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'Yamuna's water quality improved from last year'

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New Delhi: Water quality of river Yamuna has improved since last year. However, despite improvement the pollution levels are still much above normal.

While Delhi Pollution Control Committee has not revealed the river quality assessment details for August, September and October this year, the data shared at the 7th meeting of the high-level committee on Yamuna revealed a remarkable improvement in the BOD, COD and faecal coliform level in all the months this year, including September, when compared with those in 2022.

However, a comparison of the water quality of Yamuna at some of the areas as mentioned in the report showed that the pollution level in 2022 was higher than 2021 too. As per the latest report for September, the dissolved oxygen was not found at any spot in the river.

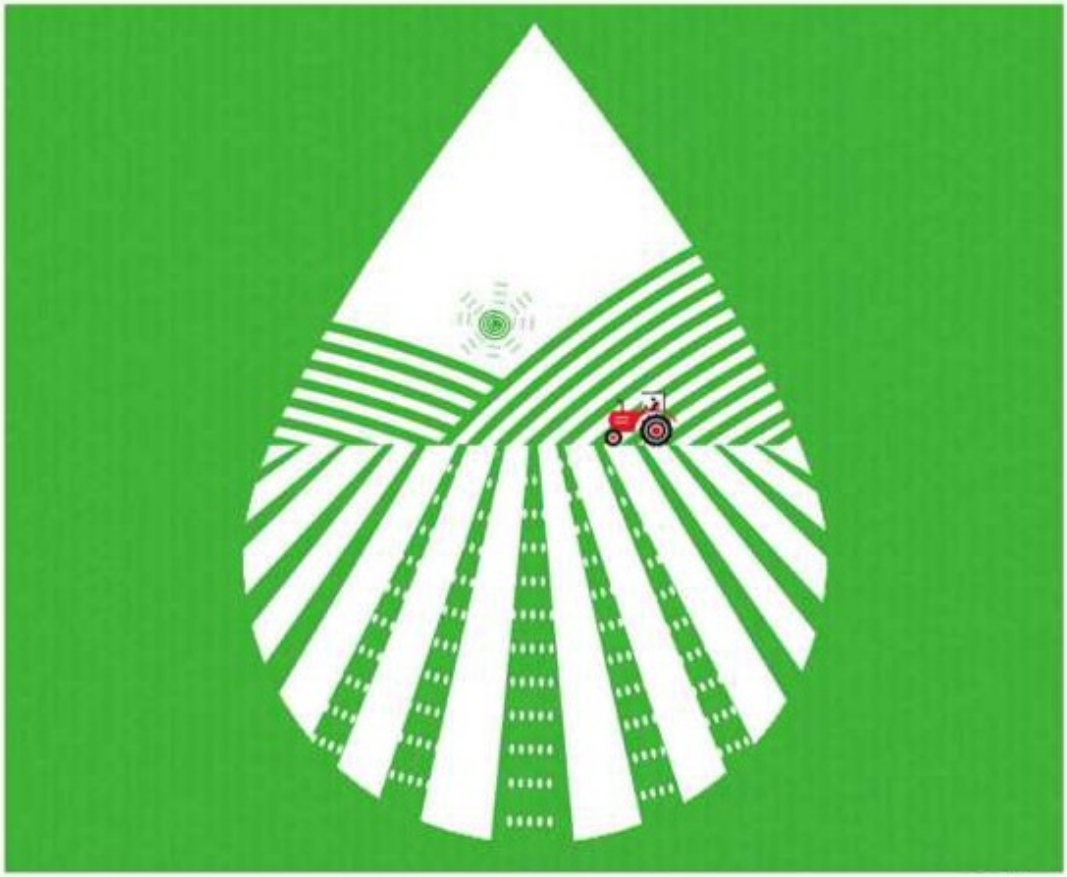
The committee has shared some pointers to clean the river including hundred percent treatment of sewage, trapping of all drains, sewerage network in 1799 unauthorised colonies and 639 JJ clusters, industrial effluent management by 13 CETPs, faecal sludge (Septage), regulation of floodplain (by DDA), utilization of treated wastewater and other issues.

