Pune. Third Year. March 2024. 3rd Issue.
Pages : 32 Annual Subscription : Rs. 100 only

Jalasamvad

A Dialogue on Water

Editor: Dr. Datta Deshkar

Cover Story

Central Water and Power Research Station
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. गजाननन देशपांडे (आगामी)

(४) Towards Excellence in Water and Culture :
Shri Gajanan Deshpande (आगामी)

(५) उद्योजकता : (स्वतःचे भविष्य स्वतःचे हाती) : डॉ. दत्ता देशकर (आगामी)

(६) जलक्षेत्रातील यशोगाथा : संपादन : डॉ. दत्ता देशकर (आगामी)

(७) जलक्षेत्रात काम करणाऱ्या संस्थांचा परिचय : श्री. विनोद हांडे (आगामी)

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(१०) Recipients of Stockholm Water Prize :
Shri Gajanan Deshpande (आगामी)

Jalsamvad

Mouth Piece of Bharatiya Jala Sanskriti Mandal

■ March 2024

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■ **Cover Design**
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■ **DTP & Page Setting**
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■ Annual Subscription Rs. 100 /-
5 Yearly Subcription Rs.200/-
10 Yearly Subscription Rs.500/-

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Full Page : Rs.500/-
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Editorial ....

Last year also Mansoon failed miserably. This year, problem of water, not only for agriculture but even for drinking has become quite grave all over Maharashtra. This is just February. Many more months have yet to pass. As days pass on, the problem will become still more serious.

A simple question can be asked at this stage as to who is responsible for this. The common answer to this question would be – of course, the Government. We would use water as we wish without any plan and when the problem arises we, without fail, would blame the Government for water shortage.

In fact, as a citizen of the country, we should come forward and find a solution to this problem. It is he who has created the problem should come forward to find the solution. What I feel is that every village should become self sufficient as far as water is concerned. Now a days, most of the village heads i.e. Sarpanch and his fellow members are drawn from young generation. That time is gone now when the Sarpanch was a aged person. Young generation which has taken the charge now is more active and enthusiastic and can definitely accept the challenge water has posed today.

Acknowledging this, Ministry of Panchayat Raj, Government of India requested Yashada, Pune to work as a nodal agency to prepare guidelines in the form of hand books for the Panchayat staff as to what should be done by these elected people to join the process of development in villages. Fortunately, I got a chance to prepare these guide lines. We worked for many days to identify these village problems. Total activities were broadly in ten broad parts like agriculture, water, education, animal husbandry etc. and we were asked to prepare a handbooks on each of these subjects. Accordingly, these books were prepared on each subject. The contents were discussed thoroughly and then finalized. These books were sent to Delhi which were translated in all Indian Languages and distributed to all the gram panchayats for implementation. We feel proud that we were involved in preparing these valuable books.

The most important message which was given to the panchayats was that every panchayat should become self sufficient in respect of availability of potable water to each and every villager. As it is, the water storing capacity of every village is inadequate. Various ways and means were suggested to the panchayat to enhance this storage. Removing silt from the nallas (water streams), deepening these nallas to store more water, construction of check dams to reduce the flow of rain water were some of the ways suggested to enhance the storing capacity.

In fact, every village is blessed with adequate rainfall. We allow that water to flow away and then start shouting that there is water scarcity. Solution of water problem cannot be the work of the Government. People should come forward and take the lead in increasing the storing capacity.

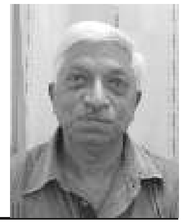
Before Britishers came to India, villagers themselves used to take care of all the water storages in the village. On two days, i.e. Pournima and Amavasya, every month all the villagers were not going to their farms and used to work on the water ponds . Their safety, cleanliness, proper use was treated as the responsibility of all the villagers. But after the British Rule started, people were cut off from these activities and now a feeling is developed that this is the work of the Government.

What I personally feel that water self sufficiency in the village should be the job of every panchayat and if that job is not performed satisfactorily heavy fine should be levied on the panchayat.

Dr. D. G. Deshkar
Editor.

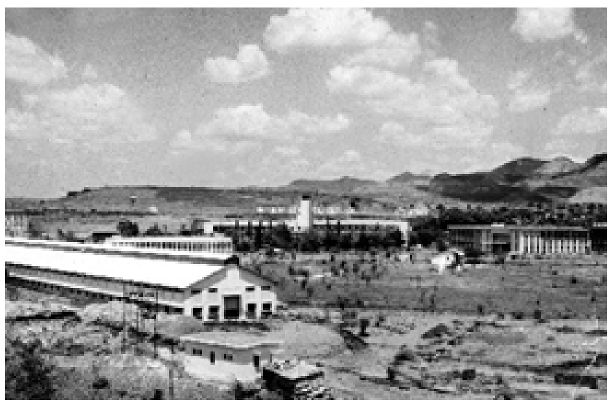
Organization - Central Water and Power Research Station (CWPRS)

Shri Vinod Hande (M) 9423677795



In the beginning of the 20th century our country needed small scale laboratory investigations to study the problems of irrigation and drainage. Same was recognised by Government. To modify the irrigation practice and agriculture requirements the 'Central Water and Power Research Station (CWPRS) was establish in 1916 at Pune by then Bombay presidency as a "special irrigation cell". The institution was taken over by Government of India in 1936. Due to considerable increase in its activities with development of water resources projects the Research Station was shifted to large campus area at Khadakwasala in 1925. Khadakwasala is about 16 km. from Pune. Today CWPRS is a part of Union Ministry of Jal Shakti, department of 'Water Resources, River Development and Ganga Rejuvenation'. CWPRS is one of the foremost organizations in the world in the field of hydraulics and allied research. CWPRS was also established to cater to the R&D need for providing technological solutions.

CWPRS provides specialised services through physical and mathematical model studies in river training and flood control, hydraulic structures, harbours, costal protection, foundation engineering, pumps and turbines, ship hydrodynamics, hydraulic design of bridges, environmental studies, earth science and cooling water tanks. The studies conducted by CWPRS are able to provide hydraulically sound and economically viable solutions to various problems related to projects on water resources, energy and water borne transport. CWPRS also collaborates with other institutions like WAPCOS (Water and Power Consultancy Services) and educational and research institutions in completing it's activities. CWPRS gets financial support from Government of India. The Research Institution is keeping pace with rapid advancement in hydraulic research by way of updating its facilities and expertise. As the Regional laboratory for ESCAP (Economic & Social Commission for Asia and Pacific) since 1971, CWPRS has offered its services to a number of projects in the neighbouring countries as well as countries in Middle East and Africa. Today they have adequate capability and expertise to undertake specific problems pertaining to water resources development projects and design of coastal and offshore engineering structure and port. The Research Station is headed by Director and presently Dr. R.S. Kankara is holding a charge of Director.



Here is little about expansion of CWPRS from Pre-Independence period. The govt. of India in consultation with provincial govt. established the central Board of Irrigation in 1928 as a coordinating body on technical and research

matter. Hydraulic research laboratories were set up in some provinces. But later it was felt necessary to have a central govt. institution for the whole India where facilities could be up graded to provide advice not only to the irrigation departments but also to other departments like Railway Board, Port Authorities and other public agencies. Govt. Of India decided to set up central research station at Pune by renaming it to 'Hydrodynamic Research Station' in 1928 and then to 'Central Irrigation and Hydrodynamic Research Station'. In 1944 the name of institution was again changed to 'India Waterways Experiment Station'. In 1949 the Govt. changed the name to the 'Central Water power, Irrigation and Navigation Research Station and subsequently in 1951 to the 'Central Water and Power Research Station' (CWPRS).

This Research Station provides total engineering back up to Central Electricity Authority for the design of a tidal power station in the Gulf of Kachchh it is an expert in the field of hydraulic investigations.

Major objectives of the CWPRS are to enable the solution of complex water resources problems in the country. In this connection CWPRS has set up laboratories in the following fields.

- River Engineering
- River and Reservoir System Modelling
- Coastal and Offshore Engineering
- Foundation and Structures
- Applied earth sciences
- Reservoir and Appurtenant Structure
- Instrumentation Calibration and Testing Services

River Engineering

River Hydraulics Division undertakes studies related to River Behaviour, Training and Management. These are for safe routing of flood through the system of river channels and maintaining sediment transport balance. The river behaviour changes are assessed arising out of the insertion of new structures or modification of plan. Methods are suggested to minimise the effect of human intervention or encroachment of river water way and ecological impacts on the river while assuring the safety of the structures. The major studies conducted in CWPRS are related to sediment control, navigational developments, design of canals and canal structures, bridges, river training, erosion control, bank stabilization works, river diversion and morphological studies.

Specialized area of CWPRS

- River training – Direct and indirect river training like spurs and groynes, flood embarkments, guide bunds, bank protection works like revetments, pitching and vanes.

Currentmeter Measurements

Bridges- Location, orientation, adequacy of waterway, safe deck levels. Scour level (is the amount of erosion or excavation that occurs at the base of a structure due to the action of water flow) and foundation level protection measures. Morphology to examine stability of river course.

