



**ARPAN SEVA SANSTHAN**  
DEVOTED TO SUSTAINABLE RURAL DEVELOPMENT



## Cover Story

**Arpan Seva Sansthan - Shri Vinod Hande**

# जलसंवाद



## जलसंवाद तर्फे इ पुस्तके

- (१) मी एक जलप्रेमी : डॉ. दत्ता देशकर
- (२) जाणून घ्या आपले पाणी : डॉ. दत्ता देशकर
- (३) जल-सुसंस्कृततेच्या दिशेने : श्री. गजानन देशपांडे (आगामी)
- (४) Towards Excellence in Water and Culture :  
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- (५) उद्योजकता : (स्वतःचे भविष्य स्वतःचे हाती) : डॉ. दत्ता देशकर (आगामी)
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# Jalsamvad



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## Rain Tax ?

In the city of Toronto (Canada), the civic body has introduced one more tax by name Rain Tax. Heavy rains and melting of ice are the points of botheration for this city. This rainwater, when the flow is heavy, enters the sewage system and makes the system inoperative. This mixture of rain and sewage water enters the basements of very many buildings and causes heavy damage to the property. These torrential rains cause serious problem to the traffic management and the normal life of the city comes to a full stop.

As a solution to this recurring problem the city is facing, the civic body has introduced one more tax by name Rain Tax. Amount collected thereby would be utilized for solving the problems caused by this heavy downpour i.e. for creating the suitable infra structure to mitigate this problem. There may be additional burden on the residents of the city due to the levy of this unusual tax. Citizens are always interested in getting maximum facilities and benefits from the civic bodies but when it comes to sharing the financial burden, the criticism starts. In fact, this tax should be treated as a tax for residing in well developed city like Toronto. Residents of such cities derive good benefits from their stay in such big cities. They should not hesitate to pay such a tax which is levied for their betterment.

Can cities like Mumbai in India start levying such a tax? A resident of Mumbai takes pride in saying that he is staying in a metropolitan city like Mumbai. In such a case, he should share the burden of the civic body in creating suitable infra structure to face he torrential rains the city is getting. Huge funds are needed for creating and maintaining the suitable infra structure to prevent the bottlenecks created by heavy rains.

Even today, residents of Mumbai remember that day when the city of Mumbai received torrential rains causing a heavy damage to the city. On 26th of July 2005 the rains started around 2 pm . Mumbai Metropolitan city was struck by severe storm and subsequent rainfall. The IMD station at Santacruz recorded 944 mm rainfall in a short time. The heart of Mumbai, i.e. the local trains, stopped functioning due to these heavy rains. Employees of various offices could reach their homes only on the third day.

Every year this downpour may not be expected but similar situation always is faced by the residents of Mumbai every year. I remember one occasion when I was stuck up in Mumbai. I was staying with my relative in Bandra Colony. The heavy downpour started and in a short time, entire Government Colony including the high way passing by the side was under water. This situation continued for three days. Many residents living on the ground and first floor had to shift to second floor. The electrical installation in every building was under water. There were no lights, no lifts, no drinking water, no vegetables, no milk for all these three days ! When I got an alarm that there is no drinking water left in the house, I decided to move out. My driver was a bit hesitant but when I told him the real situation, he agreed and we drove out of the sea around us.

We need huge funds to create the required infra structure and the normal budget of the Corporation is unable to fund such huge projects. For this, extra burden should be shared by the citizens. My humble request to Mumbai citizens is that they should come forward to help themselves if such tax is levied.

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

## Organization - Arpan Seva Sansthan

Shri Vinod Hande

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'Arpan Seva Sansthan' is a non-profit organization registered under the Rajasthan Societies Registration Act 1958 on 29th March 1996. It was formed by a team of young professionals who had dedication and commitment to serve rural community and bring positive social changes. The purpose of the organization is to ensure access of community to secured livelihood opportunities. Dr. Subh Karan Singh and his colleagues during their bachelor degree in agriculture, understood the need for development of rural community. They saw that rural community was not aware of the new and improved technologies and govt. development policies to empower themselves. Dr. Subh Karan Singh is the president of 'Arpan Seva Sansthan'. He is Doctorate in Agriculture Engineering with MBA in Rural Development. He is having more than 18 years of experience in the field of rural development.

Why name Arpan? Meaning of Arpan means to give, to deliver. For that Sansthan is committed to. They say, focus their efforts for the betterment of society which gives them power to stand. Dr. Subh Karan Singh says Swami Vivekanand and Chaudhary Charan Singh inspired him as he hails from a rural back-ground. He says there is a great potential in rural development and Natural Resource management (NRM). NRM refers to the protection and improvement of environment assets such as soil, water, vegetation and biodiversity. Dr. Subh Karan Singh also learnt from Ralegaon Siddhi that how single handed effort of an individual turned barren village into a model village.



Arpan work for the deprived rural societies and to improve their quality of life. They are working for long term sustainability for tribal and rural communities through participatory approach. 26 districts of Rajasthan are the project area of Arpan.

### Objectives of Arpan :

- To improve the socioeconomic condition of the small and marginalized section of the community particularly tribal and women through various integrated rural development plans.
- To develop and implement poverty focus approach in watershed development and water



resource program which can be replicable in other areas of Rajasthan.

- To setup village base institutions such as society, saving and thrift group, SHGs etc.
- To setup knowledge centre for rural people in the areas of watershed development.
- To promote organic production and their marketing in the area of agriculture.
- To build up capacity of community for self-dependent.

Under leadership of Dr. Subh Karan Singh Arpan team has grown from 20 to 500+ dedicated team members. The team started work as “doing by learning” concept from grass root level. To lower down the cost of cultivation technologies, importance was given to organic agriculture vermicompost through water saving. The vermicompost programme started with one district in 2003 and reached up to 26 districts in 2007 with 12000+ farmers. The team of ‘Arpan’ also provided training to farmers on soil and water conservation, water resource management, animal husbandry, improved agriculture and horticulture practices to 350000+ farmers. After watching the impact of training and awareness level from 2008-2015 the Sansthan implemented watershed development projects in 7100 hectare with support from state govt.. Mission of “Arpan” is to implement sustainable programs to improve the livelihood of rural community through participatory approach. Dr. Singh came across the quotation that “the way of development of a nation, passes through villages”. The quotation gave the actual picture of rural India. They decided then to devote career for rural society.

**‘Arpan Seva Sansthan’ is working in following fields:**

- Natural Resources Management
- Drinking Water and Sanitation
- Education
- Livelihood Enhancement
- Health

**Natural Resources Management** : Arpan has involved in training and capacity building program

of different stakeholders under watershed programme. It is focusing on the sustainable utilization of major natural resources and preserving ecosystem services. Arpan undertakes projects on huge level where large number of manpower and high level administration is required and there they have proved their capacity. Arpan has given training to different stakeholders on major issues like orientation training to WDT(Watchdog Timer), SHGs (Self Help Groups), Technical aspects in watershed management, watershed development guideline, community mobilization, Horticulture, Agro forestry, vermiculture technology, Nursery development of medical plants, Animal Husbandry, income generation activities etc. . Arpan Seva Sansthan is having experienced and well educated team to organize such training programmes. Staff is well equipped with communication skill, presentation skill, local area knowledge and dedication for their work.

**Water Resources Development** : Arpan is implementing Integrated Water Resource Management (IWRM) projects funded by EU-SPP (European Fund for Sustainable Development Plus) through SWRPD (State Water Resources Planning Department), Govt. of Rajasthan. IWRM promotes the coordinated development and management of water, land and related resources without compromising the sustainability of vital ecosystems. IWRM is also about reforming human systems to enable people to benefit from those sources. Major objectives of IWRM projects are,

- Equitable access to safe, adequate, affordable and sustainable water supply.
- Conservation, stabilization and replenishment of surface and groundwater. State Water Resource Planning Department is the Coordinating Department while Water Resource Department (WRD), Public Health Engineering Department(PHED), Ground Water Department(GWD), Watershed Development & Soil Conservation (WD&SC), Rural Development and Panchayati Raj Department (RDPRD) are looking after investment part.