Keep water at the centre

Minimising climate risk in agriculture will require rewarding farmers to switch from irrigation-heavy crops like paddy and sugarcane to less water-intensive crops like millets, pulses and oilseeds

FROM PLATE TO PLOUGH

BY ASHOK GULATI



C R Sasikumar

OCTOBER 16 IS observed as World Food Day to mark the founding of the United Nations Food and Agriculture Organisation (FAO) in 1945. Its main purpose was to ensure food and nutrition security around the world in the aftermath of World War II. How far the world has moved to achieve this goal is an open question. While there is ample food being produced on this planet that can easily feed eight billion people, its access is quite skewed across nations.

This year's theme for the World Food Day is "Water is Life, Water is Food". In this context, it would be good to review how far India has progressed in achieving food security, and how it is using its water resources in agriculture.

First on the food security front. Having been through a journey of "ship to mouth" in mid 1960s, India has come a long way. Only in the last three years, 2020-21 to 2022-23, India exported 85 million tonnes (MT) of cereals, mainly rice, wheat and corn. This it did even after giving free food (rice or wheat) to more than 800 million people under the PM Garib Kalyan Yojana. This is a stupendous achievement. India has also made major strides in milk production which has shot up from 17 MT in 1951 to 222 MT in 2022-23. The country is the largest producer of milk by far. Since 2000-01, poultry and fishery production has been growing at a fast rate. So, from the green and white revolution, India has also now ushered in a pink (poultry) and blue (fishery) revolution.

However, access to sufficient nutritious food remains a challenge for many. According to the latest National Family Health Survey, almost 16.6 per cent of India's population is malnourished (2020-22), 35 per cent of its children below the age of five years are stunted (low height-for-age) and 32 per cent are underweight (low weight-for-age). Progress on this front has been rather slow, and in a business-as-usual environment, India will not be able to achieve its Sustainable Development Goal (SDG) of zero hunger (including malnutrition) by 2030.

Now, how is India using its water resources in agriculture? It is important to note that while India is home to almost 18 per cent of the world's population, it has only 4 per cent of global freshwater resources. Much of this water is used in agriculture. While FAO puts this figure at 90 per cent, the Indian Central Water Commission says it is 78 per cent. With rising population, and rising incomes, there will be a need to produce not only more food but also save water for drinking purposes as also for manufacturing and growing urbanisation.

Thus, India needs to adopt a two-pronged strategy with respect to water in agriculture. First, on the supply side, it must augment buffer stocking of water during the monsoon season in its reservoirs, and recharge groundwater through check dams and watersheds, etc. Second, it must work on the demand side to ensure more rational allocation and efficient use of water across crops. This calls for not only institutional reforms in the Indian irrigation sector but also in the pricing of water and power for irrigation. While almost half of India's gross cropped area is irrigated today, we need to take it to at least 75 per cent if we have to cope with weather vagaries associated with climate change. This would require massive investments. India has not succeeded in attracting private sector investments in reservoirs and canal networks as water is almost free. The government does not have enough funds to invest in this, after doling out large food and fertiliser subsidies costing more than Rs 4 lakh crore. The state governments do not have the political will to charge for power that is used for groundwater irrigation. Under such a scenario, Indian agriculture remains a risky venture in the wake of climate change.

If we have to minimise this climate risk, we need a paradigm shift in our thinking. First and foremost, we need to shift focus from land productivity to water productivity. For example, we need not look at say so much tonne/hectare, but of kg of grain per cubic metre of irrigation water. Once we start looking at productivity from a water angle, we can identify the inefficiencies in the allocation and use of water in agriculture. In one of our studies at ICRIER on water productivity of 10 major crops, across all the major districts in which they are grown, we found out that while in Punjab land productivity of rice is one of the highest, its irrigation water productivity is the lowest. That means that Punjab is one of the most inefficient growers of rice in terms of water used. On top of this, Punjab also emits the highest levels of carbon emissions (CO_2eq), almost 5 tonnes/ha of paddy cultivation.

