TIMES evoke

THE AMAZING STORY OF WATER

Every living being is composed of water — but this wasn't composed on Earth. Scientists find each water molecule arrived here on asteroids and comets from space, remnants of galactic outbursts and whirls, massive agglomerations of dust and rocks, bearing water. Every bit of water arriving on Earth thus has been recycled — the water inside our own cells has also been in ice caps, clouds, plants, even dinosaurs, at different times. Water is also a free-flowing rebel — at Earth's temperatures and pressure, it should be a gas. Yet, it is liquid. Further, frozen water floats — this let huge ice sheets shield evolving life under them through the Ice Ages. Water is thus the bedrock of existence.

It also shaped social evolution. Ancient civilisations, from the Indus Valley to Egypt and Mesopotamia, grew beside water sources powering agriculture. Many became 'hydraulic empires', controlling water, channelling it via irrigation and flood management, bolstering it with cesses and engineering, visible in ancient tanks and aqueducts. In the age of industrial expansion, relentlessly harnessed by colonialism, water led to inventions like steam and hydroelectricity, while constantly supporting all life.

Today, we face a water crisis. Only 0.5% water on Earth is usable — with massive overuse and wastage, the UN World Water Development Report 2023 finds two billion people suffer water shortages globally. About 26% of the world doesn't have safe drinking water while 46% lacks sanitation. Meanwhile, 74% of natural disasters from 2001 were water-related, manifest in floods and droughts. As global warming — the atmospheric gathering of heating emissions from fossil fuels, deforestation, etc. — intensifies, a damaged water cycle will change precipitation. Further, increasing global temperatures will melt glaciers, making seas rise, threatening coasts and freshwater reservoirs. With deepening imbalances in hydrological stability, by 2030, half the world could face water stress. However, there are solutions — as Times Evoke's global experts emphasise, water's history of circling, from space to across Earth, holds answers. Sustainable strategies now include harvesting rainwater and recharging groundwater, recycling grey water, restoring wetlands, stopping deforestation to let the water cycle use plant evapotranspiration and adopting clean energy. Water is why all life is here. Join Times Evoke in learning about its immense provenance and safeguarding its — and your — future.

'Water reflects power — European imperialists used it to expand, creating new hierarchies of access'

*Historian **Corey Ross** is Director of the University of Basel's Institute for European Global Studies. Speaking to **Srijana Mitra Das** at **Times Evoke**, he explains the colonial history of water — and why this matters now:*

What is the core of your research?

■ I work on environmental history, studying the interrelationships that formed between human societies and the rest of nature. I do this particularly in the context of Europe's overseas colonisation. In my book 'Liquid Empire: Water and Power in the Colonial World', I focus on water to examine imperial power, resistance and interconnections between how humans constructed soc-ieties and hierarchies.

What was the role played by water in imperial expansion worldwide?

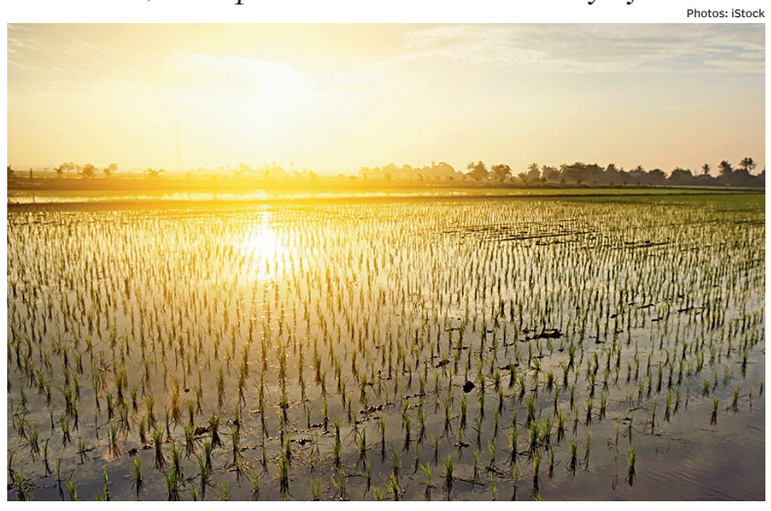
■ Water control is extremely important as a means of power generally. Many of the world's most long-lived civilisations have been based on this. Ancient Egypt and Mesopotamia were built on the control of water — ruling over water made land and labour more productive, which brought greater military and economic power to rulers. It also allowed them to demonstrate beneficence to subjects, contributing thus to political and social stability. When European colonisers took over some cradles of hydraulic civilisation in parts of India, Java or the Middle East, they were drawn to water control for the same reasons.

