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Jalasangvad

A Dialogue on Water
Editors: Dr. Datta Deshpkar, Shri Satish Khade



Anaku Valley farmers supported by: Project Hariyali



ANIRBAN GHOSH
Chief Sustainability Officer,
Mahindra Group

Cover Story:

Rising for our Planet :

Mahindra Group on the Future We Must Create

Famous rivers in the world

(1) Yangtze river



(2) Irtysh River



(3) Lena River



(4) Amur river



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Mandal

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Editorial

We can look at water from three different angles. They are, availability of water, proper distribution of water and quality of water. For increasing the availability of water, we construct dams, check dams, lakes, store water under the soil. In distribution of water we try to see that each and every person or activity gets adequate water. And in quality, we see that each one gets the quality he wants. Quality standards for different activities are different. Industry requires different quality, agriculture needs different quality, for drinking water, different quality is needed.

Till now, all our efforts are directed to increase the supply of water. We feel proud to say that we have constructed so many dams, constructed many lakes, converted sea water in potable water to strike a balance between demand for and supply of water. But unfortunately we have paid less attention to control the demand for water. We call water to be a very precious commodity but make indiscriminate use of water.

Look at how water is used in Singapore. Every individual user of water gets the water bill which educates the user how to use water. In that bill, it is stated how much water he is using, how much water other people in the locality are using and what is the national average. He tries to compare these three figures and thereby tries to know where he stands. From that comparative data, he is made aware how much extra water he is using. That helps him to bring down his consumption if he is using excess water. In our country, people use water at their will and as a result, the water budget of the city collapses. It is said that self discipline is the best discipline. This problem cannot be solved just by pricing the water. A rich person who has huge resources with him uses too much water. Nobody can question him, he would say that he has paid for it.

Same is the case with agriculture. In our country, nearly 80 percent of the available water is being used by agriculture sector. A common farmer feels that if he gives more water to the crop he would get more yield. But, unfortunately, he does not understand that the crop does not need that much water. And the ultimate result is, he does not get the expected yield from his farm. Just making water available to the farmer is not enough, he has to be properly educated how to use water. If that is not done, we would be wasting our precious resources for no reason. Unfortunately, the entire irrigation system is designed to help one crop only i.e. sugar cane. Farmers cultivate sugarcane even when the country does not require sugar in that quantity. Unfortunately, Government also has a soft corner for the sugar cane producers as most of the rulers own the sugar factories.

We are very happy to create storages of water. But unfortunately, we have failed in making full use of our stored capacity. Storages are rapidly increasing but the area under irrigation is not increasing in that proportion. This is mainly due to the fact that that stored water is underutilized. We do not have proper control on the leakages. It is said that this stored water is used only to the extent of 40 to 50 percent of the stored capacity. Even today, there are some dams where proper distribution system does not exist. We always speak about water use efficiency but do not try to increase it. The canals designed are in a dilapidated condition and they fail to deliver water where it is needed.

One fears that we are allowing the people to use water even when they do not deserve it. Much needs to be done in the field of water management. In brief, the Jalashakti Mantralaya has a lot of job to increase its performance.

Dr. D. G. Deshkar
Editor

Rising for our Planet: Mahindra Group

on The Future We Must Create

How Mahindra Group is spearheading carbon reduction innovations and strategies to better protect our future generations.

As part of our content series, The Future We Must Create, we spoke to three signatories based in the Asia-Pacific and worked with local artists to bring their vision of a better future to life. For Mahindra Group, a better future is about improving the lives of those who live on our planet by achieving net-zero carbon.

An industry stalwart supporting India's progressive development since 1945, Mahindra Group is a global federation of companies operating in many sectors like renewable energy, agriculture, logistics, hospitality, and real estate. Companies within Mahindra Group, such as Tech Mahindra and Mahindra Logistics, have made commitments to achieve net-zero carbon by 2040, double energy productivity, adopt 100% renewable energy, send zero waste to landfill, and become water positive. As part of these efforts, the Group has developed a diverse green revenue portfolio with businesses in renewable energy, auto recycling, electric vehicles, green buildings, and micro-irrigation.

Among these initiatives is an impactful nature-based project, Hariyali, meaning greenery in Hindi. The project launched in 2007, focusing on improving India's green cover and protecting biodiversity by committing to plant 1 million trees annually in the deforested Araku Valley. Within 15 years, over 20 million trees have been planted as a result of this project. These trees are now making a collective impact by contributing to carbon sequestration (removing carbon dioxide, the most common greenhouse gas responsible for global

warming, from the atmosphere). There are also fruit and forest trees that are helping to improve the livelihoods of Adivasi farmers and their communities—tree saplings provided to farmers include guava, mango, custard apple, orange, lemon, papaya, sapota, moringa, neem, bamboo and teak.



ARAKU VALLEY TREES, AS PART OF PROJECT HARIYALI



ARAKU VALLEY FARMERS SUPPORTED BY PROJECT HARIYALI

“Project Hariyali is one of the many initiatives we created to positively impact the environment and transform the lives of our

community. We hope to uplift individuals by creating new means of livelihood for them," says Anirban Ghosh, Chief Sustainability Officer, Mahindra Group. "However, to achieve our goal of net-zero carbon by 2040, collaboration is crucial. Sometimes, strategy finds itself missing from the sustainability war room, and corporations must work together to create meaningful strategies for lasting change. This is why companies within Mahindra Group joined The Climate Pledge."



ANIRBAN GHOSH, CHIEF SUSTAINABILITY OFFICER, MAHINDRA GROUP

"Project Hariyali is one of the many initiatives we created to positively impact the environment and communities. However, to achieve our goal of net-zero carbon by 2040, collaboration is crucial. Corporations must work together to create meaningful strategies for lasting change."

Anirban Ghosh

Chief Sustainability Officer, Mahindra Group

A 2022 Amazon-commissioned study of 750 APAC business decision-makers with responsibility for environmental and societal sustainability corroborates Anirban's observation. The study found that more than 2 in 3 businesses in

APAC see climate collaboration as a decisive factor in reaching a net-zero carbon future, yet, the lack of access to cross-sector networks continues to impede cooperation.

Co-founded by Amazon and Global Optimism in 2019, The Climate Pledge is a commitment to reach net-zero carbon by 2040. As a climate collaboration platform, over 375 signatories across 54 industries and 34 countries have joined the Pledge to-date. Signatories of The

Climate Pledge agree to measure and report greenhouse gas emissions on a regular basis, implement decarbonization strategies in-line with the Paris Agreement through real business changes and innovations, as well as neutralize any remaining emissions with additional, quantifiable, real, permanent, and socially beneficial offsets

to achieve net-zero annual carbon emissions by 2040.

"It is extremely challenging to achieve net-zero carbon by 2040 if companies don't work together," says Ghosh. Through The Climate Pledge, companies within Mahindra Group will continue to collaborate and connect with various international and national corporations to align on transformation strategies. With hundreds of successful projects and several others underway, we are in constant discussions with partners to decarbonize our industries. These strategic alliances are pivotal to reaching our targets. For corporations within the Pledge ecosystem that need more help with their decarbonization goals, we also commit ourselves to sharing knowledge and experience on what works and what doesn't."

Ancient Mauryan technology brings water, hope to dry Magadh in Bihar

Inspired by a college professor, villagers in the south-central part of Bihar donated money, built traditional channels and embankments to irrigate fields and ease farm woes.



A check dam built by villagers along with Maghadh Jal Jamaat near Sijuaghati in Imamganj-Dumaria area.(HT Photo)

Ancient Mauryan engineering has brought water back to the undulating and rocky terrain of Magadh, the grain bowl of Bihar that had turned almost entirely arid because of abortive modern irrigation policies.

The Magadh region, comprising 10 districts in south-central Bihar, was reeling from its worst water crisis over a decade ago, forcing farmers to board trains to distant cities such as New Delhi and Chandigarh and work there as migrant labourers.

Rainfall was scanty, people had long abandoned traditional reservoirs that caught and stored rainwater run-off, the water table in aquifers had depleted from overuse, and modern irrigation canals covered only a small area.

Gaya itself was a modern nightmare as most of its ponds overflowed with garbage. The water table had dipped below 200 feet, and taps and tube wells had gone dry. The water crisis was so acute that people sold their houses in posh localities at throwaway prices. The government promised to build a 100km canal from the Ganga, but the project failed.

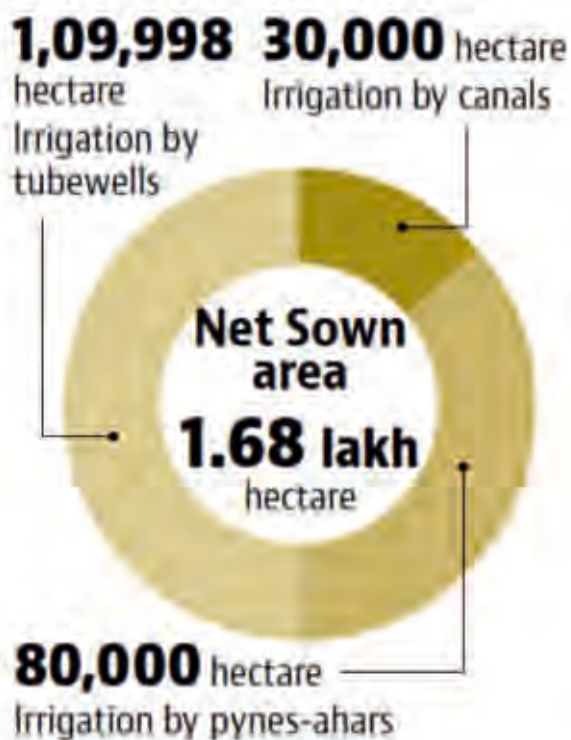
The crisis looked irreversible but Rabindra Pathak, who taught Pali and Sanskrit at a college in Arwal, was certain that the answer lay in the long-forgotten and crumbling aqueducts and water reservoirs that irrigated the fields and fed ancient India's most glorious empire.

