Central Water Commission
Water Systems Engineering Directorate
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Dated 10.06.2019

Subject: Submission of News Clippings

The News Clippings on Water Resources Development and allied subjects are enclosed for perusal of the Chairman, CWC, and Member (WP&P/D&R/RM), Central Water Commission, the soft copies of clippings will also be uploaded on the CWC website.

10/6/2019
Senior Artist
(WSE, Dte.)

Encl: As stated above.

Deputy Director, WSE Dte. 10/06/2019

Director, WSE Dte. in meeting

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All concerned may visit www.cwc.gov.in

News item/letter/article/editorial published on 10.06.2019 in the **Economic Times, Delhi** and documented at WSE Dte, CWC.

Monsoon Advances into Kerala, TN

Likely to remain weak during June-July and pick up pace in next 2 months, says IMD

Rituraj.Tiwari@timesgroup.com

New Delhi: The monsoon, which hit Kerala on Saturday after a week's delay, has advanced into more areas in the state, southern Tamil Nadu and Lakshadweep among other regions, including the southern Arabian Sea. Rain is likely to be lower than average across the country in June and July before strengthening in the final two months of the season, an official said, underscoring worries about rural weakness amid sluggish overall growth.

Mind the Gap

Region	Actual (mm)	Normal (mm)	Deficit (%)
East & North East	41.8	81.4	49
North west India	8.5	12.5	32
Central India	8	23.3	66
South Peninsula	29.3	39.3	25
Country (avg)	17.7	32.4	45

Rainfall distribution from Jun 1-9, 2019 Source IMD

The India Meteorological Department (IMD) said conditions are turning favourable for rain in parts of the northeast including Assam, Meghalaya and Tripura over the next 48 hours.

"The normal onset date of monsoon is June 1. After a delayed start, the monsoon is likely to remain weak during June-July. It will, however, pick up pace during August-September," said a senior Met department official.

A late monsoon with 45% deficient rainfall threatens agricultural activity in India, which has more than 70% of farm area fed by rains. Pre-monsoon showers in the March-May period have been 25% deficient, delaying cultivation on arable land.

The live storage of water in 91 reservoirs as of June 6 was 114% of the same period last year, which is not very encouraging. "The live storage is 30.461 BCM (billion cubic metres), which is 20% of the total live storage capacity of these reservoirs, putting pressure on drinking water and irrigation needs," said an official of the Central Water Commission, which keeps tabs on storage levels.

Catalyst for Rural Economy ▸▸ 10

Catalyst for Rural Economy

▸▸ From Page 1

The IMD had said earlier that a weak El Niño effect may have some impact during the initial months, fading out gradually and giving way to a normal monsoon season. "The Indian Ocean Dipole (IOD) is turning from neutral to positive. This will make up for the rain deficit due to weak El Niño effect," the official said.

A positive IOD signifies a warmer-than-normal western Indian Ocean, which brings high precipitation across India, while the opposite means drier weather.

The monsoon is vital for agriculture in India and is a key catalyst for the rural economy, fuelling the sale of fertiliser, tractors, two-wheelers and cars, which has a direct and indirect impact on the overall economy.

"Rains are likely to reach the fertile lands of Uttar Pradesh, Bihar, Punjab and Haryana during the last week or first week of July. Farmers have started preparing their fields for cultivation," said a senior agriculture department official.

News item/letter/article/editorial published on 10.06.2019 in **The Hindu, Delhi** and documented at WSE Dte, CWC.

'Pune will see clean Mula-Mutha soon'

Javadekar says ₹990-crore river cleaning project, a 'gift from the Centre', has been fast-tracked

SHOUMOJIT BANERJEE
PUNE

Terming the Mula-Mutha river cleaning project as a "gift from the Centre" to Pune, Union Minister for Environment Prakash Javadekar on Sunday said about 70% of the first package of the project has been completed.

"The construction of branch sewers in Baner, which forms part of the first package, has been completed and I will be reviewing it soon. Pune's dream of seeing their beloved river pollution-free is going to be realised soon as the project has now been fast-tracked," Mr. Javadekar said, speaking to reporters after reviewing the progress of the ambitious ₹990-crore project for pollution abatement in the Mula-Mutha river.

He said the foundation stone for four more packages, involving the construction of sewage treatment plants, would be laid within the next two months, and final clearance for these will be obtained in a few days.

Green crisis: Sections of the Mula-Mutha river are among the 351 most critically polluted stretches identified by the Central Pollution Control Board. ▪FILE PHOTO

'Not a JICA project'

Mr. Javadekar said the river cleaning project was a joint operation of the Union government and the Pune Municipal Corporation (PMC) under the National River Conservation Plan and not a project of the Japan International Cooperation Agency (JICA) as is believed. "JICA is only the bank which is providing the finances," the minister said, noting that the loan given by JICA would be repaid by the Central government and not by the State or the PMC.

