farmers in villages. They are also used as sources for drinking water in many cities, towns and settlements. Some of the places where sand bores are found are:

- Bellary, Challakere, Pavagada, Madhugiri and Chitradurga
- Hirehalla of Davanagere district
- Kakanur near Channagiri, and Jinagi
- Ranebennur, Hospet, Harihara and Shimoga
- Along the Vedavathi river bed in Parasuramapura
- Tavarekere near Sira
- Areas around Tumkur - Nagavalli, Halegubbi, Hebburu, Koratagere and Chikkanayakanahalli
- Along the Kagina, Bhima and Krishna rivers
- Benne stream of Yadgir
- Sedam area of Gulbarga
- Along the Palar and Papagni rivers

- Along the Kabini, Chikkahole and Suvarnavathi rivers near Srirangapatna, Nanjanagud and Yelandur of Mysore district
- Rural Bangalore including Tippagondanahalli, Kanakapura, Ramanagara and Devanahalli

Farmers of Tumkur say that the Hemavathi canal has restored water to the sand bores of the district. The presence of sand bores in Koratagere near Shivaganga could be attributed to the fact that the Shivaganga ranges possess ample sand deposits. Sand bores are very popular in Kasargod of Kerala as well as in the southern part of coastal Karnataka; the fishermen of Udupi and Coondapur use this water for drinking purposes.

Building a sand bore – simple and cost effective

Building a sand bore is simple and economical. No special category of professionals is required to build a sand bore as it is a rural technology involving only local labour. There could be some regional variations in the tools used, depending upon the availability of water. Some hardware shops sell specially designed instruments based on the requirements of the people of a particular region. The main tools required for drilling a bore are:

- Soil cutter
- Casing pipes (in order to filter the sand and allow only the water, these are slit with the help of axle blades; at places small holes are made and are wrapped with either plastic or coconut fibre and thus it acts as a sand filter)
- Shell - the sand lifting instrument, two clamps to stand on and take out the sand
- Hand clamps
- Chain, spanner, wires, cutting pliers, foot valves
- Small gravel stones
- Three to seven hp motor
- Diesel pumps where necessary, as an alternative to electricity

The bottom portion of the soil cutter is shaped so as to conveniently drill into the ground. Thereafter two persons soften the soil and dig it with their bare hands. Once a depth of 20-30 feet is reached, water and sand are obtained together. The shell is tied to the chain, and thumping repeatedly on the soil to lift the sand up. Subsequently the drilled PVC pipe is inserted into the cutter and is pushed till a hard rock or hard soil is reached. Sand can be prevented from entering the pipe by covering the holes in the outer portion of the PVC pipe with tiny gravel. The filter well, thus erected, is fitted with the motor and if there is a shortage of electricity, diesel pumps are used to lift the water.

New experiments for reviving sand bores

Rajanna, the proprietor of Rajendra Engineering Works of Chitradurga and his father Borethamanna specialize in digging sand bores. They have innovated to manufacture improved tools from their own lathes.

An innovative and interesting experiment was undertaken in Parasuramapura for groundwater conservation and its stability by erecting a 330 feet long, 25 feet wide and 20 feet deep underground clay barricade in the Vedavathi river bed. This barricade was built in summer by scooping out the sand till the workers hit hard rock. No cement was used, and there was no soil erosion. About 3,000 truckloads of clay were filled in the place of the dug out sand and subsequently the surface was flattened. As a result of this, groundwater levels improved over an area of nine kilometers. It is also significant to note here that the sand bores of the area too got a new lease of life.

Sand as water filter

It is appropriate to explore a little about the filtering properties of sand while learning about sand bores. In geological terms, it has been estimated that the age of sand is 450 million years. It is a residual deposit of rainwater that has been flowing down the slopes of mountains and hills. The relationship between water and sand is complementary and this co-existence has found mention in ancient texts also.

The American Water Works Association, while documenting the history of water purification, says that the search for pure water dates back to the pre-Christian era. As per the Association, Egyptian inscriptions and the *Sushruta Samhita*, a Sanskrit text, state that the concept of pure water is as ancient as man. While quoting these texts, the Association adds that unclean water has to be boiled over fire, through the rays of the Sun, by dipping a red-hot iron into the water, or through sand filtration.

Francis Bacon, who has compiled and edited ten centuries of history, has also mentioned the method of sand filtration in the 13th century. He observes that pure water can be obtained when the sand on the seacoast is dug, as the saline content

of the water that spurts out from the sand bore is retained at the bottom. As a result, the water obtained, which is filtered by sand, is pure.

An 18th century Persian scientist, Lahaire, had recommended a sand filter for each house. He had also stated that the rain water which passes through sand in the river banks and collects underground remains pure for several years.

The value of sand bores is endorsed

Devaraja Reddy of Geo Water Board says, "Water is available in sand bores for as much as eight months after just one good monsoon." He reiterates that people living near the Vedavathi River bed oppose deep borewells, as they are aware of the utility of sand bores.

Swami, an agriculturist from Nagavalli near Tumkur has been getting water from sand bores consistently for the past four years. In comparison, an adjacent land-owner has tried to draw water in vain from 22 different spots on his plantation. Even the little water he was able to get had the smell of roots in them.

Renukappa and his relative Siddaraju of Koratagere, who are adept at digging sand bores, say that the cost does not exceed Rs. 7,000 per sand bore. The cost of digging a sand bore where the quality of water is good does not exceed Rs 5,000.

As per their experience the quality of water is sand-dependent. Sweet water is extracted from sand bores with white sand, while the water that comes through darker shades of sand yields hard water that sometimes has a rusty odour. While this water may not be fit for human consumption, it can be used for agriculture.

When the top surface of the soil first yields clay and then sand, water is generally available in good volumes. Thick sand indicates more water and fine sand, as well as, medium-sized sticky sand indicates lesser quantities. "Blowing on a fistful of sand is a good way to assess water content," says Siddaraju.

Sand bores are a viable alternative to borewells, use local resources and knowledge and are widely accepted by the community. More importantly, they serve to conserve precious groundwater resources by optimizing water available at higher levels. All reasons to promote more intensive use of this technology.

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