He pored through old books and scriptures, and found that reviving the dilapidated network of pynes and ahars was the lone solution.

Pynes are channels carrying water from rivers. Ahars are low-lying fields with embankments that act as water reservoirs. This combined irrigation and water conservation system dates back to the Mauryan era that flourished in Magadh 2,000 years ago.

Pathak founded the Magadh Jal Jamaat (MJJ) in 2006, a network of individuals working to revive the neglected pynes and ahars. "There was no other way to solve the recurring water crisis threatening to turn the region arid. Reckless use of tube wells for irrigation without adequate recharge complicated the scenario," he said.

Convincing people to participate was not easy in a fragmented society, where nobody was willing to part with an inch of land.



"Villagers shrugged off the idea of collective participation initially, as they couldn't fathom its impact," said Kanchan Mistri at Khaneta-Pali village. "When the government with all its resources failed, how could a group (like ours) do it? That was the common refrain."

Besides, the local mafia interested in contracts for government projects posed a big threat to the voluntary initiative. A year before MJJ's formation, in 2004, social activists Sarita and Mahesh, working on an irrigation system in Gaya, were murdered by the mafia.

But Pathak was determined to do the unthinkable — bring water to the area. He got ample help from his professor-wife, Pramila, and trader Prabhat Pandey.

They persuaded villagers to form committees and donate anywhere between Rs 100 and Rs 1,000, depending on the size of agricultural plots they owned, and revived the 125-km Jamune Dasain pyne and 159-km Barki pyne. These two complex channels, rebuilt with help from social worker Chandra Bhushan, brought water from Falgu, a tributary of the Ganga.

The impact was instantaneous and miraculous. About 150 villages along the Jamune-Dasain pyne and around 250 villages along the Barki canal have been able to irrigate their fields for the kharif and rabi (monsoon and winter) crops, and grow vegetables, pulses and oilseeds as well.

The farm distress eased significantly. Life changed for marginal farmer Jairam Bhagat, who wanted to kill himself when his paddy crop failed in 2007, after he met volunteers of the Magadh Jal Jamaat. He joined the group, discarded plans to return to Chandigarh where he worked as a plumber, and contributed his mite for the irrigation system.

Bhagat, 45, from Shabaazpur village in Gaya was among thousands of people from about 700 villages who used to migrate for work — not by choice, but by compulsion. He now stays home and reaps a good harvest from his amply irrigated farm.

People began to say the water system's revival was the second-best thing to have happened to Gaya after the Buddha's enlightenment. In Gaya, residents, officials, military and police personnel joined the mission to build check dams and clear ponds of encroachment and debris.

"Recurring protests over water crises are now a thing of past in the district. Hand pumps and wells that were abandoned are now working," said Rajesh Kshitij, a lawyer in Gaya.

The social organisation's initiative drew accolades from environmentalists Anupam Mishra and Magsaysay winner Rajendra Singh.

In 2011, chief minister Nitish Kumar asked the irrigation, public health and engineering, and the revenue and land reforms departments to replicate the Magadh Jal Jamaat model.

The Magadh region has four medium and major irrigation projects, including the Sone canal. But these irrigate only 30,000 hectares in parts of Gaya, Arwal, Jehanabad, Aurangabad, Nalanda and Nawada districts.

The North Koel reservoir scheme in Jharkhand's Palamau and Punpun barrage in Gaya were launched in 1972 and 2006 respectively. But they never took off.

The Gaya circle irrigation department's executive engineer, Ashok Kumar Choudhary, said the existing canal system works only for the kharif season, or monsoon period.

But the restored pyne-ahar system helps farmers grow paddy in 150,000 hectares, wheat in 100,000 hectares and pulses and oilseeds in about 30,000 hectares in Gaya alone.

The Mauryan network brings water to the remote countryside, which seldom got any help from government agencies because of Maoist insurgents active in those areas.

The Magadh Jal Jamaat responded positively when at least seven villages in the Maoist heartland of Imamganj- Dumaria requested for a check dam to be built to conserve rainwater. The area is about 22km off GT Road, but barely

accessible.

"Our volunteers worked two months, built a check dam and rejuvenated a pyne, which is now irrigating farms of over a dozen of villages and recharging ahars and ponds," said 60-year-old Kameshwar Yadav of Pachman, ploughing his field after a decade.

The move encouraged a farm turnaround and migrant youth working in Delhi returned home to sow oilseeds.

"We built the dam with Rs 44,000 in 2014 when the state would have spent Rs 50 lakh and taken a year. This year, we hope to grow fish and reap a bumper rabi crop," said Niranjan Yadav, a 30-year-old who worked at a retail shop in Delhi.



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Stockholm Water Prize-2008

Prof. John Anthony Allen, England

Shri. Gajanan Deshpande, Pune -(M) : 9822754768



(An article series has been launched in August 2020 to learn more about the World Water Prize winners and their work.)

Professor John Anthony Allen of King's College London and School of Oriental and African Studies was honoured with the Stockholm Water Prize-2008. Prof. Allen has taken a leading role in developing key concepts in understanding and explaining water issues and how they relate to agriculture, climate change, economics and politics.

People use water not only when they drink or bathe. In 1993, Prof. Allen, 71, introduced the new groundbreaking concept of "Virtual Water" and showed that there is an embedded water use in food and consumer products, in its commercial transport, that is measurable. For your morning cup of coffee, 140 litres of water is used to grow, pack and transport the coffee beans to market. This is roughly the amount of water an average person in England uses every day for drinking and domestic purposes. Americans use about 6,800 litres of virtual water per capita per day, which is three times the water consumption of a Chinese person.

Virtual waters continue to have a major impact on global trade policy and research. This, in particular, has redefined water policy and water management in water-scarce regions. It explains how and why nations like the US, Argentina and Brazil 'export' billions of litres of water every year, and others like Japan, Egypt and Italy import billions. From this, the concept of virtual water has opened doors to various opportunities for more productive water use. National, regional and global water and food security can be enhanced using this concept. For example, taking the production of

water-intensive goods to regions where it is economically viable and trading them in regions where it is not. While studying water scarcity in the Middle-East, Professor Allen developed the theory of importing virtual water through food, as an alternative water "source", to reduce pressure on scarce domestic water resources there and in other water-scarce regions.

The international nominating committee for the award wrote in its citation that "Prof. Tony Allen has been honoured with the Stockholm Water Prize for his unique, pioneering and long-standing work in academia and for raising international awareness of the interdisciplinary links between agricultural production, water use, economy and political processes." He introduced important new concepts such as "virtual water", as well as the concept of "problematic" to emphasize that the most critical problems in the water sector are solved outside the water sector; energy is a major issue and, above all, understanding the political landscape of water science is the most important factor in the policy relationship that has led to innovative new research and action by both individuals, large organizations and social organizations. An improved understanding of trade and water management issues at the local, regional and global levels is most relevant to the successful and sustainable use of water resources".

As a scientist, educator and consultant, Prof. Allen has developed the knowledge and communication tools necessary for sustainable and efficient water resources management and policy. His research aims to provide a broad range of insights into environmental, economic, social and political theories of global water resources and



expert consultant on sustainable water development as well as countering population growth in developing countries, increasing food demand, institutional reform, valuing water, and balancing conflict resolution in the Middle East and North Africa region.

Prof. Alan has written or edited seven books and published more than 100 research papers in political science, natural resource management and interdisciplinary water journals. He has also educated over 1100 current and future water professionals. He has worked in the Middle East for over 35 years, working as a consultant on joint management of shared water resources in each of its basins. He has also edited the scientific journal 'Water Policy' and worked as a consultant for several nations, the World Bank and the European Union. His keen perception and scientific analysis have inspired new thinking on a wide range of water challenges. He has been described by many as one of the most influential thinkers in global waters today. In the year 2021 Prof. Tony Allen has passed away.

how they can be made sufficient to meet future population needs. Through their work, policymakers, scientists, water professionals and the general public are more aware of the role of water in the production of a wide variety of products and its impact on global trade and the economy. Virtual water has been a central and active component of scientific research and policy making, and has empowered individual consumers to influence water management on a global scale.

Thinkers who look beyond the box

Prof. Allen has developed the concept and terminology of "hydro-hegemony" and "problematic". This work has led to a better understanding of the different capacities and real conflicts in border regions such as the Nile River Basin, where water resources are shared between nations, as well as providing perspective on the economic and political processes that can enable food and water security for all such nations. He is an

DownToEarth

10 FACTS ON CLIMATE CHANGE FROM IPCC REPORT

- In the next 20 years the global warming will breach the threshold of 1.5°C
- If we continue to emit greenhouse gases as now, global warming will be above 2°C by mid-2100s.
- With every 1°C rise in temperature, there will be a 7 per cent increase in the intensification of extreme rain events
- Carbon dioxide concentration is highest in 2 million years
- Sea-level rise is the fastest in 3,000 years
- Arctic sea ice is lowest in 1,000 years
- Some changes we can't reverse any more, at least for next thousands of years
- Ice melting will continue for the next 1,000 years even if we manage to control our GHG emissions
- Ocean warming will continue, which has increased by 2-8 times from 1970s
- Sea-level rise will continue for hundreds of years

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Organization – Water Aid India (WAI)

Shri Vinod Hande

(M) 9423677795



Water Aid India is part of the global Water Aid Federation working with mission to transform the lives of the poorest and marginalized people by improving access to safe water, sanitation and hygiene. Vision of Water Aid India is a world where everyone everywhere has safe water, sanitation and hygiene. The goal of Water Aid India to make WASH poverty a history in the country. To achieve this Water Aid empowered marginalized people by including them in decision making, strengthening local governance institutions responsible for delivering basic WASH services.