"Hence, I say that this project is a gift given by Prime Minister Narendra Modi's government to Pune's citizens. All agencies concerned with the project have met and decided to give timelines for its projected completion. I will conduct a monthly follow-up of the project activities," Mr. Javadekar said.

He said the project had been hanging fire for a decade – from 2004 to 2014 – and it was cleared only when he took over as Environment Minister in 2014.

The Mula-Mutha river, formed by the Mula and Mutha rivers coming together, courses through the city and is an integral component of its heritage. Sections of the river are among the 351 most critically polluted stretches identified by the Central Pollution Control Board, earning it the ignominy of being one of India's most polluted rivers.

Untreated sewage and industrial effluents have brought the Mula-Mutha to the brink an ecological nightmare.

A loan agreement was signed between the Centre and JICA in January 2016 to clean the river under the National River Conservation Plan. The government of Japan has committed to provide a soft loan of JPY 19.064 billion (around ₹990 crore) to the Centre at an interest rate of 0.3% per annum. The project cost is to be shared between the Centre and the PMC, which is the implementing agency, in the ratio of 85:15 respectively.

The loan is to be repaid by the Centre over a 40-year period. The project is scheduled to be completed by January 2022.

On the anvil

Major components proposed under the project include the construction of 11 new sewage treatment plants, laying of 113.6 km of sewer lines for collection of untapped sewage, and renovation of four existing intermediate pumping stations.

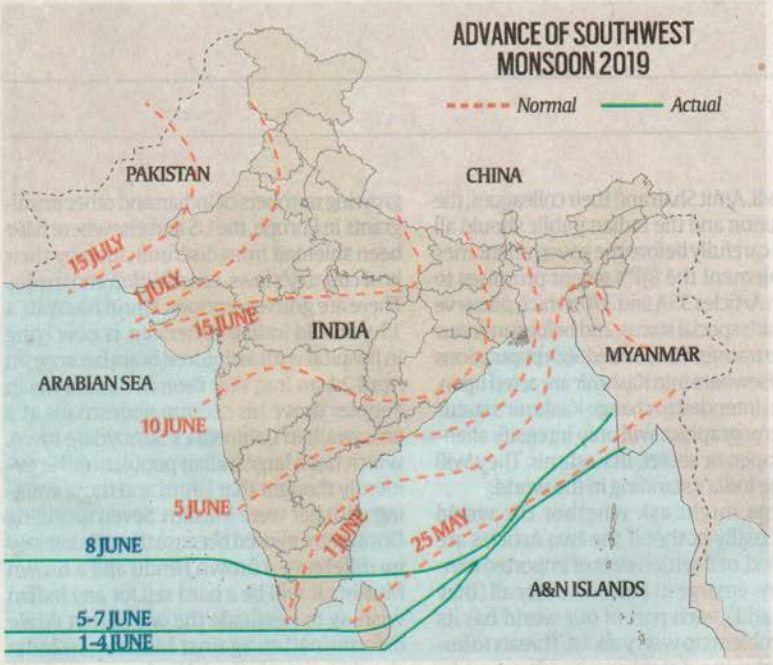
These measures are to help increase the city's sewage treatment capacity from 477 MLD to 873 MLD, enabling Pune to cater to its sewage treatment requirements till the year 2027.

News item/letter/article/editorial published on 10.06.2019 in the **Indian Express, Delhi** and documented at WSE Dte, CWC.

FACT CHECK, GROUND REALITY

WHY LATE MONSOON IS NOT RELATED TO TOTAL SEASONAL RAINFALL

FE-10-5



THE ONSET of the southwest monsoon over Kerala, which happened on June 8, marks the beginning of the four-month monsoon season over India. It came a week after its normal date of June 1.

The southwest monsoon brings over 70% of India's annual rainfall. Though an important marker for the season, the timing of the onset does not have any bearing on the quality or amount of rainfall during the season. It is just an event during the progress of the monsoon.

The Andaman and Nicobar Islands generally start getting monsoon rainfall between May 15 and 20, and the Kerala coast generally begins to have monsoon rainfall sometime in the last week of May. The onset of the monsoon is announced when certain criteria are fulfilled after May 10. If at least 60% of the 14 designated meteorological stations in Kerala and Lakshadweep report at least 2.5 mm rain for two consecutive days after May 10 — and a few other conditions relating to wind and temperature are also fulfilled — the onset of monsoon is said to have taken place; if not, it is not declared. The IMD announced that all the conditions were fulfilled on the morning of June 8.

A delayed onset has the potential to delay the arrival of the monsoon in other parts of the country as well, especially in south India, most of which starts getting rainfall within days of it reaching the Kerala coast. However, it does not mean that the monsoon over the entire country would be delayed. The northward progression of the monsoon from the Kerala coast depends on a lot of local factors, including the creation of low pressure areas. It is possible, therefore, that despite the onset happening late, other parts of the country start getting rains on time.

The IMD has maintained that most of the northern and eastern parts of the country, which start receiving rainfall only towards the end of June and early July, would have monsoon rain on time. But southern and central India, which have normal monsoon arrival dates in the first, second and third weeks of June, would obviously get delayed rains.

