

How Bidar beat back the drought

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Water warrior: "Five years ago, when V. Govindankutty first saw a trickle of water in the Naubad karez he didn't realise that he had stumbled on an ancient engineering marvel." The assistant professor of geography at the mouth of the karez. Only a handful of such underground aqueducts are found in India; this is the first of them to be restored. | Photo Credit: K.V.S.Giri The vast flatlands outlying Bidar face the brunt of the sun as it bears down on a thinly populated terrain marked by few trees and sparse foliage. But then a salubrious drop in temperature accompanies the rough descent down the six-metre-wide mouth of a medieval aqueduct to the north-west of the city. Here, about 25 feet below ground, is cool and softly flowing water, clear as crystal till bare feet touch the floor of the trough and raise a dense cloud of red sediment. Medicinal 'chamkora' fern cluster around the white kaolin (calcium) deposits where the waterline meets the unleavened laterite. The play of water and light streaks the rock face in subtly rich mineral colours: black basalt, pinkish bauxite, umber iron, ochre clay. Harmless water bugs (*Aquarius remigis*) that help keep the water potable flutter in disarray. Fifteen metres into the tunnel, a 63-foot-high shaft opens to the sky and lets a swathe of light cast vague shadows on the inky darkness further ahead, where the water is deep enough to drown a man. Harnessing old wisdom Apertures in the towering walls indicate crevices from which, nearly 600 years ago, wicker lamps may have offered light to labouring workers. Five years ago, when V. Govindankutty, assistant professor of geography at Palakkad's little known Government College of Chittur, first saw a trickle of water here, he did not realise that he had stumbled on an ancient engineering marvel — a series of an estimated 57 linearly placed vents connecting a cavernous and often winding 2.58-km-long subterranean tunnel, hewed to transport water from a perennial mother well at the start of a fault line (a linear geological fissure). The water that now flows in the Naubad [karez](#) (aqueduct) is the result of months of challenging research and meticulous restoration, not only of the aqueduct and its vents but also of [bawdis](#) and [kalyanis](#) (open wells and tanks that dot the landscape here), a part of Bidar's highly evolved and networked indigenous water systems. Recently, the Karnataka government sought to declare drought in 26 of its 30 districts, 16 of which are to the north of the State and have received deficit rainfall, including Bidar, the northernmost. As a Cabinet sub-committee on drought assesses the situation, the restorers in the city of Bidar, also the district headquarters, expect water will last in the **karez** for another two-three months at current levels of usage, and it is early days yet for a project with life-saving implications. About 117 acres of farmland are irrigated by it and nearby neighbourhoods now turn to the **karez** for their water supply. The Naubad **karez** is the first of the very few known **karez** systems in India to be documented scientifically and restored.

The octagonal 15th century Baram bawdi in Hamilapur has water again after cleaning and de-silting. Photo Credit: K.V.S. Giri