Water Aid India started its operation in country from 1986. It is registered as Jal Seva Charitable Foundation(JSCF) a non profit company under Section 25 of the Companies Act, 1956. JSCF is an associated member of Water Aid International. Sumit Bose is a Chairman of Water Aid India. Water Aid India is working in 11 states of India with their partners to transform millions of lives every year and the states are Uttar Pradesh, Bihar, Jharkhand, Odisha, Madhya Pradesh, Chhattisgarh, Telangana, Andhra Pradesh, Karnataka, Delhi and Rajasthan. Water Aid India support the Swachh Bharat Mission and National Rural Drinking Water Program of central govt. of India. Water Aid monitor the effectiveness of WASH services, advocate the role of safe water, improved hygiene and sanitation in human development particularly related to health, nutrition and education. Water Aid India is having offices at Bhuvaneshwar, Bhopal, lacknow and Hyderabad with head office at New Delhi.

We all need clean water to wash our hands, keep our homes and hospitals clean and protect against COVID-19. But many people struggle to

access this vital resource which puts them at risk.

- 1 in 10 people in India do not have access to a safe source of drinking water.
- 2 in 5 households in India lack hand washing facilities with soap and water.
- In 13 states Water Aid is working to prevent the spread of COVID-19.

Water Aid concentrate it's working in schools, women's groups, Anganwadi, healthcare centers, institutions of self governance in villages or slums. In 2015-16 due to efforts of organization 603716 people got access to the water, 1171524 people to sanitation and 1635023 to hygiene. Currently Water Aid is working in 43 districts and 14 cities of 11 states of India. Water Aid struggling to make worldwide access to clean water, decent toilets and good hygiene a reality by 2030 . the target year of Sustainable Development Goals. Other than India Water Aid works in 37 countries worldwide.

A lack of safe water, adequate sanitation and good hygiene practice is directly linked to fatal diseases and conditions such as cholera and diarrhea. Across India, millions of women are wasting precious time for collecting dirty water. Water Aid is operating in India from last 36 years. Organization demonstrate WASH solutions to make an impact at the district, state and national level for introducing policies. Local self government (Panchayati Raj) also participates in the process of planning and learning.

Safe water

In India more than 1 lakh people die of water borne diseases annually. The country faces a huge challenges in ensuring safe water supply. Water Aid focus on improving access to water. Their

approach involves promoting locally owned and managed drinking water security plans at the community level. These plans are simple which can be used, monitored and managed by people and local government. Main components of Water Aid on drinking water security includes,

Participatory water resource management

- Building capacity of local government and community on the principles, processes and provision.
- Mapping of water resources and usage.
- Water budgeting and allocation.
- Improving access to water supply by taking into account government resources.
- Expressing views for regulation of water use in water stressed areas and protection of ground water.

Source sustainability measures

- Rainwater harvesting, groundwater recharge.
- Developing alternate water supplies like surface water system.
- Securing fresh water source for consumption.

Water quality management

- Water safety plans.
- Water treatment.
- Checking and monitoring water quality through field test kits.

Operation and maintenance

- Developing skill for regular maintenance and management.
- Finance for operation and maintenance.
- Monitoring for minimum losses.



Water Aid India's school programme focus on ensuring safe and adequate drinking water in schools. Children and school management members are trained as champions to promote water quality and sustainability in school and communities.

Sanitation

Around 560 million people in India still defecate in open. Water Aid India focuses on global access to sanitation. Organization is of opinion that toilet use at household, school, institutions and public places and hygiene change behavior change are essential to make a sustainable impact on public health and needs urgent action. Water Aid India work in collaboration with district administration to achieve open defecation free districts. Organization is working on central government's Swachh Bharat Mission.

Hygiene

Good hygiene behaviour prevent the transmission of disease and reduces incidence of diseases and malnutrition. This is also necessary from children's health point of view. Simply washing hand washing with soap can cut incidences of diarrhea to half. Approach of Water Aid India is to improve hygiene practice by motivation and by knowledge. Through their local partners and institutions WAI focus on five main hygiene behaviour,

- Hand washing at critical time,
- Safe management and handling of drinking water,
- Hygienic use of toilets,
- Menstrual hygiene,
- Food hygiene weaning foods.

WAI train local institutions like schools and aanganwadi to include hygiene promotion in their regular work and motivate communities to improve their hygiene behavior.

Menstrual hygiene management

Women spend around six to seven years of their lives menstruating. Yet the importance of menstrual hygiene management is

mostly neglected. Many women are uncomfortable discussing in public. Seventy percent of mothers consider menstruation dirty. WAI knows that menstrual hygiene is for the dignity and well being of women and girls. It is important part of the basic hygiene, on which reproductive health of women and girls depends. Approach of WAI is to improve awareness among the girls, women and their families and introduce new low cost simple solutions.

Water, sanitation and hygiene in urban areas and in schools

India is a home to 17 percent of the world’s population. As per 2011 census 31.16 per cent of India’s population lives in urban areas. More than one fourth of country’s urban population lives in poverty. WAI aware that in order to ensure access to water, sanitation and hygiene services in urban areas they need to be innovative and find new ways of engaging local government and service providers. WAI are working in 21 cities and towns of India with support from 14 local partners. Organization is providing technical support and monitoring methods to local government.



Like urban areas school children have a right to basic facilities such as school toilets, safe drinking water, clean surrounding. They should have basic information on hygiene. Water, sanitation and hygiene in schools ensures children’s dignity, safety, health and attendance in classes. Children are more receptive and quick to adopt changes. They become agents of change among their families and communities. They play a important role of catalytic. In India central and

state governments have committed to ensure access to WASH facilities in schools. WAI builds strong will to promote WASH in schools. They also committed to improve and maintain WASH facilities. Educating institutions, teachers and students on WASH is also part of WAI’s program.

Climate change and Disaster Risk Reduction

In addition to their WASH program WAI takes care of Climate change and Disaster Risk Reduction program in India because India is vulnerable to floods, cyclones, earthquake, landslides, avalanches and forest fires. Natural hazards affect nearly six percent population of India and 24 per cent deaths. Around 2 per cent of India’s GDP is lost due to such disasters. Out of 35 states and territories in the countries 27 of them are disaster prone. States where WAI works fall under disaster prone category. Disaster severely affects the infrastructure and services related to hygiene, drinking water and sanitation. Floods affects ponds, water bodies and contaminate natural source of fresh water thereby forcing affected people to use unsafe water.

Rural toilets are generally weak in structure thereby can’t sustain high flood or cyclone. In such circumstances people go for open defecation as there is no other option left to them. Such crises disrupts hygiene practice and contaminated water spreads water borne diseases like diarrhea, cholera, typhoid and hepatitis. Climate change is an emerging area of attention and focus for Water Aid globally and in India. In



coming decades it is predicted that billions of people from developing and developed countries can face shortage of water and food. There will be greater risk to health and life resulting from climate change. Water Aid India prepares the communities to adopt the measure for the impacts of climate change that affects WASH infrastructure and service sustainability.



India's vast population is growing in urban areas, where people are living in slums. In many places feces and water supplies are not separated or even illegal. Rural areas have their another problems that they have no sources for maintenance. Main is culture and belief prevent people from using latrine or practising good hygiene. Water and sanitation are basic human rights. WAI believe that WASH services are achievable with the right political will and by deployment of resources. In Safeda Basti slum of New Delhi WAI is working with partners to construct household toilets for residents.

Success story

Story narrated by Chetibai Kopodi, resident of Sonpur village in Kanker district of Chhatisgarh. She has come long way from defecating in the open to accessing a well made toilet at home. Population of Sonpur is 602 people. Agriculture is the main profession of village. Main worry of village is access to clean water and decent toilets.



Chetibai was the first in her village who got an EcoSan toilet constructed in her house. Chetibai opted for a toilet at home as her daughter was growing up and safety was becoming a main issue. There was a danger of wild animals also in village. Her daughter was also reaching twenty and has to walk interiors of the jungle at wee hours.

About two years ago Chetibai attended few discussions organized by Water Aid India and it's partners. Sister in law of Chetibai and Sarpanch of village mobilized the village to constructed toilets. As Chetibai showed interest in construction of toilet, digging work started for construction of septic tank. Lot of water seeping was there as water level in that area was high because of lake nearby. Construction of septic tank was not feasible. WAI and their partners came out with solution of constructing EcoSan (ecological sanitation) toilets to over come the problem of water seepage. They require less water at the same time convert waste into manure that can be used as fertilizer for agriculture. EcoSan toilets are cost effective and their operation and maintenance cost is also low. They do not need much water, electricity and sewage treatment system. An EcoSan toilets has two chambers and each chamber used alternately for about 12 months. In addition to safety Chetibai is using manure and urine in her field.