- Barrages and Weirs
- River Morphology
- Inland Navigation
- Flood Routing
- River Behaviour
- Intake Structures for Water Supply Schemes.
- Stream Gauging and Sediment Sampling
- Siltation in Reservoir
- Sediment Control and Exclusion Devices

Mathematical Model Studies

- Flood Routing Studies- Rivers Tapi, Krishna and Mula-Mutha.
- Cubature (To determine the volume of a solid cubic content) Computation- Kosi
- Hydraulic Transients in water Conducting System of Hydel Project- Rana Pratap Sagar, Lower Sileru, Kalindi.
- System Analysis of Water Resources- Ganga basin.
- Morphological Model Studies- Ganga Yamuna, Barak.
- River Regime studies- Yamuna.
- Stratified Flow- Hot water recirculation for Kaiga Nuclear Power Project.

River and Reservoir System Modelling

The concern group undertakes studies in meteorology, applied hydrology, physico-chemical methods for water quality and hydraulics of surficial process. This laboratory consists of three divisions 1) Hydrometeorology, 2) Water Quality Analysis and Modelling and 3) Surface Water Modelling. The group conducts studies in river and reservoir systems by field experimentations, mathematical modelling tools and site specific desk studies.

Hydrometeorology Division : This division was formed in 2012 by merging physics and Statistics division to cater the needs of the clients and offering solutions for PMF (Probability Mass Function) estimation, seepage, subsurface flows and flood routing. Statistics division is to cater hydrological as well as hydraulic data analysis of various projects.

- Estimation of PMF for water resources projects and flood forecasting – Narmada, Tapi, Mahanadi, Koldam .
- Soil erosion and sedimentation yield for catchment and mine areas- Indravati, Kudremukh, Visakhapatnam.
- Water Resources Planning and Management- krishna- Koyana.
- Water availability studies- Wellington , Lara, Goa(Mandavi)
- Backwater studies for lift irrigation and power generation projects- Pranhita(irrigation), Neilla(power).

This group has also done estimation for probable maximum flood location for Narmada at various locations like Narmada sagar, Maheshwar, Omkareshwar and Sardar Sarovar from the aid of World bank. CWPRS also carried out flood estimation studies for rivers krishna, Narmada, Godavari , Tapi ect. Similarly Flood Frequency Analysis, low flow analysis, Intensity-Duration-Frequency Analysis, Drainage studies, back water studies are carried out by this group.

Coastal and Offshore Engineering :

The laboratory undertakes studies for port and harbour development, coastal protection against erosion, design of coastal structure, coastal processes, tidal inlets, intake and outfall systems of thermal/nuclear power plants using physical as well as mathematical modelling techniques.

Areas of Specialization

• Development of Ports and harbours
• Shoreline Changes, Coastal Erosion and protection.
• Design of Maritime structures.
• Cooling Water Systems for Power Plants.
• Water Quality and Environmental Aspects
• Field studies.

Facilities and Equipments

• Laboratories
• Software Packages
• Field Equipment

Major Studies undertaken – Ports and Harbours

Major ports- Kandla, Mumbai, Jawaharlal Nehru Port, Mormudao, New Mangalore, Cochin, Chennai, Visakhapatnam, Haldia.

Medium/Minor Ports/Fishing harbours- Porbandar, Mul Dwarka, Hazaria, Varsoli, Neendakara, Pondicherry, Port Blair, Kakinada etc.

Environmental Aspects

• Salinity intrusion at Chilika lake
• Fresh water lake at Port Blair.
• Disposal of dredged material at Mumbai, Campbell Bay
• Oil Spill at Sikka.

Foreign Assignments

• Port development at Singapore.
• Thermal power projects at Tripoli(Libiya), Paris Gudang(Malaysia), port Klang (Malasia)

Foundation and Structures

Foundation and Structures group deals with the determination of the properties of foundation and structural materials. They also do analysis of structural response and safety of various loads using laboratory and field tests. There are three technical divisions under this group 1) Geotechnical Engineering, 2) Structural Modelling and Analysis and 3) Concrete Technology. Major activities undertaken by the various technical divisions in this group ate listed below,

• Laboratory and field tests for estimating various Engineering properties of Soil, Rock and other construction materials.
• Tests for finding tensile strength and stability for application in hydraulic structures.
• Mathematical modelling for dynamic response analysis of dams.
• Load test on bridges, beams, column of power houses, gates etc.
• Thermal analysis of mass concrete and roller compacted concrete dams for estimating suitable placement temperature and construction schedule.

Studies undertaken

• Stress and deformation analysis of earth dams under static and earthquake load conditions.
• Seepage analysis of embankment dams, recommending suitable remedial measures.
• Rim stability of submergence.
• Slope stability assessment of natural hill slopes, embankments, mine slopes.

Port Projects completed for quality control tests for flood protection works at various sites in Bihar, Tarapur Atomic Power Plant Project, Kudankulam Reservoir, Telugu Ganga Projects, Geotube dyke at Hoogly.

In-situ permeability test in progress.

Applied Earth Sciences

The earth science laboratory comprises Geophysics, Earthquake Engineering, Isotope Hydrology and Vibration Division. It takes studies for foundation evaluation, source and path of seepage surveillance and design parameters for major projects. The geophysics division takes geophysical studies of the offer site in India and neighbouring countries. It also undertakes studies related to foundation investigations of civil structures like hydroelectric, thermal, nuclear power plant, ports and harbours and irrigation projects.

Area of Specialization

- Mapping the thickness of subsea bottom layer, morphology of bedrock in reservoirs and coastal environments for maritime structures.
- Studying pre and post dredging of subsea.
- Diagnosing the health of dams.
- Earth resistivity for earthing system.
- Mapping seepage paths.
- Archaeological and environmental studies.

Isotope Hydrology Division

This division is established in the year 1979 under UNDP (United Nations Development Program) aides projects for Applied Earth Science Division. This division built up capacity for providing rapid, economical and accurate solutions to problems related to various civil engineering structures. They have also done research activities on,

- Foundation studies for Dams, their allied structures and power plants.
- Studies related to health of hydraulic Structures.
- Detection of seepage in hydraulic structures. Etc.

Major Projects

- Concrete dam: Dimbhe, Kolkewadi, Indira Sagar, Koyana, Omkareshwar.
- Earthen Dam : Nagarjunsagar, Upper Manner, BhamaAskhed, Sipu, Salauli.
- Masonry dam : Pawan, Dudhganga, Erai, Kuttiadi.
- Rockhill dam: Salal hydro-electric, Sardar Sarovar etc.
- Canal: Indira Gandhi Main Canal, Panchkula.

Vibration Technology division is doing activities for various river valley projects as well research in the field of measurement of vibration and sound level, non-destructive testing of concrete and masonry structures. Following pictures shows monitoring of structural vibration for assessing the safety of old dams, power house, bridges.

Reservoir and Appurtenant Structure :

This group undertakes studies for efficient, economical and safe hydraulic design of spillways, energy dissipators, water conductor systems and other structures such as protection works, high head gates, surge tanks, tunnels. The studies are carried out with the help of hydraulic models, mathematical models and desk studies. There are four technical divisions under this group and they are 1) Spillways and Energy Dissipator, 2) Control Structure and Water Conductor System, 3) Sediment Management and 4) Hydraulic Analysis and Prototype Testing.

Major Activities

- Approach flow conditions upstream of spillway.
- Assessment of discharging capacity with full and partial gate opening.
- Protection work near spillway.
- Flushing of Sediments from Reservoirs.

CWPRS carried out important studies in more than 50 thermal power stations in

Maharashtra namely Khaperkheda, Bhusaval, Chandrapur, Paras, Parli, Koradi, Nasik etc. , Vijayawada Andhra Pradesh, Upper kolab, and Odisha.

CWPRS also carried out microearthquake studies around the project site for the following objectives,

• To determine location and magnitude of the local earthquake.
• To investigate aftershocks and group activity.
• To determine the source parameters of the earthquake.

Instrumentation Calibration and Testing Services

This Division was established in 1965 which was expanded by creating Hydraulic Instrumentation Centre under UNDP (United Nation’s Development Program) aid in 1976. Meter calibration facility was established in 1956 and upgraded in 2003 with latest instrumentation.

In order to provide viable and economical solutions to various coastal, river morphology, port and reservoir sedimentation studies an advanced Remote Sensing Techniques and Geographical Information System Division was established at CWPRS. Important projects were carried out at reservoirs like Khadakwasala, Jayakwadi, Shriram Sagar, Bhatghar, Ujani, Mula, Panshet, Bhandardara, Srisailam, Krishnarajsagar etc.

List of projects and studies completed by Research Station mentioned as below,

• Reservoir Flushing for Devsari HE (Hydro Electric) Project, Uttarakhand
• Reservoir Flushing for Dhaulasidh HE Project, HP
• Reservoir Flushing for Mangdechhu HE Project , Bhutan.
• Reservoir Flushing for Arun-III HE Project, Nepal
• Reservoir sedimentation for Punatsangchhu-II H E Project , Bhutan.
• Reservoir sedimentation for Tangon limb-Etalin H E Project , Arunachal Pradesh. Etc.

Proposed studies by CWPRS

• Reservoir Flushing for Tawang -I H E Project, Arunachal Pradesh
• Reservoir Flushing for Tawang -II H E Project, Arunachal Pradesh
• Reservoir Flushing for Lata-Tapovan H E Project, Uttarakhand
• Reservoir Flushing for Teesta-IV H E Project, Sikkim etc.
• Discharge measurements in River and canal.

Automatic Sluice Gate

CWPRS is a vast Research Station with wide range of studies and Projects at their credit . Their all works can’t be mentioned here due to lack of time and space. To know more about CWPRS readers can contact Research Station on the following address and other contact details.

