Innovating for water security: Ferrocement Checkdams in Jalna District, Maharashtra

Akansha Roy and Saumyadeb Dasgupta with Inputs from Deepak Meshram and Shankar More
Introduction:

Adgaon is a village, located in Bhokardan block in Jalna district of the Marathwada region, with a hilly topography situated at an elevation of 523 metres from sea level. The village receives uneven and moderate rainfalls upto 625 to 700 mm.

"Due to the sloping terrain a lot of water flows down as runoff and cannot be used for agriculture or groundwater recharge. Presently the vegetation consists of coarse shrubs and grasses, which are overgrazed by the existing livestock population", Shankar More, WOTR project officer in Bhokardan, explains.

The population pressure on the existing cultivable land is tremendous. The average dryland cultivable land holding is 1.70 ha which is primarily monsoon dependent. This has led to over exploitation of resources such as land and water in order to meet basic requirements of food, fodder and fuel.

WOTR has been working in Bhokardan for a number of years and was aware that the village of Adgaon had an active Village Development Committee (VDC) lead by Krishna Bombe. Krishna Bombe has been associated with WOTR's projects and has the exposure to watershed development in neighboring villages.

Analysing the water security in Adgaon, with a population of about 3000, Krishna Bombe elucidates, “the wells in Adgaon have water till the month of February and as summer arrives the common wells run dry”. Water tankers are called in to meet the water requirement of the households. The wells are used for storage of this water brought in by the tankers.
Water conservation challenges

For the purpose of water conservation, check-dams had been traditionally constructed in the region by WOTR, village panchayats and other agencies. However, at times these are quite expensive for the local community to afford and involve considerable amount of labour for its construction.

To address these issues, Krishna Bombe, the *up-sarpanch* of the village, took responsibility and then got the VDC members and neighbouring farmers together. They discussed various alternatives and together with the help of the technical staff from the WOTR regional office, decided to innovate with a new form of low-cost check-dam construction technology in the village of Adgaon.

VDC members and WOTR technical staff find an innovative solution

Krishna Bombe suggested site options after discussing prospects with the farmers. WOTR’s team assessed the viability of the locations and decided to innovate with a ferrocement check-dam due to limitations in budget and demands for additional water conservation work. The drainage adjacent to Devidas Jayawant Bombe's farmland was decided to be the most suitable for the check-dam construction. The location was selected given the large catchment area and the drainage line features which ensured water storage.

Meanwhile a monetary contribution was collected from beneficiaries, which amounted to Rs. 20,000. The money was collected from Devidas Jayawant Bombe and other nearby farmers who formed a water-user group. In particular, the dedication of Devidas was critical for the success of the project. He gave up a season of cultivation to support the construction of the dam and also took upon voluntary tasks during the construction of the check-dam, like watering the cement structure, etc.
The essential principle of the ferro-cement technology is that using a combination of iron rods, wire meshes together with cement mortar can add substantial structural strength. Due to this additional strength, a lesser amount of material is required and thinner, smaller structures which require less labour suffice.

In September of 2017, WOTR’s technical officers, received training for designing and building dams using this technology for water conservation structures, at Ahmednagar. The training was conducted by Sunil Srivastav of Reliance Foundation, and immediately resulted in WOTR officers applying it in the field in water scarce areas such as Bhokardan.

Deepak Meshram, a technical officer at WOTR, planned the design of one of the dams bringing in the new technology and shared it with all the technical officers. This check-dam would be a first of its kind implementation by WOTR in Maharashtra.

Construction begins at Adgaon

A foundation was built using cement concrete. Heavy earth movers were brought in and digging out of the soil carried on for 6 hours, with an addition excavation time of 2 to 3 hours. Ten feet of earth was dug out for the check-dam foundation. As mentioned before, the group of farmers benefiting from the project had made monetary contributions that was used in this construction.
A composite gabion was built into a trapezoidal shape to form the base structure. The low cost and efficiency of the ferro-cement structure stands out while it uses less cement for its thin walls supported by iron mesh and traps the water velocity with its design. Curved barriers or rings of radius one metre were measured to stand in between the walls on two sides, which was 4 metres tall. Iron rods were placed at a distance of 40 cm, while 8 rods were vertically mounted and 5 rods horizontally placed to create the five curved rings. A layer of weld mesh was put vertically around to join the rods. A concrete cement mixture comprising of 10 mm of gravel with cement and sand was made in order to fill up the structure. Two plates were placed as a base to make the collar of the curves on the top. The curves will distribute the water pressure, while the standing walls help in containing it.

It was a challenge for WOTR to find a mason who could construct the check-dam. The project team found a mason who specialised in construction of wells and has had the experience of working with iron and cement material for constructing the kind of thin walls that were expected in the new check-dam.
The result: cost savings and additional water conservation measures

The village development committee of Adgaon reports that the cost of the ferro-cement check-dam was around Rs 3 lakh, as opposed to a regular PCC check-dam which would have cost between Rs. 5.5 lakh and Rs 6 lakhs.

The money that remained after building the ferro-cement check-dam could then be used to revive a community well in the village of Wadi. This village had one source of water that was not functioning due to silt deposits. The community had to therefore resort to requesting large-farm owners for water from their private wells or travel long distances for the same.

Sangettabai Manga says, “We used to fetch water in groups and had to walk in search of water, often outside the village to neighbouring ones and make about 5 such trips a day for about 200 litres of water.

Kalyani Sonawane, who is 18 years old and is in college said, “*We have faced tremendous difficulties and many a times missed our schools, travelling the distance and the long hours it took to bring back water*”.

WOTR's officers, Shankar More and Suhas Ohol, approached the community with a plan of rejuvenation and reconstruction. Women at Wadi were reluctant to this proposal and did not want to trust outsiders with their land and community resources.

This attitude emerged out of their experiences with the political parties who would visit during elections and make fake promises concerning the development of the village.

But it did not take long for WOTR's team to convince the villagers to agree for the rejuvenation plan for the old well while explaining the revival process which included meaningful discussions about bringing back water in the village through the reconstruction of the well.

The community realized the potential of the reconstruction efforts and mobilized themselves. The old well began to take form once again. It cost a total of Rupees 1.6 lakh for the well rejuvenation.
A young 15 year old boy, Ganesh Kidime, who used to bring about 200 litres of water per day himself, now says - “I will now go to school without any delays”. While Sona Bai, an aged woman in the village, takes a look down at the water level in the newly rejuvenated well, the rest of the women and men in the village are happy about the change that will take place through the community well.
About Us

Watershed Organisation Trust (WOTR) is a non-profit that engages at the intersection of practice, knowledge, and policy across scales and in collaboration with stakeholders from across sectors. Headquartered in Pune, WOTR has supported and carried out developmental work in over 4122 villages across 7 states of India.

WOTR assists rural communities to assess their vulnerability to climate and non-climatic risks. It organizes them in a socially and gender inclusive manner to help themselves out of poverty by regenerating their ecosystems in a holistic and integrated manner, conserving and optimising resource use, especially water and undertaking climate smart sustainable livelihoods.

Being a Learning Organisation, WOTR undertakes applied research and closely engages with institutions and governance actors so that insights and good practices derived from ground experience contribute to shaping enabling policies and effective programs. With a view to upscale successful interventions, WOTR develops pedagogies for implementation and organizes a variety of knowledge sharing and capacity building events for stakeholders across the civil society, developmental and governance spaces, from India and other countries.

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