Another success story narrated by Hrudamajhi of Kirejholla village belongs to Gond tribe of Odisha. It is remote village in Boden block. The village is home for over 190 families, majority of them are farmers and daily wage laborers. Village suffers from extreme fluoride

contamination of water. Open dug wells were in dangerous state so local authorities arranged five hand pumps in the village. After five years people started complaining about tooth decolouration and joint pain. Hrudamajhi could not walk or sit



properly due high concentration of fluoride in water. Joint pain and swelling in feet was common among the villagers.

In 2016 WAI and their partners visited the village and tested water from all sources. In the

report fluoride level was 3ppm which was more than permissible limit of 0.7 ppm in all five hand pumps of village. Nearby dug well water was also tested for it's potability which found ok for human consumption. With technical and financial support of WAI it was decided to lay mini pipe line for water supply which made easier to women to collect water. 12000 liters tank was built for storage of water. After stop using of water hand pumps Hrudamajhi got relief from pain and from swelling. Not only Hrudamajhi other villagers and children will also be away from health problems.

Similarly by introducing piped water supply to households and safe sanitation practice in Padhariya village of Dindori dist. of Madhya Pradesh by WAI changed lives of villagers drastically.

WAI is working in 11 states of India with technical and financial help from their partners. This is big list to name. Among them few are listed FORCE, Centre for Urban and Regional Excellence, Society for All Round Development, Abhiyan, Pragati Gramin vikas samiti- Bihar, Sarthi Development Foundation. Etc.

TO run an Organization it needs money. Water Aid India accepts donations from individuals and institutions. Of every rupee they receive 85 percent is spent on projects of water, sanitation and hygiene and remaining 15 percent on office establishment.

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GLIMPSES OF BHAGIRATHAVIDYA–

IRRIGATION ENGINEERING IN ANCIENT INDIA

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NATIONAL SEMINAR ON “WATER AND CULTURE”
June 25-27, 2007

Accept this my praise, Ganga, Yamuna, Saraswati, Sutudri, Parusni, Marrudvrdha with Aksini and Vitasta, listen Avjikiya and Susoma” Rigveda, X, 75.5. (1)

Water as liquid, is indispensable to sustain life in all biological forms for drinking, for the metabolic functioning and cleansing of the body, for shelter and domestic animals and to prepare food and medicine. According to Chhandogya Upanishad “water is the essence of the earth and plants are the essence of water”. The personification of water in the form of rivers and the oceans is integral to Indian mythology. (2).

Shri Kakasaheb Kalelkar used the terminology “Bhagirathavidya” for Irrigation Engineering in ancient India. (3)

It is along the banks of the rivers our civilization flourished and since the Vedic times we regarded this country as Motherland (Matrubhumi) and Holyland (Punjabhumi). The Nadi Sukta of the Rigveda and the Prithvi Sukta attest to the Divinity with which they were regarded and prayers are offered to them. Markandeya Purana says, “All the rivers are sacred, all flow towards the sea, all are like mothers to the world, all purge away sins”. The pilgrimage to the various tirthas is a unique aspect of our culture which is brought down to us for thousands of years. In his every day life a devout Hindu chants the following sloka before he invokes the presence of all the holy rivers in it.

Gange Cha Yamune Chaiva Godavari Saraswati
Narmade Sindhu Kaveri Jalesmin Sannidhim Kuru

William Willcocks aptly remarks, “Following the genius of your country, your ancient writers, Vyas in the Mahabharata described the physical facts they were writing about in spiritual language but the facts were all the same. Every canal which went southward, whether it had become a river like Bhagirathi, or remained a canal like the Mathubhango, was originally a canal. They were lined out and dug parallel to each other. They were spaced apart. I remember quite well when I began to line out a scheme of canals for the irrigation of the country, I was astonished to find everywhere that a so-called ‘dead river’ on the map was just where a canal should be placed”. (4)

The Ishvakus and the Paurava-Bharatas were the two most illustrious royal dynasties of India during the Vedic period. Many early kings of the Ikshvaku dynasty are celebrated in both the Vedic literature and the Puranas. The most noted of these were Mandhata, Purukutsa, Trasadasyu, Harischandra and Bhagiratha. Bhagiratha is not only mentioned as a famous king in the Ikshvaku genealogy found in the Puranas but also in the Jaiminiya Upanishad Brahmana. (5)

The story of the descent of the Ganga, the river of the immortals, to the earth is related in the ninth chapter of the Bhagwata Purana. The sons of Sagara had been turned into ashes in Hades (Patala) during an expedition for conquests. Beseched by Prince Bhagiratha the River of the immortals Ganga in the sky Viyat Ganga – Via Lactis agreed to come down to earth to revive them. To

preserve the earth from inundation Siva who resides in Mount Kailas became the breakwater. The mighty floods however disappeared in his matted hair until at the further prayers of Bhagiratha Siva released Ganga when her pride had been sufficiently humbled to, to flow down the slopes of the Himalayas (6)

The earliest evidence of water conservation goes back to 3000 B. C. when Gabarbands were built in Baluchistan. the Harappans built tanks and wells, they were pioneers of well-digging technology. Wells were discovered in Harappan houses and they were also used for irrigation. During this period even in Rajasthan there was good rainfall. But the succeeding period (2000 B. C. to 500 B. C) is marked by increasing aridity, when cities vanished and all over the country there were rural farming cultures. After 1000 B. C. the climate became increasingly arid and many people had to resort to pastoral nomadism.

In the Chapter entitled 'The activities of the heads of Department' Kautilya says:

" He should build irrigation systems with natural water sources or with water to be brought in from elsewhere. To others who are building these he should render aid with land, roads, trees and implements and also give aid to the building of holy places and parks. If one does not participate in the joint building of an irrigation work, his labourers and bullocks should be made to do his share of work. And he should share the expenses but will not receive any benefits of it. The ownership of the fish, ducks and green vegetables in the irrigation works should go to the king." (7) A new class of odakayantrikas came into being during this period who maintained water networks. (8)

King Ashoka is associated with a remarkable feat of Mauryan Engineering in the field of irrigation. It was the construction of a reservoir called Sudarshana on the mountains of Raivataka and Urjayat near Girnar or Junagarh by artificially damming up of some of their streams. The irrigation was undertaken under Chandragupta and was improved by Ashoka who equipped the lake

with wellprovided conduits drains and means to guard against foul matters.(9)

King Rudradaman has left the earliest Sanskrit inscription which records his martial exploits and his reconstruction of a great artificial lake at Girnar in Kathiawar which had been excavated under Chandragupta and improved in the time of Ashoka. This inscription is certainly amongst the earliest dated records of ancient India and proves that Rudradaman was reigning in 150 A. D. (10)

According to the Arthashastra the City Governor was responsible for the cleanliness of the streets and the prevention of fire. His duties also involved prevention or alleviation of such disasters as famine , flood and plague. Thus the last record we have of the Girnar dam is how it burst and how it was reconstructed by the local city Governor Chakrapalita, the son of the provincial governor Pranadatta is praised in the inscription commemorating the rebuilding of the dam in terms which are indeed panegyric but certain passages are quite unexpected and depict the city governor as a popular figure on the most friendly terms with the citizens.. In any case these verses show the ideal set before the local official in the Gupta times and therefore very significant (11)

It is interesting to note as to how Rajendra Chola brought the water of the Ganges from where she flows in North India to the region of the Cholas. A glance at his Tiruvalangadu Plates amuses us when we realise he criticised even his own ancestor Bhagiratha for having obtained the stream from Siva through begging. That royal light of the solar race laughed at Bhagirath who had Ganga descent on earth by the intensity of his penance and decided to purify his part of the land by bringing the holy Ganga by the might of his arm to it. (South Indian Inscriptions, III, p. 400) Of course as a devotee he bows to Siva, but as a Kshatriya, he feels that imploring Siva even for Ganga was not a proper stance. By his own might and by overcoming the rulkers of the Gangetic plains, The Palas and the Gahdvalas, Rajendra brought the waters of the Ganges to Gangaikondacolapuram. The only

tribute that he asked of the defeated hosts was Ganges water, brought by the vanquished princes. In large vessels loaded on troops of elephants, all the way from north to south.