Address and other details

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Khadakwasla,
Pune-411024 , Maharashtra.
Phone- 020 24103200/24381801
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www.cwprs.gov.in

Odisha CM Inaugurates Lower Suktel Irrigation Project In Bolangir

By Ananya Pattnaik

Bhubaneswar: Odisha Chief Minister Naveen Patnaik today launched the much awaited Lower Suktel Irrigation Project in Balangir district.

The project worth Rs 2,723 crore, considered to be a major leap of development for the agrarian community in the drought-prone district, is expected to facilitate irrigation in over one lakh acre farmland in 203 villages of Balangir and Sonepur districts while benefiting around 80,000 farmers. The project is touted to have the ninth major dam in the State at a height of 31 metre, a 1,155 metre long earthen dam and a 255 metre long spillway. Apart from irrigation, it will also provide drinking water facility in the area to over 70,000 people.

While the project's foundation stone had been laid in 2001 by the CM, the project had faced inordinate delay over rehabilitation and resettlement issues which in turn had led to cost escalation from an initial Rs 217 crore to nearly Rs 3,000 crore.

In an official release, the Chief Minister's Office stated that there will be no displacement for

irrigation as pressurised underground pipelines will be laid for the purpose.

Hailing the sacrifices of families displaced from 29 villages for the project, the CM said their contribution will be remembered for posterity.

The Lower Suktel Project will herald a new chapter in the agricultural development of Balangir district as woes of farmers in the drought-prone district will dissipate with irrigation facility. Balangir is progressing in education, health and infrastructure. Now the district will take great strides in agriculture as well with the launch of the Lower Suktel project. It is my firm belief that with the support of people of Balangir, the district will reach new heights in development," he said.

In addition, other projects worth Rs 2,525 crore were announced for the district in various sectors. Foundation stone was laid for 112 projects worth Rs 2,220 crore apart from launching of 69 projects worth Rs 305 crore.

Among others, Health and Family Welfare Minister Niranjan Pujari, Balangir MP Sangeeta Kumari Singhdeo, Rajya Sabha member Niranja Bisi, Balangir MLA Narasingh Mishra, Patnagarh MLA and district planning committee chairperson Saroj Meher were present.

Arsenic found in groundwater in 25 states, fluoride in 27 states:

Govt Jal Shakti minister Bishweswar Tudu said that the ground water contamination reported by the Central Ground Water Board (CGWB) is mostly geogenic in nature and does not show significant change over the years.

New Delhi: Arsenic has been detected in groundwater in parts of 230 districts in 25 states and fluoride in 469 districts in 27 states, Union Minister of State for Jal Shakti Bishweswar Tudu informed the Rajya Sabha on Monday.In a written reply, the minister said that the ground water contamination reported by the Central Ground Water Board (CGWB) is mostly geogenic in nature and does not show significant change over the years. The CGWB under the Ministry of Jal Shakti

Recently, the CGWB signed a Memorandum of Understanding with the Geological Survey of India (GSI) for study of groundwater contamination, including arsenic and fluoride, with the focus on eight states -- Punjab, Haryana, Andhra Pradesh, Uttar Pradesh...

A 122-year evolution of Water Supply System in Visakhapatnam

For generations, residents relied on fickle wells and distant streams; their thirst quenching only momentarily in the face of a growing population and the ever-expanding cityscape. Here, we embark on a 122-year journey, tracing the fascinating trajectory of the water supply system in Visakhapatnam – from humble hand-dug wells to a complex network of reservoirs and pipelines. Edward Paul, a Heritage Conservationist guides us through this captivating narrative, unraveling the history of how water transformed into the lifeblood of this thriving coastal city.

The Visakhapatnam residents got protected water supply through a piped system for the first time on 18 December 1901. Before this, the residents were relying on wells for drinking water. As the population started growing and the town expanded, the need for drinking water increased. The Municipal authorities started augmenting the shortage by making improvements to the existing wells and digging new wells. During seasons of drought, many wells used to go dry necessitating the digging of temporary wells in the beds of tanks like Dykes tank near the present Turner's Choultry and Nerellakoneru in Allipuram.

The municipal authorities began contemplating the scheme of supplying protected water in the early 1880s. A search was made to find

a perennial source of water in the vicinity of the city. The Hanumanthavaka stream appeared to be the only perennial source available close to the city. Investigations and surveys started in 1884-85 and went on till 1890-91. The scheme was sanctioned in 1896-97 with an estimate of Rs. 4,21,000, half of this amount as a grant from the Provincial Government and the other as a loan to the municipality at a rate of 4.25% repayable in 30 years.

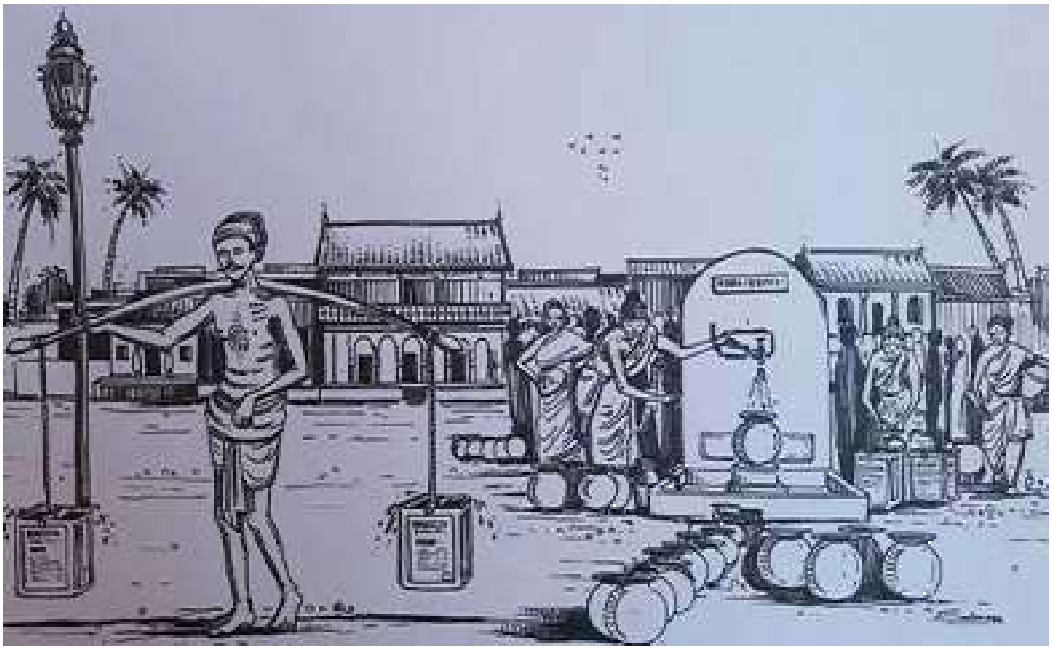
The plan was to construct a barrier to the Hanumanthavaka stream at Mudasarlova to form a reservoir with a catchment area of about six square miles to store about 25 million cubic feet of water. To construct filter beds and to lay a 10-inch pipeline to the town service reservoir (TSR Complex) near the present LIC building and to lay distribution pipelines to various municipal wards in the town. The construction of the project was undertaken by the Public Works Department. The residents of the city got the first taste of protected water on 18 December 1901, though the completion of the total project took some more time and the water supply scheme was finally handed over to the municipality on 21 May 1903. Initially, Waltair and Dondaparthi areas were not included in this scheme. As the elevation of Waltair was high, a pumping station was erected to pump water from the service reservoir and protected water was first supplied to Waltair on 28 April 1915.

The municipality supplied water through public taps. Initially tap connections were not given to the individual houses. In 1917 the Rani of Wadhwan contributed to the extension of pipelines to the northern portion of Allipuram and the Hindu Crematorium ground. Later tap connections were provided to institutions like King George Hospital, Mental Hospital, and Jail for their exclusive use.

By 1927 there were 19 public taps in Waltair, 71 in the town of which 22 were constructed by philanthropists. The most iconic one was, popularly known as Bommalakolayi, located near the present MVDM School / Andhra Baptist Church in the old town, constructed by Maharani Goday Narayana Gajapathi Row in memory of the late Rani of Kurupam. As per a news item published in Madras Mail on 5 May 1904, this tap (called fountain then) was opened by Mrs. Campbell, wife of the then District Collector, on 22 April 1904.

In those days public taps were like village wells where the women used to meet and gossip while waiting for their turn to fill their containers. Occasionally there used to be quarrels between someone or the other, about their rightful place in the queue formed with the placement of their containers, as the water supply was provided only for a few hours (one or two hours) in a day depending upon the availability of water. The middle-class families or those that could afford it, used to employ water carriers (a part-time occupation, the new water supply provided to the poor able-bodied men). These water carriers used to carry what are known as Kavidis. The Kavidi used to be a strong long bamboo stick, on either end of which hung a water container. The containers almost always used to be old kerosene tins of 4 gallons. The middle-class families used to employ these carriers to bring water from the nearest public taps to their homes and the carrying charges were paid according to the number of kavidies. This water was used only for drinking purposes and for other purposes they used to have their private well in their premises, which they were using for drinking purposes before the protected water supply scheme was introduced. This group of water carriers continued their occupation till the municipality provided house connections.

