



Shanku and Leela walk to their bhungroo through cracked land that had received rains just eight days earlier.
Photo: Jency Samuel

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Bhungroo – a women’s technology brings food and financial security

Water scarcity, waterlogging and soil salinity have long been a major problem in the Western Indian state of Gujarat. To make things worse, the region was hit by a devastating earthquake in 2001. But with a simple technology, farmers have managed to improve their harvests and earn more income. What is more, the new technology is owned exclusively by women.

“My husband asked me to leave the house when I informed him that I was one of the five women chosen to own and manage a bhungroo,” recalls Leela, a farmer from Mubarakpura village in the Patan district of Gujarat. This reaction was to be expected if a woman announced that she was going to manage the irrigation of her farm. Although equal participants in agricultural activities, women are at the bottom rung of the societal and familial hierarchy in India.

Soil salinity and hostile weather – a double whammy for farmers

Gujarat, a western Indian state, is a semi-arid region. Patan district – like many other districts of the state – suffers from flooding and drought in quick succession. Being close to the desert region, the salinity of the soil is very high, making farming extremely difficult and expensive.

Farmers look forward to the southwest monsoon in the months of July/ August, as it is the only time of the year when they get rains. But the monsoon lasts for just about a week. According to Gujarat State Disaster Management Authority, the Sami taluk subdivision of the district in which Leela’s village is located received an average rainfall of 435 mm in 2015. It recorded an average of 646 mm over the last decade. Since this entire rainfall occurs over a maximum of ten days, it causes flooding. Salinity makes the topsoil impermeable, preventing the rainwater from seeping into the ground. The pre-monsoon irrigated crop is often lost to this inundation. When the monsoon recedes, the place experiences dry, hot weather. According to Skymet Weather, a private weather service provider, Gujarat witnesses a second summer in October, after the southwest monsoon, since the temperature then goes up to 40oC. This makes the soil dry and encrusted with salt; with the rainwater not reaching the sub-strata due to impermeability of the topsoil, there will be no water for the next crop.

As 85 per cent of the Mubarakpura village population are small-holding subsistence farmers, many of them had no option but to migrate to other places to work as farmhands. This is a scene played out across many districts and states of India.

Towards a solution

Biplab Ketan Paul, a social worker who has been active in poverty alleviation in rural areas, learnt about the farmers’ problems when he went to Bhadrada village near Mubarak-pura in 2001, to help the villagers after the Bhuj earthquake that killed nearly 20,000 people and destroyed almost 400,000 homes. “When the flood water recedes, the scorching sun leaves behind salt deposits on the ground. This brings about all sorts of problems such as soil compaction, crusting and cracking of soil, reduced soil respiration, loss of biodiversity, ultimately leading to soil degradation and desertification,” says Biplab. According to the Central Soil Salinity Research Institute, India has 6.75 million hectares affected by salinity, of which Gujarat has the highest share, totalling 2.22 million hectares. A Central Water Commission report says that Gujarat and three other states are experiencing salinity and waterlogging at alarming rates and are at the risk of becoming barren. “This is a problem faced by many African, South Asian and Southeast Asian countries,” Biplab adds. According to the UN Food and Agriculture Organization, the world loses three hectares of arable land every minute to soil salinisation.

Biplab started to look for a solution. He came up with the idea that the rainwater could be drained into the ground, as this would address the problem of flooding. Later the water could be drawn for irrigation. A hollow pipe could be used to drain the water and to lift it later. The simple technology was named ‘bhungroo’, the term meaning hollow pipe in the vernacular language. After many trials, bhungroo was perfected (see Box).

How the bhungroo works

The bhungroo consists of a small cemented pit that measures about 1m x 1m. It is raised roughly 50 cm above the ground, preventing litter from entering the pipe. The lowest point in the ground is chosen as the bhungroo site. The ground is drilled till the strata with good water retention strategy is reached. A pipe of a diameter between 10 cm and 50 cm, depending on the requirement, is lowered through the drilled hole. In most places, water enters the bhungroo because of the natural gradient of the land. If necessary, a slope is made, enabling the water to reach the bhungroo. When the field needs to be irrigated, a portable motor pump is used to lift the water.

The differences in farmscape can be observed while walking to a bhungroo site. One farm still has some puddles of water, while white salt deposits are appearing on another one. A further farm has clayey topsoil that is parched, looking as if the land had suffered a drought and had not received the monsoon a week back. This is contrary to the government data, which classifies the soil as sandy. “Water stays longer in the depressions. That is where you see the salt after the water has evaporated. The soil is sandy. But during rain, the runoff water brings silt, and so it becomes clayey,” explains Biplab, pointing out the sandy layer near the bunds. All these variables, including the type of sub-soil strata, have to be taken into consideration while designing a bhungroo. In 2011, Biplab’s wife Trupti Jain founded Naireeta Services, a social enterprise, which provides site-specific bhungroo solutions. The name Naireeta refers to the clouds bringing the southwest monsoon rains.

