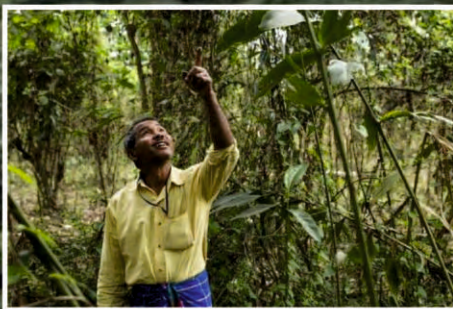
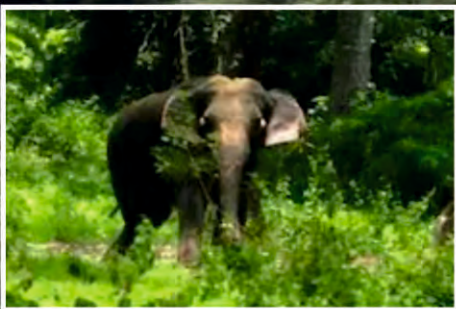


Pune, 2nd Year, November, 2022, 11th Issue.  
Pages : 32. Yearly subscription : Rs. 100 only.

# Jalasangvad

Editors: Dr. Datta Deolhar, Shri. Satish



## Cover Story:

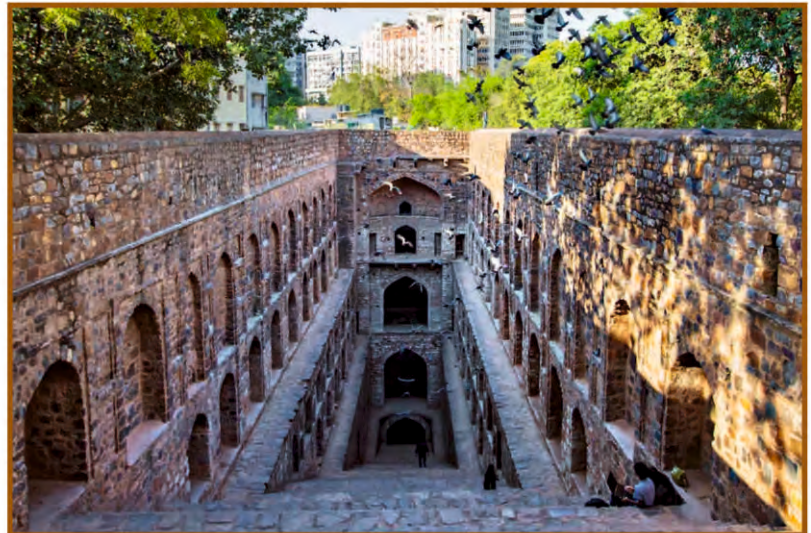
Meet India's Forest Man: Padmashri Jadav Payeng



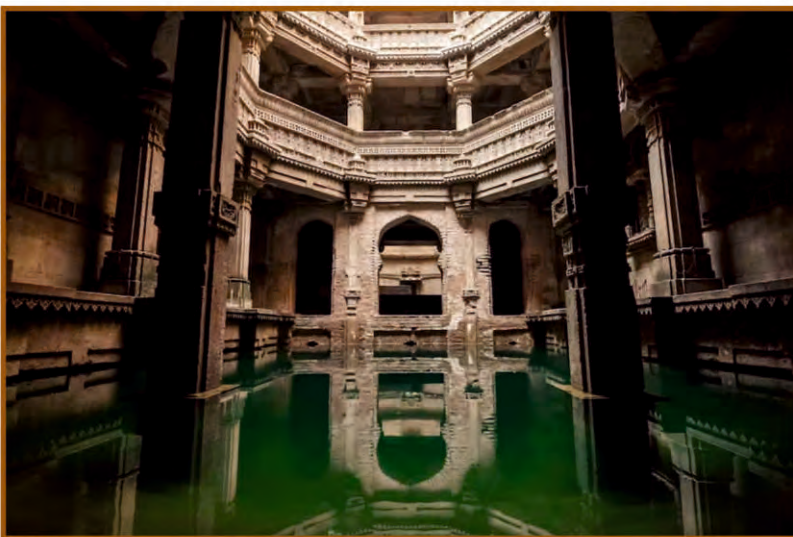
# Famous Stepwells of India



Chand Baori, in Rajasthan



Agrasen Ki Baoli, Delhi



Adalaj Vav stepwell, Gujarat

# Jalsamvad



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#### ■ November 2022

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- 5 Yearly Subscription Rs.200/-
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Last week, I had an opportunity to meet Shri Chandrakant Dalvi, Ex Commissioner of Pune Division. During the course of our discussion, he narrated his concept of ideal village development. I liked that very much and therefore I have decided to share it with you.

To give a base to his plan, he has designed a very novel method. He wants that the people who were basically the residents of the village and left the village to work elsewhere should come forward to help the development of the village. His birth place is Nidhal – a small village in Khatav tahasil, District Satara. Nearly 750 people had left this village to work elsewhere in search of jobs. He organized these 750 people, prepared a directory giving the details of each and every person (his name, address, place of service, mobile number, email id. etc) He showed me the printed copy of this directory. All these 750 people readily agreed to assist him in implementation of his plan.

Secondly, he formed one company by name Strategic Alliance for Transforming villages (SATVA Foundation) as a tool for this transformation. This company came up in 1983. The same year he joined the State Civil Service. He was very proud to say that he was next to Shri Anna Hazare in this endeavour. Anna started his activity in the year 1975. For last 40 years he is constantly involved in this work.

Shri Dalvi tries to differentiate between Rural Development and Village Development. A person living in one village is not interested in the overall rural development. He is more interested in the development of his village. When he starts reaping the benefits of development, he feels that the development has really taken place. As such, he started paying more attention to village development. For that he selected his own village i.e. Nidhal.

Shri Dalvi divides his concept of village development in three stages. Firstly he concentrates on the infrastructural development. Secondly he wishes to focus on Economic development and thirdly on Human development. He rightly says that unless the earlier stage is complete, we should not rush to the next stage. Infrastructural development provides a base to the entire work. Development of roads, provision of electricity and water are the basic needs of every villager. This infrastructure provides a base to the economic development. If these basic things are provided, the developer gains the confidence of the villagers and then gets maximum cooperation from them for further development.

His idea of village development is based on Gandhian concept of village development. Gandhiji wanted the villagers to migrate back to the village. For that, efforts are necessary to provide employment to these people. As already explained, nearly 750 villagers had migrated from Nidhal to other places in search of employment. At least these people should be brought back to the village. As a first step to proceed further, initially, he organized one Gram Sabha to know what exactly the people in the village wanted to happen. In the meeting, he gave an opportunity to each and every one to express, young and old, men and women to know their concept of development. And surprisingly enough, every individual gave his opinion on the idea of development. That is how the road map was prepared to go ahead.

Generally workers working in rural areas get exhausted after completing the work of one village. But that is not the case of Shri Dalvi and his team working in SATVA foundation. Till now the team has undertaken the work of 30 villages – 16 in Nasik District, 10 in Solapur District and 4 in Satara District. Some members of the team leave the work in between due to their personal difficulties but equal number joins the team with new vigour.

What Shri Dalvi expects from his followers is that everybody should decide what he can give out of Tana, Mana and Dhana to the work. If he can give all the three, so far so good but we cannot expect all the people to give all the three. Rich people can give Dhana, intellectuals can give Mana but poor people with limited resources can give their Tana to make the work a grand success.

We outsiders, however, can give a grand applause to Shri Salvi for the nice and dedicated work he is doing for the upliftment of the rural folk.

**Dr. D. G. Deshkar**  
**Editor**



## A Lifetime Of Planting Trees On A Remote River

Island: Meet India's Forest Man

( Cover Story )



Jadav Payeng, "The Forest Man of India," has planted tens of thousands of trees over the course of nearly 40 years. He has made bloom a once desiccated island that lies in the Brahmaputra river, which runs through his home state of Assam.

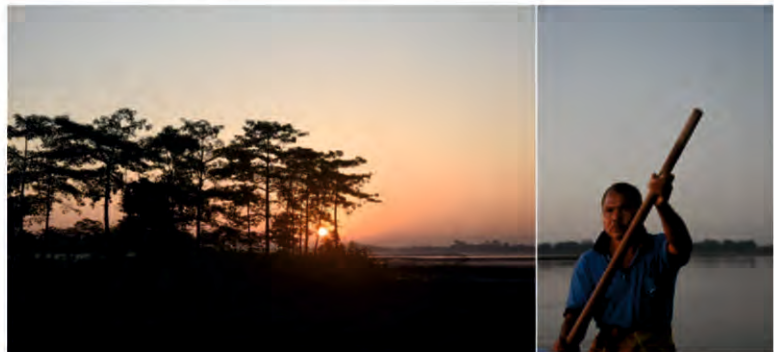
On a journey to the little known Northeast region of India, you may encounter a dizzying array of traditional tribes, rugged beauty and wildlife, including the rare white rhinos. It's here we discover perhaps an even rarer creature: the "Forest Man of India." A humble farmer from a marginalized tribal community, Jadav Payeng has single-handedly changed the landscape in his state of Assam.

Payeng, 58, is reclaiming an island in the mighty Brahmaputra river where increased flooding has changed the flow and built up sandbars along the long stretch of the river that runs through the middle of Assam.

Payeng keeps the hours of an insomniac. We arrange ourselves in a boat for a short passage with him to his river island. By 4:30 a.m. we're gliding across a moonlit channel. A fish jumps — making perfect ripples on the water's still surface.