The delay in the onset over the Kerala coast also means that the June rainfall is likely to be deficient. But the IMD has predicted that some of this deficiency would be made up for in July and August, and that the overall seasonal rainfall would be around the 96% of the normal that it has predicted. India as a whole receives about 89 cm of rainfall in a normal monsoon season.

AMITABH SINHA

News item/letter/article/editorial published on 10.06.2019 in the **Asian Age, Delhi** and documented at WSE Dte, CWC.

Water scarcity in MP causes mass migration

RABINDRA NATH CHOUDHURY
BHOPAL, JUNE 9

The acute water crisis, caused by the prevailing heatwave conditions, has triggered mass migration of people from many villages in the parched belt of Bundelkhand in Madhya Pradesh.

Reports from different parts of Bundelkhand region said people in water-scarce villages in the districts of Panna, Damoh, Chhatarpur, and Tikamgarh have started migrating to other states to escape their ordeal. "More than 50 villages in Panna district have been found deserted due to lack of access to water. All water sources such as hand pumps and ponds in their localities have dried up due to intense heatwave conditions," a district officer told this newspaper on Sunday.

The region has been experiencing temperatures between 45 and 47 degrees Celsius for the last couple of weeks, causing water bodies in the belt to dry up.

Similarly, the mass migration of people from the villages of Bakshawaha, Rajnagar, Bijabar, Badamalhar and Labkushnagar in Chhatarpur district has been reported due to similar reasons.

Mass migration of people in over dozen villages, which have been hit by water scarcity, under Mastapur panchayat in Tikamgarh district has also been reported.

According to official reports, more than 80 large water bodies in the state have dried up, while over 40,000 hand pumps in rural Madhya Pradesh have become completely non-functional.

News item/letter/article/editorial published on 10.06.2019 in the **Statesman, Delhi** and documented at WSE Dte, CWC.

Monsoon catches up in Kerala

IMD says low-pressure is expected to intensify into a depression & subsequently into a cyclone

PRESS TRUST OF INDIA
THIRUVANANTHAPURAM,
9 JUNE

Several parts of Kerala received moderate rainfall on Sunday, a day after the southwest monsoon set in over the state, even as a low-pressure area formed over the Arabian Sea.

The Meteorological Department said the low-pressure was expected to intensify into a depression in the next two days and subsequently, into a cyclone.

Forecasting isolated heavy rainfall and squally weather in coastal areas of the state and in Lakshadweep islands, it advised fishermen not to venture into the sea till June 13.

A bulletin issued by the department at 3 pm said the low pressure area has formed over the southeast Arabian Sea and adjoining Lakshadweep area and the east-central Arabian Sea under the influence of the cyclone circulation.

"It is very likely to concentrate into a depression during the next 48 hours over southeast and the adjoining east-central Arabian Sea. It is very likely to move north-north-westwards and intensify further into a cyclonic storm subsequently," it said.

The weather report also predicted heavy to very heavy rainfall (115.6-204.4 mm) in isolated places of northern Malappuram and Kozhikode on 12 June .After a delay of a week, the monsoon hit the Kerala coast on Saturday, marking the official commencement of the four-month rainfall season in the country.

The district collectors have been asked to be on alert in areas where landslides had occurred during the monsoon last year, sources in the Kerala State Disaster Management Authority (KSDMA) said. KSDMA Member Secretary Sekar Kuriakose said based on the India Meteorological Department inputs, arrangements have been made to face it institutionally.

"This year, the incident response level is up to the taluk levels, besides the district and state level. We have designated officers for handling different scenarios up to the taluk levels," he told a television channel.

District collectors have been given a monsoon preparedness handbook which is part of the Orange book that details out all different standard operating procedures.

This is the first time that such a handbook has been prepared in which 30 different departments have been addressed specifically, indicating their responsibilities.

Kerala had witnessed the worst floods in 100 years during the monsoon last year. The onset of the monsoon over Kerala was forecast to be 1 June, but it only hit the coast on Saturday.In an IMD statement issued on Sunday it said the conditions were favourable for further progress of the Southwest monsoon into the remaining parts of South Arabian Sea, Lakshadweep and Kerala, some more parts of Tamil Nadu, southwest-, southeast, east-central- and northeast Bay of Bengal and some parts of central Arabian Sea and west-central Bay of Bengal till Tuesday.

5,000 trawlers banned for 52 days

INDO-ASIAN NEWS SERVICE
THIRUVANANTHAPURAM,
9 JUNE

Starting Sunday midnight, a 52-day monsoon-trawling ban will be imposed in Kerala's coastal waters for the 31st year in succession. It will prohibit around 5,000 trawlboats from venturing any closer than 12 nautical miles to stop damage to the breeding process of fish during the season.

"Any boat which breaks these rules will be fined Rs 2.5 lakh," said an official, requesting anonymity.

Until the ban is lifted on the midnight of July 31, the trawlers would have to keep away at least 12 nautical miles from Kerala's coastal waters.

