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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 have also been uploaded on the CWC website.

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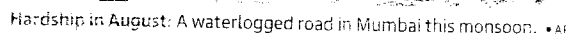
and departments of the U.S. Environmental Protection Agency, Seattle, WA

As the frequency of extreme weather events increases, urbanisation has to heed ecological principles



For India, the average monsoon rainfall is expected to increase initially and then reduce after a few decades. Examining daily rainfall data between 1951 and 2000, B.N. Goswami, former Director of the Indian Institute of Tropical Meteorology, Pune, showed that there has been a significant increase in the magnitude and frequency of extreme rainfall events along with a decrease in the number of moderate events over central India. These changes interacting with land-use patterns are contributing to floods and droughts simultaneously in several parts of the country.

The main reason for understanding extreme events is to help policymakers, emergency responders and local communities to plan and prepare for them. Cities could be laid out to reduce flooding by following natural contours, drainage and tank systems. Emergency responders should be well prepared to transport and care for people who may become stranded during disasters. Insurance companies might also be concerned about underwriting places that are at perpetual risk in the future. Once an extreme event such as a heat wave or heavy rain oc-



Conversely, for rainfall simulation, climate models cannot mimic or simulate extreme rainfall such as the kind Chennai experienced in 2015. According to a paper by Geert Jan Van Oldenborgh and colleagues, the 494 mm rain in Chennai was a rare event, with less than a 0.2% chance of occurring in any given year. The Chennai flood of 2015 did not have a clear climate signature to show that it was due to warming of the earth. On the other hand, with regard to Hurricane Harvey, Michael Mann, a well-known climate scientist, wrote in *The*

In many parts of the world, construction in cities or in urbanising areas does not take into consideration the existing topography, surface water bodies, stream flows or other parts of terrestrial ecosystems. In

For decades, urbanisation has ignored ecological principles associated with water bodies, vegetation, biodiversity and topography. These are not 'environmental' issues to be disregarded or attended to only after we have attained 'growth'. Rather, they are part and parcel of and integral to how we live and whether we prosper.

Still, construction on existing lake beds and other waterbodies needs to be removed or redesigned to allow flood drainage along natural water channels. As the frequency of extreme weather events increases around the world, losses in rich countries are higher in terms of GDP, but in terms of the number of people at risk, it is the poor countries that suffer the most. Those who are the most vulnerable and the poorest end up bearing the brunt of the burdens of climate change and mal-development, which together operate to worsen impacts.

Sujatha Byravan is a scientist who researches science and technology policy

Subhrojit Chandra



Mining And Commercial Forestry Have Destroyed A Mi

When main stream

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Rivers like stories have a beginning, end and, of course, a middle where they attain full flow. Bharathapuzha, a small river, however lacks proper and full-fledged middle. Long and intermittent stretches have become desiccated like a desert, with rocks and invasive stands of acacia defacing a landscape where, just a few years ago, sediment-rich ochre-coloured water hurtled downstream east to west at an average of three to four metres depth.

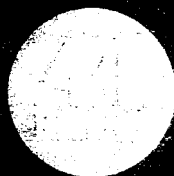
Bharathapuzha still irrigates most parts of Palakkad district, known as the granary of Kerala, which produces 84,000 hectares of paddy annually; and all along its 208-km stretch is living evidence of the centuries-old cultural efflorescence the river, known locally as Nila, has fostered. The Bharathapuzha has been, both, muse and motif to an array of arts-- from the blossoming of Kathakali and Koodiyattam to contemporary literature and cinema.

Today, its cultural watermark remains but the river itself is a travesty of its former tumultuous self. Massive deforestation along the banks, unscientific damming and pervasive sand mining has led to the slow destruction of a river, which is a primary water source for 8 lakh people across 108 panchayats. "This was not the case a decade ago, as the southwest monsoon would have replenished the river and its vast sandbed would have been submerged," says Dr A Biju, head of the department of aquatic biology, University of Kerala.

Environmentalists point out that the state forest department made a historical mistake by cutting down natural forests along the banks and planting acacia, eucalyptus and teak trees for commercial purposes. "The forests used to hold back the water and replenish the groundwater table around the river," says Biju.

Bharathapuzha has the maximum dams among all rivers in Kerala-- 41 in all. "Over the years, this has destroyed the natural flow of the river. The water in check dams could not prevent the lower portion of the river from getting dried up," says Dr Latha Anantha, founder of River Research Centre and member of the Madhav Gadgil committee. The deforestation of four major tributaries-- Gayatri, Kalapatti, Kunti and Chittur-- has

The rivers of Kerala are small, in terms of length, monsoon and water discharge. All of them are entirely monsoon-fed. Kerala's rivers flow faster owing to the hilly terrain and the short distance between the Western Ghats and the sea.



41 Flow Westward
3 Flow Eastward

Kabani into Karnataka, Pambar and Bhavani into Tamil Nadu.

1 Periyar

Longest river in Kerala. Originates in the Periyar Tiger Reserve. Lately, Periyar has lost 22% of its average flow

3 Chaliyar
4 Chalakudy
5 Pamba
6 Kallada

Demands of Bharathapuzha Samrakshna Samiti

- > Reduce dams, restore natural flow
- > Remove water absorbing acacia and eucalyptus trees from banks, grow native trees
- > Take penal action against locals, lorry owners who dump waste in river
- > Conduct awareness campaigns
- > Ban sand mining till river gets new lease of life
- > Involve local communities living along the bank to check sand mining

also led to drastic reduction in Bharathapuzha's water flow.