We alight on Payeng's island as the pink sky begins to push out the stars. The riverbanks are home to some 250 families from the Mishing tribe. Payeng explains that they have inhabited the area for eons, and there are no deeds or titles to land.

He hauls his boat ashore, unloads his bicycle and begins the daily 2-mile trek to his vegetable farm and his life's mission: reviving the ecosystem here.



Left: The sun rises over the Brahmaputra river, which hosts innumerable tiny islands within its ever-shifting riverbanks, a feature hydrologists call "braiding." Right: Jadav Payeng rowing his boat across a channel of the Brahmaputra, past sandbars and rare Gangetic dolphins, to reach the forest that bears his nickname, Molai.



When Payeng was a boy, the son of poor a buffalo trader, this strip of land in the middle of the river was attached to the mainland. Erosion from powerful river waters of the Brahmaputra severed it. He bends down to pick up a handful of earth to explain how the island's landscape has changed.

"Earlier, this was all sand. No trees, no grass — nothing was here. Only driftwood. Now, seeds of grass carried downriver from China wash up, and pollinate, on their own."

What began as a bamboo stand has grown into a dense 1,300-acre forest. The biome single-handedly nurtured by Payeng for nearly 40 years is home to tigers, deer, monkeys, elephants and a wide variety of birds.



Today fields of swaying grasses stretch into the distance. Along with emerald pastures dotted with cows, cotton trees stand straight in rows as far as the eye can see — "excellent plywood," Payeng says. He planted them, his hands transforming this once barren island the size of Martha's Vineyard.

"First with bamboo trees, then with cotton

trees. I kept planting — all different kinds of trees," Payeng says.

"It's not as if I did it alone," says the self-styled naturalist. "You plant one or two trees, and they have to seed. And once they seed," he adds reverentially, "the wind knows how to plant them, the birds here know how to sow them, cows know, elephants know, even the Brahmaputra river knows. The entire ecosystem knows."

Jadav sought no permission to plant a forest. He just grew it, carrying on what he says is his Mishing tribe's tradition of honoring nature.

Jadav Payeng covers the distance from the island banks to his forest on his bicycle, carrying the supplies he uses while working on his forest and abundant vegetable farm.



Payeng started planting here in 1979, stirred by a freakish site: dead snakes piled on sand in scorching temperatures, perished for lack of shade or tree cover.

"When I saw it, I thought even we humans will have to die this way in the heat. It struck me. In the grief of those dead snakes, I created this forest."

Over the course of nearly four decades, Payeng says he's planted so many trees, he's "lost count." He estimates there are "hundreds of thousands" of them on the island now, groves so thick they shocked even the Forest Department when it stumbled on them.

Once considered "crazy" by local inhabitants, Payeng is celebrated today as a conservationist. Sitting in a meadow beside his



forest, he credits a botanical scientist for nurturing his fascination for the natural world.

Mist rises from the tall grass that has grown over the island in the last four decades since Jadav Payeng initiated an effort to transform the sandy stretch of land into a vibrant ecosystem.

"Every day he taught me how to plant trees and care for them. Since childhood. It's in my soul," he says.



Whacking back foliage, this Mishing tribesman separates out poisonous plants from medicinal herbs. He drinks a concoction of herbs every day for his health. He smiles and says a hundred different herbs grown on his island make up the recipe for the local beer.

Payeng guides us to some of the oldest trees he's planted. Beneath a high canopy he leans against a 30-year-old teak tree with fresh scratches on the bark where a tiger has sharpened its claws.

He says that he's lost 85 cows and 96 buffalo tigers, and describes coming face to face with one of the big cats that now inhabit the island. Payeng scoffs at the danger. "I wasn't scared," he says. "I know that tigers have half the courage of women. This one killed a buffalo, saw me, and slinked off."

Jadav Payeng kneels before a fire in his cowshed, preparing morning tea before he ventures out on his daily rounds tending to the Molai Forest and collecting edible and medicinal herbs.

"I never feel danger in the forest," says this self-described lone wolf. "It's my biggest home," a



home which in addition to tigers is filled with deer, monkeys, elephants, and a wide variety of birds.

This father of three delights in the fact that wild elephants cross the shallow river waters to roam his forest. Island villagers complain the herd tramples their fields and destroys their homes. But Payeng defends the animals and says it is "man that must adjust" to these woods. When islanders suggest that Payeng cut back the forest to dissuade the beasts, he sternly warns, "You will have to kill me first before you kill the trees."

Left: Tree bark is fanned out on the ground to be dried and used as building material for local houses. The traditional homes fashion walls out of sheets made from the strips of bark. Right: Payeng holds stalks of herbs he has just cut and examines elephant dung left in a clearing in his forest. A herd



of some 115 wild elephants has been visiting the island since the reforestation.



Payeng has received one of India's highest civilian awards, the Padma Shri, and many other honors.

The dense forest bearing his nickname, Molai, now sprawls over 1,300 acres. He says he's planting an additional 5,000 acres on the island, aiming to spread the greenery along a 500-mile stretch of the Brahmaputra's barren sandbars and islands. He feels he's "set an example of what one man can do" for the environment.

Yet India's Forest Man has lived a life that most people dare not imagine: rising before dawn, paddling across a river, nearly every day, for almost 40 years to replenish nature. Jadev Payeng cycling back to his boat at day's end.

When asked how he has sustained his passion, Payeng strikes a metaphysical tone. "No one sees God," he says. "I see God in nature. Nature is God. It gives me inspiration. It gives me power ... As long as it survives, I survive."



Geographically separated from the Indian subcontinent, the northeast juts toward China, and is nestled along the borders of Bhutan and Tibet.

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## Bengaluru floods: Anatomy of a drainage

### system gone horribly wrong

By Rasheed Kappan



The city is woefully ill-prepared, despite thousands of crores spent and warnings that went unheeded.

Last week, Bengaluru was battered by rains that were unprecedented in scale and floods that were disastrous in impact. While the rains have abated, thousands living on the periphery of the Bellandur-Varthur lakes in east Bengaluru are still gripped by fear, worried that deliberately narrowed drains, encroachment of wetlands, and state apathy could trigger another round of devastation.

For years, the Karnataka government and the city corporation, the Bruhat Bengaluru Mahanagara Palike, has held out a long-term fix for the recurring floods – remodelling the city’s stormwater drains. But 16 years after its launch, the project is nowhere near completion and, worse still, has a glaring design flaw that ironically aggravated the flooding this year.

#### **Faulty drain redesign**

Flood management experts have dubbed this remodelling as a project to help the land mafia.

Why? After their redesign, the drains have shrunk from about 60 feet to 18 feet along several flood-prone stretches dotted by fancy apartment complexes. This, as experts point out, clearly violates the National Green Tribunal’s guideline to

maintain the physical integrity and buffer of the SWDs.

The impact of this violation affected thousands last weekend. As rains pounded Marathahalli area barely a km away from the HAL Airport, the drain – or rajakaluve, a channel that connects water bodies – taking excess water from the upstream Doddanekundi lake to Bellandur and Varthur overflowed. In a flash, vast swathes of the locality and its surroundings were five feet underwater.

The locals knew exactly what the problem was.

“The rajakaluve here is 40 feet wide but, about 500 metres from here, has been narrowed down to just 10 feet by a big builder,” said Jagadish Reddy, who has lived in Marathahalli for decades. “They laid a slab over it for a road to their complex. We had complained several times and asked them to at least clear the silt under it, but they did not care even for the MLA.”

Only after chief minister Basavaraj Bommai visited the flood-affected areas and ordered removal of encroachments on SWD that the people managing the residential enclave, which is named Divyasree 77, reluctantly agreed, Reddy added.

On September 8, the BBMP’s earthmovers razed concrete slabs installed on the SWDs and demolished a wall. Many residents in flooded villas within the enclave were evacuated.

#### **Expensive and delayed project**

In the last 16 years, BBMP has remodelled only 428 km of the city’s 842-km network of SWDs. It spent a hefty sum to do so of Rs 1,658 crore and has estimated a cost of Rs 4,670 crore – three times the initial cost – to complete the remaining 414 km.

Yet this project, now costing a total of Rs





make money through kickbacks but also earn more from builders by narrowing the drains.” Ill-prepared pre-monsoon

Angry residents point out that it’s not rocket science for BBMP to desilt drains well before the onset of monsoons.

“Yes, the rajakaluves are narrowed and encroached. But why wait till the rains to clear the muck out?” said Anand Raj, who has lived in Yemalur for 35 years. “Even the shoulder drains

6,328 crore, has been found to be seriously wanting in design and utility, even as it’s touted to be a robust defence against future floods.

“If you look at the Bellandur-Agara lake side, the drains are narrowed and concretised in the name of remodelling,” said Dr TV Ramachandra, who heads the Centre for Ecological Sciences at the Indian Institute of Science. “If they had not concretised, 60 percent of the water would have seeped down to the underlying layer. Now, since it is a paved surface, all the water flows over land.”

This is seen even a week after heavy rains at Devarabeesanahalli, an area adjoining the Outer Ring Road. This area, with several big tech companies and a large super-speciality hospital, saw waist-high flooding. The drain, which is considerably narrowed here, is still filled to the brim with rainwater mixed with sewage.

“People say the corruption is 40 percent. It must be more than 150 percent,” Ramachandra said. “The chief minister announced Rs 1,100 crore for remodelling drains [as another instalment]. This tamasha happens every year. Not only do they

flanking the houses are not cleared for years. When it rains, we have no peace of mind. We cannot sleep. It is mental torture.”

And everyone knows why the drains get clogged – through dumping of solid waste and construction debris. Additionally, the unregulated inflow of raw sewage continues unabated.