**Community Lift Irrigation :** In this scheme command area is divided into checks. Each check covers 4-6 hectare area depending upon topography. Each check has an outlets. The command area of lift normally varies from 25 to 40 hectares. Cost benefit ratio comes to 1.5 to 2.5. water user committee is strengthened and empowered by organizations so that they can manage their distribution system, power consumption, electricity bills and overall management. Impact of scheme:

- Around 1280 households were benefited and covered 1150 ha. area under irrigation.
- The cost of installation of lift has been recovered within a period of three years.
- Arpan has provided the knowledge on improved agriculture practices, improved seed variety, vegetable cultivation etc. .
- Migration has been controlled.
- Higher income generation led to better food habits. Attendance increased in schools.
- After installation of lift community income increased by 50% to 150%.



**Drinking Water and Sanitation :** Arpan’s focus on

water and sanitation (WASH) in rural areas to improve the quality of life of communities. Sansthan is working for central government’s “Swachh Bharat Mission” and “Jal Jeevan Mission” for effective implementation in rural area.

Arpan provides access to clean drinking water in rural areas by installation of solar powered drinking water schemes in villages, by construction of roof top rainwater harvesting structures in schools and community buildings and storage structures. Arpan promotes responsible water use and sustainable water management practice.

National Rural Drinking Water and Sanitation Program (NRDWP) focus on drinking water security at household level. To ensure adequate safe drinking water and sanitation to all households in rural areas on a long-term basis Gram Panchayat and Village Water & Sanitation Committees (VWSC) and Gram Sabha have to play a main role and for that they should be provided with continuous training and support in terms of training, creating awareness on various aspects of drinking water supply. At present predicted work are:

- To execute the interpersonal activities in the targeted villages.
- To conduct the participatory exercise in the targeted village for identification of local issues.
- To prepare water security plan of the village.
- To aware school children for water management.
- Enhance access to water for poor and marginal community.

Arpan Seva Sansthan is executing above activities in following villages of districts,

Name of Project	Name of Districts	No. of Villages
Barmer & Jalore	Barmer	326
	Jalore	211
Bharatpur & Karouli	Bharatpur	446
	Karouli	197
Jodhpur & Jaisalmer	Jodhpur	296
	Jaisalmer	211
Nagour, Jaipur & Chittorgarh	Nagour	346
	Jaipur	180
	Chittorgarh	181



**Education :** Arpan is expert in education field also. They provide innovative and sustainable solutions in learning at village level. Arpan focus on strengthening school education by providing quality education and by enhancing school infrastructure. Arpan provides home-based support to these kids. Kinder Garden training is provided to 410 kids at their home. Arpan has established 10 learning resources centres in their project area. They provided 10000+ learning kits to students that includes books, water bottle, masks, sanitizer.

**To strengthen quality education Arpan adopted following measures:**

- Building capacity of teachers and school management committees.
- Mainstreaming of Drop-out children
- Bala program- child friendly learning.
- Personal development activities.
- Awareness campaign for reducing drop-out percentage.
- Establishment of learning and resource centres.
- Baal sansad- student-led governance.

**To strengthen school infrastructure**

- Providing smart classroom.
- Provision of safe drinking water facilities.
- Providing well equipped laboratories.
- Plantation of trees for raising awareness about trees and environment.
- Construction and renovation of toilets.
- Set a library in a school for increasing accessibility of books.

**Livelihood Enhancement :** It is a comprehensive and impactful approach to empower rural communities both from farm and non-farm. By promoting sustainable and innovative practice Arpan has transformed lives of number of families by increasing productivity and their income. Arpan works with community is mostly with farmers. Land is their source of livelihood. There are so many factors on which productivity from farms depends. Major reasons are low fertile land, lack of sufficient water for irrigation, limited inputs, inadequate knowledge about improved crop production. Under the smile program of Arpan is supporting farmers in seeds, fertilizers and irrigation to increase output. This is a sponsored project. This program was started in Udaipur, Bansavara and Chittorgarh district and at Pratapgarh with financial support from Tribal Area Development (TADD). Arpan supported 835 BPL families to produce healthy vegetable crops. Another part of their field they grow Maize, Wheat & Gram in both kharif & Rabbi season and earn annually in the range of Rs.15000-20000. In addition to this farmers were to cultivate fruit plants such as lemon and papaya for generating additional income.

**Horticulture :** Arpan is implementing a long term Horticulture program for poor marginalized Tribal Communities of Pratapgarh district sponsored by NABARD. In this program 1660 disadvantaged poor families were considered for their economic, health and women’s status upliftment. Improved agriculture practice, dairy development and Water resource development at farmers field was also part of this project. Argo Service Centre of Arpan will provide a high efficient market for farm produce at local and National market.





**Livestock Development :** This is also a part of Livelihood Enhancement program of Arpan. In this program Sanathan is developing dairy, poultry and goat farming as source of livelihood improvement of rural community in Rajasthan and Madhya Pradesh. Nearly 500 families are benefited from above two states.

**Health :** Arpan has dedicated it's services to improve public health suffering with wide range of issues, from AIDS prevention to maternal and child health to COVID-19 awareness. For AIDS control Arpan is working with Rajasthan State AIDS Control Society (RSACS) in Chittorgarh dist. Since 2008. They also work to prevent STD related health hazards with various precautionary measures among homosexual men and female sex workers. Arpan has organized health camps in 16 villages where 1108 individual's health check up were done. Arpan is implementing various CSR projects related to poverty eradication, livelihood promotion, water and sanitation etc. with L&T (Larsen & Toubro).

Now the main problems before the readers is that how Arpan approaches to their projects for getting effectiveness. So Arpan's strategy is that they always include the beneficiary community from initial stage of planning so that their actual problems and solutions for the same can be considered during project development. They include local community representative during discussion.

Their community mobilization is an attempt to bring both human and non-human resources together to undertake development activities in order to achieve sustainable development.



Below mentioned are the strategy and approaches of Arpan.

- Promoting village institutions.
- Bottom up planning process
- They believe in doing themselves.
- Uses participatory community based management approach.

- Promote research, innovation and knowledge building in Natural Resource Management. Etc.

Now about the partners of Arpan who help them financially and technically in their projects. Arpan is having number of partners in following categories.

CSR Partners- L&T, SANDVIK. BOSCH India, HDFC, JUMIO. etc.

International partners- Jica, The World Bank, L'OREAL and Save the Children.

National Partners-SFAC, Ministry of Rural Development, Ministry of Drinking Water & Sanitation, NABARD

Regional partners- Watershed Development & soil Conservation, Govt. of Rajasthan, Madhya Pradesh Jal Nigam, Rajasthan AIDS Control Society etc.

Support Partners- LetsEndorse

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### Awards

Arpan is having so many prestigious awards at their credit for service they have rendered to the society. Few of them are,

- Kota Ratan Award in 2020.
  - State CSR Excellence Award 2019.
  - For Sustainable sanitation award in 2019
  - Mahatma Award in 2020
  - Best CSR project of the year 2022.
  - 4th National Award 2022 in NGO category in 2023.
- Etc.

For further details of Arpan Seva Sansthan readers can contact on following contact details.

Address-



## World Water Day - 2024

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### Leveraging Water for Peace

(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. This is the last article of the series.)