This water supply scheme met the needs of the city for about 10 to 15 years as people were using tap water for drinking and well water for other needs. However, the construction of a new harbour had put the municipality in a difficult situation in providing water to the harbour and to the ships. As the municipality was unable to meet their needs the harbour authorities looked for alternative sources. They found a spring on the south side of the entrance channel on Dolphin Nose Hill almost about 150 ft above the sea level in the area known as Lova Gardens. This Lova Garden area was owned by the family of local Zamindar Goday



Narayana Gajapathi Rao. The government under the Land Acquisition Act acquired this land in the spring of 1928 for the development of the Harbour project. The harbour laid a pipeline to carry water from the spring to a water tank constructed towards the southwest side of the entrance channel. Water from this source was used by the harbour to supply ships through water barges. This saved the municipality from the further burden of providing water to the ocean-going ships.

Further growth of population, due to the establishment of Medical College, King George Hospital and the shifting of Andhra University to Waltair put more strain on the Municipality to supply water. Added to this the Second World War had brought large contingents of the Army and Air Force to Vizag further increasing the water pressure. In that situation, the Army took up a new water supply scheme to tap water for the town from the Gostani River between Tagarapuvalasa and Bheemlipatnam. This Gosthani Water Supply Scheme was constructed by the Army Engineers in 1942 for a supply of an additional 4 lakh gallons per day (0.4 MGD) which was later handed over to the Municipality. After independence, the following schemes were constructed. Post-independence, a series of dams and reservoirs like Gambhiramgedda, Tatipudi, and Meghadri were built, augmenting the supply. Yet, the ever-expanding city and industries face constant challenges. With new industries, the struggle for water persists, a testament to the ongoing importance of this precious resource.

1 Gambhiramgedda scheme in 1957 for a supply of 1.8 MGD per day
2 Tatipudi reservoir scheme in 1967 for a supply of 10 MGD per day
3 Meghadri reservoir scheme in 1977 for a supply of 10 MGD per day
4 Through canals from Raiwada and Yeleru reservoirs another 15 MGD supply was added in 1995

Water supply schemes for supplying water to Visakhapatnam City. The city limits shown have extended further in recent years. With the new industries coming up and the city growing, there is always a shortage of water to cater to the needs of residents and the industry, with deficit monsoon years creating crises. The Government is relentlessly struggling to find new water sources to meet the ever-increasing demands.

Peninsular river basins in India more likely to face widespread flooding than transboundary rivers:

By Rohini Krishnamurthy

Study

Researchers looked into drivers of widespread flooding in seven Indian subcontinental river basins

River basins in peninsular India face a higher probability of widespread flooding compared to the Ganga and Brahmaputra, according to a new study published in the American Meteorological Society's Journal of Hydrometeorology.

Narmada basin has the highest probability (59 per cent) of widespread flooding, followed by Mahanadi (50 per cent), Godavari (42 per cent), Krishna (38 per cent) and Cauvery (19 per cent).

As for transboundary river basins, Ganga and Brahmaputra have a probability of 21 per cent and 18 per cent, respectively.

Widespread flooding causes enormous losses and damages compared to localised flooding, as it covers a large part of a river basin.

"However, understanding the occurrence and drivers of widespread floods in the Indian subcontinental river basins is limited as the focus has primarily been on localised flooding," the researchers from the Indian Institute of Technology Gandhinagar wrote in the paper.

The team analysed the occurrence of widespread floods in seven major river basins in the Indian subcontinent, such as Ganga, Brahmaputra, Godavari, Krishna, Mahanadi, Narmada and Cauvery in 1959-2020.

With 40 events in the period, the Mahanadi and Narmada river basins had the highest frequency of widespread floods, the analysis showed. Krishna and Godavari basins witnessed more than 20 widespread floods, while Ganga, Brahmaputra and Cauvery basins saw less than 15 events in the period.

The team also found strong seasonal trends in widespread flood probability in the subcontinental river basins. For example, during the summer monsoon season, all seven river basins, except Cauvery, experienced widespread flooding in August.

Godavari, Mahanadi and Narmada basins recorded widespread flooding in July, August and September.

The trend of seasonality is also tied to rainfall. India receives around 80 per cent of the total annual precipitation during the summer monsoon season from June-September, the paper highlighted.

Godavari, Mahanadi, and Narmada basins lie in the core monsoon region and receive more rainy days in July to September, the findings showed.

The Cauvery faces flooding in October-December, as most of the river's subbasins receive rainfall during the northeast monsoon season.

The Brahmaputra river basin experienced widespread floods during June-July as the northeast region receives rainfall earlier compared to north Indian states.

"Therefore, most widespread floods occur during the summer monsoon season and the probability of widespread floods during the summer monsoon season is similar to the annual probability in all basins except for Cauvery," the paper read.

The researchers also looked at the drivers of widespread flooding. The 2018 Kerala floods, 2022 Pakistan floods and lower Mississippi river floods in 2008, 2011 and 2015–19 have been linked with atmospheric rivers that usually carry moisture from the tropics to the extratropics. Atmospheric rivers are large sections of the Earth’s atmosphere carrying water vapour through the sky.

Widespread floods in India are associated with large atmospheric circulations that cause precipitation in the river basin, the study noted.

The drivers of widespread floods are expected to alter the timing, occurrence, and probability of widespread floods in a warming climate, the researchers wrote in the paper.

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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संपादक डॉ. दत्ता देशकर
e-mail - dgdwater@gmail.com
मासिकाची वेबसाईट - www.jalsamvad.com

Surface irrigation may encourage monocropping:

Evidence from Telangana holds lessons for India

By Shagun

Providing farm households with new irrigation facilities that improve groundwater table also significantly enhances farm profits

Farmers are more likely to move towards monocropping if farms receive a higher level of surface irrigation, as opposed to irrigation facilities achieved through projects that increase the groundwater table, a recent study on cropping patterns and trends in Telangana showed.

Surface irrigation is a traditional method in which water moves over the land, depending on the gravitational gradient. When water is applied to the field, it advances across the surface until the water extends over the entire area. The drawback of this irrigation method is inefficient usage and wastage of water.

Results from the research indicate that the presence of new irrigation facilities, achieved through projects that increase the groundwater table, increases the likelihood of farm households adopting crop diversification compared to those with existing irrigation facilities.

This suggests that surface irrigation tends to encourage the adoption of monocrops, especially paddy, Dayakar Peddi and B Suresh Reddy, researchers from Centre for Economic and Social Studies (CESS), Hyderabad, Telangana, who conducted the study observed.

"The coefficient of surface irrigation is negative, indicating that farmers are less inclined to adopt diversification when their farms receive more surface irrigation compared to rain-fed conditions. This is attributed to the shift observed among many surface irrigation farmers towards

paddy crops," the authors mentioned in the report Analysis of Irrigation Enhancement, Crop Diversification and Farm Profits: Evidence from Telangana State published in Review of Development and Change journal.

Insights from focus group discussions revealed that small farmers cultivate a higher variety of crops when provided with access to irrigation through groundwater.

Meanwhile, it was also found that providing farm households with new irrigation facilities aimed at improving the groundwater table significantly enhances farm profits, compared to those in regions relying on surface irrigation.

In newly irrigated regions, the introduction of improved irrigation facilities has resulted in a 21 per cent increase in farm incomes compared to those in regions utilising surface irrigation.

"Although surface irrigation may initially seem like a more lucrative option for achieving higher returns, it carries potential environmental challenges, including soil fertility loss due to waterlogging and salinity. In addition, continuous access to irrigation may contribute to the development of monoculture," the researchers pointed out.

The findings hold significance for breaking the monocropping pattern followed by many farmers across India to enhance productivity. Monocropping has led to nutrient soil deficiency and a decrease in resource-use efficiency. In states like Punjab, Haryana and Telangana, the monocropping of paddy has led to several problems, including an alarming decline in groundwater.

In October 2023, a report from United Nations University-Institute for Environment and Human Security, warned that India was close to reaching its groundwater depletion tipping point. More research has indicated that the rate of depletion of groundwater in India during 2041-2080 will be thrice the current rate with global warming.

Telangana, where the study was conducted, is one of the largest producers of paddy in the country. The observations of cropping patterns and trends in the state indicated a decline in diversified cropping systems over the years, attributable to different factors such as improved access to irrigation facilities and market policies favouring the cultivation of cereals. The state-level crop diversification index has been consistently low, standing at 0.27 over decades.

Farmers tend to move towards conventional and monocropping practices over the years across the state, except in some patches of rain-fed regions, the findings showed. Major cereals (paddy and maize), minor cereals (sorghum, finger millet, pearl millet and small millets), pulses (chickpea, pigeon pea and minor pulses), oil seeds (groundnut, sesamum, rapeseed, safflower, castor, linseed, sunflower and soybean), commercial crops (cotton and sugarcane), fruits and vegetables are predominantly cultivated, comprising more than 90 per cent of the total cultivated area in Telangana, according to data given in the study.

However, the proportion of cultivation of major cereals, commercial crops, fruits and vegetables significantly increased from 1966 to 2017, while that of pulses, oilseeds and millets significantly decreased during the same period.

Farmers make decisions regarding the cultivation of a specific crop based on the expected benefits derived from its cultivation and the constraints faced by their households (adopters).