“When the drains overflow, our drinking water lines get contaminated,” said Glen Souza, a resident of Marathahalli. “The piped water stinks. We end up spending thousands on cleaning our storage tanks and sumps.”

A week after the floods, the water has not fully receded in Yemalur.





## Organization – National Bank for Agriculture and Rural Development (NABARD)

Shri Vinod Hande - (M) 9423677795



National Bank for Agriculture and Development (NABARD) is an apex development financial institution in India. Its head quarter is in Mumbai with branches all over India. The bank has been entrusted with "matters concerning policy, planning and operations in the field of credit for agriculture and other economic activities in rural areas in India". Dr. G.R. Chintala is the chairman of NABARD. It has 336 District Offices across the country, one special office at Srinagar. It also has 6 training centers.

NABARD was established on the recommendations of B.Shivraman Committee on 12th July 1982 to implement the National Bank for Agriculture and Rural Development Act 1981. B.Shivraman was former Member of Planning Commission, Govt. Of India.

It replaced the Agriculture Credit Department (ADC) and Rural Planning and Credit Cell (RPCC) of Reserve Bank of India and also replaced Agriculture Refinance and Development Corporation (ARDC). It is one of the leading agencies providing development credit in rural areas.



International connections of NABARD are with World Bank affiliated organizations and global development agencies working in the field of

agriculture and rural development. These organizations help NABARD by advising and giving monetary aid for the upliftment of the people in rural areas and best use of agriculture process. NABARD was setup with initial capital of Rs.100 crore which is now Rs.17080 crore as on 31th March 2022 it's paid up capital. The organization had developed a huge amount of trust in its last 4 decades of work with rural communities for the following reasons.

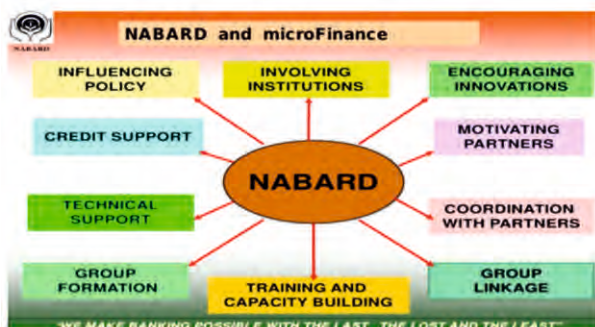
- NABARD, the most important institution in the country looks after the development of cottage industry, small scale industry and village industry and other rural industries.
- NABARD supports and promotes integrated development.
- NABARD serves as an top finance agency for the institutions providing various development activities in rural areas.
- NABARD co-ordinates the rural financing activities of all institutions engaged in development work and maintains liaison with Govt. of India, State governments, Reserve Bank Of India.
- NABARD undertakes monitoring and evaluation of projects refinance by it.
- NABARD refinances the financial institutions which finances the rural sector.
- NABARD also keeps a check on its client institutes.
- NABARD refinance is available to State Co-operative Agriculture and Rural Development Bank (SCARBD), state co-operative banks, regional rural banks, commercial banks and other financial institutions approved by RBI.

NABARD also is engaged in Natural Resource Management Programmes that involve



Watershed Development, Tribal Development and Farm Development. Separate dedicated funds are allocated by the NABARD for the purpose. Rural Infrastructure Development Fund(RIDF) is another scheme offered by NABARD to banks for rural development. Under this scheme Rs.51283 crore have been sanctioned for 244651 projects which cover irrigation, rural roads and bridges, health & education, soil conservation, water schemes etc. . From 2007-08 NABARD has started a new direct lending facilities under “Umbrella Programme for Natural Resource Management Activities”. 35 projects have already been sanction by NABARD for amount of Rs.1000 crore.

NABARD achieves its goal of empowering and financial upliftment of rural India by adopting three heads. They are Financial, Development and Supervision. Through these initiatives organization touches almost every aspect of rural economy. Over the years NABARD’s initiatives have touched millions of rural people across the country. The Self Help Group Bank project launched by NABARD in 1992 is now world’s largest micro finance project. Kisan Credit Card designed by NABARD is now used by crores of farmers. Organization has financed one fifth of India’s rural infrastructure. NABARD was pioneer in the field of watershed development as a tool for sustainable climate proofing.



NABARD’s soft loan for drinking water facility in rural areas- National Bank for Agriculture and Rural Development has extended soft loan assistance to the projects of state Govt. for creating drinking water facilities for 293 rural habitations for the project cost of Rs.140.20 crore. Projects after

completion will provide drinking water to 21 rural habitations in Musiri , 73 in T Pettai, 122 in Thuraiyur and 77 in Uppiliapuram. Construction work is in progress for collector well at Seventhilingapuram village in Musiri and 5.2 lakh



liters sump at Valavanthi in T Pettai and branch and main pumping feeder for 637 km.

This project will benefit roughly 1.5 lakh people with the provision of 55 liters per day per person. About 33% of work has been completed by Tamil Nadu Water Supply and Drainage Board (TWAD) and it was to be completed at end of 2018. At Thirukambaliyur collection sump, suction sump and booster pump house have also been completed by L&T infrastructure. Work was financed and supported by NABARD and RIDF (Rural Infrastructure Development Fund) of Rs.319 crore. This project will provide drinking water to 135 rural habitations in Vaiyampatti and Maruungapuri and 354 habitations in Dindigul district. As Tamil Nadu is a water stressed state NABARD is willing to support state for check dams construction, sub surface dykes for obstructing natural flow of ground water flow and modernization of transport system of water for better efficiency.

**Water campaign by NABARD**

On the occasion of World Water day of 2017 NABARD launched a major water campaign to cover around 100000 villages in water stressed area where ground water is over exploited. Dr. Harsh Kumar Bhanvala, Chairman of NABARD launched the campaign in presence of Senior Officials of State Govt., Banks, NGOs, and other



stakeholders across the country. Major Highlights of campaign include community participation in adopting efficient irrigation methods, ground water recharge and appropriate crop pattern for enhancing agriculture productivity. For more effectiveness of campaign NABARD selected local volunteers as Krishi Jaldoots. All activities were coordinated by NABARD with representatives from State Govt., State level bank's committee, NGOs, Agriculture Universities, Water experts and farmer's club volunteers. NABARD worked with villagers on better use of water for agriculture and household purposes. NABARD asked bankers to provide advances to farmers if any demand comes for irrigation after the campaign.

NABARD will educate farmers and villagers about efficient use of water. Under this programme trained volunteers of NABARD will go to the 100000 villages across India and will conduct conservation programme in the gram sabha. Currently NABARD is giving training to 8000 volunteers. These volunteers will select 11 people from each village and train them. Thus creating a force of 1.1 million for the programme. India is dependent on rain water for agriculture and drinking water. NABARD participation will enhance private investors in creation of water sources and its efficient use. NABARD will also provide loan for micro irrigation. The Union Govt. has allotted Rs. 5000 crore fund for micro irrigation.

NABARD's new 'water Atlas'.- Many regions in India are facing water scarcity with the onset of summer. It is important to work on a concrete plan which will provide for the judicious use and distribution of water across all sections of society. Farmers living in water stress area have to bear brunt year after year. According to the Organization for Economic Co-operation and Development 80 percent of India's total water is used for agriculture and out of which 50 to 55 percent is used for irrigating two crops rice and sugarcane. To tackle this problem, NABARD has come up with farmer centric initiative to improve crop planning to mobile more judicious usage of water.



A 'water atlas' that is mapping of physical and economic productivity of water available in India is underway by the Indian Council for research on International Economic Relations(ICRIER). The water usage of crops like rice, wheat, maize, chickpea (chana), pigeon pea (tur), groundnut, mustard, sugarcane, cotton and potato have been mapped under this project. 'ICRIER' has estimated water productivity of ten important crops. With this move states can work towards reducing their contribution towards groundwater depletion by shifting to other crops. Water consumption per kilogram of crop output would be mapped so that crop planning and water efficiency can occur across the country.

NABARD also concluded that cultivation of water guzzling crops like rice and sugarcane are expensive in states like Punjab and Maharashtra where these crops are exhausting groundwater table in their area. Despite the govt. efforts to move farmers from rice to maize and cotton no change observed in Punjab. NABARD hopes that 'Water Atlas' initiative not only guides farmers in water scarce region to choose crops that will sustain in summer and will also provide better return.

NABARD and Safe Water Network shows new approach in Andhra Pradesh. Safe Water Network will get financial support from NABARD through 'Rural Innovation Fund'. System will be owned and managed by local people. The initiative of Safe Water Network also includes an impact study to determine the benefits of providing safe water to a village in need. The safe water station will be built in village of Galigudem of



Mahbubnagar Dist. Where watershed Development project is going on with financial support of NABARD. The approach of Safe Water Network is to involve community engagement and to bring a sense of ownership among them. Extensive training and support is provided for operation and management capabilities. Added feature is remote monitoring, which identifies system problems quickly and reduce service cost. Finance is the main problem in this work. Safe Water Network will provide financial assistance through NABARD to community based organization.

NABARD promotes and provides credits to institution, companies and entrepreneurs focused on agriculture, small scale industries, cottage and village industries, handicraft and other rural crafts to support rural economy to improve livelihood of rural population. Mission of NABARD is to bring modern technology to achieve rapid development in agriculture to secure prosperity.

NABARD is also working in the Naupada dist. of Odisha for conservation of water through management of run-off in the river basin of Jonk River. River Jonk is the tributary of Mahanadi. This project is executed by Department of Water Resource of Government of Odisha. Total cost of this project is Rs.20 crores which will benefit the inhabitants along the side of river.