However, the ban, that has been imposed annually since 1988, will not apply to the traditional fishermen.

The trawlers are banned from fishing in the coastal waters because this is the time when fishes breed and any disturbance to that process will deplete the marine wealth, a state government fisheries official said.

News item/letter/article/editorial published on 10.06.2019 in the **Punjab Kesari,** and documented at WSE Dte, CWC.

वर्षा में कमी बढ़कर 45 प्रतिशत हुई : मौसम विभाग

नई दिल्ली, (भाषा): भारतीय मौसम विभाग ने कहा कि मानसून के आने में देरी से जून के पहले नौ दिनों में देश में वर्षा की कमी बढ़कर 45 प्रतिशत हो गई है।

मानसून ने सामान्य आगमन की तारीख से एक सप्ताह की देरी से आठ जून को केरल में दस्तक दी। इससे देश के अलग..अलग हिस्सों में मानसून का आगमन भी विलंबित हुआ। मौसम विभाग ने कहा कि देश में 32.4 मिलीमीटर की सामान्य वर्षा के मुकाबले केवल 17.7 मिलीमीटर बारिश हुई, इससे वर्षा की कमी लगभग 45 प्रतिशत तक हो गई है। जून में वर्षा की कमी मानसून की सुस्त गति और कमजोर अलनीनो के कारण बढ़ सकती है। अल नीनो प्रशांत महासागर के पानी के गर्म होने

● जून में वर्षा की कमी मानसून की सुस्त गति और कमजोर अलनीनो के कारण बढ़ सकती है

से जुड़ा घटनाक्रम है। अरब सागर में जारी चक्रवाती परिसंचरण के चलते अगले कुछ दिनों में मानसून की गति धीमी हो सकती है। देश के चार मौसम डिविजनों में सबसे अधिक 66 प्रतिशत की कमी मध्य भारत में है जिसमें महाराष्ट्र, मध्य प्रदेश, गुजरात, गोवा, ओडिशा और छत्तीसगढ़ राज्य आते हैं। इसमें कहा गया है कि मध्य भारत के गुजरात में कच्छ तथा सौराष्ट्र उप-प्रभागों में 100 प्रतिशत की कमी देखी गई है। स्थिति महाराष्ट्र में, विशेष तौर पर विदर्भ और सूखाग्रस्त मराठवाड़ा में गंभीर है, जहां बारिश की कमी क्रमश: 70 प्रतिशत और 50 प्रतिशत हो गई है। इन क्षेत्रों के जलाशयों में पानी का स्तर भी निम्न स्तर पर पहुंच गया है। विभाग ने कहा कि पूर्व और उत्तर-पूर्व भारत डिवीजन में मानसून की कमी 49 फीसदी है जिसमें झारखंड, बिहार, पश्चिम बंगाल और सभी पूर्वोत्तर राज्य आते हैं। दक्षिण प्रायद्वीप में कमी देश में सबसे कम 29 प्रतिशत है जिसमें सभी दक्षिण भारतीय राज्य आते हैं। मानसून ने केरल और तमिलनाडु के कुछ हिस्सों को कवर किया है।

उत्तर-पश्चिम भारत के सभी उत्तर भारत के राज्यों में वर्षा की कमी 32 प्रतिशत है।

News item/letter/article/editorial published on 09.06.2019 in **The Hindu Delhi** and documented at WSE Dte, CWC.

Scientists create a global map of where groundwater meets oceans

PRESS TRUST OF INDIA

Scientists have created high-resolution maps of points around the globe where groundwater meets the oceans – the first such analysis of its kind that may help protect both drinking water and the seas.

In a study published in the journal *Geophysical Research Letters*, researchers from The Ohio State University in the U.S. showed that nearly one-half of fresh submarine groundwater discharge flows into the ocean near the tropics.

They also found that regions near active fault lines send greater volumes of groundwater into the ocean than regions that are tectonically stable.

They found that dry, arid regions have very little groundwater discharge, opening the limited groundwater supplies in those parts of the world to saltwater intrusion.

The team worked with researchers at NASA's Jet Propulsion Laboratory and the University of Saskatchewan to combine topographical data from satellites and climate models to show the flow of groundwater around the world's coasts.

Aquifers: Regions near active fault lines send greater volumes of groundwater into the ocean than tectonically stable ones.

■ K. R. DEEPAK

Managing freshwater

The findings may help coastal communities better protect and manage their drinking water.

"Freshwater-groundwater discharge is a natural line of defense against saltwater intrusion," said Audrey Sawyer, an assistant professor at Ohio State.

"It's a problem that dry regions have as little groundwater discharge as they do because these are also the places where people are going to tend to look for groundwater to meet their freshwater needs," said Dr. Sawyer.

The research work, the first near-global and spatially distributed high-resolution map of fresh groundwater flow to the coast, could give scientists better clues about where to monitor groundwater discharge.