Importantly, water is also a means of power in the sense that whoever decides access to it represents the force that produces and reproduces social hierarchy — whoever has to live with a lack of water is shaped by social status. Water is a reflection of power relations and a producer of these — those who hold sway over it also control several other aspects of life.

What technologies did the colonial control of water involve?

■ This took different strategies, including using new technologies to supposedly improve older irrigation systems, build entirely new ones to open dry lands to cultivation, use industrial techniques like dredges and steam power to drain swamps and clear marshlands for agriculture, utilise hydropower and attempt to modernise fisheries. It also involved the creation of new navigation routes and networks, even changing coastlines and rivers to make them conduits of commerce and projections of political and military might.

Photos: iStock



A REGAL POWER: The management of water allowed human societies to grow through productive agriculture —this led to empires based on water control and its surpluses

Importantly, all these different uses of the hydrosphere were interconnected — for example, there were trade-offs between using a river for irrigation or navigation, the two having very different requirements. Equally, irrigating areas upstream or draining marshes near coasts might aid farming but had adverse impacts on fisheries. Generating hydroelectricity for industries, particularly mining and textiles in the Indian context, had hugely detrimental impacts for those displaced by dams or dependent on the rivers downstream because now, the river flows were very different.

Could colonial administrations entirely control water though?

■ Actually, water highlights the limits of imperial power. Despite all the claims by European colonialists of having mastered nature — which was an important way to justify their rule — water was never mastered. It did all kinds of unexpected things, especially in monsoon territories whose water regimes were very different from what Europeans were familiar with. All these attempts at control often caused negative consequences like malaria epidemics breaking out near irrigation canals or waterlogging and salinisation of land, which remain a huge problem.

THE PAST IS PRESENT

Precisely because Europeans claimed to control nature in the interests of all, including their colonial subjects, a failure to harness water effectively also translated to a responsibility for problems — water became a flashpoint of many anti-colonial protests, such as when colonisers tried to close wells for sanitary reasons and start charging for a resource which used to be free. Water became a site of social and cultural contestation, mirroring the limits of colonial power.

We often think of timber or coal in this regard but what role did water play in the huge commercial expansions of colonialism?

■ In many areas, the use of hydropower was critical. In Mumbai, the first large hydroelectric plants were built in the early decades of the 20th century, specifically to support the city's textile mills. Many of the earlier coal-fired plants had led to complaints about pollution, so hydroelectricity emerged as a relatively cheap and cleaner source of energy. This led to protests upstream though against the flooding of vast areas in the Western Ghats.

Other places were also trying industry-oriented strategies utilising water — the then-princely state of Mysore used state investment to boost mining at the Kolar Gold Fields and grow manufacturing by developing electric plants at the Kaveri Falls' Shivasamudram. In much of sub-Saharan Africa, almost all hydroelectric capacity built during the colonial period, and much of it afterwards as well, was essentially to develop mining. This led to the phenomenon in both the African and Asian contexts of hydroelectricity being developed for distant urban markets, bypassing potential rural markets which were considered unviable. This was based mostly on prejudices about the extent to which 'ordinary' people in the colonies were 'ready for' something as exotic and new as electricity — thus, most rural electrification happened only after freedom.

In the late 19th and 20th centuries, colonial powers were also justifying themselves not only as a means of exploiting colonies but seeking to 'develop' them. With most people engaged in agriculture, the only way to do this was by improving farming productivity — irrigation played a key role, creating agricultural surpluses which could then be invested into industry.

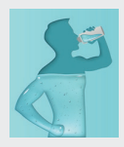
What are the implications of the colonial approach to water in a postcolonial world which is also facing an environmental crisis?