Vijitais tadiyatatabhuminayakais
Salilam tadiyam atha pavanam param'

Nijanayakaya mathurantakaya tat
Samaninayat sapadi dandanayakah (S II . III, p. 400)
(12)

The discovery of a Gahadwal inscription in the temple of Siva at Gangaikondacolapuram, mentioning the Chola emperor as sovereign lord makes this event significant. The issuing of a special commemorative gold coin with the obverse and reverse identical to emphasise the esteem in which Ganga was held. Rajendra mentions the twelve mile long tank name Cola Ganga that he dug in his capital and used for holding the waters of the Ganga, as a (liquid pillar of victory) Gangajalamaya Jayastambha: (13)

The Samaranganasutradhar of King Bhoja is worthy of attention. The word sutradhar literally means thread-bearer i. e. an architect who takes measurements by means of the plumbline Here is the pun on the word samara which means both the battlefield and a mortal human being destined to die. Thus the title as applied to Bhoja would signify, firstly that he was the architect of the fortunes on the battlefield i. e. who planned the strategy of battle leading to victory and secondly who was the architect of human dwellings i. e. civil architecture on an extensive scale. (14)

Ancient Indians were aware of the floating force of water, its weight and its relative power, the qualities which are chiefly used in hydraulic machines as is evident from the references in the Samarangana Sutradhar. (15)

When water flows with a force, it conveys things with it or pushes things coming in its way ; when water drops from a height or exerts an impact and when it is pushed from one direction, it reaches in all directions and these are properties of water that are used in water machines. When a thing

floats in water it means that water lifts it up with a pressure equal to its own weight. When turbines and sprouts rotate, it means water reacts on the pipes while getting out at the open ends. (16)

Water can be stored, it can be supplied; it can be directed or compelled to react and in this way its force can be used in hydraulic machines. Such storage etc., has to be resorted to because the power of water is greater when stored, as it is situated at a higher level or as it is available in a larger quantity or as it is conveyed in a more water tight tube. (17)

Probably the largest of the Indian irrigation lakes until recent years was the lake at Bhojpur near Bhopal built in the middle of the 11th Century by Bhoja Parmara the King of Dhar. This too has vanished The embankment was breached up by the Muslim invaders in the fifteenth century and has never been restored. But it is evident from available traces that the lake originally covered no less than 250 sq. miles(18)

Another monument due to the genius of King Bhoja was the Bhoja Sagar in which water was collected from the three enclosing slopes of mountains and stored into a reservoir by building an embankment on the fourth side. The fame of this wonderful lake resounded in popular memory throughout the medieval times and has been preserved up to our own times in the Hindi saying : " Tala to Bhopala Tala Aur Sub Taalaiya" i. E. among the lakes the foremost is the one called Bhopal Tal or the lake built by King Bhoja, round which was planned the city of Bhopal, the others are mere ponds of water. (19)

Kalhana's Rajatarangini is replete with information on canals, irrigation channels, embankments, aqueducts, circular dykes, barrages, wells and water-wheels. According to the historian Aurel Stein, numerous channels from Dal and Anchar lakes that intersect suburbs of Srinagar and pass into the centre of the city bear testimony to the evidence from Rajatarangini. In fact according to him, "in the earliest traditions recorded by Kalhana, the construction of irrigation canals plays a significant part " Aurel Stein could

identify quite a few of the canals which Kalhana claimed to have been built during the reigns of different kings. One of these canals is Sanmanikul, which is mentioned in the Rajatarangini by its ancient name, Suvarnamanikulya, and can be ascribed to antiquity. Another old canal that Stein could identify is called Nandi, whose name is perhaps connected with that of Nandaka village referred to in the context of Avantivarman's drainage operations.

Among the many works mentioned in the Rajatarangini, the more significant ones include the huge embankment called Guddasetu, built by Damodara II, , controlling the waters of the Mahapadma (Wular lake), by a network of canals, and diversion of waters of the Vitasta and construction of series of water wheels for distribution of waters in different villages by Lalitaditya Muktapida of the Karkota dynasty. However the most important evidence of sophisticated waterworks in the Rajatarangini is about the irrigation work carried out by during the reign of Avantivarman of the Utpala dynasty by Suyya. Having drained off the waters of the Vitasta, he controlled it by constructing a stone dam clearing its bed. Suyya also displaced the confluence of the rivers Sindhu and Vitasta. And constructed stone embankments for seven yojans along the Vitasta for damming the Mahapadma lake. The construction of new beds for the river at points threatened by inundation breaches was among the measures designed to achieve the same object.. The change thus made at the confluence of the Vitasta and its important tributary the Sindhu Can still clearly be traced. It shows the large scale and the systematic basis of Suyya's regulation. The result of the latter was a great increase in land available for cultivation and increased protection against disastrous floods, which in Kashmir have ever been the main cause of famine.(20)

Suyya made the different streams, with their waves which, like the quivering tongues of snakes, move about according to his will, just as a conquerer does with the snakes.

According to Kalhana Suyya supplemented

these measures by equally important improvement in the system of irrigation which is indispensable for the cultivation of rice, the staple produce of Kashmir. The facilities thus secured for cultivation produced a remarkable reduction in the price of rice, the cost of a rice being alleged to have fallen from 200 Dinars to 36 Dinars in consequence. (21)

The system of irrigation designed by Suyya was designed in such a way that everyone was supplied with a fair share of water. Lalitaditya Muktapida is also credited with having supplied villages near Chakradhar now called Tskdhar with irrigation by constructing a series of arghatta (water wheels which raised the waters of the vitasta.. The arid plateau of Martand with its magnificent Martand temple, the flourishing township that surrounded it, and his capital Parihasapur (which now suffers water scarcity) had a system which ensured a perennial water supply.

Ganga's purity is such that almost everywhere her sanctity is claimed in some stream or pool in different places. Vijayakshetra, Nadikshetra and Varahakshetra in Kashmir are described as places hollowed by Vishnu, where the stream of Ganga bears the name Vitasta, and where the famous Mandapakshetra and Uttaramanasa are located. (22)

As descendents of Bhagiratha, who brought down the Ganga from the Heaven to the earth for the welfare of human being, it is our sacred duty to make Bhagiratha efforts to make the Ganga Kaveri Link Project a reality and prove ourselves to be worthy successors to Bhagiratha.

Notes.

1. S. D. Misra, Rivers of India, 1970, Rigveda, X, 75-5.
2. D. N. Tiwari, "Protection of Environment, We and Mother Earth" in Vishwa Mangala Hetave, 2000-1, p.90
3. Kakasaheb Kalelkar, Lokamata, 1938.
4. Ramesh Dutta, Economic History of India under Early British Rule, p. 199.
5. P. L. Bhargava , King Bhagiratha and the River,

- Puranam –puranam, Vol. XIII, No. 1
6. R. S. Pandit, Kahlana's Rajatarangini: The Saga of the Kings of Kashmir. 2006, pp. 227-8.
 7. M. K. Dhavalikar, Water Conservation Systems in Ancient India,
 8. Ibid.
 9. R. C. Majumdar, The Age of Imperial Unity, 1953, p. 87.
 10. L. Basham, The Wonder That was India, 1954, p.. 192.
 11. R. P. Kangle, Kautilya Arthasashtra, 2. 20-24.
 12. C. Sivaramamurti, Ganga, 1976, p. 89.
 13. Ibid.
 14. V. S. Agrawal – Samrangansutradhar – 1966, p.xii
 15. K. V. Vaze, Extract from a paper on Shilpa Sansar, 19th March 1955, p. 173.
 16. Ibid p.193
 17. K. V. Vaze, Ibid
 18. L. Bhasham Op Cit., p.193
 19. Agrawal and Sunita Narain, Dying Wisdom, 2005, p. 11
 20. Ibid. p.98
 21. Silpa Sansara, Feb. 1955 p. 133.
 22. Kathasaritasagara, 39, 36–38

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Lessons in Water Management from neglected Chola era Stepwells

M T Saju

The Stepwell covered with shrubs at the Moovar Koil in Kodumbalu, located 45 kms from Trichy

Chennai : In a recently released booklet on kundimaramathu, a flagship project of the Tamil Nadu government to revive water bodies in the State, mentions stepwells as the ancient method of water management in drought - prone areas.

But today this traditional knowledge hardly garners any attention. Besides other stepwells found in the State, the book highlighted the importance of one on the premises of the Moovar Koil, a Chola era temple in Kodumbalur, 45 kms from Trichy. But the stepwell in the Moovar Koil doesn't seem to be cared for by the Archaeological Survey of India (ASI) which maintains the monument. It doesn't give much importance to the stepwell, which is surrounded by grass and shrubs and the well has not been desilted for long.

The Temple got the name Moovar Koil because of the three main shrines (only two exist today) on its premises. After analysing the standing and excavated remains in the complex, archaeologists had revealed the plan of an early Chola temple unit with three principal vimanas and their ardhmandapas with their accessories in the axial and peripheral planes. The stepwell, according to senior archaeologist K Sridharan, is small, but it still stands an example of the great water management in the region. The area was dry and that's the reason why people dug a stepwell here centuries ago. It should be maintained well so that those who visit the site will get an idea about our ancient water management said Sridharan,

former deputy director of the Tamilnadu state archaeology department.

The temple contains dome of the finest early Chola structures. According to the Sanskrit inscription in Grantha script on the south wall of the middle shrine, the temple with three vimanas enshrining Shiva lingas was constructed by Bhuti Vikramakesari, the Irukkuvel chief of Kodumbalur in his name and those of his two queens along with a monastery for the Kalamukha (a medieval Shaivite sect) ascetics. Vikramakesari was the subordinate and political ally of Sundara Chola Parantaka II (AD 957 - 970). The Pundarikakshan Perumal temple in Thiruvellarai (near Trichy) is another temple with a stepwell designed like a swastika.

Aravind Venkartraman, who documented the Shola temples in south India, said when he visited Moovar Koil in 2014 the water in the stepwell was clean. It's better if the ASI maintains it. Many miss the stepwell as there is no direction at the site, besides the usual the ASI info board at the entrance, he said.



decreasing now. This divine gift, in the form of rainfall, is drained almost entirely (95%) into the sea.

(4) It has already been mentioned that rainwater is not useful in raising the groundwater level because it flows rapidly. The groundwater level fluctuates greatly with the seasons. The wells that overflowed during the monsoons dry up in the summer. Due to not having perennial water, it adversely affects agriculture. Perennial agriculture is not possible due to this. This should be considered a big limitation. The paddy crop is grown mainly on flat land during the kharif season. On the steep slopes, ragi and millet are cultivated. Much attention is paid to orchards. Mango, cashew nut, coconut, betel nut, amla, pineapple, and chickpea are the main fruit crops grown. Mainly, pulses are grown during the Rabi season. These crops depend on moisture and dew in the soil. Due to the light texture of the soil and high temperature, crops such as spice crops, coffee, tea, and rubber cannot be grown. Now again, the crisis of climate change has arisen. Unseasonal rains have reduced orchard blossoms; their fall is even extreme. So the orchard industry is in trouble. The farmer here is hardworking, but all his efforts fail due to not getting a proper price for their produce. Due to the lack of proper development of transport, a market like Mumbai is not able to take advantage of it even though it is very near it.