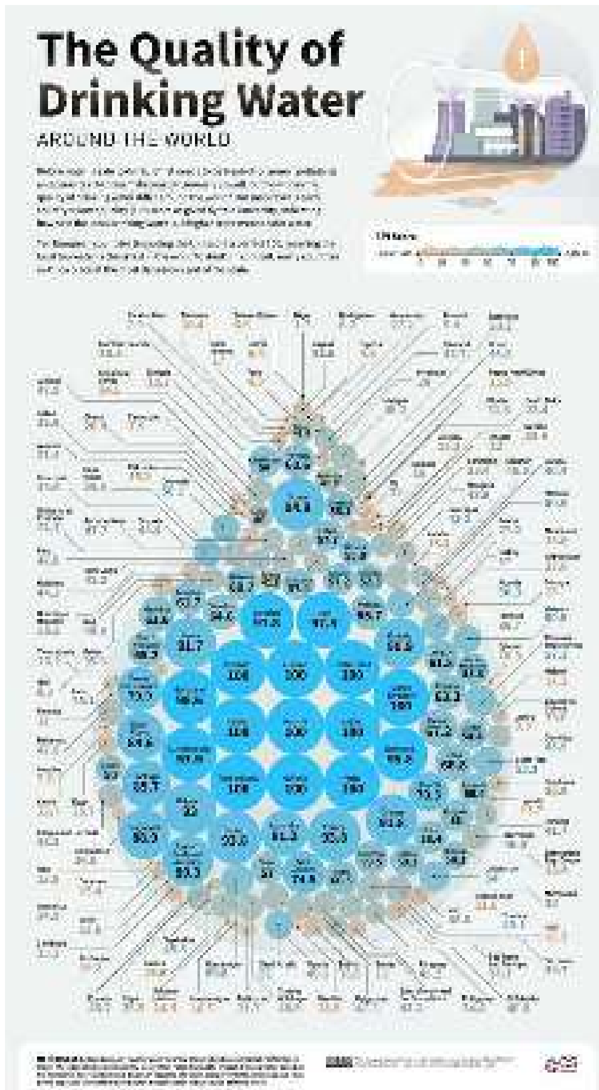
Additionally, the decision to cultivate a single crop (monocrop) or a set of crops (crop diversification) was based on the anticipation that the expected benefits from a specific crop surpass that of another set of crops or its associated benefits.

The research encompassed 12 districts and 24 villages within Telangana, covering all agro-climatic zones. Among the 12 districts, six experienced partial benefits from new irrigation projects.

Data for this study were obtained through a household survey, conducted from January-March 2022, involving 700 farmers, who were categorised into two groups: Those in highly irrigated areas and those in low irrigated areas.

In addition, focus group discussions were conducted with various stakeholders at district levels, including farmers, government officials and scientists, for the study.

These discussions highlighted that the minimum support price also plays a pivotal role in choosing a crop. Other characteristics which affect crop choices were agricultural implements and market access variables such as road connectivity and distance to the nearest city.



Mapping rainfall erosivity over India using multiple precipitation datasets

Author links open overlay panelRavi Raj a, Manabendra Saharia a, Sumedha Chakma a, Arezoo Rafieinasab b

Abstract

Rainfall erosivity is a measure of the erosive force of rainfall which represents the potential of rain to cause soil erosion. A large proportion of the total eroded soil in India is due to erosion by water, and rainfall erosivity is one of the major components. The current assessments of rainfall erosivity in India are however largely based on rain-gauge recordings and surveys which hinders its estimation and understanding over large areas. Growing availability of remotely-sensed gridded precipitation datasets presents an unprecedented opportunity to study long-term rainfall erosivity over varied terrains and address some of the limitations of point data-based estimations. In this study, multiple national and global gridded precipitation datasets were utilized to develop a high-resolution rainfall erosivity factor (R-factor) map to highlight areas prone to rainfall-induced erosion. Further, a large selection of empirical equations from literature were employed for estimating rainfall erosivity to provide a comparative analysis of these commonly adopted methods. The calculated rainfall erosivity is also compared with alternative methods to estimate R-factor such as Fournier Index (FI) and Modified Fournier Index (MFI). It was observed that MFI is highly correlated with rainfall erosivity, and an equation was finally proposed to estimate R-factor using MFI. This is the first such national-scale assessment of rainfall erosivity over India using gridded precipitation datasets, which will aid in understanding and mitigating rainfall-induced erosion.

Introduction

Soil erosion which is also called the ‘creeping death of the soil’ is a global problem (Tripathi and Singh, 1993). India is facing soil erosion problems in sectors such as reservoir siltation, soil-degradation and in agricultural sectors mainly. The upmost layer which is also the most fertile layer of the soil, is also most exposed to erosion induced by water (Lukić et al., 2019, Lukić et al., 2018). Rainfall erosivity also known as rainfall-runoff erosivity factor is one of the contributing factors to the Universal Soil Loss Equation (USLE) (Wischmeier and Smith, 1978) as well as the Revised Universal Soil Loss Equation (RUSLE) (Renard et al., 1997), which is used to estimate long term average soil loss. This study performs a comprehensive estimation of rainfall erosivity over India as well as establishes new empirical equations suitable for field applications.

Apart from classical models such as USLE and RUSLE, several large-scale soil erosion models have also been used at continent level to estimate soil erosion (Bosco et al., 2015, Morar et al., 2021, Panagos et al., 2015b). Soil erosion models play a significant role in the planning and implementation of soil management strategies (Lukić et al., 2019, Panagos et al., 2015a). The potential ability of rainfall to erode soil is termed rainfall erosivity (Wischmeier, 1959), which is one of the best indicators (Renard et al., 1991) to measure the erosive potential of rainstorms for a particular duration. When a rainfall droplet falls on the soil surface it exhibits forces on the surface, and if the forces applied exceed the cohesive forces between the soil particles, the movement of soil particles start (Bryan, 2000). Studies highlighted rainfall erosivity as a key factor to investigate natural hazards such as landslides and floods as it is one of major root-causing reasons for these hazards (Capolongo et al., 2008, Diodato, 2004, Nazzareno et al., 2015). Ideally, the R-factor should be estimated using high-resolution with 1–5-minute interval precipitation records (Williams and Sheridan, 1991) but such datasets are not available in most parts of the world for long-enough periods. So, half-hourly or hourly data has been widely used for the estimation of the rainfall erosivity factor using the kinetic energy-rainfall intensity principle (Padulano et al., 2021, Panagos et al., 2017). The rainfall erosivity factor (Annual R-factor) is one of the factors of the widely adopted RUSLE (Revised Universal Soil Loss Equation) model, and calculated for a minimum period of 20 years as the average of the sum of the rainfall erosivity factors for every year (Vantas et al., 2019). Proper measurement of both rainfall intensity and kinetic energy is required to get an accurate estimation of the R-factor, but it is very difficult to record rainfall kinetic energy directly as the instruments required are costly, and the measurement of the drop size distribution of the rainstorm is an inconvenient method (Dash et al., 2019, Fornis et al., 2005). There are numerous mathematical empirical relationships (linear, polynomial, logarithmic, exponential, and power-law functions between rainfall intensity and kinetic-energy) to estimate the kinetic energy of a rainstorm (Rosewell, 1986). Dash et al. (2019) collated fourteen empirical equations to estimate kinetic energy developed by researchers across the world from which they used only six for their study because of their universal application (Dash et al., 2019), the same six equations were adopted in this study.

The R-factor is highly sensitive to the method used to estimate EI30 (R-factor for 30-minutes rainfall intensity) and the amount of I30 (30-minutes rainfall intensity) (Catari et al., 2011), but if I30 value records are not available, then other forms of intensity estimation are used (I5, I10, I15, I40, I60) (Sharifah et al., 2006, Sinzot et al., 1989, Usón and Ramos, 2001). There are contradictory points of view on the selective use of these intensities (Zheng and Chen, 2015). In Eastern Ghats of India, Dash et al., 2019, Rajbanshi and Bhattacharya, 2020 emphasized that if we use hourly rainfall intensity data (I60) instead of half hourly (I30), it underestimates the value of the R-factor by 23.4% while Lobo and Bonilla (2015) pointed out in their study that the R factor estimated using I60 gives a value less than 10% as compared to that of I30. The R-factor computation using I30 and I60 rainfall data are also known as EI30 and EI60, respectively. In this study, I60 will be considered as I30 due to inaccessibility of sub-hourly data at national scale. 3-hourly precipitation product (TMPA 3B42) has been used to estimate rainfall erosivity factor for Africa (Vrieling et al., 2010). They had used 3 hourly rainfall value as the value of I30, although I30 would be higher than the mean precipitation intensity during 3 h (Vrieling et al., 2010).

Spatial variation in the R-factor is not certain in comparison with the spatial variation of rainfall as it occurs in Indian conditions (Tiwari et al., 2016). The R-factor can also be computed using indices such as Fournier Index (FI) and Modified Fournier Index (MFI) when high-resolution precipitation datasets are unavailable (Pandey et al., 2007, Prasannakumar et al., 2011). MFI has been used to assess rainfall erosivity and its relationship with other climatic variables which lead to estimate disastrous erosion (Lukić et al., 2016, Morar et al., 2021). All the studies performed in the Indian context thus far have been based on gauge-based precipitation records. The average annual R-factor for Kerala state was computed as 151.466 MJ cm/ha/h/yr for years 2004–2008 (Prasannakumar et al., 2012), but variation in the R-factor was reported at the nearby locations in the same state as 3.16 MJ cm/ha/h/yr for the years 2005–2008 (Prasannakumar et al., 2011). In Arunachal Pradesh also such type of variation was reported. Dabral et al., (2008) considered average annual R-factor for the state as 189.46 MJ cm/ha/h/yr, but Rawat et al., (2013) experimentally estimated the annual R-factor as 974.77 MJ cm/ha/h/yr with standard deviation of 160.16 MJ cm/ha/h/yr.

