

Evaluation Of Water Governance Policies In India And Their Effectiveness In Ensuring Water Scarcity

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Abstract

“Anyone who can solve the problems of water will be worthy of two Nobel prizes – one for peace and one for science.” - John F Kennedy

The research paper focuses on evaluating several government policies regarding water governance over the years beginning with the *National Water Policies of 1987, 2002 and 2012*. These policies laid the foundation and framework from which the state authorities could plan their projects and policies. In recent years several flagship programs have been undertaken which aim to provide drinking water connections, last mile irrigation and rejuvenation of rivers through schemes like Namami Gange Yojana, Pradhan Mantri Krishi Sinchai Yojana, Har Ghar Nal Jal Yojana. Several ground watershed and infrastructure projects have also been undertaken across the country, especially in remote areas. The research paper focuses on some of the case studies which were based on successive and unique water management models. The paper also highlights the problems faced in urban areas with regard to water supply, sewage treatment, and sanitation and tries to highlight the existing policies and also the required changes in them.

Further, it compares the water governance policies of India and China and the different approaches taken by them and what India can learn from them. Developed countries have made significant strides in improving their water security and climate change mitigation policies, these policies ride on the basis of rationalizing pricing and technology-enabled solutions, the research paper also highlights them. At last, the paper focuses on what lessons India can learn from Israel with regard to irrigation and desalination as well as how India can learn to solve its river-sharing disputes amongst its states, further recommendations are provided which can help in reducing the water consumption and improve the conditions of water sources as well as the changes that could be brought in pricing mechanism and technology.

Introduction-

Water governance and security have emerged as one of the most significant aspects of sustainable development over recent years. India has had a significant amount of policies and programs regarding the above. As agriculture, the biggest employer of the Indian economy is dependent on water and its use and source, India also faces the daunting task of providing sanitation and piped water to all of its households. With the growing industrialisation and urbanization, wastewater effluent, water pollution, development of sewer and drainage systems are some of the concerns and challenges the country faces.

Along with these, the biggest issue which the country is facing is water scarcity, thousands of villages and most of the Indian cities lack adequate water supply. Thus several governance norms and policies focus on developing and creating clean water sources. Climate change acts as the biggest threat with chances of more and more floods and droughts being witnessed across the country.

Just after independence, the state played the role of provider in this sector too. Several state-led projects focused on developing irrigation projects, huge dams were one of its components, similarly tube wells and borewells were built. However, in the last two decades, the state is changing its role from being a provider to being a regulator and facilitator which has encouraged private-sector participation and community-led initiatives.

In India water governance and management rests with the state. However, the Centre government also plays a big role, especially in funding and providing a common framework. Furthermore, the local bodies in both rural and urban areas have an important role in the implementation of policies and the operation and management of water bodies.

The paper tries to analyze various water-related policies across several decades as well as the recent policies being undertaken.

National Water Policies of 1987, 2002 and 2012-

Water management has always been the primary responsibility of the state. However in 1987, it was realized that a National level framework for water-related policies can help to ensure better coordination and efficient use of water, so the government came up with the National Water Policy. Some of the recommendations were as follows

- 1)The policy's main focus was to ensure that the existing water basins and resources are optimized efficiently and steps should be taken in that direction.
- 2)The plan advocated for steps to ensure the recharge of groundwater and steps to avoid overexploitation of groundwater.
- 3)Flood zoning and early flood warning will be crucial to minimize the losses due to floods and for prevention of droughts policies to be undertaken to promote rainwater harvesting, soil conservation techniques and reduce evaporation losses.¹

Although the National Water Policy of 2002 is quite similar to the earlier policy it has taken an important element of recognising the importance of information and data in policymaking. Some of the important recommendations were as follows.

¹[Central GroundWater Board](#)

1. Strong institutional mechanisms should be in place to ensure that the one area which is lagging i.e. maintenance of water resources is focused on.
2. Tribunals which are fair and multi-disciplinary can solve the disputes that often take place between states regarding sharing of river water.
3. It recommends bringing in new technology to desalinate seawater and encouraging technological research in this aspect.
4. Ecological problems related to water can be solved by decentralizing the decision-making process and even allowing private sector participation.²

National Water Policy of 2012 -

1. It has emphasized giving communities a big role to work in avoiding climate change losses, this could be done by reviving the traditional methods of harvesting water like Tanks, Bavadi's, Well, etc.
2. Some of the other recommendations are to persuade the farming community to try drip and sprinkler irrigation; even the water which seeps from the canal can be used to recharge groundwater. NREGA-like schemes can be very helpful in promoting such infrastructure.
3. Water rates should be rationalized considering the scarcity value of the resource.
4. With regard to the water supply in urban areas, it has been recommended that water audits check on leakages and fault lines. Diversifying the domestic water supply sources through water treatment plants can also be helpful³

National Water Framework Bill – 2016

Ministry of water resources, river development and Ganga Rejuvenation, came up with the National Water Framework Bill, in 2016. The main purpose behind bringing this bill was to bring together all the states in agreeing to the establishment of integrated inter-state river basin development authority. The bill recognises the necessity of having an integrated policy for groundwater and surface water conservation. As river basins have both of these water sources any over-extraction can have a negative impact across the river basin - The bill mentions- "Provided that every water-related activity in any part of a river-basin shall ensure that over-extraction of groundwater in the immediate vicinity of a river, destruction of catchment areas and river flood-plains do not negatively impact river flows and that a decrease in river flows, in turn, does not negatively impact groundwater recharge in riparian aquifers in the vicinity of the river."