NABARD also planned in 2017 to reach 1 lakh villages of Maharashtra through their 'Jaldoots' to take up work in water stressed villages. These 'Jaldoots' will create water awareness in the rural community. Communities will be taught about micro irrigation to achieve more crop per drop. For this work NABARD will identify local volunteers for more effective approach. These volunteers will campaign about rain water harvesting, efficient water use, recharging ground water system. Bank will support investors in water sector.

Irrigation projects in Maharashtra-NABARD has sanctioned Rs.475.72 crore under RIDF (Rural Infrastructure Development Fund) to Maharashtra for developing 39 minor irrigation

projects. These projects created additional irrigation area of 23704 ha. and also generated recurring and non-recurring employment. Recurring employment to the tune of 17.78 lakh man days and non-recurring to the tune of 285.91 lakhs man days generated. Out of 39 projects, 22 are in six dist. Of Vidarbha region, 2 projects in Akola, 6 in Amaravati, 3 in Buldhana, 2 in Wardha, 2 in Washim and 7 in Yavatmal dist.. Remaining 17 were



in Latur and Beed dist..

NABARD have also sanctioned 311 road & 74 bridge projects in 32 dist. of Maharashtra. They covered 667.2 km of road length and 3388.21 meters of bridge length which connected 1380 villages, 710 market places, 320 tourist places and 311 pilgrimage centers. These projects also created non recurring employment to the tune of 192.59 lakh mandays.

Other sanctions of NABARD

- Sanctioned Rs.65634.93 crore for 93 irrigation projects under Pradhan Mantri Krishi Sinchai Yojana.
- Max. projects sanctioned are in Uttar Pradesh.
- Bigger irrigation projects also sanctioned in Maharashtra, Telangana and Madhya Pradesh.

**Contact details of NABARD :**

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[www.nabard.org](http://www.nabard.org)



## First Farmer-led Company in India raises

## Capital from Group of European Investors

Sahyadri Farms Post Harvest Care Limited raised Rs.310Cr (almost EUR 40 million) growth capital from a group of impact-focused investors. Incofin, Korys, FMO and Proparco see Sahyadri Farms well-placed to help farmers run their businesses in a more profitable and sustainable way.



India is a country with an aspirational, young population (74% of the population is younger than 45 years) focused on enriching their lives through hard work and entrepreneurship. At the same time, the country faces challenges like inequality (gender, education, family wealth), outdated technology, inefficient supply chains, and lack of access to capital. The country is witnessing a strong movement towards entrepreneurship to help solve these multidimensional problems the country faces.

Sahyadri Farms is a good example of rural entrepreneurship providing end to end solutions to small and marginal farmers.

In 2010 a group of 10 farmers took the initiative to collectively produce and export fresh

grapes to Europe. That initiative has grown into the leading fruits and vegetable export and processing company that Sahyadri Farms is today, servicing over 18,000 farmers, covering more than 31,000 acres and 9 crops. The company walks with its farmers from their choice of crops to the farming practices they employ, from the inputs they use to how they harvest and sell their agricultural products. The company for example offers a digital platform that informs farmers on high yield crop varieties, farm inputs, real time climate information and access to the market place.



The economic and social impact of Sahyadri for these farmers is significant. Namdeo Pawar is one of them: "In 2012, I was on the verge of selling my land. Sahyadri supported me, helped me get back up, and I pushed myself to return to work. Through Sahyadri, my income increased. In 2014, I even repaid my bank loan." Also for farmer Anil Dawre working with Sahyadri Farms brought about a turnaround: "I farm on less than one acre, because a part of my land is taken up by my home and an animal shed. Group farming turned out to be a success. My parents never imagined their son's



produce would travel abroad. Their joy knows no bounds.”

The capital coming from Korys, FMO, Proparco and Incofin is intended to further grow the farmers' companies. Sahyadri Farms wants to expand its processing capacity for fruits and vegetables-based products, set up a biomass plant to generate electricity from process waste and enhance its infrastructure, like packhouses.



Vilas Shinde, founding farmer and Managing Director of Sahyadri Farms: “The idea of Sahyadri Farms is to unite farmers and make them think like professional entrepreneurs. We are building a sustainable, scalable, and profitable organization for all our stakeholders by making farming profitable and viable activity for each small and marginal farmer.”

Michael Jongeneel, CEO of FMO: “We are very happy to have found a long-term partner in Sahyadri Farms to support smallholder farmers in India. We are impressed by Sahyadri Farms’ ability to identify and deliver exactly the help farmers need to make their business flourish. We expect this first international equity investment in a farmer-led organization in India to help Sahyadri Farms reach even more farmers and set a blueprint for further growth in the industry.”

Alpen Capital acted as exclusive strategic advisor to Sahyadri Farms for this transaction.

#### **About Incofin Investment Management**

Incofin is an independent emerging markets focused impact investment fund manager, focused on financial inclusion, the agri-food value

chain and safe drinking water, driven by a purpose to promote inclusive progress. Incofin IM is an AIFM licensed fund manager and has over EUR 1 billion in assets under management. Incofin has a team of more than 80 professionals spread over its headquarters in Belgium and local investment teams in India, Colombia, Kenya and Cambodia.

As a leading impact investment firm, Incofin has invested (via equity and debt financing) over EUR 2.7 billion in more than 320 investees, financial institutions and SMEs in the agri-food value chain, across 65 countries in Asia, Africa, Latin America and the Caribbean and Eastern Europe. <https://www.incofin.com>

#### **About Proparco**

Proparco is the private sector financing arm of Agence Française de Développement Group (AFD Group). It has been promoting sustainable economic, social and environmental development for over 40 years. Proparco provides funding and support to both businesses and financial institutions in Africa, Asia, Latin America and the Middle-East. Its action focuses on the key development sectors: infrastructure, mainly for renewable energies, agribusiness, financial institutions, health and education.

ts operations aim to strengthen the contribution of private players to the achievement of the Sustainable Development Goals (SDGs) adopted by the international community in 2015. To this end, Proparco finances companies, whose activity contributes to creating jobs and decent incomes, providing essential goods and services and combating climate change. For a World in Common.

For further information: [www.proparco.fr/en](http://www.proparco.fr/en) and @Proparco

#### **About Korys**

Korys is the investment company of the Colruyt family. Today, it has more than EUR 4.5 billion of assets under management. Besides holding a significant participation in the Colruyt Group, a leading retail company in Belgium and France, it actively manages participations in privately held companies and in private equity



funds. Korys has also set up proprietary funds to manage its portfolio of listed investments. Across its activities, Korys' investment decisions are taken with a long-term perspective and on basis of strict economic (Profit), social (People) and ecological (Planet) criteria. Korys aims to create sustainable value in 3 major ecosystems: Life Sciences, Energy Transition and Conscious Consumer. To do this, Korys can count on a motivated team of 30 professionals based in Belgium and Luxemburg.

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**World Water Day-2008**  
**Sanitation Matters**  
**Gajanan Deshpande, Pune**  
**(M) 9822754768**



(A new article series has been launched from August 2021 to learn more about the importance of World Water Day and the various water awareness programs implemented every year.)

On the occasion of World Water Day-2008, the special theme 'Sanitation and Water for Health Protection' was chosen for awareness. This stream highlighted several key sanitation issues at the regional and national levels and taking urgent action to address them as a matter of priority. Water is life! Therefore, the importance of clean and pure water in human life is unique. Water quality and cleanliness are closely related. It is said that where there is cleanliness, there will be health; and where there is health, there will be prosperity. We know that for health, we need clean air, clean surroundings and clean water for drinking along with nutritious food. All the society should even be healthy for economic and social development of the country.

Neglecting sanitation issues due to scarcity of water is an invitation to numerous diseases. That is why the approach of sparing water for reasons of health and hygiene is never justified. That is why the making available sufficient water for every

family has become a key issue before the government in the precautions to be taken for health protection.

We are taking various precautions for personal hygiene or family hygiene and for this we are doing a lot of public awareness in the society. Just as everyone needs water for drinking, bathing, it is equally essential for maintaining proper cleanliness in the house from the point of view of health. For that, cleaning the house every day, having enough water available to flush the toilet and wash hands after using the toilet, is also important; otherwise it can be an invitation to many diseases. In short, it is not worth sparing even a drop of water for health protection.

Clean drinking water and sanitation are recognized as universal human rights, as they are of high importance to the life of every person. On July 28, 2010, the United Nations General Assembly recognized this as a human right in international law. The human right to water assures everyone access to adequate, safe, acceptable, physically accessible and affordable water for personal and domestic use. Clean water, basic sanitation and adoption of good hygiene practices not only set children on the path to prosperity, but also keep them healthy in life.

World Health Organization (WHO) has brought forward the concept of WASH (Water, Sanitation and Hygiene) at the global level. A lot of efforts are being made to inculcate this concept and approach in the global community, especially in the backward areas. The concept of WASH focuses on teaching basic hygiene to community and school children with a special focus on girls' education and gender equality. The main objective of this stream is to attract the attention and action of global and local communities, organizations in order to restore safety to every person on earth from water stress and water-related disasters, raise awareness among the general public and motivate them to bring about a positive change in public opinion.

When water is scarce and cannot be obtained at the doorstep, poor people cannot



afford the time required to fetch it from afar. Hence, by being dirty, not only themselves but also their rich neighbours are in great danger, and this is the main reason why the poor masses of the big cities are often in the throes of disease. The Greater Mumbai Municipal Corporation has fully recognized the importance of these matters and has provided ample water supply to the city at great expense, so that water is available not only for drinking but also for washing the clothes and houses of all the inhabitants and even for cleaning the streets.