World Water Day-2024 focuses on 'Using Water for Peace'. How to balance the needs of everyone and ensure that no one is left behind will be implemented with the aim of working together with dedication to make water use more of a catalyst for a peaceful world. The occasion will provide an opportunity for individuals, organizations and governments to come together to solve the water and sanitation crisis and accelerate the necessary changes.

Water is central to human existence, the environment and the economy. Communities with minimal access to water and sanitation often lack healthcare and stable jobs, perpetuating the cycle of poverty. Disparities in access to water and sanitation facilities between men and women, urban and rural areas, rich and poor are also of concern.

Small enterprises or large global enterprises cannot survive without reliable and safe access to water. If abundant and good quality water is available, it will increase the availability of jobs and bring about positive changes in people's lives.

#### **Water and peace :**

Water is the essence of life - an invaluable resource that supports survival, nourishes the environment and drives human progress. In

cultural, religious and spiritual terms water can mean a connection to community and self, while in political terms water can mean peace, harmony and protection.

Today the world is facing an unprecedented water and sanitation crisis. Millions of people lack access to safe drinking water and adequate sanitation facilities. A government's inability to provide basic water services can lead to increased social unrest, particularly in the context of food insecurity, high unemployment and internal migration. These challenges must be addressed as water scarcity and pollution threaten the lives of millions of people worldwide.

The pressure of various factors on water is increasing. The water-related impacts of climate change are worsening, and demand for this limited resource is increasing due to a growing global population. In many countries, access to safe drinking water is unequal and not distributed equitably. A widespread lack of trans-boundary cooperation in relation to shared water resources in many countries threatens the quality and quantity of water supplies, and threatens social and international stability. This can ignite a conflict there.

Water conflicts can erupt when the interests of various water users, including states and provinces, collide and are perceived as incompatible, or when water quantity or quality declines, which can affect human and ecosystem health. Also, water becomes an issue of conflict when water sources, water systems, or utility workers are the target of casualty or violence. During an armed conflict, water can be a weapon to



exert pressure on the opposing side. Such attacks on civilian infrastructure, including water systems, pose health risks and violate international humanitarian law.

Decades ago newspaper headlines warned that future wars would be fought over water, but those predictions did not come true. History shows that cooperation, not conflict, is the solution to international trans-boundary water disputes. There have been more instances of cooperation than conflict over water. Research shows that countries do not go to war over water. It was found that countries are more likely to cooperate over shared waters than to go to war.

Water becomes a tool for peace when different communities and countries cooperate with each other regarding this precious shared resource. Water brings us to peace, helps us build trust in each other. It keeps the door of communication open even in times of conflict and relieves tension in the path of prosperity.

There is an urgent need to work together to protect and conserve this most precious resource of ours. Cooperation on water paves the way for cooperation on all shared challenges. So we must use water as a tool to create a more peaceful and prosperous world for all.

Research into how the risk of armed conflict can be reduced through the sustainable management of natural resources has become important. Good water management and awareness can contribute greatly to food security and livelihoods for people in low-income countries.

Water is not just a resource to be used and contested - it is a human right. Access to drinking

water has been recognized as a human right. Water can be a stabilizing force and a catalyst for sustainable development. It is inherent to every aspect of life; we must act with this in mind.

The world must learn how to share this precious resource effectively and fairly. This can be achieved through increased cooperation in managing water resources. Countries should develop bilateral, regional or global cooperation



agreements on trans-boundary waters and establish institutions to peacefully manage water resources that cross international borders.

Water is at the heart of sustainable development, peace and humanitarian programmes. Linking policy and science therefore becomes a fundamental tool for conflict prevention, and for that collaboration has become a key issue at the local, national and international levels.



## Sewage discharge in Ganga: NGT orders Uttarakhand

### PCB to take criminal action against officials concerned

By Vivek Mishra

Just half of total sewage generated daily in 13 districts treated properly before is being dumped in river



The Ganga does not find reprieve from pollution, even in its birthplace in Uttarakhand. The National Green Tribunal (NGT) has ordered Uttarakhand Pollution Control Board (UKPCB) to take punitive measures, including initiating criminal proceedings against local body officials and departments concerned, under relevant sections of the The Water (Prevention and Control of Pollution) Act, 1974 for discharging untreated sewage into Ganga river.

Additionally, an environmental penalty for pollution should be evaluated and fines should be imposed on the relevant authorities or departments, the NGT added. Examining sewage treatment reports from 13 districts in the state, the tribunal noted that even districts located in hill stations are directly releasing sewage into rivers,

which are regarded as ancient and sacred.

The reports from 13 districts also showed that half of the total 700 million litres of sewage generated daily (MLD) was not being treated appropriately before being released. Many houses are yet to be connected to the sewer line.

The bench of NGT Chairman and Justice Prakash Srivastava said the increasing number of tourists and devotees further increases the sewage generation during the season, while most of the hotels and dharamshalas (rest house for spiritual pilgrims) are still running with septic tanks or soak pits.

In every district, the local bodies concerned were directly discharging domestic and industrial sewage into the Ganga or its tributaries, causing river pollution, the bench said. At some places, the sewage discharged into rivers is being treated, while at other places, the sewage was partially released into the river.

This is not only illegal but also a violation of the provisions of the Water Act, it pointed out. Section 24 of the Act 1974 completely prohibits direct or indirect discharge of pollutants into rivers. These districts of Uttarakhand are not only violating the provisions of the Water Act but also all the orders of the NGT for the last decade, the bench said.

The bench stated that in the majority of districts, the work of sewage treatment plants (STP) was either at the detailed project report (DPR) stage or awaiting construction proposals. It is evident that untreated sewage is being released into rivers, the tribunal said.

## Sewage generated and treated in Uttarakhand

District	Sewage Generation (in MLD)	Existing Treatment Capacity (in MLD)	Utilized Capacity (in MLD)	Gap (in MLD)
Bageshwar (2)	4.0	0	0	4.0
Rudraprayag (6)	3.45	0.525	0.239	3.2
Dehradun (7)	143.05	148.45	90.0	53.05
Puri Garhwal (8)	37.491	7.39	6.46	30.54
Pithoragarh (3)	9.0	6.25	1.70	7.30
Chamoli (5)	5.98	9.42	4.963	5.457
Chjampawat (4)	5.72	0	0	5.72
Tehri Garhwal (6)	11.167	15.085	9.749	1.418
Haridwar (14)	236.74	152.0	152.0	84.74
Udham Singh Nagar(19)	117.47	0	0	117.47
Uttarkashi(2)	5.31	2.5	2.5	281
Almora(7)	2.0	1.0	0.2	1.8
Nanital(7)	70.42	49.45	25.93	54.49

- Figures in parenthesis indicate the number of local bodies

The NGT additionally found the water quality report was not clearly outlined in the submissions made by district magistrates concerning STP and sewage. In numerous locations, the outlet water was left untested. The tactic was employed to divert the tribunal's attention away from the facts, the bench said.

The bench also observed that no punitive action was taken by the UKPCB against those violating the orders. The Board has remained a mute spectator instead of discharging its constitutional duties, it added.

Despite being given many opportunities, the authorities have not taken appropriate steps to ensure sewage is not discharged in the river. Even

the National Mission for Clean Ganga, which is responsible for the rejuvenation of Ganga, is not properly looking into the issue of sewage in the hills. The tribunal also ordered NMCG to file its reply on this matter by the next date of hearing.

The bench has ordered UKPCB to initiate criminal prosecution against the concerned officials under Section 24 and Section 43 of the Water Act, 1974. The report is to be submitted to the tribunal within two months.