(5) Emigration has to be said a great curse on Konkan. The working class in the population tends to live in Mumbai, and the proportion of older people and women is higher everywhere. There is a shortage of workers. When I went to a place in Konkan for a speech, I came to know that the average wage is 500 to 600 rupees. In addition, when the worker arrives at work, he is given "pej" (a sort of local food), lunch, and afternoon tea. Moreover, wages have to be paid in cash immediately after the work is done, and beside this, an expression can be seen on the face of the labourer as if he has done a great favour to the farm owner. Due to the non-availability of local labour, the labour is brought in from other regions. Nepali

labourers are more involved in it.

(6) The condition of agricultural land seems to be very serious. Even if the family members go outside the village for work, they do not give up their right to the village land. Because of it, the record of each 7/12 form has 40–50 names, even if the piece of land is small. This reminded me of the movie *Mulshi Pattern*. Finally, the boy who shoots says, "I am the 40th signatory." The person in the family who takes care of the farm has to take care of all these chores apart from the farm, and so his interest in farming ends. This makes long-term development impossible. Therefore, a long-term improvement in agriculture is lacking.

Konkan has a large number of temples. Almost all temples have lakes on their premises. These lakes fulfil the drinking water requirement. Also, many lakes are used for irrigation purposes. Groundwater recharge is also done through these ponds. When the winds of development blew, the government attempted to build many dams in Konkan. But it all turned out to be an insider's affair. Despite spending over 6,000 crore rupees, the majority of the dams are still incomplete. Only 20 to 25 percent of their capacity is intercepted. Even more unfortunate is the fact that the usage is only 1 percent, which is embarrassing. Hydropower generation is also embarrassing. These dams were not only non-beneficial, but they also had to face the problems of displacement of people, change in their way of life, destruction of places of worship, deforestation, destruction of the habitats of wild animals, obstacles to the free movement of elephants, tigers, fish, and wild cows, and embezzlement of money. Most of the projects flouted environmental norms.

What is the solution to this situation?

The situation is dire. There are many problems, but finding a solution to them is a challenge. The biggest change expected is in the mindset of the people. Until it happens, all efforts will be futile. In management science, there is a study called SWOT analysis. Studying my own strengths and weaknesses, as well as the opportunities and challenges that await me, is as

important for the individual as it is for the region. The real sorrow about Konkan is that it is not happening. First of all, we need to know what our strengths are. Our strength is the natural beauty of our 720-km-long coastline, its beautiful beaches, the peace and friendly nature of the people, and the various types of forests in the hills. If agriculture and tourism are developed using all these, Konkan will be like Switzerland. This country is known as an important tourist destination in the world. Rather than worrying about what we don't have, wouldn't it be better to use what we do have for our growth? Creating a tourist destination means providing employment to at least 100 people. This is direct employment. More than this, the indirect employment is immeasurable. Grains, vegetables, and fruits grown in our region have a big market at home. Every citizen of Mumbai and Pune is looking for new tourist destinations. He wants peace and tasty food. Places like Mahabaleshwar, Matheran, and Alibaug which were very popular few years ago have become unpopular because of heavy turnover of tourist. Every tourist buys locally produced goods wherever he goes. It also encourages local handicrafts.

What kind of facilities should be available in a tourist destination is a subject of special study. If you try to make a list of them, the paper would be less, but the list will not end. Add a new facility and get 100 new tourists. As for the questioning of the workers, there is so much unemployment in the country today that countless workers can be obtained. Meanwhile, I was shocked to read some news in the newspaper. It was news that "Chhat Puja" was celebrated in a big way in a village in Konkan. Chhat Puja is a festival of the North Indians. The fact that it is celebrated on such a large scale in our region means that there are a large number of people from other states residing in our region. If you start a tourism business, this business will increase, and you can be sure that you will not be short of workers. As water finds its way, employment also finds its way. Now you will say, "Where is the connection to water in this scheme?" Every tourist destination needs a lot of water. There

are many water sports that can be started near your tourist destination. No one should be under the illusion that water is needed only for agriculture and factories. It cannot be forgotten that water is also used for creating good gardens, water sports, and fountains in tourist places.

I would like to draw your attention to one more important point. Tourism development is a golden opportunity for women entrepreneurs. Food arrangement is the focal point in every tourist centre. The more delicious the food, the more popular is the tourist destination. Moreover, the food and goods produced in women's self-help groups have access to a large market, which is a different story. Today, women's employment is a neglected issue in society. It will get a lot of momentum from this project.

If we consider the question of agriculture, it can be said that agriculture in the Konkan needs protected water. If large dams are insufficient, Jalyukta Shivar schemes can also help meet this requirement. Only the planning of this scheme should be done properly. Sugarcane needs a lot of water, and here there is a lot of water. Despite this, the main reason why this crop is not grown here is that this place does not produce the required yield. Banana is an ideal crop in Konkan. If perennial water is made available for it, then this crop can be given attention. It would certainly be welcome if we spread our legs and see what is our potential was without being trapped in the mess of big factories and big industrial organizations.

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.

World Water Day-2010

Clean Water for a Healthy World

Shri. Gajanan Deshpande, Pune -(M) : 9822754768



(A new article series has been launched from August 2021 to learn more about the importance of World Water Day and the various water awareness programs implemented every year.)

The slogan "**Clean Water for a Healthy World**" for World Water Day-2010 was created to emphasize how water quality is essential for the entire world. This includes reflecting the importance of water resources in water management, increasing water quality challenges, creating awareness for sustainability in healthy ecosystems and human development and addressing global water pollution issues.

Common citizens do not have much awareness about the good / bad quality of water and its consequences. Water is considered the most important resource in maintaining water quality and natural ecosystems for human well-being; which provides life support services to all animals and plants. Contaminated water is a major cause of illness and death. Water quality is also considered a critical factor for human poverty alleviation, education and economic development. But, unfortunately, water quality is declining worldwide; this poses a threat to the environment and human health worldwide. Waterborne diseases kill 1.5 million children every year and 2 million tons of sewage and other liquid wastes are released into water every day. The world is facing these problems in serious form day by day.

Due to our inappropriate social habits, water sources like rivers, streams, reservoirs are getting polluted on a large scale. Municipal councils and factories discharge their waste water into

these sources without any treatment and thus pollute rivers and streams on a large scale. New health problems arise from this. We now have to make special efforts to preserve this deteriorating quality of water. Also, due to inappropriate human behaviour, excessive use of chemical fertilizers, improper disposal of plastic waste and the adverse effects on the aquatic life in rivers, reservoirs and oceans are also increasing. Instead of conservation and security, there has been an era of total neglect or over-exploitation. It is very important to stop this now.

Most of the sacred water bodies like ponds, Pushkarani, Kund, step-wells at the places of our religious places have become polluted and smelly due to the garbage and sewage that is thrown in it by the devotees. To improve this situation, we have to brainstorm in the communities.

Due to this knowingly or unknowingly, many issues arise out regarding the water quality and health. Urban as well as industries generate large flows of sewage and it flows through rivers and reaches our drinking water sources, degrading its water quality to a large extent. This water is further supplied to citizens for drinking and consumption. As a result, people's health problems arise. Therefore, protecting water from pollution has become a major issue in front of us. The big challenge is to protect the quality of water and environment for human and animal life.

Hence, protecting water quality becomes a shared responsibility for the common good. Therefore, it requires action from governments, municipalities, civil society, individuals including international organizations to prevent pollution of

our water resources.

The problem of groundwater pollution is very difficult to handle. In that context, whether it is the use of chemical fertilizers in agriculture or the methods we adopt for the disposal of municipal waste - we should consider their disposal appropriately. When it rains, it percolates into the ground. Some of the fertilizers are soluble and some of them are even harmful. They contain toxic components. Once they enter groundwater, they remain there for years. In this way, we have to be careful and take precaution that the ground water does not become contaminated. For overcoming this, some chemical purification processes are required, for that some purification plants are to be installed and some technical facilities need to be created. But, that is quite expensive.

Our pollution laws do not address our collective responsibilities. Whosoever creates faeces, creates filth, a proper provision as to how he should handle it and how should he purify it is there in the pollution laws; however, it does not suggest, as to what type of forum should be there, to deal with all these things collectively. We have river pollution control boards. But that is not enough. It does not connect the relationship of the society with that element of pollution in the river.

It is easy to pollute water. But it is not so easy to restore the polluted water to a usable state. Also, it is very expensive. For this, voluntary social organizations should be formed to look after that environmental factor. They should represent the society and see that wherever there is any unfair thing happening, immediate attention should be paid there and the situation be improved. To achieve this socially, we need to change our personal habits a lot.



In drought-hit Iraq, a dam threatens to swallow farmland

AL-MESSAHAG: Jamil al-Juburi, 53, has never left his village in northern Iraq, where his family has worked the land for generations -- but a dam will soon swallow his home, forcing them out.

Tens of thousands of Iraqis are threatened by the Makhoul dam, which the government hopes will be operational on the mighty Tigris in five years. "I was born here and I grew up here," said Juburi, whose village of Al-Messahag is set in pasture land on the banks of the river.