■ We face multiple challenges involving water today, from its availability to its increasing volatility with climate change, quality, etc. Most of the severest water-related problems are in the Global South and in former colonial territories. One challenge is that governments, international NGOs, donor countries, development banks, etc., tend to opt for technological solutions to water problems. This has a long genealogy — from leaders and development experts of the 1950s and '60s who were obsessed with large dams, you can travel back to the colonial era when this modern water management script was actually written. We must trace those continuities of how people try to deal with water by using 'technological solutions' rather than addressing traditional knowledge systems, examining local usages of water, etc.

FAR OFF: Rural women seek water

The different levels of vulnerability to water crises today also lie in the colonial past. The IPCC highlights highly water-vulnerable regions like South Asia, sub-Saharan Africa and parts of South America — their problems are not a matter of natural difference. This reflects deeply rooted inequalities of wealth based in the colonial past. A recent IPCC Assessment Report (2023) specifically cites colonialism not just as a driver of climate change but also a critical factor in explaining the differential vulnerabilities of groups to this. Water, through its profusion or lack, is the main medium through which all the impacts of climate change are manifested — recognising its colonial legacies is extremely important in the effort to find solutions to changes in the water cycle caused by global warming now.

OUR LIMPID SELVES



● Up to **60% of the adult human body is made of water** — experts state the **brain and heart are composed of 73% water**, the lungs are 83% water, **skin** is 64% water, **muscles** and **kidneys** are 79% so and **even our bones are aqueous** with 31% water

● **Human cells contain water** — it dissolves substances, allowing these to **use minerals, nutrients and chemicals**. Water helps **kidneys dispose of toxins**, lubricates **joints for smooth movement** and **regulates body temperature** through sweat — water's 'sticky' properties, coming from surface tension, help transport and **metabolise carbohydrates and proteins from food** in our bodies

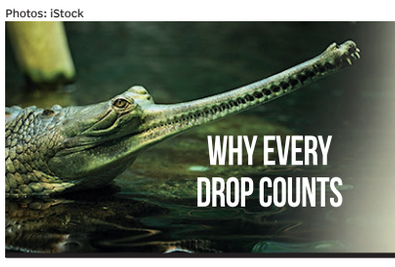
● **Water molecules float upwards against gravity** — they even pull each other up through small channels like the tiny blood vessels inside you. That's how **oxygen and nutrients reach our brains in capillary action** — the same movement **lets plants pull water from deep underground up to their leaves and flowers in sunlight**

● Medical experts thus advise **drinking six to eight glasses of water a day** and also derive H_2O from fluid-rich **peaches, oranges and strawberries, cauliflower** and **cabbages**, drinks like **fruit juice, milk** — and, of course, **pure water** itself

Research: BBC Ideas, Encyclopaedia Britannica, National Geographic, NYT, Scientific American

DEEP CITY: Mumbai was built from the sea

Photos: iStock



● Once, the **gharial** swam across the rivers of **Bangladesh, Bhutan, India and Myanmar** — today, only small groups are found in northern India. This long-nosed crocodilian is an **aquatic being, living in rivers** — but **dams and barrages have shrunk its habitat** and polluted water while **unsustainable fishing** has reduced its food. Gharials also get caught in fishing nets — while **losing their nesting habitat of riverbanks to sand mining**

● The stunning **Scarlet Ibis**, a resident of **South America, some Caribbean islands and occasionally, southern Florida**, lives in **wetlands, marshes and mangroves** — large Ibis flocks, recognised by their trademark 'honking' calls, forage in waters for **aquatic insects, crustaceans and fish**, using their long, pointy beaks. However, as **marshes and wetlands are increasingly built over**, they face **habitat loss** — and a shaky future

● As climate change intensifies, the **African elephant faces the heat** — it **needs hundreds of litres of water daily** as **an elephant can't sweat** to release heat stress. Thus, they **swim and spray their skin with water**, evaporation cooling them. But **global warming** is causing **severe droughts** — in 2016, many elephants in southern Africa perished, longing for a priceless drop

Research: Smithsonian Magazine, WWF, IUCN

'Water bodies are often seen as real estate which must be built on — that causes a cycle of floods and droughts'

***Harini Nagendra** and **Seema Mundoli** teach climate science and sustainability at Azim Premji University. Speaking to **Times Evoke**, they outline how water flows in modern cities:*

We need to reimagine our connection to water, an existential resource everyone on Earth uses, yet rarely thinks about. In the era of global warming, as water grows more unpredictable, we should consider where it comes from, the stories it carries and the offerings it brings to our lives. That could make our consumption more thoughtful and felt. We delved into many of these aspects in our book 'Shades of Blue: Connecting the Drops in India's Cities'. As environmental researchers, we also found that whenever water is discussed now, it is usually in relation to a crisis like a flood, pollution, etc. While those issues must be addressed, we also hope people think of water as a joyous good, something that nurtures us and must in turn be looked after.