## Water every other day: Bengaluru is drying up &

### destruction of lakes is the reason

By M Raghuram

City is now dependent on Krishna Raja Sagara reservoir, which received only 75% of its usual inflow last due to poor rainfall in River Cauvery catchment area

water on a rotational basis every alternate day, the residents have been informed. That means, each locality will have to manage without water supply for 24 hours at least. And even on the days a locality



***Kalkere Lake is among the 81 lakes that have remained in the city that boasted of 262 lakes in 1961. Photo: Bruhat Bengaluru Mahanagara Palike (BBMP) / author provided***

The gardens of Bengaluru, also known as 'garden city', may soon wilt while its citizens wait for water to trickle out of taps. The city is facing the worst domestic water crisis in history.

Over 30 localities inside the Bruhat Bengaluru Mahanagara Palike (BBMP) will receive

does receive water, it won't be for longer than 30-45 minutes. This is particularly concerning as summer has already arrived in the city, and there are at least 75-90 days of peak summer ahead.

While narratives and theories doing the rounds indicate many things, including the alleged highhandedness of the water tanker lobby in the city, scientists point out the phenomenal neglect of the city's water bodies and the total absence of conservation.

The city, up until 1961, had 262 lakes, and the last count taken by the city's environmentalists

indicates that there are only 81 left. The rest have been claimed by the real estate business for making housing layouts; the Bengaluru Development Authority and BBMP have been held responsible for levelling over 100 lakes directly and indirectly.

Out of the 81 lakes that are identified as 'as lakes,' only 33 are living just because they are located in zones where land cannot be reclaimed for any activities.

The Dharmambudhi Lake, developed by the rulers of Bengaluru, the Hoysalas, Wodeyars and Kempegowda, for more than 500 years of known history, was the first to go in as early as 1969. It was filled up to hold consumer fairs organised by a political party. Later, it became the Kempegowda interstate bus terminus.

These lakes perished mainly due to real estate development, mining and infrastructure. However, due to the whistle-blowers of the city, some of the lakes were saved, including Nagavara, Halasuru and Hebbal, the largest among the 32 lakes classified as 'living lakes'.

The city is now dependent only on the augmented water source at the Krishna Raja Sagara (KRS) reservoir in Srirangapatna, built across River Cauvery, which is about 125 kilometres from the city. However, due to a lax southwestern monsoon in 2023, the Cauvery catchment area did not get enough rain and, consequently, the KRS reservoir got only 75 per cent of its usual inflow.

Even as the citizens are holding demonstrations, the tanker water prices have plummeted to Rs 2,000 for a 12,000 litre tanker, which was just Rs 800-1,000 a fortnight ago. "We have a hunch that the government is playing a big game with us. First, the politicians will make deals with the tanker lobbyists and then direct the Bangalore Water Supply and Sewerage Board officials to tune down the water availability to nil for days together so that they approach the tanker business owners. We have spent lakhs of rupees on the water in the last three months ever since our taps ran dry in November," said Hanumanthappa, the resident association leader of Jaimaruthi Nagar extension in Bengaluru South.

Dasarahalli and Rajarajeshwari Nagar zones in North Bengaluru are the worst affected. "Even though all six stages of the Cauvery pipeline corridor pass through our area just across the Bengaluru Mysuru Infrastructure Corridor, still our areas do not get water regularly. In the far end of Rajarajeshwari Nagar, tap water supply stopped in November 2023 and all dug wells and borewells have also gone dry. We are entirely dependent on the tanker water services," said resident association office bearer Ramachandrappa.

Bengaluru is located at 920 metres above sea level, directing the natural flow of water away from the city and into surrounding valleys. The city receives an average of 920 millimetres of rainfall spread over 60 rainy days annually, nourishing two river basins, the Cauvery and Dakshina Pinakini.

With over 200 lakes and tanks, Bengaluru's landscape faces the challenge of diminishing open wells, urging the need for preservation efforts. Moreover, the proliferation of private borewells, estimated at over 400,000, underscores the critical importance of water management in Bengaluru.

In Bengaluru, the city's lakes rely solely on rainwater and surface runoff from their catchment areas, which are the regions where water collects and flows into the lakes. These lakes are interconnected through a network of stormwater drains called kaluves, which transport excess water from higher to lower-elevation lakes, effectively managing floods and conserving water.

Bengaluru boasts of six lake series, including Yellamallappa Chetty, Varthur, Madavara, Byramangala, Puttenahalli and Hulimavu.

Most lakes in Bengaluru are primarily fed by stormwater through their inlets, but they also receive sewage from leaky pipes and streets. To control water levels, overflow weirs or culverts known as kodis are used, while human-made lakes are equipped with bunds or ridges, to create reservoirs.

Many non-governmental organisations (NGO) working on improving water conservation have opined that community involvement is pivotal in preserving Bangalore's lakes. Examples like



Puttenahalli and Kaikondrahalli lakes showcase how urban and traditional communities collaborate with government agencies, forming trusts authorised to maintain these lakes. Organisations like Friends of Lakes Bangalore or One Bengaluru for Lakes facilitate citizen engagement in lake conservation efforts, offering support from awareness campaigns to liaising with authorities.

Individuals can contribute to lake restoration efforts by organising events like “Kere Habba”, featuring activities for children, organic food stalls and environmental NGOs discussing water issues, birdwatching, competitions and lake walks.

Regular community activities such as cleaning, gardening and tree planting are encouraged, each lasting no more than an hour, according to locals.

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**Water levels in Bhavanisagar Dam recede, Erode farmers seek water from Kundah reservoir**

**| Photo Credit: M GOVARTHAN**

With water storage levels in the Bhavanisagar Dam receding to less than 10 tmc ft (thousand million cubic feet), inadequate to meet the requirements of the second crop season, farmers in the Lower Bhavani Project (LBP) canal ayacut areas have urged the Water Resources Department (WRD) to seek 2 tmc ft water from Kundah Hydro reservoirs in The Nilgiris.

Water from the Bhavanisagar Dam was being released into the canal from January 5, 2024, to benefit 1,03,500 acres in the districts of Erode, Tiruppur and Karur, where farmers widely cultivate groundnut and sesame crops, and water release is required till the end of April for the crops. But, poor rainfall and poor inflow have led to a drop in storage levels in the dam which is a cause of concern for farmers.

At 2 p.m. on Tuesday, water level in the dam stood at 67 feet against the full reservoir level of 105 feet. The inflow was 39 cusecs, while the discharge was 2,300 cusecs into the LBP canal, 700 cusecs into the Arakkankottai and Thadapalli canals, 150 cusecs into Kalingarayan Canal and 100 cusecs into the River Bhavani for drinking water purpose. The storage was 9.74 tmc ft against the total capacity of 32.80 tmc ft.



With storage level dropping, Thirumoorthy, Executive Engineer of the Lower Bhavani Basin Division, conducted a meeting at his office with members of the Lower Bhavani Farmers Federation, in which president in-charge A. Ramasamy, secretary R. Eswaramoorthy and other office bearers took part. Farmers stressed the importance of releasing water for 26 days in March and April and pointed out that shortage of water would affect the crops severely. "Water could be obtained from Kundah Hydro reservoirs for improving the storage level in the dam for supply in the canal from April 18 to April 30," they added.

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It may be recalled that in October, 2023, when water level dropped to 66 feet, farmers placed the same request and Tangedco agreed to release 5 tmc ft water. But, due to an increase in storage in the dam, water was not released from the reservoirs in The Nilgiris.





## (Un) nailed it

Shekhar Paigude

### An engineer on a mission to remove advertisements nailed on trees

FOR THE past five years, every time Madhav Patil sees an advertisement hoarding nailed on trees of Pune, he stops his car, gets down and takes it down. I always carry my two friends, a hammer to remove the nails and a helmet for safety, says Madhav an engineer in his mid-forties.

As the driving force behind the Nail Free Trees campaign, Madhav says he and other volunteers have till date removed over 100,000 nails from trees in Pune and other cities in Maharashtra such as Mumbai, Thane, Pimpri Chinchwad and Vasai Vihar.