Theoretically, Tiwari et al., (2016) estimated the R-factor for 52 gauge stations and later interpolated over whole India. Dash et al., (2019) also mapped rainfall erosivity for Eastern Ghats of India using gauge-based precipitation and the annual R-factor varied from 3040 to 10127 MJ-mm/ha/h/yr with standard deviation of 1981 MJ-mm//ha/h/yr. A global R-factor map was created by Panagos et al., (2017) covering a total of 87 countries of the globe considering high resolution datasets of 1675 rainfall stations. They also mapped the R-factor for India considering hourly rainfall dataset of 247-gauge stations for an average seven years (2007–2015) and interpolated the results to get the rainfall erosivity map at 30 arc seconds (□1km).

In this study, for the first time, multiple gridded precipitation datasets were used to calculate rainfall erosivity over India. The R-factor was calculated for a minimum period of 20 years to counter the uncertainties and biasness raised due to wet and dry seasons (Vantas et al., 2019). Although gauge-based rainfall provides accurate records of the occurred precipitation, it has limitations due to poor spatial coverage in many parts of the globe (Kidd and Huffman, 2011, New et al., 2001), and gauge data alone are not sufficient to for many hydrologic simulations (Kotlarski et al., 2019, Villarini and Krajewski, 2008). Gridded precipitation has its own limitations depending upon the source and mode of the derivation of the data and also due to the intrinsic differences in spatial scales (Chen et al., 2008, Shen et al., 2010, Tapiador et al., 2012, Xie et al., 2007).

The objectives of this study were to create a R-factor map for India using high resolution gridded precipitation data, highlighting the rainfall-erosivity-prone areas and analyzing the sensitivity of the method chosen to estimate rainfall erosivity over India. This will be the first such national-scale assessment of rainfall erosivity over India using gridded precipitation. Agricultural experts as well as soil conservational experts could apply the rainfall erosivity map to incorporate safety measures to minimize soil erosion.

Section snippets

Study area

Our study covers the entire political boundary of India. India is the seventh-largest country in the world and is surrounded by three major oceans - Arabian Sea, by the Indian Ocean, and the Bay of Bengal. Its diverse climatic conditions range from deserts in the west, glaciers in the north, humid tropical forests in the southwest, and many islands in the Arabian Sea and the Bay of Bengal. The nation's tropical climate is classified into four main seasons i.e., monsoon, post-monsoon, summer,

R-factor estimation

IMDAA hourly (I60) precipitation data was used to estimate rainfall erosivity factor using all the six equations (equations 1 to 6) of kinetic energy-based methods explained in the previous section. The average R-factor averaged over 40 years are shown in Fig. 2(a) to 2(f).

The R-factors estimated using all the six equations exhibit a similar trend and spatial distribution throughout the nation (Fig. 2(a) to 2(f)). The regions having higher values of R-factor, i.e., regions prone to

Uncertainty and limitations

The approach followed in this study consists of application of hourly (I60) precipitation intensity data for the calculation of rainfall erosivity factor. R-factor is defined as the product of total kinetic energy by the maximum 30-minutes rainfall intensity for an erosive rainfall event (Vantas et al., 2019). This study utilized some of best-available high-resolution rainfall datasets for entire Indian region, these gridded datasets have their own limitations depending upon the source and mode

4. Conclusions and recommendations

This study describes the variation of rainfall erosivity pattern throughout the nation and check the applicability of alternative indices to estimate

R-factor in Indian context. High resolution rainfall (IMDAA hourly reanalysis product) for 40 years and daily rainfall data (IMD daily and CHIRPS daily) for 116 years and 39 years respectively were used for the study. The main conclusions of this research are as follows:

All the six equations to calculate R-factor are applicable throughout the

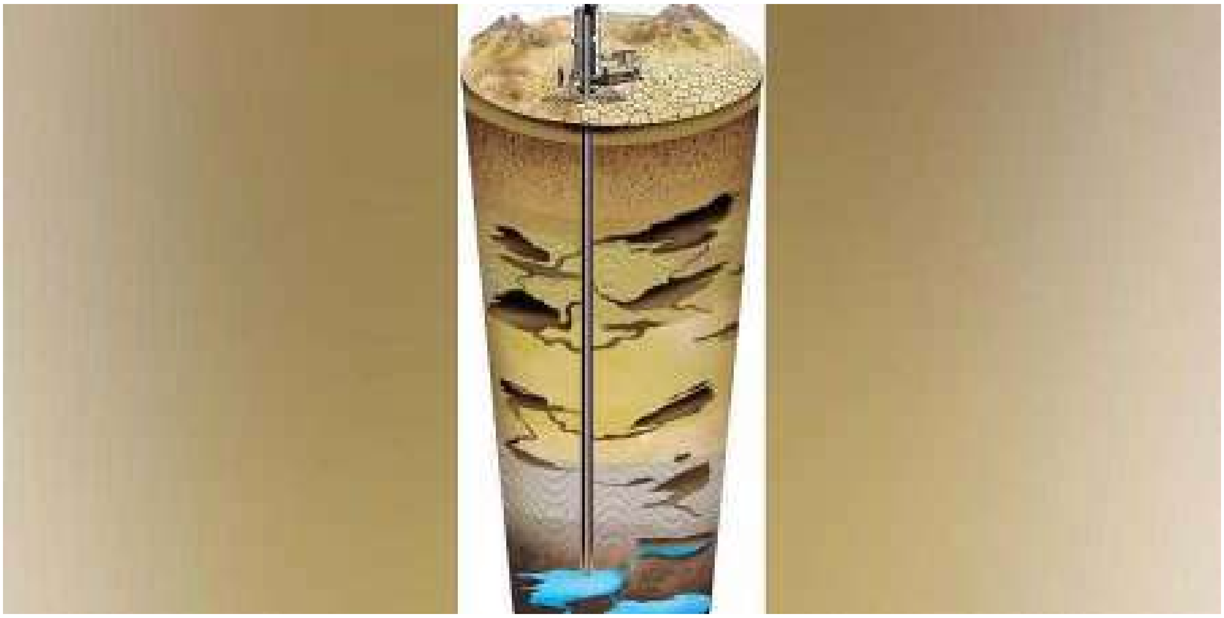
Declaration of Competing Interest
The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements
This work was supported by Indian Space Research Organization (Rp04139), IITD-UCL MFIRP (MI02273), and the IIT Delhi New Faculty Seed Grant. Authors gratefully acknowledge the India Meteorological Department (IMD) and NCMRWF, Ministry of Earth Sciences, Government of India for providing access to the datasets. The authors would also like to thank the handling editor and the anonymous reviewers for providing useful comments which greatly improved the quality of this manuscript.

References (80)
R.B. Bryan
Soil erodibility and processes of water erosion on hillslope
Geomorphology
(2000)
D. Capolongo et al.
Analyzing temporal changes in climate erosivity using a simplified rainfall erosivity model in Basilicata (southern Italy)
J. Hydrol.
(2008)
R.L. Fornis et al.
Kinetic energy-rainfall intensity relationship for Central Cebu, Philippines for soil erosion studies
J. Hydrol.
(2005)
G.P. Lobo et al.
Sensitivity analysis of kinetic energy-intensity relationships and maximum rainfall intensities on rainfall erosivity using a long-term precipitation dataset
J. Hydrol.
(2015)
R. Padulano et al.
Datasets and approaches for the estimation of rainfall erosivity over Italy: a comprehensive comparison study and a new method
J. Hydrol. Reg. Stud.
(2021)
P. Panagos et al.
The new assessment of soil loss by water erosion in Europe
Environ. Sci. Policy
(2015)
V. Prasannakumar et al.
Estimation of soil erosion risk within a small mountainous sub-watershed in Kerala, India, using Revised Universal Soil Loss Equation (RUSLE) and geo-information technology
Geosci. Front.
(2012)
J. Rajbanshi et al.
Assessment of soil erosion, sediment yield and basin specific controlling factors using RUSLE-SDR and PLSR approach in Konar river basin
India. J. Hydrol.
(2020)
K.G. Renard et al.
Using monthly precipitation data to estimate the R-factor in the revised USLE
J. Hydrol.
(1994)
F.J. Tapiador et al.
Global precipitation measurement: Methods, datasets and applications
Atmos. Res.
(2012)

Declining groundwater level; borewell census to be held in 2024

By Bosky Khanna



An official from the groundwater board said 14 lakh borewells in Karnataka include private and commercial, borewells for irrigation purposes.

BENGALURU : As part of the all India borewell census undertaken by the Central Groundwater Board in coordination with the groundwater boards of all states in 2024, the Karnataka State Government is working to find out the total number of authorised and unauthorised borewells in the state. In the previous census held in 2019, Karnataka registered 14 lakh authorised borewells, but there was no conclusive report on the unauthorised borewells.

The census gains importance as the National Green Tribunal (NGT) has taken note of the rapidly depleting groundwater levels across India. Taking note of this, the Ministry of Environment, Forests and Climate Change (MoEFCC) has asked all State governments to submit a report on the groundwater levels and the measures taken to address the issue.