In this way, it is hoped that existing views of water, shaped by diverse and complex histories, evolve. Contrary to the ancient approach of Indian civilisation, European colonials had an instrumental or utilitarian view of resources. They didn't see water as holding manifold connections to life which sustained Indians, from the lakes of Bengaluru to wells in Rajasthan. Instead, they saw water just as real estate which wasn't being used properly. In Mumbai, marshy land had an ecological role but in the colonial gaze, this was just something to build on. In Bengaluru, lakes were seen as a source of productive agriculture — and a nuisance because of flooding. If a waterbody was kept intact, it had to look acceptable — researching the colonial discourse over the Yamuna in Delhi, we found local brick makers, washer folk and melon growers were considered 'unsightly' herein. The riverfront was to be used for recreation, which meant only the British and their permitted visitors could go there for promenades, etc. Thus, a predatory approach developed around water, constantly asking 'What's in it for us?', negating an entire sweep of connections Indians had developed with waterbodies.

Photos: iStock

THEN & NOW: In ancient India, water was preserved in urban tanks (L) — it is now built over by complexes standing literally on marshes (R)

There was also a growing view of water as a source of ill-health, something which caused diseases — but the focus remained on providing clean water to Europeans in India while 'Black Town' or native areas could use contaminated water. The British were interested in whether water could be transported to them in piped form rather than understanding the diverse ways in which Indians needed water, whether for prayer or nurturing cattle — these began to be seen as 'unhygienic' practices. But for less privileged people, these uses were critical — and continue to be so in many places.

However, such sharp changes in perceptions of water resulted in people growing more unaware of how they impacted it. We studied the links between contemporary drug usage and water and found antimicrobial resistance to be a tragedy of the commons. When anyone feels unwell, they generally pop a pill. The effluents of such medication reach waterbodies swiftly, causing pollution and antibiotic-resistant bacteria to develop. This affects the entire aquatic ecosystem, with implications even for people living far away. Individual benefits and the absence of rules mean a common resource gets degraded. The same applies to the meat industry, poultry, pisciculture, the medical industry, etc., where dumped chemicals and waste pollute water for everyone, with almost no consequences for anyone.

A BEND IN THE RIVER

This prevails across the Global South where urban building is outpacing the capacity to provide infrastructure, from roads to water and sewage systems. Cities are growing exponentially while urban infrastructure is only growing arithmetically, which explains the pollution seen in South America, Africa and India. Being aware of the underlying causes is vital. We don't consider, for instance, exactly how drainage works — this is mainly just piping which takes untreated water, from industrial effluents to sewage, into underground water bodies that then transport this to rivers. Thanks to poor planning, most of our waterbodies, from lakes to ponds, once seasonal and rain-fed, have now become perennial — and sewage-fed.

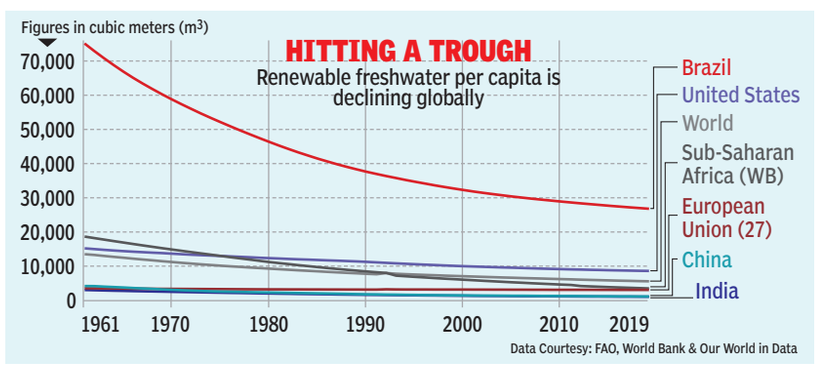
We are also not using ecological knowledge suitably. Once, drains were lined with certain plants which cleaned water. This would then go onto wetlands and be further treated by vegetation — by the time the quantum reached a large waterbody, it would be considerably cleaner. Now, drains are usually made across concretised riverbanks. There is no space left for these ecological processes to function. Ironically, such nature-based strategies have roots even in colonial history. The British used to pump waste directly into the Hooghly. But then, they discovered a slope which let them divert this into the wetlands of the east. This ecosystem filtered sewage naturally while growing more fertile for farming and fishing in the process. Instead of viewing wetlands as wastelands and filling them up rapidly, we need to draw from such experiences and create new nature-based solutions now.