"It's difficult to leave for somewhere else. It is a whole past that we leave behind us."

Once the dam is erected, Juburi's whole region will be under three billion cubic metres (105 billion cubic feet) of water.

In a country highly vulnerable to climate change -- and buffeted by three consecutive years of drought -- authorities have defended the project, which will boost water stores and help prevent shortages.

However, activists decry the impact on more than 30 villages -- home to about 118,000 people -- and the threats to biodiversity and archaeological sites.

Employed at a state-run oil refinery, Juburi leaves his sons to work the family land, where they plant wheat and citrus trees.

He would agree to move, he said, to put "the national interest above personal interest" -- on condition that the dam "will serve Iraq" as a whole.

Juburi also demanded "adequate damages" in order to safeguard his and his family's future.

- 'Severe threat' -

Iraq already has eight dams, but it complains that construction of the facilities upstream, mainly in neighbouring Turkey, has impacted its river volumes.

Plans for the Makhoul facility can be traced back to 2001, in the twilight of dictator Saddam

Hussein's rule.

His downfall in a US-led invasion and chaotic subsequent occupation saw the project shelved for years.

Work finally got underway in 2021, with drilling, soil analysis and a bridge spanning the river.

Riad al-Samarai, deputy governor of Salaheddin province, lists a 250 MW hydroelectric power plant and an "irrigation canal that will serve agricultural areas and contribute to the nation's food security" as among the project's benefits.

"The public interest requires the construction of this dam to guarantee water reserves for Iraq," he said.

Five villages are located on the site of the future reservoir, he added, and "a commission has been formed by the provinces and relevant ministries to ensure adequate damages for residents" and to relocate them.

But civil society is up in arms, not only about the human impact.

There are also repercussions for flora and fauna, warn environmental groups Save the Tigris and Humat Dijlah, who say the ancient city of Ashur -- a UNESCO world heritage site -- is also at risk.

In August, the International Organization for Migration noted that "there has been no official attempt to speak or engage" with local communities.

"Respondents who are farmworkers and landowners saw Makhoul Dam as a severe threat to their livelihoods," IOM said in a report, sharing the findings of a study by Iraqi organisation Liwan for Culture and Development.

- Lack of trust -

"Nobody has come to see us. Nobody has asked us anything," said Jamil's father, Ibrahim al-Juburi, who is in his 80s.

"My ancestors, my father, then I, all stayed in this

region," the farmer said, his body hunched.

Liwan researcher Mehiyar Kathem said the real problem was the "reduction of water that is coming in" from upstream beyond Iraq's borders.

"Iraq doesn't need a new dam," he added. Instead, "the Tigris needs to keep flowing" because of the increase in salinity.

Kathem also pointed to the impact on vulnerable women-led households.

"There is a higher number of women in the area who rely on the agriculture and on the land. We don't know what is going to happen to female-headed households."

The study found that 39 villages -- each home to between 200 and 8,000 residents -- risk being submerged.

According to Liwan, 67 square kilometres (26 square miles) of "fertile farmland, estates and orchards" will also disappear if the Makhoul dam reaches full capacity, and more than 61,000 livestock will have to be "sold or relocated".

"The dam can disrupt the everyday life of some 118,412 individuals," said Liwan, noting an "absence of trust with decision-makers" among the local communities.

Residents "commonly stated that any expression of discontent with Makhoul dam would fall on deaf ears, and their voices would be ignored", it added.-AFP



WATER AND IRRIGATION PANORAMA OF INDIA

Shri. Suresh A. Kulkarni

FOREWORD

India is likely to be the highest populated country in the world by April 2023. The country is also aspiring to become the third world economy by the end of 2030. Water plays a pivotal role in the social and economic development of any region / country. India is the largest user of freshwater for irrigation. It was estimated that in 2010, the total water withdrawal was 710 km³ of which 78 percent (557 km³) were for irrigation. Although, authentic data about the water withdrawals by different uses in the last decade is not available at the national level, but in view of the rapidly growing population, urbanization and industrialization, it must have increased significantly. By 2030, the total water demand of the country for all uses is expected to be 1498 km³/year, which will exceed the total freshwater availability (1122 km³/ year). Meeting this big gap of water supply– demand is one of the toughest challenges for India. The industrial and municipal water demands are expected to rise drastically at the expense of the agricultural sector. Exacerbated by the adverse impact of climate change on the water resources availability both temporally and spatially, coping with the water sector challenges will be one of the most complex challenges of 21st century for India. It requires not only adoption of the best water management practices but also the good governance of this precious resource. It is therefore necessary to understand the entire gamut of India's water sector. Commencing from this issue of the Jalsamvad, the water and irrigation panorama of India will be presented through a series of seven articles. It is hoped that these articles will be of interest to young water professionals, researchers,

students and journalists.

PART 1 GEOGRAPHY, CLIMATE, POPULATION AND AGRICULTURE

1. Geography

India is located in southern Asia and has a total area of 328.74 million ha making it the largest peninsula in the world and the seventh largest country. The geographical coordinates of India are between 8°4' and 37°6' latitudes north of the Equator, and 68° 7' and 97° 25' longitudes east of standard meridian. It is bordered in the northwest by Pakistan, in the north by China, Nepal and Bhutan, and in the northeast by Myanmar and Bangladesh. In the south, some 7 517 km of coastline is on the Arabian Sea, Indian Ocean and Bay of Bengal. Geo-morphologically India can be divided into four regions: the great mountain zone, plains of the Ganga and the Indus, the desert region, and the southern peninsula. In addition, the Lakshadweep Islands in the Arabian Sea and the Andaman Islands and Nicobar Islands in the Bay of Bengal are part of the territory of India. For administrative purposes, India is divided into 28 states and 8 union territories.

2. Climate

Most of India falls in the tropical zone. It has four seasons viz., winter (December-February), pre-monsoon or summer (March-June), southwest monsoon season (June-September), and post-monsoon season (October-November). In India, surface winds undergo a complete reversal from January to July. In winter, dry and cold air from the

northern latitudes flow southwest (northeast monsoon), while in summer, warm and humid air originates over the ocean and flows in the opposite direction (southwest monsoon). While Mawsynram (nearby Cherapunji) located in the Meghalaya state in India, is the wettest place in the world, it receives an annual rainfall of 11,871 mm. The average precipitation of the country, however, is about 1105 mm per year. In some states, the temperature in summers rise up to 45°C and minimum temperature decreases as low as 15°C. In winters, the average temperature is about 10-15°C. The highest temperature recorded in India so far is 50.6°C in Alwar, Rajasthan. The lowest temperature was recorded in Kashmir at -45°C.

The south-west monsoon is the most significant feature of the Indian climate. The season is spread over four months (June to September), but the actual period at a particular place depends on onset and withdrawal dates. It varies from less than 75 days over west Rajasthan, to more than 120 days over the south-western regions of the country contributing to about 75 percent of the annual rainfall. In the southern coastal areas near the east coast (Tamil Nadu and adjoining areas) much of the rainfall is influenced by the northeast monsoon during October and November. The average annual rainfall over the country is around 1105 mm, but has large spatial as well as temporal variability ranging from less than 100 mm in the western Rajasthan to more than 2,500 mm in north-eastern areas. The annual normal rainfall over the states and union territories varies significantly. The monsoon is influenced by global and local phenomenon like El Nino, northern hemispheric temperatures, sea surface temperatures, snow cover etc. In recent times, every year there has been large variation in rainfall across the country resulting in phenomenon of widespread floods in a few regions as well as drought in a few others.

3. Population

India presently, is the second most populous country in the world. India's National Commission on Population has estimated the total population of the country in 2021 as 1363 million.

Of which 469 million (34 percent) were living in urban area and 893 million inhabitants (66 percent) were living in rural areas. The country's average population density was estimated as 415 inhabitants/km², varying from fewer than 100 inhabitants/km² in the north-eastern states to more than 900 in the states of West Bengal, Odisha, Assam, Uttar Pradesh, and Kerala. The states of Delhi and Bihar have population density of more than 1300 inhabitants/km². The average annual population growth rate was 1.78 percent in 2000, 1.36 percent in 2010 and it has declined to below one percent since 2020.

About 66 percent of India's population lives in rural areas, making this one of the largest drinking water supply service delivery challenges in the world in terms of scale. While access to water has improved markedly in recent years, with almost 85percent of rural households and more than 90 percent of the urban population had access to 'basic drinking water', the provision of safe water remains a large challenge. About 2 lakh people die every year due to inadequate water, sanitation and hygiene. The Jal Jeevan Mission (JMM) launched by the Govt. of India in 2019 aims to provide 55 liters of water per person per day (LPCD) through individual household tap connections to all the rural households and 4 million public institutions in the country by 2024. In January 2022 of the total 191 million rural households about 43 percent (82.7 million) households were provided with improved /tap water supply. The JMM plans to achieve India's SDG-6 target six years ahead. As per the 5th edition of the National Family Health Survey (NHFS-5), 70 percent population (65 percent rural and 82 percent urban) have access to improved sanitation facilities.

4. Economy, agriculture and food security

As per the World Bank, in 2020 the Gross Domestic Product (GDP) in India was worth 2623 billion US dollars which represents 2.32 percent of the world economy. India's overall working population was estimated to be at 401 million as of 2021. India is still largely a rural economy and agriculture continues to be the mainstay of a large

segment of the population. The country's dependence on agriculture is brought out by the fact that about 58 percent of rural household are engaged in agriculture. Of the 313 million main workers in the country, 166 million (56.6 percent) were engaged in 'Agricultural and allied activities' of which 55 percent were women. Agriculture accounted for 18.8 percent of GDP in 2020, while in 1999 it represented 25 percent. In 2012, 22 percent of the total population comprising 26 percent rural and 14 percent urban were assessed to be below the poverty line.