Every citizen should have access to water which means that water should not be more than 1,000 meters or 3,280 feet away and should be accessible within 30 minutes. Availability of water is essentially a consideration of whether water supply is adequate, reliable and sustainable. Water quality refers to whether the water is safe for drinking or other purposes.

Water that looks clean and pure to us is not necessarily pure and safe always. Water that looks clean and clear may contain billions of pathogens that can be harmful to humans. Therefore, it is very important to regularly disinfect the water used for drinking and cooking. It should not have any odour and should not contain any colour for water acceptability.

Sanitation is a public health condition related to the availability of clean drinking water and the disposal of human excreta and sewage. Preventing human contact with it is also part of hygiene, such as washing hands with soap. The purpose of sanitation systems is to protect human health by providing a clean environment, which will stop the spread of disease. For example diarrhoea, a major cause of malnutrition and stunted growth in children can be reduced through adequate sanitation. There are many other diseases that spread easily in communities with low levels of sanitation, such as cholera, hepatitis, polio, etc.

The definition of 'WASH' includes management of faeces. Sanitation generally refers to the provision of facilities and services for the safe disposal of human urine and. The term 'sanitation' also refers

to the maintenance of sanitary conditions through services such as garbage collection and sewage disposal as well as excreta management systems, sewage management systems (this includes sewage treatment plants), solid waste management systems as well as rainwater drainage systems - also known as storm water drainage. Sanitation includes all these four technical and non-technical systems.

For developing countries, balancing the financial costs of addressing inadequate sanitation is a major concern. According to a World Bank study, the financial loss to the Indian economy due to inadequate sanitation is equivalent to 6.4% of GDP. This includes premature deaths, loss of productivity and additional expenditure on healthcare among other reasons. Inadequate sanitation also damages potential tourism revenue. As a whole, this theme 'Sanitation and Water for Health Protection', adopted for public awareness globally is of utmost importance.

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**DownToEarth**

**10 FACTS ON CLIMATE CHANGE FROM IPCC REPORT**

- In the next 20 years the global warming will breach the threshold of 1.5°C
- If we continue to emit greenhouse gases as now, global warming will be above 2°C by mid-2100s.
- With every 1°C rise in temperature, there will be a 7 per cent increase in the intensification of extreme rain events
- Carbon dioxide concentration is highest in 2 million years
- Sea-level rise is the fastest in 3,000 years
- Arctic sea ice is lowest in 1,000 years
- Some changes we can't reverse any more, at least for next thousands of years
- Ice melting will continue for the next 1,000 years even if we manage to control our GHG emissions
- Ocean warming will continue, which has increased by 2-8 times from 1970s
- Sea-level rise will continue for hundreds of years

[www.downtoearth.org.in](http://www.downtoearth.org.in)



## This startup's chemically engineered water filtration system helps large farms and industrial processors recycle their wastewater

### KEY POINTS

- Wastewater reprocessing startup ZwitterCo announced on Thursday that it has raised \$33 million to scale up its chemically engineered membrane water filtration technology to help industrial companies and large farms recycle wastewater.
- The patented filtration technology came out of a research lab at Tufts University.
- In many cases — such as in manure digestate treatment, meat and poultry treatment, dairy waste water, and bioprocessing applications — the material that is filtered out with can be resold as fertilizer or feedstocks.



The water in the jar on the left is wastewater before being put through ZwitterCo's filtration membrane. The jar on the right is water cleaned and ready for reuse. The jar in the middle is the concentrate of waste that has been pulled out of the water with the filtration system and can be used in to make other products, like fertilizer or feedstock, which can be sold.

Photo courtesy ZwitterCo The wastewater reprocessing startup ZwitterCo has raised \$33 million to scale up its chemically engineered

membrane water filtration technology to help industrial companies and large farms recycle wastewater from their systems, allowing them to use less fresh water.

"The goal for us is to maximize reuse, so that you can limit the amount of freshwater consumption," CEO and cofounder Alex Rappaport told CNBC in a video interview. "We're going to enable a future of water abundance."

That's important now because climate change is increasingly making fresh water a scarce commodity. Currently, 37% of the United States and 44% of the lower 48 states are in a drought, according to the National Integrated Drought Information System.

"The world is getting hotter and, in many places, drier. Demand for water outstrips supply in much of the United States, including the Colorado River Basin, which is at its lowest level in 1,000 years," Jason Pontin, a partner at DCVC, the venture capital firm that is leading this funding round, explained in a post about their investment.

"But Americans also waste a lot of water: every day, industrial facilities in the U.S. discharge 255 billion gallons of wastewater into public waterways," said Pontin, who is also the chair of ZwitterCo's board. "Most of that is treated through chemical, physical, or biological means, but it's still not pure enough for industrial reuse. If it were, then facilities wouldn't discharge it."

That's the problem ZwitterCo is solving with its membrane technology made of so-called "zwitterionic copolymers" — hence the company's name — which was first developed by the chemical engineering professor Ayse Asatekin at Tufts University.



**What is a zwitterionic membrane?**

Decades worth of previous efforts to develop water filtration technology for industrial use cases have been stymied by a problem called “membrane fouling,” which means the pores of the filter get so clogged up so frequently that it takes too much time to clean them.

That’s especially true of the kind of materials that need to be taken out of wastewater from an industrial factory or large agricultural farm, like fats, oils and greases.

ZwitterCo’s technology, the zwitterions, are so good at sucking up water, they actually wick moisture out of the air, Rappaport told CNBC.

A filtration membrane looks something akin to a sponge when you zoom in really close, and it’s the width of that sponge, or the height of the pores, that’s the hardest part to keep clean. But the ZwitterCo membrane’s pores act as sort of vacuums for the water, pulling the water molecules out of the oils.

“Because the membrane is so, so, very hydrophilic from these zwitterions, you’re able to operate for years in environments that another membrane would be ruined in hours,” Rappaport told CNBC. That’s “because you’re constantly able to sort of re-wet, re-hydrate the surface and regenerate it back to the starting performance.”



**ZwitterCo’s water filtration membranes**

What’s really critical to winning customers is that the system can save customers money in addition to water, according to Rappaport. Exactly how much money and water depends on the farm or industrial facility.

“In the absence of having efficient tools to extract all of those contaminants out of the water, you’re sort of stuck.” Other options include hauling it away, dumping it down the drain, or coordinating with regulators to spread some quantities of the waste out over the land, Rappaport told CNBC. ZwitterCo’s technology reduces those costs.

For Solugen, a Houston-based company that manufactures chemicals and materials using enzymes, ZwitterCo’s water filtration system has let it recycle about 10 million gallons of water in the last year, according to an estimate from cofounder and CTO Sean Hunt.

“Our first manufacturing facility, Bioforge 1, is a zero discharge facility in that we do not have air or wastewater emissions. ZwitterCo’s membranes are a key technology in our toolbox,” Hunt told CNBC. “Our process water recycling loop is north of 20 gallons per minute, and it goes through various membrane, recovery, and reuse steps to conserve and recycle our process water back to the front-end of Bioforge 1.”



**The ZwitterCo membrane skid is in the bottom middle-left of the Solugen chemical manufacturing factory**

In many cases, such as in manure digestate treatment, meat and poultry treatment, dairy waste water, and bioprocessing applications, the material that is filtered out with ZwitterCo’s membranes can be resold as fertilizer or feedstocks, creating a new revenue stream.

“So in the meat and poultry industry, the fats and oils we take out can be sold in pet food. In the bio processing industry, the cellular material



that we can take out can be sold as an organic feedstock to help serve as a high protein diet for the livestock. In the manure industry, the organics that get taken out can be a fertilizer," Rappaport told CNBC. "So the goal is create value on both sides of the membrane."

ZwitterCo was launched in 2018 and subsisted on grants for its first year and a half, including \$1.25 million from the Department of Energy. Rappaport and his co-founders, Christopher Drover and Chris Roy, primarily spent the early years figuring out how to take the research from Asatekin's lab and turn that into a product that could be manufactured and commercialized at scale.



**Alex Rappaport, CEO and co-founder of ZwitterCo**

The \$33 million ZwitterCo is announcing Thursday brings total funding raised to \$44 million and will allow ZwitterCo to complete the build out of a 30,000 square foot facility in Woburn, Massachusetts. There are currently 50 full-time employees and while the company is making revenue from 16 clients, it's not yet turning a profit.

This funding will also go partly toward hiring more people to work with industrial clients to tailor the ZwitterCo installation to the needs of the client. The cost of installing a ZwitterCo water filtration system varies tremendously depending on the customer, but can run between five and seven figures, Rappaport told CNBC. This is on par with the infrastructure improvements that factories and farms make regularly, he said.

**Stockholm Water Prize-2006**  
**Prof. Asit K. Biswas - Mexico**  
**Gajanan Deshpande, Pune**  
**(M) 9822754768**



(An article series has been launched in August 2020 to learn more about the World Water Prize winners and their work.)

Indian-origin Mexican Professor Asit K. Biswas was awarded the 2006 Stockholm Water Prize. While many hydrologists have contributed highly effective methods for rational use and management of water resources, Professor Asit K. Biswas created a socio-economic and political environment, which enabled effective conversion of scientific (both natural and social) and technological advances into meaningful solutions. His role as a global facilitator on an international platform where any organization or individual can take concrete action on water has been multifaceted.