The idea, he says, came during a family vacation in Kolkota many years ago. where he had bought his daughter a plant sapling that died because of poor upkeep. The sapling died due to may family's collective negligence. It got me thinking how we as a society are collectively hurting our trees by putting nails in them, says Madhav, adding that the removal of the first advertisement felt akin to extracting a bullet from the heart of a tree. It set the stage for a campaign that has gradually spread throughout the state.

The Nail Free Trees campaign now boasts more than 500 registered volunteers and garnering support from 100 non-profits in Pune and Pimpri Chinchwad. The initiative is low-capital and most of the tools, which include ladders, hammers and



helmets, are pooled from the volunteers.

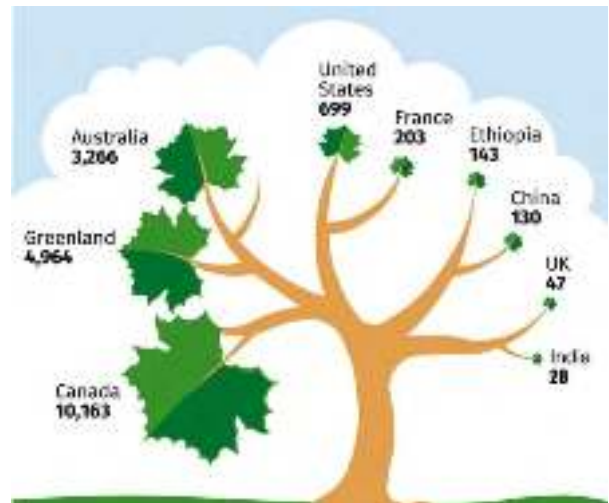
Madhav's advocacy efforts have successfully persuaded 10 municipal corporations to issue notifications under the Maharashtra (Urban areas) Preservation of Trees Act 1975, with the aim to safeguard trees and enhance the aesthetic appeal of urban spaces.

The campaign represents a crucial component of individual climate action, addressing the significant role trees play in urban life and underscoring the harm inflicted by nails, he says.

Guruswami Tumbhale of the Pune Municipal Corporation says that the 1975 state law clearly highlights that damaging trees is a criminal offence. The Nail Free Trees campaign has helped create awareness among the people and has reduced such incidences in the city, says Tumbhale. The awareness campaigns have also instilled a general sense of tree conservation among the city residents, he adds.

Avinash Patil, the first volunteer to join the campaign organised an exhibition at the Balgandharva gallery in Pune to showcase the removed nails from trees. Many people joined the campaign after the exhibition, says Avinash, who is now the campaign convenor.

Last year, we also got our first corporate donation which we plan to use to spread the movement to other parts of the country. We will soon be promoting it in small and medium sized cities, says Madhav.





## Stockholm Water Prize-2022

**Prof. Wilfried Brutsart, USA**

**Shri. 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.)

The 2022 Stockholm Water Prize was awarded to Professor Wilfred Brutsart of the US for his outstanding research in measuring environmental evapotranspiration through integrated studies of land and atmosphere. Prof. Brutsart is an eminent hydrologist and also a pioneering researcher. His innovative concepts in evapotranspiration and hydrology have been of lasting theoretical and practical importance, particularly in terms of climate change. He pioneered innovative approaches to understanding changes in groundwater storage and made major contributions in developing tools to assess climate water availability.

Prof. Wilfred Brutsart is an Emeritus Professor of Engineering at Cornell University, USA. He is a renowned expert professor in Hydrology and his work has earned him the respectful title of Mr. Evaporation.

Terrestrial evaporation is a fundamental aspect of the water cycle. But it is very difficult to measure. So when Prof Brutsart found new ways to predict evaporation and its effect on the Earth's energy balance, it was a breakthrough. Their theoretical approach opened the door to further developments in the technology for measuring both remote sensing and terrestrial observations to assess evapotranspiration. It is also important for climate modelling and understanding the impact of climate change on the water cycle.

Prof. Brutsart's work has helped improve local predictions of whether an area will experience more or less evaporation, or indirectly less or more precipitation. Brutsart's research, more than anyone else's has contributed more to improving the understanding of spatial geospatial information. Scientists have always found it more difficult to make predictions at the local level than at the global level, because local geospatial information is so difficult to make predictions about. Due to the contribution of Prof. Brutsart, significant progress has been made in this field. This is particularly important for local communities, enabling them to anticipate the various impacts of



climate change on their local water supplies and water resources.

Prof. Wilfried Brutsart has developed creative new methods for understanding changes in groundwater reserves, another central aspect of the water cycle. He has been instrumental in bringing new knowledge to the world about how global warming affects the water cycle, including research on how it affects groundwater as the permafrost melts. Wilfried Brutsart's work has greatly enhanced the scientific understanding of the water cycle, and is also fundamentally important in practical water management.

Prof. Wilfried Brutsart was born in 1934 in Ghent, Belgium. He went to University of California, Davis, USA for research and studies. In 1962 Wilfred Brutsart joined the faculty of the Department of Civil and Environmental Engineering at Cornell University, where he served for over 50 years. He has also done research in Japan, Netherlands, Belgium, Switzerland and China. His significant work includes extensive research in environmental hydrology and fluid mechanics. However, they are best known for their important role in evapotranspiration and groundwater storage. He has authored and co-authored more than 200 refereed articles in several

scientific journals. Also, author of two important books, "Evaporation into the Atmosphere" (Springer) and "Broader Hydrology: An Introduction" (Cambridge).

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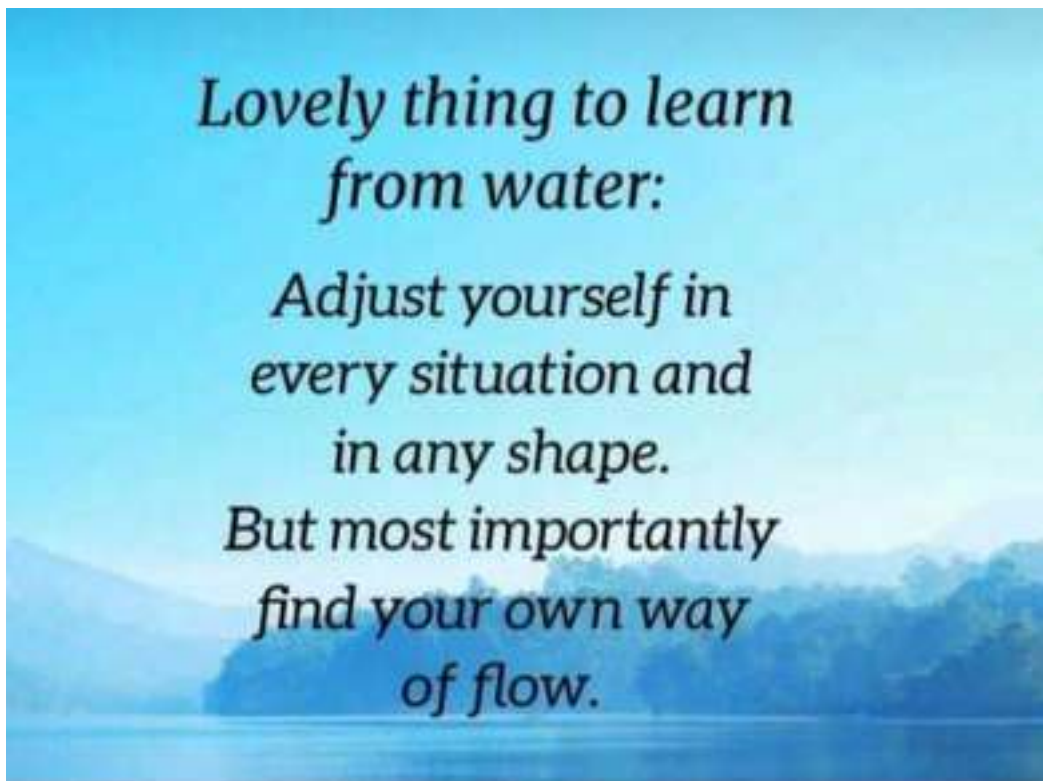
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Source : MoJS Partners with IISc Bangalore to Establish International Centre of Excellence for Dams, Boosting 'Make in India' Initiative in Dam Safety





## Along the mighty Indus, stories of a changing river and evolving relationships

Alefa T Hussain



### DEVELOPMENT AND ENVIRONMENT

Dams and barrages with hydropower and irrigation projects are affecting the natural flow of the river, which remains central to the lives of people.