An official from the groundwater board said 14 lakh borewells in Karnataka include private and commercial, borewells for irrigation purposes. "Despite the emphasis on preserving and utilising surface water, 80 percent of water requirements for irrigation, and 5 percent of domestic water requirements are still dependent on groundwater. Only 20-30 percent surface water is used for irrigation."

The official explained that the groundwater situation in Karnataka had improved during 2021 when the state received good rain. There was a decline in the year 2023 because of the drought. This led to increased dependency on groundwater, reducing the groundwater table.

"The borewell reports should be generated annually and the data should be updated to the Centre, by the state. Instead, the ministry carries out the census once every five years. Government departments including minor irrigation, panchayat, groundwater board and forest department of each state are a part of the census to collate the data," the official added.

Minor Irrigation and Science and Technology Minister NS Boseraju told TNIE, "In the last five years there would have been a 20- 25 per cent increase in the number of borewells. Despite the Central and State governments keeping a record of the number of borewells, there are many unauthorised borewells. Once the census is done, we will know how many of these are built without authorisation, and they will be closed down."

The NGT team member who passed the order said, "It is clear that there will be a severe shortage of groundwater by 2025. While government agencies are taking baby steps to address the issue, people's attitude is a major concern. Everyone has borewells today. Water is drawn from it, despite getting pipe water. Rainwater harvesting is not being implemented. Everyone wants to take a shower and have a bathtub. There is a lack of awareness when it comes to water conservation."

*****

India to lead nine-member Global River Cities Alliance

National Mission for Clean Ganga director general G Asok Kumar said the GRCA's launch was a testament to the fact that river management was a matter of global interest.

NEW DELHI: A nine-country 'Global River Cities Alliance' (GRCA) inspired by India's River Cities Alliance was launched at the Indian Pavillion, Dubai on the sidelines of the ongoing COP28 on Sunday.

Global River Cities Alliance, GRCA, officially launched at India Pavillion, Dubai, marking a watershed moment (X/cleanganganmcg)The other eight nations are Denmark, Cambodia, Japan, Bhutan, Australia, Netherlands, Egypt, and Ghana.

The National Mission for Clean Ganga, under the Jal Shakti ministry and Housing and Urban Affairs ministry's National Institute for Urban Affairs (NIUA), will take on the role of the Secretariat of the GRCA to generate the initial momentum of the alliance activities which will include knowledge exchange, capacity development, high-level advocacy, and bi-lateral interactions among member cities.

Senior officials of multi-lateral funding agencies such as the World Bank, Asian Development Bank and Asian Infrastructure Investment Bank have also pledged their support for the initiative, a statement by NIUA said.

National Mission for Clean Ganga director general G Asok Kumar said the GRCA's launch was a testament to the fact that river management was a matter of global interest. India is happy to lead the efforts in this direction, he said, according to the statement. The River Cities Alliance currently has 142 river cities in India and serves as a dedicated platform for members to discuss aspects related to enhancing the state of urban rivers within their administrative boundaries.

On December 8, the National Mission for Clean Ganga signed a Memorandum of Common Purpose (MoCP) with the Mississippi River Cities and Towns Initiative (MRCTI), representing 124 cities/towns situated along the banks of the Mississippi River, USA. on the sidelines of COP28. As part of the collaboration, a comprehensive water monitoring program, sharing best practices for renaturing urban areas, and restoring aquatic ecosystems for sustainable urban development initiatives will be discussed.

*****

Key Facts about Painganga River

Protests were staged against a proposed dam project on the Painganga river in the Vidarbha region of Maharashtra recently.

About the Painganga River:

The Painganga River (also known as the Penganga River) is the chief river of the Yavatmal district in Maharashtra and flows along the south-east boundaries of the district in a winding, meandering course.

Origin: It originates in the Ajantha ranges in Aurangabad district in Maharashtra.

It is a major tributary of the Wardha River, the other major river in the district. The Wardha River flows into the Wain Ganga Riverto form the Pranhita River, which finally joins the Godavari River.

It is acutely deep-rooted and difficult to navigate.

The total length of the river is 676 km.

Major Tributaries: Include the Adan, Kas, Arunavati,Kayadhu, and Pus Rivers.

The Penganga River gets flooded in the rainy and winter seasons and partially flooded in the summer.

It provides irrigation to the Washim and Yavatmal districts in Maharashtra.

There are two dams being constructed on the river, namely Upper Painganga and Lower Painganga. This dam is also known as Isapur Dam.

PWCDF's Remarkable Journey : A Year of Resilience and Hope - Part 3

Responsibilities of the Commissioners:

1. To mobilise, create awareness, capacitate communities for drought and flood mitigation, adaptation, and resilience.
2. Mobilise resources for the work of the Commission.
3. Understand the local ecohydrology and develop a team of Advisory Council members and General Assembly members in their geographical area of work.
4. Develop a work plan and oversee its execution based on inputs of Advisory Council and General Assembly.
5. Build bridges between various stakeholders.
6. Contribute to the Commission's deliberations, framework, and activities.

Advisory Council

Responsibilities of the Advisory Council:

1. To advise/support the Commissioners their work.
2. Create an enabling environment to the marginalised most affected by drought and flood.
3. Develop community-centred and evidence-based process for recommendations for drought and flood mitigation, adaptation and resilience.
4. Respect ago-biodiversity, understand its linkage with climate and create awareness amongst communities for respecting indigenous biodiversity and linking with water cycle and water availability and local ecosystems.
5. Explore and create a vibrant database of 'scientists with sense or community scientists.

General Assembly

The General Assembly members will comprise of those who are directly working on the ground or are associated with such persons/institutions/ civil society organisations. They are willing to search for solutions. They are working with communities who have been displaced due to lack of water and hence livelihoods, for their return to successful agriculture, for groundwater recharge, for river rejuvenation and ecosystem restoration, air pollution or any relevant organization. There is no limit to the number of members and can include those interested.

The Commissioners will represent different eco-hydrological regions and will be from that region itself.

Annex II

PEOPLE'S WORLD COMMISSION ON DROUGHT AND FLOOD UDAIPUR DECLARATION

DECEMBER 10, 2022

"The world has enough for everyone's need, but not enough for everyone's greed."
- Mahatma Gandhi

RECOGNISING THAT, water is the source and creator of life. We bow to her and offer our deepest reverence, love, and gratitude. We are water.

RECOGNISING THAT, water is not only a technical issue. Water is an economic issue, water is a political issue, water is a social and human rights issue, water is an educational issue, water is a spiritual issue. Working with water must therefore be engaged with from multiple disciplinary perspectives and stakeholders.

RECOGNISING THAT, water is climate and climate is water. The climate regulates the hydrological cycle, and the hydrological cycle affects the climate. Climate change is the defining issue of our times, and we are in a critical state of climate emergency. The climate, water, biodiversity, health, and social inequality crises our planet is facing today are deeply interlinked.

RECOGNISING THAT, the increased frequency, duration and intensity of drought and floods due to climate change have already caused immense stress and loss to peoples' lives around the world in addition to billions in economic damage, disruption of social fabric and deepening inequality. This is slated to increase in the coming years in both rich and poor countries. Nobody can escape it.

RECOGNISING THAT, most water-related disasters are caused by excessive human tampering with nature and efforts to "control" it. They can be particularly traced to the market-consumerist economy, monoculture mal-development practices, privatisation of the commons, massive unsustainable urbanisation, and inequitable excessive consumption. Nature is responding to these fundamental civilizational shifts in our behaviour and outlook. We can no longer keep perpetuating a narrative that blames nature. We must take responsibility for the harm our human systems are causing.

RECOGNISING THAT, our formal education systems have focused only on the head and have ignored the heart, the hands and home. They have also dismissed and destroyed indigenous knowledge and nature-based wisdom. There is an urgent need to change our understanding of and relationship to water and our natural ecosystems with new education programs integrated into the primary, secondary and tertiary levels. In addition to outer landscapes, there is a need to heal our inner landscapes.

RECOGNISING THAT, drought and flood mitigation, adaptation and resilience is dependent on healthy groundwater and rivers. Many ecosystems have been severely degraded and there is an urgent need for holistic ecosystem restoration initiatives. Successful ecosystem restoration calls for us to recognize the tremendous diversity that exists within and between ecosystems.

RECOGNISING THAT, climate change has been disproportionately caused by industrialised countries, yet its effects are disproportionately felt by the poorest communities, and that whether a country is rich or poor, it is the poorest citizens who are most vulnerable, and have the least means to cope with the effects of climate change.

RECOGNISING THAT, the leadership of women, youth, indigenous, rural farmers, and marginalised peoples need to be central to decision-making around water and climate and calling for every voice to become part of the solution.

RECOGNISING THAT, traditional knowledge and local wisdoms must be brought into partnership with scientific research, innovative technologies and creative management in order to find viable and long-term regenerative solutions.

RECOGNISING THAT, there is a need for national and international bodies to set high standards and effective monitoring with local governments in partnership with industry, academia and civil society groups.

RECOGNISING THAT, Tarun Bharat Sangh and its partners have over 5 decades of grassroots experience in building decentralised, ecologically appropriate participatory water conservation and management systems, action-research approaches that have led to resilient communities.