While serving as Chief Scientific Adviser to the Secretary-General of the United Nations Water Council held in Mar-del-Plata, Argentina in 1977, Professor Biswas was instrumental in designing and promoting the campaign for the International Decade on Water Supply and Sanitation. After the UN General Assembly endorsed the initiative, Professor Biswas guided international and national organizations on what the Decade should look like. During this decade, visions of affordable technologies to serve those without access to improved water and sanitation services and how to engage them were developed. Professor Biswas, along with former UN Under-Secretary-General Dr. Peter Hansen, reviewed the work of all UN agencies for the Mar-del-Plata Conference and provided guidance on how to maximize the impact of all their water-related activities.

"My ultimate dream is that in my lifetime every citizen of the world will live in a water-safe world". He goes on to say that "This dream is not impossible but achievable. If we fail, as Shakespeare says in Julius Caesar, 'The fault, dear Brutus, is not in our planet, but in ourselves; because we are failing to work'".





Believing that water is not a source of conflict but of cooperation, Professor Biswas chaired the Middle East Water Commission from 1993 to 1997 in collaboration with the Sasakawa Peace Foundation. He brought together high-level personalities from most of the countries in the region for a face-to-face review and assessment of water issues. Many of the Commission's recommendations were based on existing agreements on water issues between these countries. Finally, Professor Biswas was inspired by the concern that the next generation of aspiring hydrologists were not being properly recognized at major international forums and initiated a new 3-year program in collaboration with the Nippon Foundation to select emerging hydrologists under the age of 40 to mentor and promote water development work.

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**Jeevitnadi : Activities for the month of September 2022 :**  
**Shubha Kulkarni**  
**(M) : 9930809046**



Awareness :

- Mrinal Vaidya from Jeevitnadi had a good interaction with students and staff members of Ambedkar college, where she briefed the team



about our actionable programs.

- ACWADAM team visited Rajiv Gandhi Bridge stretch to learn more about the live springs at the location. We spoke to them about how the fisherman use the live springs to keep their catch



fresh until evening and also the story of Mula river.

- On the event of World River Day ( September 25th); we conducted a Flash mob at two prime locations in Pune : Sambhaji Park and Fergusson college entrance. The weekend strollers on the road



were captivated by the adhv dance for the rivers that began with all energy and vigour. Justine Bhatt a top choreographer in Pune took the initiative of conducting this flash mob and also interacted with citizens on the road. It was a very refreshing way to engage with the general public and speak about the River Front Project that we are opposing.

**Action :**

- The month began with Ganesh visarjan and this time with a combined effort of over 12 NGOs in Pune with Jeevitnadi being on the pivotal stand, a campaign called Punaravartan was initiated along with PMC’s support.
- <https://shabnamnews.in/news/481324> : Dr.Babasaheb Ambedkar college donation of idols through the constant support of Jeevitnadi.
- Volunteers were at the ghats to educate common citizens to do an eco- friendly immersion this year. With most of the river ghats made inaccessible and citizens requested to immerse the idols at the temporary tanks, we saw a drastic improvement from previous years.
- The 200 day ( September 15th ) milestone of the chain fasting campaign that citizens all over Pune are doing against the PMC’s River front project took the form of a silent march by citizens from Garware college until PMC office and submission of a letter to the commissioner.



- Repeated letters to NGT about the sand mining and dumping of debris on the river beds, led to a suo motto case being raised against the Pollution

control board. The case was heard under NGT on 26th September with an order released on 29th September where both citizens and Government agreeing and accepting to work together towards the river revival in Pune region.

**Regular activities :**

- Though there was increased awareness this year, we still found the stretches polluted with individual faith and devotion! We keep wondering when this blind faith would end ... The volunteers continue to have a hard time cleaning the stretches especially after rains and festivities.





## Role of Voluntary Agencies in Preventing river pollution

SHILLONG, Sep 12: Since 2019 a team of concerned citizens have converged with a common concern to clean up a section of the Umkaliar river which flows into the Umkhrah. Working under the umbrella of Operation Clean-Up (OCU) the group decided to concentrate on cleaning this single section until they see results. Three years down the line the OCU is disillusioned at the lack of cooperation from the government (barring the East Khasi Hills deputy commissioner).

Week after week they return to see the same amount of garbage – tonnes of it collecting at the Umkaliar which then flows on to the Umkhrah. The Umkaliar is located under the new Dorbar Shnong of Urkaliar. The Umkaliar river is fed by streams that flow across many villages (Shnong) beginning from Lapalang, Nongrah, Rynjah, Umpling, Nongmensong and Wahkdait.

The team has been cleaning the Umkaliar river twice a month with a short gap during the pandemic. But even during that period they met for the clean-up programme after wearing protective gear including masks and gloves etc. Since 2022 they have started the regular clean-up.

The group comprises of Jiva Cares, Meghalaya Home Guards, Col Sishupal Security

Company (CSSC), KC Secondary School, NGOs Shubham and MakeSomeoneSmile, Martin Luther Christian University, the Sikh Youth Organisation and other concerned individuals.

In 2021 members of the OCU had a meeting with Environment Minister James PK Sangma and explained to him the challenges they face in sustaining their efforts to clean the Umkaliar. They had hoped that the department would make some immediate intervention but were disillusioned by the lack of response. Sources close to the government also claim that there was a detailed project report on saving the Umkhrah lying with the Water Resources department but that project too has come a cropper.

Since the Umkaliar flows through several Shnongs the OCU members feels that a wire fencing or any appropriate mechanism be placed at the boundary between one Shnong and the next to trap garbage. This would also help to fix responsibility since each Shnong tends to blame the next one for the garbage flowing down the river. Invest India, an investment promotion and facilitation agency of the central government, has been trying to explore possibilities of bringing in such innovative mechanism to Meghalaya through





its CSR wing.

Garbage that collects at the Umkaliar comprises tonnes of clothes (pants, jackets, blankets, saris shoes, sandals and what have you), plastic carry bags and packages. The river is also loaded with empty cement bags. An audit of the garbage would reveal that household garbage and debris from construction activities are all dumped into the river.

Week after week when the OCU return to clean the river they find the same amount of garbage with no attempt by the residents residing upstream to stop dumping their garbage into the river.

The OCU then appealed to East Khasi Hills Deputy Commissioner Isawanda Laloo who has been a supporting pillar and provided the team with assistance from the Shillong Municipal Board to cart the garbage to Marten and a JCB to help with lifting garbage from the river.

In response to the OCU plea, the deputy commissioner has called a joint meeting of the Rangbah Shnong of those villages through which the Umkaliar flows on September 13. The endeavour is look for cooperation and collaboration in preventing further dumping of garbage along the path of the Umkaliar river and for each Shnong to be responsible for policing their respective areas.

The OCU members feel that if the Shnongs

work in tandem and the KHADC also lends its weight behind this initiative there is hope to revive the Umkaliar and subsequently the Umkhrah.

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### Drought Causes Yangtze – China’s Most Important River – To Dry Up

Satellite images captured by the Copernicus Sentinel-2 mission show a comparison of the Yangtze and Jialing rivers, near Chongqing, over the last three years. Higher than normal temperatures increase the evapotranspiration of the river’s waters and, together with missing precipitation, result in lower water levels and sediment transportation downstream, which explains the significant color difference of the Yangtze in the August 21, 2022, acquisition. Several areas of dry and exposed riverbed can also be seen west of Chongqing.

A record-breaking drought has caused parts of the Yangtze River to dry up – affecting hydropower, shipping routes, limiting drinking water supplies, and even revealing previously submerged Buddhist statues.

As China’s most important river, the Yangtze provides water to more than 400 million Chinese people. This summer, with rainfall in the Yangtze basin around 45% lower than normal, it

reached record-low water levels with entire sections and dozens of tributaries drying up. The loss of water flow to China’s extensive hydropower system has created problems in Sichuan, which receives more than 80% of its energy from hydropower.

Satellite images captured by the Copernicus Sentinel-2 mission show a





comparison of the Yangtze and Jialing rivers, near Chongqing, over the last three years. Higher than normal temperatures increase the evapotranspiration of the river's waters and, together with missing precipitation, result in lower water levels and sediment transportation downstream, which explains the significant color difference of the Yangtze in the August 21, 2022, acquisition. Several areas of dry and exposed riverbed can also be seen west of Chongqing.

The Yangtze is the longest river in Asia and the third-longest in the world. It rises at Jari Hill in the Tanggula Mountains (Tibetan Plateau) and flows 3,900 miles (6,300 km) in a generally easterly direction to the East China Sea.

Major rivers around the world are drying up as record-breaking heatwaves take their toll, including the Rhine and Po rivers in Europe as well as the Colorado River in the United States. Sentinel-2 is a two-satellite mission to supply the coverage and data delivery needed for Europe's Copernicus program.

The mission's frequent revisits over the same area and high spatial resolution allow changes in water bodies to be closely monitored, as well as measuring turbidity – giving a clear indication of the health and pollution levels of rivers around the world.

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**China declares water supply 'red alert' for biggest lake as long drought lingers**



An aerial view shows a tributary stream running through the dried-up flats of Poyang Lake that stands at record-low water levels as the region experiences a drought, outside Nanchang, Jiangxi province, China on Aug 28, 2022. (Photo: Reuters/Files/Thomas Peter)

SHANGHAI: The central Chinese province of Jiangxi has declared a water supply "red alert" for the first time after the Poyang freshwater lake, the country's biggest, dwindled to a record low, the Jiangxi government said on Friday (Sep 23).

The Poyang Lake, normally a vital flood outlet for the Yangtze, China's longest river, has been suffering from drought since June, with water levels at a key monitoring spot falling from 19.43m to 7.1m over the last three months.