On its 3,100-kilometre course from the mountains of Tibet to the Arabian Sea, the mighty Indus River flows through foothills and plains, national parks, lands that have been denuded of their forests, fertile farmland and bustling towns. Along the way are dams and barrages, with large hydropower and irrigation projects affecting the natural flow of the river.

The Indus provides almost 90% of the water for agriculture in Pakistan, but its waters can also take lives through floods. For the herders,

farmers and fishers of the Indus basin, the river is a way of life, providing them with livelihoods and sustenance, yet it possesses the power to strip them of their homes, businesses and livestock with just one flood. They fear as well as revere the river. Floods are an ever-looming threat in the Indus basin. Between 1950 and 2010, 21 major floods killed a total of 8,887 people, while immense floods in 2022 killed more than 1,700 and displaced nearly 8 million. The government estimated that an additional 8.4-9.1 million people would be pushed into poverty as a result.

The Third Pole travelled down the Indus, from the mountains of Khyber Pakhtunkhwa in the north to the desolate villages of Sindh in the south, meeting people who depend on the river. We heard stories of a changing river and evolving



relationships: many contend that engineering interventions like dams and barrages have transformed the Indus' once free-flowing and predictable character, rendering it volatile and unforgiving. But almost nobody mentioned climate change, despite this being a key factor behind the unusually intense monsoon rains that caused the catastrophic 2022 floods.



***The main locations visited by The Third Pole during its journey along the Indus River. Credit: The Third Pole***

**'Hits the poor the hardest'**

Most people in Khaplu and Skardu towns, where the Shyok River meets the Indus in Gilgit-Baltistan, know of Muhammad Jan and the homes he runs for destitute children.

Muhammad Jan says that in this area, surrounded by towering mountains, the relationship between the Indus and its people is defined by fear and destruction. Here, most of the river's water comes from glacial melt in the Karakoram mountains. But climate change impacts are jeopardising the food security and livelihoods of local people, increasing poverty levels.



Muhammad Jan in front of the Apna Ghar, a home for destitute children, he set up in Skardu. Credit: Alefia T Hussain, via The Third Pole.

"The people of this area are at the mercy of Indus. It hits the poorest the hardest," says 57-year-old Muhammad Jan.

**Note :** While designing the issue of Jalsamvad - English we find very interesting news, information and articles specially on water and its management. That tempts us to include the same in our issues. Getting formal permission for this inclusion is that way difficult. Therefore our effort is to print them as it is in our magazine. We may kindly be excused for such inclusions. We express a deep sense of gratitude to the original writers.

Thanks.



## Water crisis may swell beyond Bengaluru,

## reservoirs in southern India drying too

Samrat Sharma

Karnataka has 16 major reservoirs that are only 29 per cent full, compared to 45 per cent in 2023. Karnataka is facing one of the worst water crisis in recent years.

Posted By: Anuja Jha



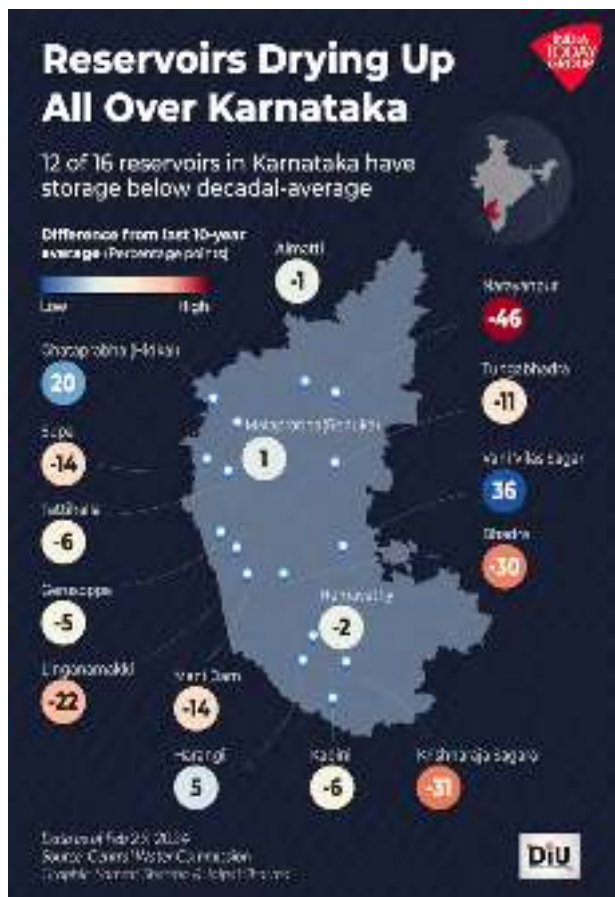
### In Short

1. Southern India facing water crisis
2. Groundwater levels decreasing, reservoirs shrinking
3. Reservoir levels in multiple states below decade-average

Residential and industrial areas of Bengaluru are grappling with a water crisis. But the problem isn't limited to one city in one state — it's prevalent in the entire southern region. Media reports suggest that groundwater levels are going down and water reserves in the Cauvery River basin reservoirs have shrunk because of weakened southwest monsoon rainfalls, among other factors. Dams that provide for drinking water supply during crises have little water stored.

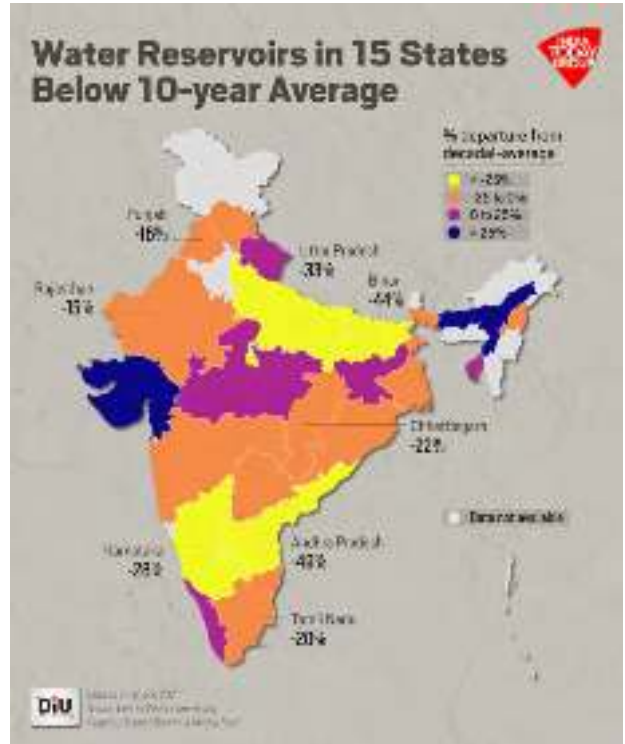
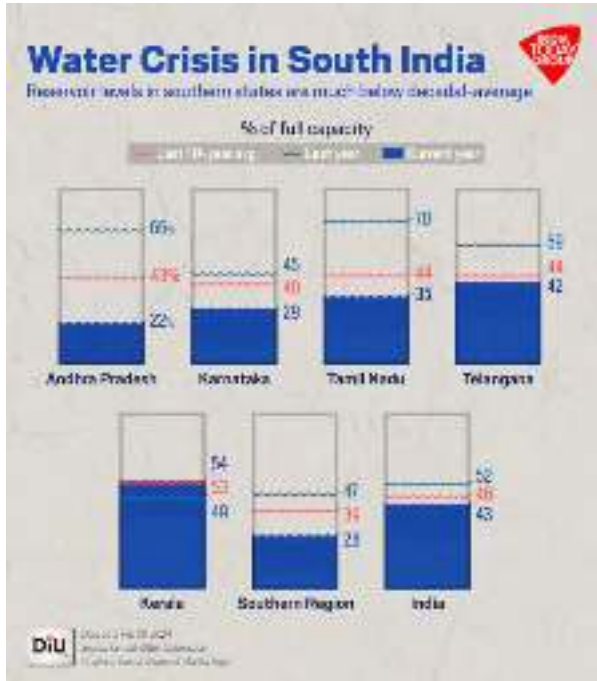
Karnataka has 16 major reservoirs that are only 29 per cent full, compared to 45 per cent in