We need to shift focus from land productivity to water productivity. For example, we need not look at say so much tonne/hectare, but kg of grain per cubic metre of irrigation water. Once we start looking at productivity from a water angle, we can identify the inefficiencies in the allocation and use of water in agriculture. In one of our studies at ICRIER on water productivity of 10 major crops, across all the major districts in which they are grown, we found out that while in Punjab land productivity of rice is one of the highest, its irrigation water productivity is the lowest. That means that Punjab is one of the most inefficient growers of rice in terms of water used.

All this calls for a revamping of policies, farm practices, and products, keeping water at the centre of agriculture. Can one reward farmers for switching from water-guzzling crops like paddy and sugarcane to less water-intensive crops like millets, pulses and oilseeds? Talk of green water credits! In our research on Punjab, we have found the subsidy from power and fertilisers in paddy cultivation amounts to roughly Rs 30,000/ha. Can this amount be given to farmers in Punjab who are willing to switch from paddy to pulses, oilseeds, and millets? This will create a level playing field across crops and would be good for the environment as well as nutrition. Above all, it will save Punjab from water disaster as roughly 78 per cent of its blocks are over-exploiting groundwater.

Farming practices such as direct seeded rice (DSR) and alternate wet and dry (AWD) irrigation, or zero till, etc., can also be rewarded as they will save water. And also drip irrigation, especially in sugarcane, which can save half the water. The bottom line is that unless we use water efficiently, ensuring sustainable food security is difficult.

Gulati is Distinguished Professor at ICRIER. Views are personal

Lessons from deluge

Glacial lake floods, like in Sikkim, could increase due to global warming. These lakes must be monitored, risk-management systems developed

SHARAD JAIN

IN THE EARLY hours of October 4, the southern bank of the South Lhonak Lake in Sikkim burst open, leading to an outflow of huge amounts of water. Flowing over the steep mountain slopes in the Teesta basin, a lethal mix of icy water and debris washed away whatever came in its way. The floods caused heavy damage to the Chungthang Dam and hydropower projects of NHPC. More than 35 people were killed, 14 bridges were washed away or submerged, 1,320 houses were severely damaged, drinking water supply lines and sewage networks were damaged and widespread damage to highways was reported in North Sikkim, Gangtok, Pakyong, and Namchi districts. The floods damaged sections of National Highway 10, connecting Sikkim with the rest of India.

Since the lake region is too remote and has scarcely any monitoring network, we do not yet know the exact cause of this glacial lake outburst flood (GLOF). There are several hypotheses — one or more spells of intense rainfall in the lake area, a landslide or avalanche or an earthquake. In 2021, a collaborative study by researchers from IIT, Roorkee, Indian Institute of Science, Bangalore, University of Dayton, USA, University of Graz, Austria, and the Universities of Zurich and Geneva in Switzerland highlighted that the South Lhonak Lake had grown significantly in recent times and was susceptible to a GLOF.

Glacial lakes are formed near the snout of glaciers when meltwater accumulates. In recent times, such lakes have been forming with increased frequency because the increased warming of the troposphere has glacier melting. The embankments of these lakes consist of loose deposits of glacier moraine, rocks, boulders, soil and ice. Since these embankments are not properly compacted, they have a high vulnerability quotient. They can fail if the lake water level rises rapidly due to intense rainfall or if a portion of the glacier is detached from the main body and plunges into the lake, generating high waves. These waves could hit the embankment forcefully. Earthquakes could also destabilise the embankment and water seeping in through the embankment could cause erosion.

Catchments of the three river basins in north and northeast India have a large number of glacial lakes. In March, the ISRO's National Remote Sensing Centre (NSCRC) released a glacial lake atlas of the Himalayan River Basins. NRSC used images acquired by RESOURCESAT-2 satellite during 2016-17 to prepare this atlas, which has identified more than 28,000 glacial lakes of more than 0.25 ha.