The total cultivable area is approximately 181 million ha, or over 55 percent of the total area of the country. In 2019, the total cultivated area was about 154 million ha, of which 144 million ha were annual crops and 10 million ha were permanent crops. The cultivated area in 1950 was 129 million ha and then steadily increased and it was 156 million ha in 2008 since then it has remained almost stagnant and but lately has been shrinking further. Crop yields, however, have increased significantly (food grain yields have more than tripled since 1950) as well as the cropping intensity, which increased from 111 percent in 1950 to 118 in 1970, 130 in 1990 and 144 percent in 2017.

India has a multiplicity of cropping systems across agro-climatic zones, mainly on the basis of soil type, rainfall, climate, technology, policies and existing socio-economic situation of the farming community. The major cereals grown in India are rice, wheat, maize, bajra (spiked millet), barley, jowar (great millet), and ragi. The average yield of food grains (cereals and pulses) increased from 522 kg/ha in 1950 to 2386 kg/ha in 2020-2021. Farmers are gradually shifting from traditional, subsistence farming of non-commercial crops to commercial/cash crops to be able to respond to changing demand patterns and tap opportunities for higher returns.

In 2019-2020, the production of food grain and horticultural crops was 296 and 320 million metric tons, respectively leading to apparent self-sufficiency. Total food grain production in 2020-

2021 was estimated at 309 million tonnes. Despite India having achieved food sufficiency in agricultural production, the food security is yet to be achieved. This is evident from the fact there were still 176 million people living under poverty and over 194.4 million undernourished

Viability of Smallholders Agriculture in India and most of Asian countries is dominated by small land holdings. The total number of operational holdings as per the first the Agriculture Census (1970-71) were 81.6 million which as per the 10th Agriculture Census (2015-16) were 146 million. Smallholder and marginal farmers (< 2ha) account for nearly 86.3 percent of farmers, 47.4 percent of the cultivated land and over 50 percent of the total agricultural production. Shrinking size of farms is one of the major challenges for Indian agriculture. The average operational farm size reduced from 2.3 ha in 1970-71 to 1.55 ha in 1990-91 to 1.08 ha in 2016. This size of land holding does not generate adequate income with the usual agricultural practices and products. Thus, two options are left to raise income of such farm holdings. One, enable these farmers to go for high value crops and livestock activities, where they can make optimum use of their family work force. And, two, supplement agriculture income with income from non-agriculture sources like wages and salaries, some kind of business and trade. Small holders also face the problem of scale economy in input as well as output markets that require different type of institutional help.

(In Part 2, a detailed discussion on the water resources of India will be presented)

References:

Department of Economic Affairs.2022. Economic Survey2021–22, Ministry of Finance, Government of India.

Directorate of Economics and Statistics, 2020. Agricultural Statistics at a Glance 2020, Department of Agriculture, cooperation and Farmers' Welfare, Ministry of Agriculture and Farmers welfare, Government of India.

Directorate of Economics and Statistics, 2020,

Pocket Book of agricultural statistics 2020, Department of Agriculture, Cooperation and Farmers' Welfare, Ministry of Agriculture and Farmers welfare, Government of India.
Ministry of Jalshakti. 2021. Two years of Jal Jeevan Mission, Department of Drinking Water and Sanitation, National Jal Jeevan Mission, Government of India

National Commission on Population.2020. Population Projections for India and States (2011 - 2036), Report of the technical Group on Population Projections, Ministry of Health and Family welfare. NITI Aayog.2018. Strategy for New India @ 75



अभिनव जलनायक सामाजिक कार्यकर्त्यांनी का वाचावे ?

१. ओढ्यात, बंधान्यात, तळ्यात पाणी साठवले ,पण त्या साठवलेल्या पाण्याचे अचूक व्यवस्थापन करण्यासाठी लागणारे विविध तंत्रज्ञान.
२. गावचे सांडपाणी ओढ्यातच करा नैसर्गिक पध्दतीने शुद्ध ! ट्रीटमेंट प्लांटचा मोठा खर्च, वीज, केमिकल्स, मनुष्यबळ यापैकी काहीही लागत नाही अशा दोन तंत्रज्ञान. ओढे नाले स्वच्छ झाले की नद्या हो होतील अमृतवाहीन्या !
३. आरोग्य पेशा कितीतरी स्वस्तात पाणी निर्जंतुक करणारी ओझोन टेक्नॉलॉजीची माहिती.
४. कचऱ्याचे डोंगर वेगाने खतात रूपांतर होण्यासाठीचा मंत्र आणि तंत्र.
५. कचऱ्याची दुर्गंधी पूर्ण थांबवली पुणे महानगरपालिकेने, काय केले त्यांनी ? त्याची माहिती.
६. बंद पडलेल्या बौअरवेल साठी जमिनीतच असणारे पाणी शोधून बौअरवेल भरण्याची किमया
७. बारा गावांचा गट करतो भूजल व्यवस्थापन व नियोजनाचे यशस्वी प्रयत्न.
८. दुर्गम भागात पिण्याचे पाणी शुद्धी करण्यासाठी मोबाईल फिल्टर.
९. गावच्या तळ्यातले पाणी भिजवते दुष्पट क्षेत्र या तंत्रज्ञानाने
१०. बंधान्यातून, तळ्यातून, जमिनीतून होणाऱ्या पाणी गळतीला थांबवण्याचे उपाय. ही सर्व तंत्रज्ञाने सोप्या शब्दात वाचा या पुस्तकात.

बुकगंगा/
ऑनलाईन वर
उपलब्ध...

मेनका प्रकाशन, पुणे
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India Could Soon Experience Heat Waves

Beyond Human Survival Limit: World Bank

The World Bank report titled "Climate Investment Opportunities in India's Cooling Sector" said the country is experiencing higher temperatures that arrive earlier and stay far longer.

Thiruvananthapuram: Severe heat waves, responsible for thousands of deaths across India over the last few decades, are increasing with alarming frequency and soon the country could become one of the first places in the world to experience heat waves that break the human survivability limit, according to a new report.

The World Bank report titled "Climate Investment Opportunities in India's Cooling Sector" said the country is experiencing higher temperatures that arrive earlier and stay far longer.

"In April 2022, India was plunged into the grip of a punishing early spring heat wave that brought the country to a standstill, with temperatures in the capital, New Delhi, topping 46 degrees Celsius (oC) (114 degrees Fahrenheit). The month of March, which witnessed extraordinary spikes in temperatures, was the hottest ever recorded", it said.

The report will be released during the two-day "India Climate and Development Partners' Meet" being organised by World Bank in partnership with the Kerala government.

Predicting that heat waves situation in India could break the human survivability limit, it said the recent heat wave supports what many climate scientists have long cautioned about with reference to rising temperatures across South Asia.

"In August 2021, the Sixth Assessment Report of the Inter-governmental Panel on Climate Change (IPCC) warned that the Indian subcontinent would suffer more frequent and intense heat

waves over the coming decade.

"The G20 Climate Risk Atlas also warned in 2021 that heat waves across India were likely to last 25 times longer by 2036-65 if carbon emissions remain high, as in the IPCC's worst-case emission scenario," the report said.

It also warned that rising heat across India can jeopardize economic productivity.

"Up to 75 percent of India's workforce, or 380 million people, depend on heat-exposed labor, at times working in potentially life-threatening temperatures. ...By 2030, India may account for 34 million of the projected 80 million global job losses from heat stress associated productivity decline", the report said.

It further said India showed the largest heat exposure impacts on heavy labor among South Asian countries, with more than 101 billion hours lost a year.

Analysis by global management consulting firm, McKinsey & Company shows that lost labor from rising heat and humidity could put up to 4.5 per cent of India's GDP- approximately USD 150-250 billion - at risk by the end of this decade.

It said India's long-term food security and public health security will depend on a reliable cold chain network.

Transporting food and pharmaceutical goods across India requires a system of cold chain refrigeration that works every step of the way.

"A single temperature lapse in the journey can break the cold chain, spoiling fresh produce and weakening the potency of vaccines. With only 4 per cent of fresh produce in India covered by cold chain facilities, annual estimated food losses total USD 13 billion", it said.

It also noted that the third largest producer of pharmaceuticals in the world, pre-COVID-19, India lost approximately 20 percent of temperature-sensitive medical products and 25 percent of vaccines due to broken cold chains, leading to losses of USD 313 million a year.

"As temperatures rise across India, so will the demand for cooling. However, in a country where two-thirds of the population live on less than USD 2 a day, and where the average cost of an air-conditioning unit can vary between USD 260 and USD 500, air-cooling systems are a luxury available only to a few." According to analysis presented in the India Cooling Action Plan (ICAP), only eight per cent of Indian households own air-conditioning units.

"Indoor and electric fans can help to maintain thermal comfort, but these too are expensive to buy and inefficient. As a result, many poor and marginalized communities across India are more vulnerable to extreme heat, living in inadequately ventilated, hot and crowded homes without proper access to cooling", the report warned.

Staying cool during extreme heat is about more than just comfort - it can constitute the precarious line between life and death, it added.



Rising heat across India can jeopardize economic productivity, the report warned. (Representational)



Famous rivers in the world

(5) Amazon river



(6) Niger River



(7) Zambezi River



(8) Angara river



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