2023. Of the 16 reservoirs, 12 have water levels less than the ten-year average of 40 per cent. Narayanpur, Krishnaraja Sagara, and Bhadra reservoirs have water 30 percentage points less than the decade-average, according to the Central Water Commission.



Water scarcity in reservoirs is not limited only to Karnataka. Reservoirs in Andhra Pradesh have water storage of 22 per cent, compared to 66

per cent last year. Telangana has 42 per cent against 59 per cent last year. And Kerala has 35 per cent against 70 per cent last year. Overall, reservoirs in the south are at 43 per cent capacity, against 52 per cent last year.



Of the 21 major states where reservoir status is tracked, 15 have reservoirs level below the decade-average. In Tamil Nadu, Karnataka, and Andhra Pradesh, along with Bihar, Uttar Pradesh, and Chhattisgarh, reservoir levels are over 20 per cent less than the decade-average. At 49 per cent, the departure from the ten-year average is the highest in Andhra Pradesh.

Meanwhile, the water crisis has become such a grave concern in Bengaluru that a housing society has announced a fine of Rs 5,000 on residents and deployed a separate security person to monitor the misuse of drinking water. Also, the district administration has fixed rates for 200 private tankers for a four-month period. The development comes amid private tankers doubling their prices as the Karnataka capital faces a severe water shortage.

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## Ariyalur's Ramsar wetland Karaivetti Bird Sanctuary

attracts nature's 'transit passengers' from all over the world

NAHLA NAINAR

Karaivetti Bird Sanctuary in Ariyalur district, which was recently recognised as a Ramsar site, hosts over 20,000 feathered visitors in its idyllic surroundings

property, there are more birds, perched on a dead tree trunk, looking on with apparent interest, as a farmer tries to get his tractor going.



***Birds seen at Karaivetti Bird Sanctuary in Ariyalur district. | Photo Credit: M. Moorthy***

Hérons, egrets and ibises have queued up on the parapet, watching life go by as small waves lap on the embankment wall of the lake at Karaivetti Bird Sanctuary, located in Ariyalur district, 50 kilometres from Tiruchi.

They do not seem to mind the photographer preparing to shoot them on camera. Across the narrow road running through the

The sanctuary, one of the largest inland wetlands of Tamil Nadu, was recently declared a Ramsar site, along with the Longwood Shola reserve forest in The Nilgiris.

A Ramsar site is a wetland designated to be of international importance under the Ramsar Convention, an international environmental treaty signed on February 2, 1971 in Ramsar, Iran, under the auspices of UNESCO. The pact is also known as The Convention on Wetlands.



The recognition is an important one, especially for Tamil Nadu, which leads the country with 16 such sites, says Supriya Sahu, Additional Chief Secretary, Environment, Climate Change, and Forests.

“The Ramsar site tag improves the potential of the wetlands through national and international funding,” she writes in an email interview. “It is a permanent tag and only in exceptional circumstances, due to extreme anthropogenic factors, are the Ramsar sites put in the Montreux record (negative list) until the time they are restored to their existing level.”



***Black-winged Stilt, found in a wide range across Europe, Africa, Asia, and Australia, spotted at Karaivetti Bird Sanctuary. | Photo Credit: M. Moorthy***

### **Strategic location**

Covering 453.7 hectares, Karaivetti is home to over 500 species of flora and fauna. Its geographical location on the Central Asian Flyway makes it an important breeding and foraging ground for birds.

The lake is managed by the Forest Department and Public Works Department and stores water from the Mettur Dam from September onwards, besides being fed by the Northeast monsoons. Cultivators of paddy, sugarcane, cotton, corn and split red gram in the region use the lake extensively to irrigate their fields.

“Karaivetti Bird Sanctuary is an important source of water for the agriculture-based livelihood in the area. It is surrounded by paddy fields and so far has been free from the human wildlife conflict.

More than 20,000 migratory birds visits the wetland regularly,” says the official.



***Asian Openbill (foreground) and Red-wattled Lapwing spotted at Karaivetti Bird Sanctuary. | Photo Credit: M. Moorthy***

Even at midday, there is a rich variety of birds to be seen in the verdant settings, with Yellow-billed and Western Great Egrets tiptoeing around the tall grasses, foraging in the shallows, while Whistling Ducks create a ruckus in the distance, splashing and clucking with abandon in the deeper portion of the lake.

A majestic Asian Openbill stork looks thoughtfully at visitors, before flying away, undisturbed by the strong winds.

In the undergrowth, numerous cheeps and twitters of young birds indicate the presence of nesting sites.

According to documentation on the official Ramsar portal, Karaivetti supports about 198 bird, 10 mammal, 82 butterfly, 19 reptile, 10 amphibian and 165 plant species. The heronry of Karavetti Birds Sanctuary has more than 10,000 individuals of colonial nesting water birds. Near-threatened bird species like Spot-billed Pelican, Black-headed Ibis and Oriental Darter nest in the trees of the wetland.

The Indian Flap-shelled Turtle can be found nesting in the swampy regions here.

### **Upgrade in the pipeline**

Though entry is restricted to visitors, the sanctuary’s facilities are in a need of a facelift. A watchtower’s banister walls are crumbling, and

there are signs of littering in places, including broken glass bottles that could be lethal for the wildlife here.

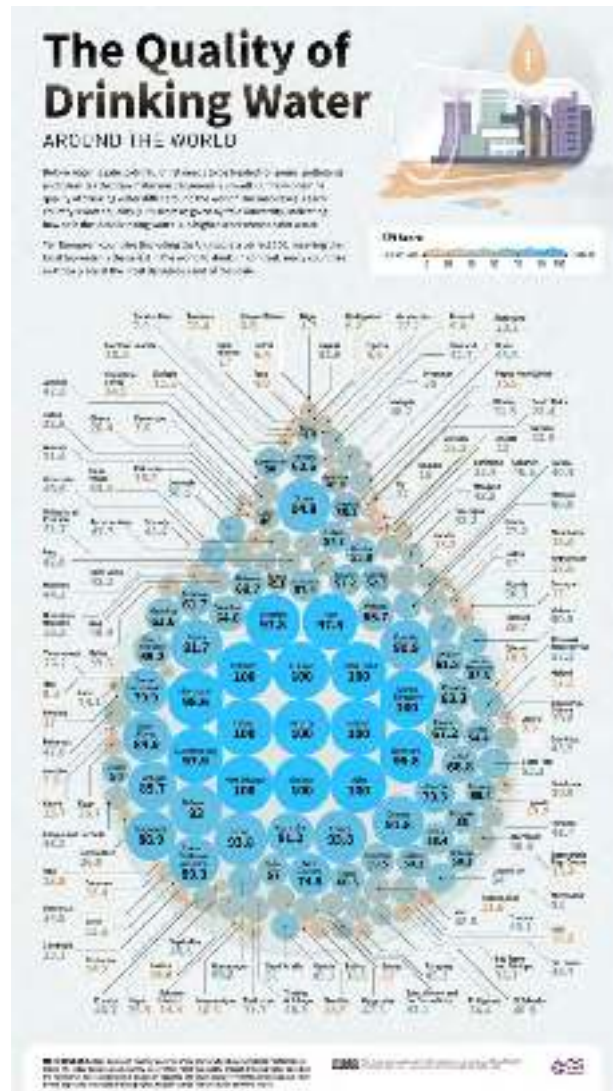


**Grey Heron, a long-legged wading bird of the heron family, Ardeidae, native throughout temperate Europe and Asia, and also parts of Africa, seen at Karaivetti. | Photo Credit: M. Moorthy**

The recognition will speed up efforts to promote low-impact, responsible ecotourism facilities, which will include protective measures, and an overall improvement of the sanctuary, says the official.