When researchers think about coastal water quality and the way water affects the biochemical makeup of the world's lakes and oceans, they typically think about rivers and streams – and for good reason. Most of the water that gets to lakes and oceans comes from surface water sources. However, groundwater plays an important role, too, carrying minerals and, in some cases, pollutants, to surface bodies of water.

"If you've ever been swimming in a lake or in the ocean in the summertime and you go through a cold patch, that is probably a place where groundwater is coming out," Dr. Sawyer said.

"And that's just one way that groundwater affects surface water – in that case, it's affecting temperature, but it also affects the chemistry of the water. These effects can be hard to measure over large scales," he said.

The team started building these images. The research group focuses on groundwater, and realised that there was limited information showing where groundwater was most likely to flow into the oceans.

The study found that in some parts of the world, groundwater could be polluting oceans and lakes with nutrients and other chemicals.

Groundwater, for example, can carry higher concentrations of nitrates – a key contributor of the types of harmful algal blooms – as well as high concentrations of mercury.

Understanding how and where groundwater gets to surface water could help policy-makers create better plans to improve those bodies of water.

The study also found that climate heavily influences groundwater flow, and that cities in dry areas are especially vulnerable to salt water contamination of aquifers.

News item/letter/article/editorial published on 09.06.2019 in the **Hindustan Times, New Delhi** and documented at WSE Dte, CWC.

A week late, monsoon finally hits Kerala coast

HT-9

IMD FORECAST Rains expected to reach central India after delay of 5-7 days

Jayashree Nandi
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NEW DELHI: The monsoon arrived in Kerala on Saturday, marking the delayed beginning of a season that millions of people are hoping will end a searing heatwave, irrigate farms and ease a scarcity of water amid what has turned into one of the driest summers the country has seen in years.

Officials of the India Meteorological Department (IMD) said heavy to very heavy showers are expected over Kerala, parts of Tamil Nadu and coastal Karnataka over the next 48 hours, but the progress of rains over the rest of the country could be interrupted by a cyclonic circulation in the southeast Arabian Sea around the Lakshadweep islands.

"There will be a delay of five days to a week in monsoon reaching Central India. A low pressure system is forming over the west coast. Monsoon rains will depend on the progress of this low-pressure system," said DS Pai, senior scientist at IMD Pune.

The system, the IMD had said earlier in the week and reiterated on Saturday, could sap moisture from the monsoon winds entering the southern peninsula, making rains less likely till at least the third week of June.

The IMD separately warned of heatwave conditions in north and western parts of the country and "severe heatwave" in several places in Rajasthan, Madhya Pradesh and Maharashtra during the next three days. For the national capital, which reeled under scorching heat as well as high humidity, no relief is expected for two days. Officials have asked farmers to hold off on sowing summer crops given the possible delays in rains. "We have already advised farmers who sow Kharif crops like soya bean, cotton and maize in June to delay sowing by 8 to 10 days. We are hoping that crops which are sown in July will not be affected by weak monsoon and delay," said Mahesh Palawat, vice president (meteorology and climate change) of Skymet, a private forecaster.

Farmers in nearly half of the country depend on the rains to irrigate their fields, and reservoirs that give water to the remaining are depleted.

> There will be a delay of five days to a week in monsoon reaching central India. A low pressure system is forming over the west coast. Monsoon rains will depend on the progress of this low-pressure system
> DS PAI, IMD senior scientist

CONTINUED ON P 6
RELATED REPORT · P8

SLOW, AND UNSTEADY

A late arrival has meant rains have been significantly deficient in the first week of the official monsoon season that begins on June 1

All India	East & Northeast	Northeast	Central	South Peninsula
-42%	-53%	-7%	-62%	-22%

Source: IMD, Govt of India

Monsoon and its effect on summer crops

Year	Rainfall*	Agri growth**
2017-18	95%	4.7 (Q3)
2018-19	91%	2.7 (Q3)

*Rainfall (as % of LPA)

**Agricultural and allied sector growth rate (at 2011-12 prices) (in %)

Source: CMIE and IMD

Monsoon

Key cotton growing states of Maharashtra and Gujarat, which account for 27 of the 91 reservoirs in the country, had storage shortages of 64% and 27% respectively as on Thursday, compared with the 10-year average, according to news agency Reuters.

This year's delay is being linked to weak El Nino conditions prevailing over equatorial Pacific Ocean. The World Meteorological Organization (WMO) recently said weak El Nino conditions are likely to persist for three more months – which will cover the monsoon season until August. El Nino is a climate pattern characterized by above normal sea surface temperatures over equatorial Pacific Ocean which contributes to above normal land temperatures in the tropical latitudes. El Nino years are linked to below normal monsoon rains and higher than normal frequency of heat waves in India.

Depleting reservoirs have also forced municipalities in places like Chennai, Mumbai and Hyderabad to cut supplies to ensure water lasts until the arrival of the monsoons.

According to WaterAid's State of the World's Water 2019 report released in March, a billion people in India live with water scarcity during at least one part of the year.