The Jiangxi Water Monitoring Centre said Poyang's water levels would fall even further in coming days, with rainfall still minimal. Precipitation since July is 60 per cent lower than a year earlier, it said.

As many as 267 weather stations across China reported record temperatures in August, and a long dry spell across the Yangtze river basin severely curtailed hydropower output and damaged crop growth ahead of the autumn harvest.

Though heavy rain has relieved the drought in much of southwest China, central regions continue to suffer, with extremely dry conditions now stretching more than 70 days in Jiangxi.





An aerial view shows a dried up fish habitat experimentation farm at Poyang Lake that stands at record-low water levels as the region experiences a drought, outside Nanchang, Jiangxi province, China on Aug 26, 2022. (Photo: Reuters/Files/Thomas Peter)

A total of 10 reservoirs in neighbouring Anhui province have fallen below the "dead pool" level, meaning they are unable to discharge water downstream, the local water bureau said earlier this week.

State weather forecasters said this week that drought conditions still prevailed in the middle and lower reaches of the Yangtze, and efforts were required to seed clouds and divert water from elsewhere.

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### **Krem Mawmluh: A storehouse of India's drought records**

SHILLONG, Sep 20: The Mawmluh Cave, locally known as Krem Mawmluh, is a geological treasure field. Inside the cave, rainwater has been slowly dripping from the ceiling in the same spots for over 1,000 years. With each drop, minerals in the water accumulate on the floor below, slowly growing into calcium carbonate towers known as stalagmites. These stalagmites are more than geological wonders – like tree rings, their layers record the region's rainfall history. They also carry a warning about the potential for catastrophic multiyear droughts in the future.

These stalagmites have revealed an accurate chronicle of severe and protracted droughts in India over the past 1,000 years coinciding with historical events like the abandonment of Fatehpur Sikri by the Mughals (between 1585 and 1610) due to water shortage, the infamous Chalisa Famine (1783-84) in north India and the Deccan Famine (1630–32).

The stalagmite records also corroborate droughts during the Durga Devi Famine of western

India (1396-1407), at the start of India's de-industrialisation after the end of the Mughal era, the Ming Dynasty (China) drought (1637–1643) and the Monsoon's failure in 1877 when the all-India rainfall level dipped below 30% of the average.

The records of severe and protracted droughts during periods of weak monsoon lasting decades stored in natural rock deposits have exposed the vulnerability of the Indian summer monsoon, which could periodically "lock" into a drought-prone mode that might last for decades, the scientists said.

In contrast, meteorological data of the past 150 years showed only one instance of 10-15% rainfall shortage that lasted for three consecutive years (1985-87). Moreover, there are only five instances of subcontinent-wise monsoon failure, of which the most severe one was in 1877.

"This seemingly reassuring but rather myopic view currently informs the region's present-day water resource infrastructure and contingencies policies, and discounts the possibility of protracted monsoon failures in the future," the researchers cautioned in their study published in the Proceedings of the National Academy of Sciences on Monday.

"But historical documentary and proxy evidence show that Indian summer monsoon's drought history in the past millennium was characterized by sub-decadal to multi-decadal periods of weaker monsoon that contained protracted droughts," the researchers said.

Reconstructing India's drought history between 1080 and 1905 by studying oxygen isotope records in the stalagmites of Krem Mawmluh, the scientists found chemical evidence of a 25-year-long drought period in the Mughal era between 1595 and 1620, which coincided with Emperor Akbar's abandonment of Fatehpur Sikri.

The pieces of evidence also support the Deccan Famine — one of the most devastating mass mortality events in recorded Indian history; multi-year droughts in northern India between 1296 and 1316 under the reign of Alauddin Khilji and 11 drought-related famines in the late 18th



century, six of which, including the well-known Chalisa and Doji Bara or Skull Famines, occurred between 1782 and 1792 with a combined estimated death toll in the excess of 1.1 crore, making it one of the deadliest decades in Indian history.

Even India's de-industrialisation history in the 18th and 19th centuries has a climate link as loss of farm productivity led to the limited supply of grain, leading to an increase of wages in the weaving industry. This was coupled with a sharp rise in the prices of cotton.

"The early phase of de-industrialisation coincides with the most severe 30-year spell of the weak monsoon of the past millennium," the

researchers said.

While El Nino, a climate pattern that describes the unusual warming of surface waters in the eastern tropical Pacific Ocean, is widely blamed for poor Monsoon in India, the researchers demonstrated that only in 20-50% of cases, the unusual warming of the Pacific could be held responsible for India's historical droughts. The monsoon's internal dynamics and other external forcing are equally critical.

(Credit: Proceedings of the National Academy of Sciences, USA)

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Jalsamvad monthly is owned & published by  
Datta Ganesh Deshkar  
Published at A/201, Mirabel Apartments,  
Near Pan Card  
Club, Baner, Pune - 411045.  
Editor - Datta Ganesh Deshkar

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## 100 years after compact, Colorado River

### nearing crisis point

DENVER : The intensifying crisis facing Colorado River amounts to what is fundamentally a math problem.

The 40 million people who depend on the river to fill up a glass of water at the dinner table or wash their clothes or grow food across millions of acres use significantly more water each year than actually flows through the banks of the Colorado.

In fact, first sliced up 100 years ago in a document known as the Colorado River Compact, the calculation of who gets what amount of that water may never have been balanced.

The farmers of the compact and water leaders since then - have always either known or had access to the information that the allocations they were making were more than what the river could supply, said Anne Castle, a senior fellow at the Getches - Wilkinson Center at the University of Colorado Law School.

This is part of a collaborative series on the Colorado River as the 100th anniversary of the historic Colorado River Compact approaches. The Associated Press, The Colorado Sun, The Albuquerque Journal, The Salt Lake Tribune, The Arizona Daily Star and the Nevada Independent are working together to explore the pressures on the river in 2022.

During the past two decades, however, the situation on the Colorado River has become significantly more unbalanced, more dire.

A drought scientists now believe is the driest 22 year stretch in the past 1200 years has gripped the southwestern US, zapping flows in the river. What's more, people continue to move to this part of the country. Arizona, Utah and Nevada all rank among the top 10 fastest growing states,

according to US Census data.

While Wyoming and New Mexico aren't growing as quickly, residents watch as two key reservoirs, popular recreation destinations, are drawn down to prop up Lake Powell. Meanwhile, southern California's Imperial Irrigation District uses more water than Arizona and Nevada combines, but stresses their essential role providing cattle feed and winter produce to the nation.

Until recently, water managers and politicians whose constituents rely on the river have avoided the most difficult questions about how to rebalance a system in which demand far outpaces supply. Instead, water managers have drained the country's two largest reservoirs. Lake Mead and Lake Powell, faster than Mother Nature refills them.

In 2000, both reservoirs were both 95% full. Today, Mead and Powell are each about 27% full, once, healthy savings accounts now dangerously low.

The reservoirs are now so low that this summer Bureau of Reclamation Commissioner Camille Touton testified before the US Senate Energy and Natural Resources Committee that between 2 million and 4 million acre - feet would need to be cut next year to prevent the system from reaching, critically low water levels, threatening reservoir infrastructure and hydro power production.

The commissioner set an August deadline for the basin states to come up with options for potential water cuts. The upper Basin states, Colorado, Utah, New Mexico and Wyoming submitted a plan. The lower Basin States, California, Arizona and Nevada did not submit a



combined plan.

The bureau threatened unilateral action in lieu of a basin - wide plan. When the 60 day deadline arrived, however, it did not announce any new water cuts. Instead, the bureau announced that predetermined water cuts for Arizona, Nevada and Mexico had kicked in and gave the states more time to come up with a basin - wide agreement.

A week before Touton's deadline, the representatives of 14 Native American tribes with water rights on the river sent the Bureau of Reclamation a letter expressing concern about being left out of the negotiating process.

What is being discussed behind closed doors among the United States and the Basin States will likely have a direct impact on Basin Tribe's water rights and other resources and we expect and demand that you protect our interests, tribal representatives wrote.

Being left out of Colorado River talks is not a new problem for the tribes in the Colorado River Basin.

The initial compact was negotiated and signed on November 24, 1922, by seven land - owning white men, who brokered the deal to benefit people who looked like them, said Jennifer Pitt of the National Audubon Society, who is working to restore rivers throughout the basin.

They divided the water among themselves and their constituents without recognizing water needs for Mexico, the water needs of Native American tribes who were living on their midst and without recognizing the needs of the environment, Pitt said.

Mexico, through which the tail of the Colorado meanders before trickling into the Pacific Ocean secured its supply through a treaty in 1944. The treaty granted 1.5 million acre-feet on top of the original 15 million acre-feet that had already been divided, 7.5 million each for the Upper and Lower Basins.

Tribes, however, still don't have full access to the Colorado River. Although the compact briefly noted that tribal rights predate all others, it lacked specificity, forcing individual tribes to negotiate settlements or file lawsuits to quantify those rights,

many of which are still unresolved, It's important to recognize the relationship between Native and non-Native people at that time, said Daryl Vigil, water administrator for the Jicarilla Apache Nation in New Mexico.

In 1922, my tribe had subsistence living, Vigil said. The only way we could survive was through government rations on a piece of land that wasn't our traditional homeland. That's where we were at when the foundational law of the river was created.

Agriculture uses the majority of the water on the river. around 70-80 % depending on what organization is making the estimate. When it comes to the difficult question of how to reduce water use, farmers and ranchers are often looked to first.

Some pilot programs have focused on paying farmers to use less water, but unanswered questions remain about how to transfer the savings to Lake Powell for storage or how to create a program in away that would not negatively impact a farmer's water rights.