In a widely quoted scientific paper in Nature Communications this year, geologist Caroline Taylor and her colleagues noted that GLOFs can arrive with little prior warning. The authors concluded that more than nine million people in High Mountain Asia (HMA) — its surrounded by the mountain ranges of Tien Shan, Pamir, Hindu Kush, and the Karakoram in the west, the Himalaya in the south and southeast, and Qilian Shan in the east — are vulnerable to glacial lake outbursts. This is a cause for concern.

The Sikkim State Disaster Management Authority has identified more than 300 glacial lakes in the state. Of these, 10 have been identified as vulnerable to outburst floods. NRSC has identified 733 glacial lakes in Sikkim. The Geological Survey of India has found that 13 of the 486 glacial lakes in Uttarakhand are vulnerable to GLOFs. A 2021 study led by Delhi University scientist Suraj Mal reported that Jammu and Kashmir has the highest number of vulnerable glacial lakes followed by Arunachal Pradesh and Sikkim. Different studies use different data and methodologies. Hence, their outcomes are not always comparable. But one thing is certain: GLOF threat is rising with time. India has witnessed at least three highly devastating GLOF events in the Ganga and Brahmaputra basins over the last decade — at Kedarnath in 2013, Chamoli in 2021 and Sikkim in 2023.

Threats from GLOFs are likely to increase with time due to global warming. Multipronged action is, therefore, required to address such dangers. Intense monitoring of meteorological events near the snout of vulnerable glacier lakes is an urgent necessity. Data should be gathered at observatories and communicated to a centralised office. It should be processed in real-time to forecast the behaviour of glacial lakes and alert people. Water levels in rivers downstream of vulnerable lakes should also be monitored continuously. A nationwide programme to regularly monitor vulnerable glacier lakes by satellites and drones should be initiated. Hydrometeorological information and data gathered through monitoring should be combined to issue forecasts and warnings.

GLOF floods are different from floods caused by intense precipitation. Given increased threats due to GLOFs, standards to ensure the safety of projects in mountainous areas should be revised at the earliest.

Infrastructure projects in mountains — dams, bridges and highways — must be subjected to stringent quality control measures. GLOFs and other floods in mountainous regions have shown that buildings constructed close to rivers were the first and the worst sufferers. Construction close to rivers should, therefore, be carefully regulated.

Scientific studies on glaciers in the country must be scaled up. Lack of funds and skilled personnel today mean that very few glaciers are monitored. Climate projections indicate that glaciers are receding in the Himalayan region. This means that new lakes are likely to form and the existing ones could expand. Glaciers are among the best indicators of climate change. It is, therefore, necessary to understand how these ice bodies respond to climate change in the different Himalayan zones — among the most data-scarce regions in the country.

The Himalayan region requires a comprehensive risk assessment that accounts for projected temperature rise, changes in precipitation patterns, and land-use/cover changes. This assessment should inform disaster risk-reduction strategies.

The writer was Director, National Institute of Hydrology and is now visiting professor IIT, Roorkee

The Hindu- 16- October-2023

The world needs to stop taking water for granted

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is Country Director and Representative, International Fund for Agricultural Development

Elisabeth Faure
is Representative and Country Director, United Nations World Food Programme in India

The theme for World Food Day (October 16) this year – 'Water is Life, Water is Food' – calls for urgent action in managing water wisely. Availability or a lack of water has become even more critical with increasing climate extremes. Countries face severe challenges such as drought, floods, unseasonal rains and prolonged dry spells. With less than seven years left to achieve the UN Sustainable Development Goals (SDGs), the Food and Agriculture Organization of the United Nations (FAO), the International Fund for Agricultural Development (IFAD) and the United Nations World Food Programme (WFP) – the UN's food agencies – lay stress on the need to adopt innovative and collaborative approaches for improved management, conservation and availability of scarce water resources.

Water availability affects every aspect of human life, especially food and nutrition security. For instance, about 60% of India's net sown area is rainfed, contributing to 40% of the total food production. However, rainfed agriculture depends directly on water availability, and rain and soil moisture variations can severely affect food and nutrition security. There is an urgent need to adapt to climate change by promoting technologies and practices that make rainfed production more resilient and sustainable. Sustainable water management is critical to address the impending food and nutrition security threats. In turn, irrigated agriculture accounts for 72% of global freshwater withdrawals, sometimes with lasting damaging effects on the sustainability of significant ecosystems, such as seasonal rivers and deep aquifers.