To worsen matters, Kerala, which historically received annual rainfall at twice the national average, has recorded below normal readings over the past three years. The incessant downpour so typical of monsoon months has been replaced by intermittent dry spells. Last year, the state had 34% below normal rainfall; trend seems to be the same this year-- deficit is at 22% as end of the season approaches.

Sand mining too has become rampant and its effect catastrophic. Environmentalist C Rajagopalan, who lives on the banks of the river and is part of Bharathapuzha Samrakshna Samiti, says only 60 cm depth of sand dredging is permitted, but miners dig pits nearly 10 feet deep and this has converted the river into shallow drains.

Panchayats have been authorised to issue licences to mine sand from various kadavus (piers) in an indiscriminate manner. "There has been

no sand audit till date. As a result, the tributaries have got rock beds and water flows quickly into the sea. Earlier, the expansive sand bed used to slow down the flow of the river, thereby increasing groundwater table," says Dr Latha Anantha.

Sahitya Akademi award-winning writer C Radhakrishnan, who was born and raised next to the Bharathapuzha and has seen its sad decline, says almost every region around Bharathapuzha has a history that is integral to the development of modern Malayalam language, its culture and arts. "The river witnessed the blossoming of Malayalam culture and literature. Poets like Kunchan Nambiar, Melpathur and Ezuthachan were born and nurtured here. Even many modern writers like VKN, O V Vijayan and MT Vasudevan Nair lived in villages surrounding the river," he says.

Radhakrishnan still hopes that the river can be reclaimed but his warning is dire. "The river is a university in itself. If you destroy it, you are killing a civilization."

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BHARATHAPUZHA IS PLUNDERED FOR SAND & WATER

R K Sreejith

With a watershed of 1,86,500 sqkm, the Bharathapuzha basin is the largest among all the river basins in Kerala

2 Bharathapuzha has a large basin, but its flow is relatively less compared to other long rivers in Kerala because a large portion of the basin is located in comparatively drier regions

4,400 sqkm is within Kerala and the remaining 1,78,650 sqkm is in Tamil Nadu

CULTURAL CRUCIBLE



> The world-renowned Kerala **Kalamandalam**, a finishing school for performing arts like Kathakali, Koodiyattam and Ottamthullal, is located right next to this river



TORRENT BECAME A TRICKLE: After the rains, isolated streams are all that's left of the vast river

> The **Adhaytma Ramayana**, the epic's first rendering in Malayalam, was composed by Ezhuthachan who lived beside the Bharathapuzha and called it '**Shokanasini**' or destroyer of sorrows

> The **Thirunavaya temple**, called the southern Kashi, is situated on the banks of Bharathapuzha

Spiritual guru in God's own country

Spiritual leader Sadhguru Jaggi Vasudev's pan-India Rally for Rivers reached Thiruvananthapuram on Tuesday where he called upon the entire country to emulate the state's initiatives. "Kerala has proved revival of rivers is practical by rejuvenating a couple of them recently," he said. He met with CM Pinarayi Vijayan who assured his full support to the Rally, aimed at rejuvenating India's fast-depleting rivers. Sadhguru said he chose to campaign through 16 states where depletion of rivers was most alarming due to heavy farming. "Though Kerala is only behind Uttarakhand in number of rivers, a majority among these 44 rivers run dry during most of the year," he said.

On Wednesday, the rally reached Trichy in TN, from where he left for Puducherry.

...A clean-up forces a shutdown

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Sitting on the banks of the Chaliyar, P K M Chekku smiles as boys go boating in its clear, flowing waters. Till two decades ago, this was one of the most polluted channels in the state. But with Gwalior Rayons shutting down its unit 16 years ago, the 168km-long perennial river flowing through Kozhikode and Malappuram districts in north Kerala has gradually returned to its pristine state.

It took a people's movement to put an end to the massive dumping of effluents into the river.

Chaliyar began turning toxic after Gwalior Rayons set up its textile unit on its banks at Mavoor in the sixties. Though the factory provided jobs to around 3,000 people, there was no awareness about the amount of heavy metal effluent flowing into the river till people in the region turned ill.

"The air too was so polluted the moss on roof tiles withered away due to sulphur compounds," Chekku says.

A survey conducted by the Vazhakkad panchayat found that during the period from 1993 to 1998 there were 245 cancer patients from the village alone undergoing treatment at the Kozhikode Medical College.

As the number of cancer cases rose and every sample from the river showed extremely high levels of toxicity, a mass agitation began.

"Initially our demand was not to close the factory. But after activists like K A Rahman, who led the agitation, himself succumbed to cancer after almost three decades of relentless struggle, we demanded its closure," Chekku says.

The factory suspended production in May 1999. Though the management submitted a revival proposal, the state government rejected it and the factory had to be wound up in 2001.

"Chaliyar today is not only clean but is enriched with a treasure trove of aquatic life. If we can do it in Chaliyar, why not replicate this in Yamuna or Ganga?" says Chekku.

RALLY FOR RIVERS
GIVE A MISSED CALL
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