The results of not doing so will be severe. We see linkages growing between both droughts and floods in cities like Chennai. Once, Chennai had the Adyar, Cooum and Kosasthalaiyar rivers, the Buckingham Canal and the Pallikaranai marshes that ensured safe drainage from the city into the sea. But massive building has taken place over these river systems, shrinking their ability to absorb water. The city has also built over its marshes which acted earlier like a sponge and ensured replenishment of the water table — so, parts of Chennai which stored water and parts which mitigated floods have both been built over. This causes a cycle of floods and water scarcity, like the 2015 deluge and the 2019 shortage, a situation which could repeat across many cities.

Yet, there are ways to create a healthier water future. Some are pragmatic, from preserving mangroves to extending circular systems of waste management, reviving urban rivers, desilting estuaries, segregating garbage to not pollute marshes, harvesting rainwater and reusing grey water. Some are scientific — it has been found, for instance, that the brown smog which hangs over South Asia impacts the monsoon. By cleaning air pollution, we could both purify another vital resource and reduce climate impacts on the monsoon, which is growing increasingly volatile with global warming while the natural capacity of wetlands to soak up rain has been whittled down. Upland afforestation is another positive strategy — states often fight over river waters. Ironically though, deforestation, land use change and sand mining have weakened these so much, they can't hold the same volumes anymore. We need hydrological assessments to alter this state now.

We live in an era of 'solastalgia' or the fear of losing nature to deterioration. The loss of water often exemplifies this anxiety — but the river cleaning groups, rainwater harvesters, wetland conservationists and other champions of water also encourage hope for a future where water tells a story only of growing life, not diminishing it.

ARE WE 'UNSIGHTLY'? Cattle need water too



READERS WRITE

Dear Times Evoke,

Biologist KS Gopi Sundar's wonderful insights about bird species in Udaipur (14th October) made a heart-warming read. In 18 months in Kharagpur, West Bengal, I've seen many exotic species, from crimson-throated barbets to golden orioles and sunbirds alongside hoopoes, woodpeckers, rosefinches, etc. The secret, as TE points out, is the thriving of old and new trees. Thank you, TE, for bringing us joy, even amidst other dark news.

— **Pampa Paul**, Kharagpur

Reading Times Evoke is a truly insightful experience. It has not only imparted knowledge to me but also heightened my awareness regarding challenges nature faces. But there are also positives like KS Gopi Sundar's Udaipur study which shows how even a bustling city can be habitat for birds. Times Evoke is truly a blessing for all readers keen to conserve biodiversity.

— **Sangamitra A. Padmarajan**, Mumbai

Thank you, TE, for the lovely Udaipur article! During a family trip in 2018 there, we noticed a large variety of tiny colourful sunbirds — this article brought back those fond memories. It is eye-opening to see urban locations managing to sustain biodiversity. This study can aid efforts to preserve ecosystems.

— **Sudhanshu Khajuria**, Bengaluru

TE on birdlife in Udaipur was extremely encouraging for both sustainable development and conservation. Many can learn from Udaipur which boosted even rare migratory birds. A similar mapping was conducted by me for Kanpur where I've spotted about 140 bird species. Although Kanpur is an industrial city, its Cantonment, ponds, ghats, etc., are bird hotspots. Thanks, TE, for this beautifully presented article.

— **Rajesh Kumar**, Kanpur

Share your thoughts at:
timesevoke@timesgroup.com
Read Times Evoke online at:
www.timesofindia.indiatimes.com/india/times-evoke