Water and crop production

Decades of poor water management, misuse and pollution, and the climate crisis have degraded freshwater supplies and ecosystems, adding to the vulnerability of small-scale producers to climate shocks and land degradation in some of the world's most fragile ecosystems. About 40% of the planet's total land area is degraded, leaving farmers with less productive land. Small-scale farmers, who make up more than 80% of farmers globally, are especially affected as they often lack access to finance, technology and irrigation to maintain a level of production that can sustain their livelihoods.

Extreme weather events and variability in water availability are severely affecting agricultural production, changing agro-ecological conditions and shifting growing seasons. Changes in rainfall and higher temperatures also affect crop productivity, reducing food availability.

The Government of India has assessed the impact of climate change in 2050 and 2080 using climate projections and crop simulation models. Without adaptation measures, rainfed rice yields in India are projected to reduce by 20% in 2050, and by 47% in 2080 scenarios, while irrigated rice yields are projected to decline by 3.5% in 2050 and 5% in 2080 scenarios. Wheat yields are projected to decrease by 19.3% in 2050 and 40% in 2080, while *kharif* maize yields could decline by 18% and 23%. In every scenario, climate change without adequate adaptation measures reduces crop yields and lowers the nutritional quality of produce. The FAO, in Andhra Pradesh, Karnataka, Himachal Pradesh, and Maharashtra, is piloting a crop forecasting framework and model incorporating climate (weather), soil characteristics and market information to aid rainfed farmers in making informed decisions contributing to food security.

Irrigation can also be an effective measure to make agriculture more resilient, and in most cases, enable farmers to transform their livelihoods by growing, consuming and selling high-value crops such as nutritious fruits and vegetables. In this context, the WFP supports soil and water conservation, the building or fixing of irrigation canals, dams, ponds, and dykes, as well as flood barriers through food assistance in exchange for labour. In 2021 alone, 8.7 million people across 49 countries benefited directly from such support. Similarly, IFAD supports Indian States in leveraging the Mahatma Gandhi National Rural Employment Guarantee Act scheme. Through safeguards during design and planning and encouraging participatory institutional development, IFAD ensures that micro-irrigation infrastructure is environmentally and socially sustainable and financially viable.

Sustainable water management is critical to address impending food and nutrition security threats

Climate change adaptation

The FAO also supports the sustainable transformation of agrifood systems and climate-smart agriculture practices to improve water-use efficiency. It supported the farmer water school programme in Uttar Pradesh, which helped smallholder farmers. At the same time, the Andhra Pradesh Farmer Managed Groundwater Systems project reached out to 638 habitations in seven drought-prone districts, that included a hydrological monitoring programme.

Similarly, IFAD has enshrined climate change adaptation in its core strategies. It set ambitious targets in terms of leveraging climate financing to mitigate climate change by addressing the adverse impacts of agriculture and helping farmers to adapt to the increasing volatility of weather conditions, by investing in the restoration and preservation of soil health, water resources and merging modern technologies with indigenous knowledge systems to build productive and resilient production systems and value chains. IFAD-supported projects in Maharashtra, Odisha, Uttarakhand, Nagaland and Mizoram incorporate climate-resilient seed varieties and crops, including millets, and train farmers in climate-sensitive agricultural practices and soil management to cope with increased water stress. The WFP is collaborating with the Government of Odisha to develop solutions for smallholder farmers, focusing on women. The goal is to enhance resilience through solar technologies, establish community-based climate advisory services to help manage climate impacts and promote a millet-value chain that reduces water usage and improves nutrition.

Steps needed

To achieve global food and nutrition security, political commitment is needed as much as concrete investment. The needed policies and investments must promote: Innovative and proven technologies that allow farmers to increase their productivity, adapt to climate change and become more resilient to shocks; environmentally and socially sustainable and financially viable irrigation and water management strategies; reduce their climate footprint of agricultural production, as well as bio-hazards and environmental pollution; bring sanitation and drinking water supplies closer to rural households; adopt efficient food and water recycling strategies and strengthen institutional arrangements and capacity for sustainable and equitable water regulations, management, access and ownership.