Monsoon usually sets in over Kerala by June 1. Last year, it arrived on May 29 but the season ended with below normal rains, which were recorded at 93% of the long period average (LPA) – the average of rains recorded in the last 50 years. After the onset, the monsoon advances northwards, usually in surges, and covers the entire country around July 15.

For this year, the IMD has forecast a "near-normal" monsoon season, estimating the rains to be at 96% of the LPA.

While the onset was announced, IMD officials said it did not meet all of the parameters that are must before monsoon arrival can be declared. For example, the key criteria that at least 2.5mm rainfall is recorded for two consecutive days from 60% of the 14 weather stations in Kerala was not met. "Only 7 of the 14 or 50% stations reported more than 2.5 mm rainfall. But other synoptic features like cyclonic circulation, deepening of westerlies were met which is why monsoon has been declared," said Sunita Devi, senior scientist at IMD.

News item/letter/article/editorial published on 09.06.2019 in the **Tribune, Delhi** and documented at WSE Dte, CWC.

Groundwater scarce, 2 districts in dark zone

Sangrur, Barnala in spot ahead of paddy season

PARVESH SHARMA
TRIBUNE NEWS SERVICE

7-9-19

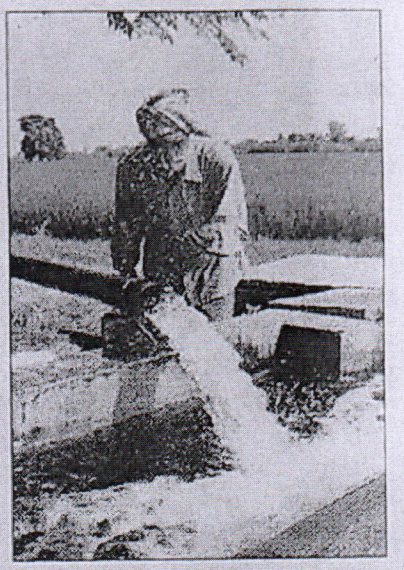
SANGRUR, JUNE 8

All blocks in Sangrur are in the dark zone, while two of three blocks in Barnala are in the dark zone due to over-exploitation of groundwater.

However, farmers are still adamant to sow paddy on their maximum land as they claim that the state government has failed to offer required help to them to switch over to other crops.

Blocks like Bhawanigarh, Andana, Dhuri, Dirba, Malerkotla-1 and 2, Sherpur, Sangrur, Amargarh and Ahemdgarh are in the dark zone. Despite the tall claims of the state government and their campaigns to convince farmers against paddy cultivation, merely 10,000 hectares will be diverted to non-paddy crops this year in the district.

"Last year paddy was sown in 2.87 lakh hectares, but this year we are hopeful to divert 10,000 hectares toward maize and cotton. Farmers will sow paddy over 2.77 lakh hectares," said Sushil Kumar, Chief Agriculture Officer, Sangrur.



TROUBLED WATERS

- All blocks in Sangrur are in the dark zone, while two of three blocks in Barnala are in the dark zone due to over-exploitation of groundwater
- Farmers still rely on paddy as the government 'failed' to help them switch over to other crops

In a majority of villages, the water table has gone down to around 350 to 500 ft; while earlier it was available at 200 ft. The decline in groundwater is compelling farmers to install more tubewells to extract required quantity of water. Farmers have announced to start paddy sowing before the date fixed by the state government.

In Barnala, except Sehna, both blocks, Barnala and Mehal Kalan, are in the dark zone.

However, efforts by the Agriculture Department have shown little impact as only 1,000 hectares have been diverted towards non-paddy crops. During the current year, farmers will sow paddy over 1.13 lakh hectares against the last year's figures of 1.14 lakh hectares.

"Every year the water table is going down by around 1.14 meters. We are organising special camps in villages to spread awareness to convince farmers to opt for non-paddy crops," said Jaswinderpal Singh Grewal, Chief Agriculture Officer, Barnala.

News item/letter/article/editorial published on 08.06.2019 in the **Business Line, Delhi** and documented at WSE Dte, CWC.

Tap drip irrigation to save water

This method is more productive and cost effective in agriculture, which accounts for 80% of the water consumed

A NARAYANAMOORTHY

Water scarcity has now reached a new level in India. While severe drinking water scarcity is noticed commonly everywhere, farmers are facing a lot of difficulties in cultivating crops with reduced water availability in different regions. What is worrying is that water scarcity is expected to aggravate further in the near future.

Projections made by the International Water Management Institute (IWMI) indicate that one-third of the world population would face absolute water scarcity by the year 2025. NITI Aayog's report (2018) on 'composite water management index' also underlined the depressing state of water stress.

Though India has the largest irrigated area in the world, about 85 per cent of total irrigation potential (139.90 million hectares) has already been created, leaving limited potential for future use. An estimate of the Ministry of Water Resources (2008) shows the total demand for water will overshoot the supply by 2050. With this alarming scenario, how are we going to solve the ever increasing water scarcity problem?