Now running on plenty A semi-arid Bidar receives 60-100 cm of rainfall annually. Its terrain is uniquely composed of 'duricrust' honeycomb-structured laterite (hard but porous and capable of absorbing rain water when forested with the right vegetation), below which lies the impermeable basalt of the Deccan trap that does not allow what is collected to percolate away. Since that first excursion, Govindankutty has marked 814 bawdis and kalyanis along the three karez systems he has mapped around Bidar — the most accessible Naubad karez; the six-km-long Shukla Tirth, which begins at the old Gornalli kere (a lake-like waterbody) to provide water by terracotta pipes for the Agrahara village; and the poorly understood 1.33-km-long Jamna Mori, likely a water distribution system from the Bidar fort's Fateh Darwaza to the moat of the royal enclosure, now buried under rampant urbanisation. Following restoration efforts, after a brief spurt of heavy rains in September 2015, the Naubad [karez](#) was operational again for the first time in centuries — a monitoring team recorded water pouring out of its mouth at 120 litres per minute. Though it was dry again by the end of February 2016, the now-inspired restorers used the months that followed to continue with de-silting. Nature handed them an unexpected turning point. Following the overall deficit rainfall since 2012, in the summer of 2016, for the first time in living memory, most of Bidar's *bawdis* and *kalyanis* ran dry. "When this happened, people took the *karez* and *bawdis* seriously and it was easier to generate awareness about them. In a way, the crisis became an opportunity," says Vinay Malge, 35, a civil contractor who co-founded Bidar YUVAA (Youth United for Vigilance, Awareness and Action) with friends in 2011. Bidar YUVAA activists like Malge, Sabish Dande, Dileep Kumar and others carried forward Govindankutty's work on the ground, egging on the local authorities to undertake the de-silting and cleaning of wells as part of MGNREGA projects; litigating against the encroachment of watershed land; protesting the proliferation of indiscriminately deeper tube wells that have caused the water table to drop drastically, adversely impacting the *karez*'s mathematical reliance on gradients; planting over one lakh indigenous trees so that rainwater wouldn't run off before it could be absorbed; and creating awareness to prevent the dumping of garbage, and open defecation, along the *karez*. Then, in September 2016, it rained copiously, and the Naubad karez, several irrigation reservoirs and many restored kalyanis have not run dry since. A man and his mission To date, Govindankutty has mapped 28 vents of the Naubad *karez*, which also serve as wells that harvest rainwater, although the numbers remain changeable as work on the *karez*'s restoration continues. In the beginning, he had little to go by besides the presence of fig and jamun trees and certain shrubs as indicators of water nearby. Often alone, the 43-year-old academic has climbed down four-storey-deep vents tied to a rope, taken several bruising falls down bramble and boulders, and had close encounters with a variety of fauna. Cobras, vipers, dragonflies, baya weavers, babblers, langurs and fruit-eating bats are a part of the biodiversity the *karez* supports, he says. He was, on one occasion, chased by a pack of dogs, and keeps his torch and camouflage cap handy at all times by way of defence. As he made fortnightly trips from Palakkad to Bidar, taking off on weekends and holidays with modest personal funds, Govindankutty worked with Google Earth images, handheld GPS and GPS-aided mobile apps, survey devices like the dumpy level and prismatic compass, to record coordinates and create the Karez Geographic Information System, which he intends to make public once his research is completed. "The passion with which he has thrown himself into the painstaking and risky survey of the entire terrain is exemplary," says K.K. Muhammed, retired regional director of the Archaeological Survey of India and now project director with the Aga Khan Trust for Culture (AKTC) in Hyderabad. The Naubad karez or surang bhawi ('tunnel wells') is a complex system, Govindankutty discovered, which works inversely underground to leverage gravity — that is, the plateau's natural gradient ascends from the mouth to the mother well but the tunnel underneath has been cut to descend from the mother well to the mouth. "Initially, even I was surprised," Govindankutty says. "How did they do it?" The professor, who will soon submit his PhD thesis on 'Historic landscape conservation' to the Kerala University, recalls inching forward on his stomach over some sections of the tunnel, relying only on his understanding of Bidar's geology. "I knew the roof wouldn't collapse, only the walls might slide," he laughs, his energy for tromping terrain he now understands encyclopaedically quite boundless. Today, as they continue to work their way underground from the mouth to the mother well, his efforts and that of local volunteers, now assisted by government funds, have rendered 16 vents accessible (vent 14 is additionally a junction with a branch 'gallery' that originates from the Naubad tank near here). The Bahmani bequest A marvel of engineering, the

qanat

(Arabic for 'conduit') or

karez

(Persian for 'smaller channels') system of collecting, transporting, storing and distributing water in arid areas, with very little lost to evaporation, originated in ancient Iran. The first