“The State launched the Tamil Nadu Wetlands Mission in 2021, under which every opportunity to bring the wetlands on the global map was taken up. The addition of 15 new Ramsar sites after a gap of almost two decades gives us an immense pleasure and motivation to work more

towards the conservation of the wetlands which are ubiquitous ecosystems and lifelines of society. We feel proud that we could become the leading State in the country in terms of Ramsar sites, even though we have miles to go and a lot more remains to be done,” says Supriya.



## Bengaluru Braces for Water Scarcity :

### BBMP Lists 58 Locations of Concern

The gravity of the situation came to the forefront during a coordination committee meeting presided over by Rakesh Singh, additional chief secretary of the urban development department, alongside officials from BBMP and Bangalore Water Supply and Sewerage Board (BWSSB)

**Bengaluru :** Amid the looming summer season, concerns over drinking water scarcity have surfaced at 58 locations across Bengaluru, as reported by the Bruhat Bengaluru Mahanagara Palike (BBMP). These areas, primarily situated in tech hubs like Mahadevapura and Bommanahalli, as well as RR Nagar, Yelahanka and Dasarahalli zones, are grappling with the impending water crises.

While the focus remains on these 58 locations, including upscale residential complexes,

BWSSB has indentified an additional 257 points across the city as water stressed. Ram Prasath Manohar, chairman of BWSSB, assured that measures are underway to mitigate the crises. Initiative include the deployment of existing 68 tankers for supplying potable water acquisition of 18 new tankers, and hiring of 200 private tankers to meet the escalating demand anticipated during the summer months. Manohar expressed optimism, stating that the situation is expected to improve by the end of April with the completion of projects under Cauvery V Stage.

In tandem, BBMP has also mobilised efforts to tackle the impending challenges. Rakesh Singh, also the BBMP administrator, emphasised the need for immediate action. Additional borewells will be





drilled in severely affected areas, while defunct or dried up Reverse Osmosis (RO) water plants will be repaired and reactivated by connecting them to nearby borewells. Singh urged officials to ensure round the clock dispensation of potable water.

Tushar Giri Nath, BBMP chief commissioner, issued directives for a comprehensive assessment of water stressed areas and prompt allocation of funds to address the crises. He reaffirmed the commitment to prevent any water shortage across the city, with zonal commissioners instructed to prioritise the allocation of tankers and borewells to affected areas.

Contrary to the situation on the outskirts, BWSSB engineers affirmed that central parts of Bengaluru continue to receive a steady supply of 1450 million litres per day (MLD) from the TK Halli pumping station in Mandya district. They clarified that while there is no scarcity owing to ample reserves at reservoirs like Krisharaja Sagar, the challenge is predominant in peripheral areas dependent on groundwater.

Acknowledging the severity of the crises in newly added villages within BBMP limits, Rakesh Singh highlighted the need for focused intervention. Zonal officials are tasked with coordinating with BWSSB to ensure efficient operation of water tankers in these localities.

As Bengaluru braces for the sweltering summer, concerted efforts are underway to mitigate the looming water scarcity and safeguard the city's residents from the impending crises.

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## 'Save Coorg' calls trend as water crisis takes

### centre stage in Karnataka

k. c. Deepika

As Karnataka battles the aftermath of a failed monsoon season in 2023, residents of Kodagu district, where the River Cauvery originates, have stepped up calls to save the district's ecology, which has a direct bearing on the vital river apart from the ecologically sensitive Western Ghats.

Through 'Save Coorg,' an online petition, residents and people belonging to Kodagu are hoping to draw the attention of the government to long pending problems of the district, including over tourism, mass conversions of wetlands and the rapid concretisation taking place in the district.

Why the crisis?

"Cauvery's cry: A wake up call for conservation," points out to the water scarcity in the Cauvery river belt, which has implications for Bengaluru, Mysuru and even Tamil Nadu. "The conversion of wetlands, illegal tree felling, mass tourism, and commercialisation are exacerbating the situation. Additionally, the construction of railway lines, national highways and other infrastructure projects are further fragmenting and damaging the ecosystem," says Nanaiah Bottolanda who manages the page 'Kodava Naad' on Instagram.

"No one is using paddy fields for its actual purpose and have converted them into sites. Instead of fighting over the river, it is time to preserve the district," he said.

"Bengaluru, Mysuru and Tamil Nadu residents must prioritise saving Coorg to secure their Cauvery water supply...Immediate action is needed. Conservation efforts must focus on preserving wetlands, implementing sustainable forest management practices, regulating tourism activities and promoting water efficient agriculture. Additionally, there is need for stricter enforcement of laws against illegal activities and sustainable urban planning practices to minimise the impact of infrastructure development on water





resources,” it said.

#### Loss of forest cover

The Western Ghats Spatial Decision Support System (WGSDSS), launched by the Indian Institute of Science’s Energy and Wetlands Research Group, has showed that the Western Ghats, which is among 36 global biodiversity hotspots, saw a loss of 5% evergreen forest cover with an increase of 4.5% built-up cover, and 9% agriculture area, according to the spatiotemporal analyses of land use, highlighting anthropogenic induced developmental thrust. Fragmentation analyses also highlight that interior forest constitutes only 25% of the forest landmass, depicting the fragmentation pressure, impacting local ecology.

T.V. Ramachandra from the Group, said recent events are a wake-up call. “We need to protect forests of native species. Water availability in lakes and streams in places where this is not threatened is for 12 months, while those with monoculture, such as in Kodagu, is for six to eight months. If you look at livelihood too, people can grow multiple

crops throughout the year where the native species are protected, while in degraded forest regions, only one crop is grown over a lesser period, resulting in lesser earnings. Yield is also higher in non-degraded forests as pollinators are abundant. If you want to give life to Bengalureans, conserve the green cover and rivers and lakes in the forests as well as in Bengaluru,” he said.





## डॉ. दत्ता देशकर यांनी लिहिलेल्या विविध पुस्तिका

- (१) चला, जलसाक्षर होवू या.
- (२) संकल्पना शाश्वत शेतीची.
- (३) चला , जलपुनर्भरण करू या.
- (४) पाण्याचे गणित.
- (५) बळीराजा सावध हो, दुष्काळ भेडसावतोय.
- (६) वनशेती. (\* )
- (७) शेततळी. (\* )
- (८) पाणी वापरा, पण जरा जपून. (\* )
- (९) हिसाब, किताब, पानीका.
- (१०) चला, जलसाक्षर होवू या (चित्रमय पुस्तिका)



(\* ) ही पुस्तके महाराष्ट्र सरकारच्या प्रौढ शिक्षण संस्थेने प्रकाशित केली आहेत.

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