There's much scope for easing water scarcity in agriculture. The agricultural sector (irrigation) currently consumes about 80 per cent of water in India, thanks to the inefficient conventional flood method of irrigation (FMI). Data on water use efficiency indicates that India uses 2-3 times more water than major agricultural countries like China, Brazil and the US to produce one unit of food crop.

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Benefits of drip irrigation

Drip method of irrigation (DMI) has been found to increase water-use efficiency by saving a substantial amount of water. What is DMI? Unlike FMI, the drip method supplies water directly to the root zone of a crop through a network of pipes and emitters. Since it supplies water directly to the crop, rather than the land around, water losses occurring through evaporation and distribution are significantly reduced. The on-farm efficiency of the drip irrigation system is estimated to be over 90 per cent; it is only 35-40 per cent for FMI.

DMI was introduced in India during the mid-1980s primarily to save water. But it generates a lot of other benefits as well. That there is water saving of 30-70 per cent for different crops under DMI when compared to FMI has been well established. While reducing the cost of cultivation substantially, especially in irrigation, weeding and inter-culture, DMI also helps increase the productivity of different crops by 30-90 per cent.

Reduced water consumption also curtails the use of electricity for operating pumpsets. With better productivity and quality of crops cultivated under DMI, farmers are able to realise substantially higher income. A nationwide study conducted to find out the impact of National Mission on Micro Irrigation (NMMI) during 2014 covering 13 States reveals that DMI has benefited farmers significantly. While increasing productivity by 42-53 per cent in fruit and vegetable crops, DMI helps reduce irrigation cost by 20-50 per cent, electricity consumption by around 30 per cent and fertiliser consumption by about 28 per cent.

One of the major questions often asked is whether the fixed investment required for installing a drip system is economically viable. But the cost-benefit analyses done using field survey data reveal that DMI is economically viable even for small and marginal farmers cultiv-

Every drop counts Drip irrigation has benefited farmers significantly E LAKSHMI NARAYANAN

ating different crops. Realising the significance of DMI, various promotional programmes have been introduced to increase its adoption by the Central and State governments since the early 1990s. Maharashtra is probably the first State to have taken a number of initiatives — subsidy programme being one such — to popularise DMI even during the mid-1980s.

To achieve the objective of 'per drop more crop', the Central government is taking a series of efforts to increase its adoption. While Centrally-sponsored schemes have been in vogue since the early 1990s, the National Mission on Micro-Irrigation (NMMI) introduced during 2010-11 and the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) launched in 2015 have significantly increased DMI adoption. As a result, the area under DMI has risen from a mere 1,500 ha in 1985-86 and 70,859 ha in 1991-92 to 4.24 million hectares as on March 2017.

India has enormous potential for DMI, which should be harnessed to reduce water scarcity. The Indian National Committee on Irrigation and Drainage, in its report on *Drip Irrigation in India*, indicates that about 80 crops can be grown viably under DMI. Although DMI is considered to be highly suitable for wide spaced and high-value commercial crops, it is also being used for cultivating oilseeds, pulses, cotton and even paddy and wheat. The area under DMI has risen sharply in recent years but it is still far lower than the potential.

The agenda ahead

The Task Force on Micro-Irrigation in India (2004) estimated India's total drip irrigation potential at 27 million hectares as. In spite of having many advantages, the area under drip-irrigation accounts for a mere 4 per cent of gross irrigated area and about 15 per cent of its total potential as of 2016-17. The adoption of DMI is also concentrated only in a few States. With the current pace of adoption, it may take a long time to achieve full potential. Given the looming water scarcity and variations in rainfall pattern due to climate change, more efforts are needed to increase the pace of DMI coverage.

First of all, the capital cost required for DMI should be brought down substantially. A special subsidy programme may be introduced for water-intensive crops like sugarcane, banana and vegetables. A differential subsidy scheme for water-scarce and water-abundant areas should be introduced. Subsidy is provided to a maximum of five hectares per beneficiary under NMMI, which should be done away with.

All the areas of sugarcane cultivated using groundwater should be brought under DMI within the next 10-15 years. For encouraging the adoption of drip irrigation, a special scheme may be introduced linking bank loan facility for digging wells with electricity connection for pumpsets to those farmers who are ready to adopt drip irrigation.

Currently, water from surface sources (dams, reservoirs, etc) is not used for DMI. At least 10 per cent of water from each irrigation project should be allocated only for DMI. Appropriate pricing of canal water and electricity will also help in increasing the area under DMI.

The writer is a former Member (Official), Commission for Agricultural Costs and Prices, New Delhi. The views are personal.

News item/letter/article/editorial published on 08.06.2019 in the **Indian Express, Delhi** and documented at WSE Dte, CWC.