A women-centric model

Having observed the struggles of rural women, their resilience and their eagerness to adapt to new ideas while working with them, Trupti decided that bhungroo would be a women-centric model. For ease of execution, the option chosen was that five women would own and manage one bhungroo. Earlier, the women had formed thrift and credit SHGs (self-help groups). All the decisions regarding the ownership of bhungroos were left to the SHG, which based ownership on four criteria: The bhungroo owner should be the poorest farmer, lacking food security. Her land should have suitable soil conditions for the installation of bhungroo, and she should have no other income and no other option but to migrate.

Naireeta required that the land should be in the woman’s name if she wished to be a bhungroo owner. This was what the men vehemently opposed. But by then, the women had understood the importance of peer support. “An individual can’t win a cause. There’s unity in strength. We came together,” says Shanku, a member of Leela’s bhungroo group, gesturing with her hand, bunching up her five fingers. As there would be no bhungroo if this condition was not fulfilled, the men finally relented. In the 7/12 Record of Rights, which has all the details pertaining to land and is maintained by the local administrative body, each woman was included as the co-owner in her respective family record.

The women supervise the construction of pits and drilling and take care of the maintenance, too. They use their knee and elbow height to measure the volume of water that went into the bhungroo, decide on the irrigation cycle depending on the number of irrigations needed and laying of pipes to pump the water for irrigation if the plots are not contiguous. As each landholding is about two acres or less, roughly ten acres are irrigated with one bhungroo.

“But each bhungroo can irrigate up to 50 acres, the minimum being 25 acres,” informs Biplab. As the women also figured this out, they have started inducting more women. Some bhungroos now have up to ten women owners. The new entrants pay a fee to join the group as they were not part of the initial agreement.

A contribution to climate resilience and poverty reduction

The bhungroos have been installed free of charge so far, with Naireeta paying all the award money the duo received for the innovation of technology and the innovation of its application. To sustain, Naireeta has decided on cross subsidy. A case in point is the Jharkhand State Cricket Association Stadium in Ranchi, where a bhungroo was installed and the state government paid four times its actual cost. This helped Naireeta provide bhungroos free of charge for the farmers. Through the support of the Indian Government’s Department of Science and Technology, bhungroo is being implemented in various African and Asian countries. Besides, Naireeta plans to develop the locals’ knowledge so that they can co-create bhungroos in future. An open source technology, the only condition Naireeta lays is that it should be used by and for the marginalised.

From being fallow, the farms in Patan District and elsewhere in Gujarat have started producing two crops a year. The post-monsoon crop ensures food security for the family and water and fodder for the farm animals. Thus it makes them climate-resilient. The winter crop brings cash income to the farmers as they are able to sell the produce. “We grow cumin, jowar (sorghum) and millets,” Dhani, another farmer, explains. While the post-harvest stalks serve as fodder, if necessary, they grow fodder grass additionally. Biplab informs that the farmers are being initiated into inter-cropping, to maximise returns from their fields.

“Improvement in soil fertility has been an invisible income for these farmers, ever since bhungroo was installed,” says Biplab. This becomes manifest in the form of increased and better quality of produce. Installation of bhungroo helps the local economy as materials and labour are sourced within the village, which also ensures post-installation services.

Up to now, the installation of more than 3,500 bhungroos has empowered close to 20,000 women and hence about 100,000 individuals who are members of the women’s families. About 50,000 acres of land left fallow are being cultivated for monsoon as well as winter crops, which has also helped stem migration in the region.

“We all own a house now,” say farmers Godavari, Dhani, Shanku and Leela in unison, commenting on how their lives have changed. Considering that the village was totally flattened during the Bhuj earthquake, this is an incredible achievement. Leela lists the impact of bhungroo in her life, ticking off with her fingers. “I own a house. Within three years I cleared the previous farm debts I had incurred, sent my daughter and son to school, bought a tractor, repaid the loan on the tractor and bought a buffalo,” she beams. She has achieved all this in a period of eleven years. She hopes that her example will encourage more women to install bhungroos in their farms.

Godavari’s face clouds when she recalls the kind of demeaning work that she had to do as a maid, for a measly sum of Rs 150 (about 1.50 US dollars then) per month. Her face brightens up as she adds: “But now I work my own farm.”

The most dramatic impact has been the change in perception of the women by the others and their own sense of self-esteem. “Earlier, people used to call me Shanku; now they call me Shankuben,” says Shanku with pride, ‘ben’ translating as sister, a form of addressing a woman with respect and affection. The women aver that they have had ‘jagruith’, an awakening. Just then a tractor enters the village. Leela’s face lights up and she points out that it is hers and that her husband is driving it. “The same man who once asked me to leave the house,” she adds with a grin.

A women’s technology that benefits the whole community

Bhungroo in Gujarati means a hollow pipe. The small hollow pipe with which women blow into the traditional biomass stove to keep the fire burning is called a bhungroo. It is a tool in the woman’s hand to prepare food for her family. Men had nothing to do with it. Similarly, the bhungroo water management system in the field is owned and operated by women farmers, ensuring food for the family. Men have no role in farm water management. Although the bhungroo is managed by women, the agricultural work is shared by men and women, as in the past. And naturally, it benefits everyone.