in India were built in Bidar, likely with help of Persian engineers — the Bahmani Sultanate was the first medieval Muslim kingdom to have links with Persia. Bidar was discovered because of water. Ahmad Shah Bahmani 'Wali' was on his way from Berar to Gulbarga when he chanced upon a bamboo grove (bamboo is bidru in Kannada; the art of Bidri metal work that originated here is also said to give the region its name). His platoon of parched soldiers asked a shepherd named Bomkandeshwar where they could find water. The lad pointed to a spring. Soldiers removed stones to discover what later became the mouth of the Shukla Tirth karez. The shepherd had the village and lake that's still here named after him in perpetuity. The Naubad karez is likely to have been constructed after his reign was fully established in AD 1427. It was meant to serve a naubad (for new abaadi or population), a settlement that was never completed, leaving the abandoned karez to fill with debris. Apart from Naubad, there is also a 14-km [karez](#) (the longest in India) in Aurangabad that still serves parts of its municipal water network despite neglect. Huge pipelines bring water into the bafflingly cross-connected 12.5-km-long multi-level [karez](#) in Bijapur, which may defeat restorers if they ever get there. Reference to a [karez](#) system is found in hydrological studies by the Geological Survey of India in Hukkeri near Belagavi. There also exists a six-km-long [karez](#), locally called the [kundi bhandara](#) (open well reservoir) in Madhya Pradesh's Burhanpur, also dysfunctional, but the town once preferred to convey water down this aqueduct's origin in an alluvial fan (a cone-shaped deposit of sediments) in the Satpura ranges than rely on the Tapi river by which it stands. Support and challenges Meanwhile, Govindankutty persuaded C. Kunjambu [Ettan](#), a highly regarded 76-year-old water diviner from Kerala, to travel by flight for the first time in his life and share his native wisdom at a March 2015 seminar on 'The Glory That Was Bidar', inaugurated by the late A.P.J. Abdul Kalam, who took a personal interest in the subject and conversed privately with restorers for half an hour. "There is water here," the old man from Kasaragod said simply, after reading the landscape and its botany, and placing his hands on the earth. The academic has found supporters in Bidar's dynamic district collectors: Dr. P.C. Jaffer, Anurag Tewari, and Harsh Gupta, who first tasked him with looking for what they thought were escape tunnels, and from Dr. H.R. Mahadev, who took charge recently. He could also rely upon AKTC's Muhammed. An example of the challenges they face may be seen in the 1.5-km-long Kamthana embankment to the south-west of the city — a perfect oval in Google Maps — which falls on the old route between Bidar and Gulbarga. The breached embankment is seen with its moat in ruins, the adjoining forested areas barren, and the tank to which its water channels lead in shambles. Other problems persist. A ring road proposed by the Bidar Urban Development Authority's Master Plan, which connects to the SH15 Naubad-Hyderabad highway and bypasses Bidar town, bifurcates the second of two agricultural zones that used to be fed by the [karez](#), endangering the system. Similarly, new roads connecting the ring road via the Siddheswar and Papanash temples to Bidar town pass through the surrounding grasslands, already under threat with the loss of indigenous tree species like neem, tamarind and jujube. Gliricidia, a water-consumptive ornamental species planted along the edges of the plateau for social forestry, also needs to be replaced with them. Rapid urban development is causing the unique laterite plateau to erode. The area around the Nanak Jira, sacred to Sikhs, is heavily concretised, with the well here now cemented on all sides and the course of small springs leading to it altered beyond recognition. A railway line cuts through the catchment area of the Naubad embankment, which lies directly above geologic fractures or water movement channels called lineaments. Well done, more to do The water warriors continue undeterred. Malge says, "People's behaviour is the most difficult challenge. We clean and de-silt, water returns and everyone benefits. But the minute we go forward, garbage is dumped again. All we can hope is that the sanctity of these waterbodies will be respected." They have plenty more to do. Last year, there wasn't a drop of water in the 117-acre Vilaspur tank to the north-west of Bidar. De-silted completely, it is now a beautiful expanse of water welcoming migratory birds. The Jahaz ki Bawdi, a 114-feet-deep well in the old city that had 86 feet of silt in it, is also full of water after massive cleaning. Official help is also at hand. The Department of Tourism is funding some of their restoration work, with an initial outlay of Rs.3 crore, followed by an additional Rs.5 crore. The Karnataka Urban Infrastructure Development Finance Corporation has identified the conservation of the Naubad [karez](#) system as one of 17 projects shortlisted for a pilot study. The Karnataka government's Kere Sanjeevini ('life-giving lakes') scheme and Koti Vriksha Andolana ('campaign for one crore trees') are inspired by Bidar. The antique land waits patiently. Cart tracks have left furrows on the plateau all the way to Bhalki, 24 km away, separated by disused step wells every kilometre or so, where parched wayfarers and draught animals must have quenched their thirst centuries ago. At an ancient and largely roofless farmhouse in the Naubad embankment, the walls are blocks of laterite so thick that the small homestead appears fortified. A family still lives in here, by a disused brick kiln and cowshed. They share their freshly plucked pulpy berushi mangoes with warm hospitality. The Naubad [karez](#) flowing beneath their land is a blessing — four vents lie within their property and they are happy to allow restorers access to them. High above, the celebrated Surya Kiran Aerobatic Team, which takes off early every morning from the Bidar Air Force Station, flies daring practice sorties in the cloudless sky. Over 600 families of defence personnel rely on water pumped from one of Bidar's many nameless *bawdis* near the old temple at Papanash. Somewhere between these aerial and subterranean realities is a third that is both fragile and threatened: though Karnataka is declaring drought, for now, Bidar and its surrounds have water. First published by *The Hindu*