Antiquated state laws mean the amount of water that a water right gives someone access to can be decreased if not fully used.

That's why the Camblin family ranch in Craig in northwest Colorado plans to flood irrigate once a decade, despite recently upgrading to an expensive water-conserving pivot irrigation system. Nine years out of 10, they'll receive payment from a conservation group in exchange for leaving the surplus water in the river. But in Colorado, the state revokes water rights after 10 years if they aren't used.

Not only would losing that right mean they can't access a backup water supply should their pivot system fail, but their property's value would plummet, Mike Camblin Explained. He runs a yearling cattle operation with his wife and daughter, and says an acre of land without water sell for \$1000, about a fifth of what it would sell for with a water right attached.

There are other ways to improve efficiency, but money is still often a barrier.



Wastewater recycling is growing across the region, albeit slowly, as it requires massive infrastructure overhauls. San Diego built a robust desalination plant to turn seawater to drinking water, and yet some agricultural users are trying to get out of their contract since the water is so expensive. Some cities are integrating natural wastewater filtration into their landscaping before the water flows back to the river. It's all feasible, but is costly, and those costs often get passed directly to water users.

One of the biggest opportunities for water conservation is changing the way our landscapes look, said Lindsay Rogers, a water policy analyst at Western Resource Advocates, a nonprofit dedicated to protecting water and land in the West.

Converting a significant amount of outdoor landscaping to more drought-tolerant plants would require a combination of policies and incentives, Rogers explained. Those are going to be really critical to closing our supply-demand gap.

After years of incentive programs for

residents, Las Vegas recently outlawed all nonfunctional grass by 2026, setting a blueprint for other Western communities. For years, the city has also paid residents to rip out their lawns.

In Denver, Denver Water supplies about 25% of the state's population and uses about 2% of the water. The city has had mandatory restrictions in place for years, limiting home irrigation to three days per week.

This summer, in southern California, the Metropolitan Water District instituted an unprecedented one-day-a-week water restriction.

Still, regardless of the type of water use, more concessions must be made.

The law of the river is not suited to what the river has become and what we see it increasingly becoming. Audubon's Pitt said. It was built on the expectation of a larger water supply than we have.

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## Varanasi To Bogibeel

By - V Bhagya Subhashini

Varanasi To Bogibeel : Covering More Than 4,000 km, India's Longest River Cruise To Begin In Early 2023

India's "longest river cruise service" will begin early next year between Varanasi in Uttar Pradesh and Bogibeel in Assam, traversing a distance of more than 4,000 km, Union Minister Sarbananda Sonowal said on Monday (19 September).

The route will connect rivers Ganga and Brahmaputra via Indo- Bangladesh Protocol Route (IBRP), the Minister of Ports, Shipping and Waterways (MoPSW) stated.

The service will usher in a novel opportunity for the people of Assam to use inland waterways for promoting their trade, tourism and cargo transportation, Sonowal said, launching multiple projects for the development of area in and around the Bogibeel bridge in Dibrugarh district.

The Union Minister, during the day, laid the foundation stone for the construction of floating jetties at Bogibeel and Guijan, besides inaugurating the Bogibeel Riverfront Passenger Jetty, which has been built by the Northeast Frontier Railways (NFR) as part of the development initiatives near the bridge.

Sonowal, on the occasion, said Prime Minister Narendra Modi's vision to harness the potential of an economic and ecologically sound logistics avenue of inland waterways is being realised through the Gati Shakti National Master plan.

"The Gati Shakti plan is exactly the key to unlock the huge potential of inland water transportation in Assam using National Waterways

2 on our river Brahmaputra.

We must tap this opportunity and build an economic advantage which will power the whole of Northeast India as the New Engine of growth for India," he said.

He maintained that the BJP government is also identifying avenues to promote inland navigation and river cruise tourism and to construct suitable terminals across the Brahmaputra.

The two floating jetties at Bogibeel in Dibrugarh district and Guijan in Tinsukia will be constructed as state-of-art terminals at an estimated cost of Rs 8.25 crore with advanced and updated technology.

The Minister said the project is scheduled to be completed by February 2023. The Inland Waterways Authority of India is constructing both jetties (IWAI).

According to an official statement, the project was awarded to Coastal Consolidated Structures Pvt. Ltd on an EPC basis (engineering, procurement, construction).

He added that plans are also afoot to build an open platform, a restaurant, eight bio-toilets and six awnings as part of the riverfront





development initiatives near the bridge.

The Minister of State For Petroleum and Natural Gas and Labour, Rameswar Teli and the General Manager of NF Railways Anshul Gupta were present.

Further to the floating jetties, Ferry Ghats, floating restaurants, public eating stalls, tourist visits, picnic spots, eco resorts and so on are also being planned.

It is also proposed to build a permanent cargo terminal at Bogibeel to facilitate cargo transportation from nearby businesses like Brahmaputra Cracker and Polymer Limited and Brahmaputra Valley Fertilizer Corporation, among others, reports Economic Times.

A Detailed Project Report (DPR) is being done in this regard. The proposed tourist terminal in the vicinity of the Guijan Ghat is located on the banks of river Lohit.

The Project Influence Area (PIA) for Bogibeel terminal is upper part of Assam which forms the Dibrugarh and encompasses districts of Golaghat, Jorhat, Sibsagar, Dibrugarh, Tinsukia and parts of Nagaland.

The PIA is marked by the presence of paper industry, coal deposits, food processing units, tea estates, fertiliser production unit and refineries.

Similarly, the huge potential of inland navigation, river cruise tourism on Lohit and Brahmaputra will be explored, development of jetties along the way to be considered and the opportunity for an ecologically sensitive economic development of the region is aimed to be tapped.

The river Brahmaputra was designated as National Waterway No. 2 (NW-2) on 1 September 1988. Its length is 891 kilometres between Bangladesh's border and Sadiya.

According to the IWAI legislation of 1985, IWAI is implementing numerous development projects on the canal to improve its navigability (82 of 1985). The development of the canal for navigation is IWAI's responsibility under the IWAI, Act of 1985.

The Assam government, the Army Border Security Forces, a tourism organisation, and

various private operators are currently using vessels on the waterway. Regular trips between Pandu and Majuli island near Neamah are made by large tourist cruisers.

Over dimensional cargo (ODC) is occasionally moved over the waterway from October to May.

Tags: assam, Inland Waterways, Brahmaputra River, Bogibeel Bridge, Infrastructure in Northeast, northern frontier railway, Waterways Minister Sarbananda Sonowal, MoPSW, varanasi cruise, Varanasi To Bogibeel, National Waterway II, Tourism and Transportation.

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### Las Vegas-area water company files bankruptcy as Lake Mead 'straw' runs dry



The company that was the sole supplier of water for the City of Henderson for decades has filed for bankruptcy protection, a victim of a 23-year drought that created a problem too expensive to fix, KLAS reported.

Although Henderson no longer relies exclusively on the Basic Water Company (BWC), industries that built the city out of the desert to meet World War II demands still do. And their water bills threaten to break the bank.

When Lake Mead dropped to "Failure Elevation" — 1,043 feet in July — Basic Water Company's 40-inch-diameter pipe stopped sucking in water at Saddle Island. The pipelines are



commonly referred to as “straws.” The lake dropped as low as 1,040 feet, but it has since risen to 1,043 feet. Forecast models show it dropping under 1,040 feet again by April of 2023.

Water that’s coming to the Las Vegas valley now is coming from the “third straw,” which draws water at an elevation of 860 feet. Lake levels are expressed as an elevation above sea level.

In a 27-page declaration filed with the U.S. Bankruptcy Court on Saturday, Stephanie Zimmerman, President and Chief Financial Officer for BWC laid out the reasons for the bankruptcy. She essentially wrote the water history of the city. Starting in 2007 and escalating in 2015 as the pending emergency grew, BWC explored ways to re-engineer the Saddle Island “straw.” Design work was even completed at one point, but by then Lake Mead’s level was dropping so fast that the fix would only buy a few years.

The top of Intake No. 1 is visible above the surface of Lake Mead in this photo from Monday, April 25. As the lake level continues to drop, another intake pipe that sends water to Henderson has stopped functioning. (Courtesy, Southern Nevada Water Authority)

The company grew out of agreements made in the early 1940s, when the demand for magnesium fueled a construction boom that created the Basic Complex, unofficially known as

the “Basic Townsite,” according to the court filing. “That year, the town was given the official namesake “Henderson” in honor of famed Nevadan and former U.S. Senator Charles Belknap Henderson,” the document says.

The water agreement that still exists survived separately from the Colorado River Compact, preserved by Congressional action in 1966.

But now, with the lake level headed lower according to water forecasts, BWC has become a customer instead of a provider. It is contracted to provide water for Kerr-McGee Chemical, Pioneer Americas LLC, Chemical Lime Company of Arizona and Titanium Metals Corp.

But it can’t afford to buy potable water from Henderson to provide water for these four industries because the cost is “four to five times higher than the rate for raw water” from the lake, according to the document.

With its responsibility for bond payments looming, BWC filed for bankruptcy protection. It still owes about \$7.5 million on bonds that will mature in 2032.

The document also notes other payments BWC has made to hook into the delivery system that everyone else is using:

City of Henderson: \$1,006,506.46 deposit, based on 2021 water use

Southern Nevada Water Authority ( S N W A ) :  
\$ 4 , 5 1 5 , 0 7 9  
connection charge  
SNWA “System Development Charge” of \$386,019  
In the meantime, BWC continues to work toward a “viable permanent solution” with the City of Henderson and SNWA.





# Famous Stepwells of India



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