MINISTRY MATTERS

WHEN THE new list of ministers and their portfolios was released after the oath ceremony, the Water Resources, River Development and Ganga Rejuvenation and Drinking Water and Sanitation ministries were merged into "Jal Shakti" under one minister. This had been promised by Prime Minister Narendra Modi in an election rally in Ramanathapuram, Tamil Nadu, on April 13. Interestingly, the relevant rules of Business Allocation are yet to be amended and in the absence of any such order, several officials of related departments in Environment, Forest and Climate Change, and the erstwhile Water Resources, River Development and Ganga Rejuvenation and some other departments are holding their breath and speculating on which ministry they will go to. All correspondence of the Jal Shakti ministry is at present being done with the earlier names.

News item/letter/article/editorial published on 08.06.2019 in the **Mail Today, Delhi** and documented at WSE Dte, CWC.

RAGI CAN RESOLVE CAUVERY ISSUE

by Nilanjan Ghosh

ON JUNE 3, Karnataka water resources minister DK Shivakumar lamented on the "very bleak" water situation in the river Cauvery. According to a news report "the combined live storage in all four reservoirs [of the Cauvery basin]... is 13.93 tmcft as against their full live storage capacity of 104.55 tmcft."

If the south-west monsoon fails to arrive before June 12 (the date when water will be released to the Mettur dam in Tamil Nadu), it is highly possible that Karnataka will fail to release water to Tamil Nadu.

Who owns the water?

Karnataka's decision to refuse to release water, to protect its irrigated summer paddy, will have an adverse effect on the standing Kuruvai paddy in TN. The Cauvery water dispute can be construed as a conflict over the definition of property rights. The three extreme principles of water allocation based on divergent definitions of property rights are: Harmon, History and Hobbes. The Harmon doctrine states that the primary rights of water are bestowed on those owning land at the source of the water. History confers primary rights to historical users of water irrespective of their geographical location. Hobbes identifies rights as the final result of awards obtained through negotiations.

Downstream, Tamil Nadu has been advocating its rights in terms of history, given the precedent of water use especially in the delta regions. Upstream, Karnataka has been exercising the Harmon doctrine by maintaining that a downstream state cannot make a claim when there is a scarcity and inadequacy the upstream.

The conflict gets amplified by the fact that the subject of water falls in the state list, subject to the provisions of Entry 56 of List-I, ie Union list, of the Indian Constitution. Even the provisions of the Interstate River Water Disputes Act, 1956 and its subsequent amendment in 2002, merely talk about setting up tribunals for adjudication. One can see that the Hobbesian mode of negotiations is failing. In a departure from this thinking, the Supreme Court in its 2018 order has observed that Cauvery river water was a "national asset and no single state could claim ownership over it."

A key reason behind the conflict is the government's incentives for paddy cultivation, to promote 'food security', in terms of promoting production and procurement of water-intensive paddy and wheat.

The incentives include increasing the minimum support price (MSP) of paddy at a much faster rate compared to that of drier crops like millets.

The MSP mindset

It is well-known that MSP for rice and wheat, where government agencies like Food Corporation of India play a role in procurement, creates a reference for market prices. In the Karnataka part of the Cauvery basin, *ragi* used to be a prominent crop till the 1970s.

However, as the relative market prices (or 'terms of trade') moved in favour of paddy, the farm community also shifted acreages from *ragi* to paddy, leading to a spurt in agricultural area for paddy in the 1980s and '90s, especially for the irrigated summer paddy of Karnataka. The water requirement of paddy is almost 10 times that of *ragi*. Karnataka's late spurt in irrigation development sped this process.

In 2018, the Commission for Agricultural Costs and Prices (CACP) increased the MSP of *ragi* by around 50 per cent, and for paddy by merely 5 per cent, in a bid to promote dry crops. Over the last 15 years, the trend in the 'terms of trade' has reversed from what it was during the 1980s and '90s. In addition, while the acreage of paddy has turned flat with time, the acreage of *ragi* in the Cauvery has increased. However, the change is too small to substantially change water use. The change may become perceptible if the government also procures *ragi* at MSP.

The idea of transferring 'surplus' water from river Godavari to Cauvery is ecologically disastrous. It is not viable economically and it will escalate conflict between states. 'Surplus is defined in pure arithmetic hydrology terms by government engineers. According to the scientific knowledge of basin ecosystem, there can be no surplus water as every drop of water has an ecosystem function in the basin.

Interlinking disaster

Secondly, the definition of surplus will not remain stable under arithmetic hydrology. Moreover, Cauvery water is primarily needed for agriculture during the pre-monsoon months, a time when even the Godavari goes dry in certain stretches! So, the cost of interlinking rivers outweighs the project's proposed benefits.

Supply-side interventions in the Cauvery river basin under the engineering paradigm, in place since the era of British rule, have brought the conflict to its current state. Demand management of water through crop diversification should be key to keep water instream for the languishing delta ecosystem, which is affected by salinity ingression due to rising sea levels, as freshwater flow gets depleted. Irrigated paddy should make way for *ragi*! A gradual change can be brought about through incentives, awareness, an interdisciplinary knowledge base and holistic basin governance. However, the formation of the 'engineers-only' Cauvery Management Board does not augur well for the Cauvery water dispute.

The writer is director, Observer Research Foundation, Kolkata.

The views expressed are personal.