The UN's food agencies work closely with the Government of India and State governments on innovations such as Solar 4 Resilience, Secure Fishing, and the revival of millets for renewable energy promotion, food security and nutrition.

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FROM PLATE TO PLOUGH

INDIAN AGRICULTURE MUST BE GEARED TOWARDS EFFICIENT USE OF WATER

Water *is* food

ASHOK GULATI
Distinguished professor, ICRIER
Views are personal

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First, on the food security front: Having been through a journey of 'ship to mouth' in the mid-1960s, India has come a long way. In just the last three years, 2020-21 to 2022-23, India exported 85 million tonnes (mt) of cereals, mainly rice, wheat and corn—even after giving free food (rice or wheat) to more than 800 million people under the PM Garib Kalyan Yojana. This is a stupendous achievement.

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However, economic access to sufficient nutritious food remains a challenge for many. Almost 16.6% of Indian population is malnourished (2020-22), 35% of its children below the age of 5 years are stunted (low height-for-age), and 32% are underweight (low weight-for-age), as per the NFHS-5 (2019-21). The progress on this front has been rather slow, and if business-as-usual continues, India will not be able to achieve its Sustainable Development Goal (SDG) of zero hunger (including malnutrition) by 2030.

Now, how is India using its water resources in agriculture? It is important to note that while India is home to almost 18% of world population, it has only 4% of global fresh water resources. And much of this water is used in agriculture. While FAO puts this figure at 90%, Indian Central Water Commission says it is 78%.

With rising population and rising incomes, there will be a need to produce not only more food but also save water for drinking, manufacturing and other needs of growing urbanisation.

Thus, India needs to adopt a two-pronged strategy with respect to water in agriculture. First, on the supply-side, it must augment the buffer stock of water during monsoon season in its reservoirs and recharge groundwater through check dams and watersheds, etc. Second, it must work on the demand side to ensure more rational allocation and efficient use of water across crops. This calls for not only institutional reforms in the irrigation sector, but also in pricing of water and power for irrigation.

While almost half of India's gross cropped area is irrigated today, we need to take it to at least 75% if we to cope with the vagaries of climate change. This would require massive investments. India has not succeeded in attracting private sector investments in reservoirs and canal networks, as pricing of water remains almost free. The government does not have enough funds to invest in this, after doling out large food and fertiliser subsidies that cost more than ₹4 trillion. Neither do the state governments have the political will to charge for power that is used for groundwater irrigation.

Punjab may have one of the highest tonnes/hectare figures in the country, but on water usage, its agriculture is one of the most inefficient. The need is to reorient agriculture towards water productivity (kg of grains produced per cubic metre of water used)

Under such a scenario, Indian agriculture remains a risky venture in the wake of climate change.

If we have to minimise this climate risk, we need a paradigm shift in our thinking. First and foremost, we need to shift focus from land productivity to water productivity. For example, we need not look at, say, a large tonne/hectare number, but talk of a certain kg of grain per cubic metre of irrigation water. Once we start looking at productivity from the water angle, we can identify the inefficiencies in allocation and use of water in agriculture. In one of our studies at ICRIER, on water productivity of 10 major crops across all major districts in which they are grown, we found that though Punjab has one of the highest land productivity of rice, its irrigation water productivity is the lowest. That means Punjab is one of the most inefficient grower of rice in terms of water used. On top of this, Punjab also emits highest levels of carbon emissions—almost 5 tonnes/ha of paddy cultivation.

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Farming practices such as Direct Seeded Rice (DSR) and Alternate Wet and Dry (AWD) irrigation, or zero till, etc., can also be rewarded as they will save water. So also would drip irrigation, especially in sugarcane—saving half the water currently consumed. The bottomline is that, unless we use water efficiently, ensuring sustainable food security is difficult.