WE DECLARE:
We commit to build local teams comprising of communities, civil society organisations, farmers, researchers, media, artists, religious groups, government, and corporate partners across political divides to collaborate on drought and

flood mitigation, adaptation and resilience projects in 100 hotspots around the world in the next 3 years.

We commit to collectively mobilising investments for a Global Fund to build drought and flood resilient communities with an approach to innovation that focuses on holistic solutions rather than on "techno-fixes" that ignore the systemic problems. These solutions will be based on community wisdom and aligned to the eco-hydrological and cultural diversity.

We commit to launching the Global Center for Drought and Flood Resilience which bring to fore indigenous knowledge systems, successful case studies and contextual agro-hydro-ecology suited solutions. We will build leadership capacities through water management courses, water literacy drives, art and culture, policy campaigns and action-research initiatives to bring about larger non-violent systemic change. Data analysis, and bridge gaps between indigenous knowledge and modern knowledge.

This Udaipur World Water Conclave pledges to carry forward through practical, measurable, and time-bound actions the water community's collective response to climate change as recognised recently in the COP-27 Declaration.

Annex III.
World Pledge to Rejuvenate the Water-Cycle

I am water. I stand before you as water. Together, we advocate a healthy water cycle.
Our support is for the kinship of people and water.
Through water, we connect:

PERSON: Every one of us carries water in our bodies;

PROCESS: Every community comes together and can flourish with and around water;
PLANET: Water gives life and balance to this Earth: one Planet— one Water.

It is within our lifetime that the water cycle has been broken. Our solution is rejuvenation.

Rejuvenation is a paradigm shift in thought and practice that goes beyond the dominant human centric worldview. We encourage 10 key shifts:

1. From narrow to all-encompassing concepts, terms and frameworks that cover all stages of the water cycle.

2. From data and information to Wisdom, weaving indigenous knowledge systems with modern science, art and technology.

3. From formal education systems to living knowledge that energizes youth.

4. From wasteful abuse to judicious circulation and guardianship of waters.

5. From commercialisation to communitization, where community is understood as the fellowship of all living beings.

6. From a general attitude of indifference and apathy to organised action and work for water.

7. From insensitivity to a sensitive awareness of every water body as a unique and biodiverse ecosystem.

8. From short-term goals and timeframes to life-long commitments to present and future generations.

9. From narrow economic value to broad and fair ecological values.

10. From ownership and control to free-flowing water, acknowledging the equitable rights of all living beings.

We hold the collective conviction that fulfilment of this pledge can lead to climate change adaptation, restoration and resilience. These changes will condense in one shift from outer to inner understanding, paving the way for a spiritual life that strives for happiness, well-being and peace.

Annex IV

Puri Declaration: 8-9 May 2023

The People's World Commission on Drought and Flood (PWCDF), an independent body established and headquartered at Sweden held its First General Body Assembly Meeting of the Indian Chapter at Puri, Odisha, India on 8th and 9th of May. This was jointly organized with Lok Seva Mandal (LSM), (Servants of the People Society, Odisha Branch).

The assembly was attended by over 100 delegates from 11 states of the country, representing diverse river basins. The more than 30 participants from Odisha also represented different river basins.

After 2 days deliberations and discussions, the following resolutions were passed:

1. Looking at the present crisis of rivers across the globe, including India and Odisha, in the context of climate change, a Legislation pertaining to River Rights has become imperative and hence, Government of India must come up with a Bill in the coming Parliament Session.

2. Rivers are threatened by three major challenges: Over-Exploitation, Encroachment and Pollution. The government at centre and state must prevent these threats in the pursuit of sustainability.

3. There is urgent need of connecting the community/people with the river. Hence, river-literacy programs should be made mandatory by governments and supported by civil society.

4. The vital importance of small rivers and streams must be recognised, given their importance in contributing to larger river health and to the livelihoods of communities and nature rejuvenation. The revival of these streams are also important from the perspective of climate mitigation, adaptation and resilience. These small streams and rivers therefore need to be revived through community-centred water conservation measures.

5. In each river, big or small, there must be a people's organization/nadi-sansad which should take up issues concerning that river. The general assembly will appeal to the civil society to create such community organizations for decentralized management of rivers.

6. Inter-state river basins conflicts have become a major challenge before us. The laws pertaining to resolution of this conflict have been inadequate to resolve the conflict. Hence necessary amendment in the existing laws is imperative .

7. There is no scope for civil society intervention in the matters before the river tribunals. The assembly strongly demands that there should be scope for civil society intervention in the river tribunal adjudication process.

8. The general assembly endorses the formation of People's Mahanadi Commission proposed by Mahanadi Bachao Andolan and decides to extended all support in terms of national and international expertise.

9. For each river there must be a documentation of the mythical, spiritual, natural, geo-hydrological, ecological, economic and all other aspects, urban and rural, so that we may resolve unique manner of addressing the river protection and rejuvenation by civil society.

10. The assembly resolved to undertake 100 community driven projects for flood and drought mitigation across India.

11. The general assembly appeals to the people and governments of Chattisgarh and Odisha states to enter a process of consultation, negotiation and resolution of river-water conflicts, beyond the purview of the tribunal.

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1.2 tonne of clothes removed from river Cauvery in Srirangam

Deepak Karthik

TRICHY: Ahead of Thai Amavasya, the Trichy Corporation on Friday cleaned the banks of the river Cauvery and Amma Mandapam ghats in Srirangam.

The ghats in Srirangam are a preferred location for locals and visitors to perform rituals for their ancestors during Thai Amavasya, scheduled to be observed on February 9 this year.

A special team of workers was engaged in the cleanliness drive for the event.

People drop their old clothes in the river as part of the rituals. Old clothes pollute the river and at times affect the water flow. Bins provided by the local body were seldom used.

"As the water in river is away from the banks at present, devotees are not using the bins placed on the banks. We instructed our workers to guard the ghats to sensitise the devotees to use only the bins to dump old clothes," a corporation official said.

Last year, around two tonne of clothes were removed from the river. This year, the quantity of waste came down to 1.2 tonne. The civic body has appointed an agency to collect old clothes and process waste either for recycling or for being reused as rags in in automobile workshops.

Scientists discover giant water mass in Atlantic

Scientists have discovered a massive water mass in the Atlantic Ocean called the Atlantic Equatorial Water. This water mass blends distinct water masses along the equator due to ocean currents. The discovery, published in the journal Geophysical Research Letters, completes the understanding of fundamental water masses across the World Ocean. The Atlantic Equatorial Water was identified using data from the Argo program, which consists of self-submerging floats. This finding will enhance scientists' understanding of the ocean's mixing processes and global transport of heat, oxygen, and nutrients.

In a groundbreaking revelation, scientists have uncovered a massive, previously undetected water mass in the heart of the Atlantic Ocean. Stretching from the tip of Brazil to the Gulf of Guinea near West Africa, this colossal body of water, named the Atlantic Equatorial Water, was identified as ocean currents seamlessly blend distinct water masses along the equator, reported Live Science.

Published on October 28 in the journal Geophysical Research Letters, this discovery marks the first recognition of equatorial water mixing in the Atlantic, complementing similar phenomena observed in the Pacific and Indian oceans. Viktor Zhurbas, a physicist and oceanologist at The Shirshov Institute of Oceanology in Moscow, emphasized the significance of this find in completing the undeA°standing of fundamental water masses across the World Ocean.

Ocean water, far from uniform, constitutes a complex tapestry of interconnected masses and layers, shaped by currents, eddies, temperature fluctuations, and variations in salinity. Each water mass possesses unique characteristics, such as density and dissolved isotopes of oxygen, nitrate, and phosphate, and is distinguished by a shared geography and formation history.

Oceanographers utilize temperature-salinity charts to map the relationships between these vital variables, revealing distinct water masses. Equatorial waters were first identified in the Pacific and Indian oceans in 1942, characterized by temperature and salinity curves along lines of constant density resulting from the convergence of northern and southern waters. However, this distinctive pattern was conspicuously absent in the Atlantic.

To locate the elusive water mass, scientists delved into data collected by the Argo program - an international network of robotic, self-submerging floats dispersed throughout the world's oceans. Through meticulous analysis, researchers identified a previously unnoticed temperature-salinity curve running parallel to the well-known North Atlantic and South Atlantic Central waters: the Atlantic Equatorial Water.

According to Zhurbas, distinguishing the Atlantic Equatorial Water from other masses required a dense network of vertical temperature and salinity profiles covering the entire Atlantic Ocean. Now that this water mass has been identified, it promises to enhance scientists' understanding of the ocean's intricate mixing processes, crucial for the global transport of heat, oxygen, and nutrients.

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Groundwater extraction declined in Karnataka

Groundwater extraction declined in Karnataka, says report The groundwater quality tagging has also been done during the survey. A total of 17 taluks have been tagged for salinity and 14 taluks for fluoride.

Extraction of groundwater has decreased in Karnataka in 2023 compared to last year, says a latest report on status of ground water, prepared by the Central government.

“The groundwater extraction has decreased from 69.93 per cent in 2022 to 66.26 per cent in 2023 indicating improvement in overall groundwater scenario,” said the report titled ‘Dynamic Ground Water Resources of India-2023’. As compared to 2022, in 1...

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.

डॉ. दत्ता देशकर यांनी लिहिलेल्या विविध पुस्तिका

(१) चला, जलसाक्षर होवू या.

(२) संकल्पना शाश्वत शेतीची.

(३) चला , जलपुनर्भरण करु 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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