² [National Water Mission](#)

³ [National Water Mission](#)

The central government would establish a River Basin Authority, for each interstate river water basin. This River Basin Authority would prepare a Master plan for their particular river basin. This master plan would include various initiatives, projects and community-led initiatives for water treatment, rejuvenation and efficient use of water resources.

The bill gives each and every citizen the right to water for life, which would mean that every citizen has the right to a sufficient quantity of safe water and all the drinking water agencies should comply with the required norms.

For river rejuvenation, the bill encourages community participation by reflecting the following principles-

- 1) 'AviralDhara'- continuous flow in time and space including maintenance of connectivity of flow in each river system.
- 2) 'Nirmal Dhara'- unpolluted flow so that the quality of river waters is not adversely affected by human activities; and
- 3) 'Swachh Kinara' – clean and aesthetic river banks.

National Water Informatics Centres would be established across the country to collect data regarding water resources as well as use satellite images to maintain a Water Resource Information System.

Some of the other issues taken up are to promote people-centred water management, promoting sustainable irrigation techniques like drip and sprinkler irrigation, strengthening the institutional structure to solve the big problem of inter-state water dispute, etc.⁴

Need for National Water Commission

Central Water Commission and the Central Ground Water Board are two primary bodies in India that play a big role in the assessment, management and monitoring of water resources. The role of the Central Water Commission and the Central Groundwater Board has also been significant in relation to water infrastructure projects. However, they are very specialized in their approach. The Central Water Commission has been concerned with the technical factors concerning water and the Central Ground Water Board only looks after the groundwater sources. What is the need of the hour is to create an apex multi-speciality body which has all the necessary skills and domains as well as the authority to control and frame integrated water policies.

The existing two bodies Central Water Commission and the Central Ground Water Board have civil engineers and hydrogeologists respectively as their biggest employees. No effective water governance

⁴ [National Water Framework Bill 2016](#)

policy can be possible without having agro-economists, policy experts and social scientists on the board.

Hence, a National Water Commission should be formed by merging the Central Water Commission and the Central Ground Water Board. This would be the apex water governance body in India. The body should be headed by a Chief National Water Commissioner who would be an expert in public administration. The full-time commissioners would be hydrogeologists, civil engineers, and agricultural economists.

The body would frame guidelines and provide them to the state governments. Thus it would act as a guide and a policy recommender for them as the state governments and local governments have powers regarding the implementation of water projects. The responsibility of the National Water Commission would be to frame and enable policies related to sustainable irrigation, promotion of groundwater surcharge, ensuring reuse and recycling of water in urban areas, treating industrial effluents, keeping river water surface and banks clean, framing an integrated approach for inter-state river basins by taking the states into confidence, promote data collection and use of technology in water management, etc.⁵

Policies post-2014-(Namami Gange Yojana, Pradhan Mantri Krishi Sinchai Yojana, Har Ghar Nal Jal)

Namami Gange Yojana is a flagship program launched by the Central Government in 2014, as the name suggests it is working to rejuvenate the Ganga River and its basin. The two biggest steps taken are constructing more than 100 sewage treatment plants across the state where Ganga flows, secondly, more than 200 Ghats have been modernized and beautified, and several projects for river surface cleaning have been undertaken. Industries located on the river basins have been made to comply with much stronger effluent norms where untreated effluents can lead to closure and hefty fines. However, the long-term aim is to restore the biodiversity of the river, such as conserving fishes like Hilsa, Gharial and turtles.⁶

Another such program which has been developed is the Pradhanmantri Krishi Sinchai Yojana. This is an umbrella of several initiatives related to watershed development, soil water conservation, micro irrigation, recharging groundwater and so on. The main aim of this yojana is to improve the last-mile irrigation to all the farms of the countries. It focuses on such infrastructure that can help productivity increase significantly per hectare. It even identifies crop cultivation and accordingly decide the necessary form of irrigation, some of the components of this scheme are the Accelerated Irrigation

⁵ [International Water Management Institute](#)

⁶ [National Mission for Clean Ganga](#)

Benefit Programme which focuses on new irrigation of more than 20 lakh hectare; Per Drop more crop; the micro irrigation scheme benefiting more than 60 lakh hectare and more such on watershed development and repair and renovation which has benefitted several farms.⁷

The most ambitious among all is the Jal Jeevan Mission and its Har Ghar Nal Jal which aims to provide safe tap water connections to all rural households by 2024. It will provide 55 litres of potable water per day per individual. It has helped most importantly the rural women who had to go miles to bring clean and potable water. “Since the announcement of the Jal Jeevan Mission on 15 August 2019, so far, more than 6 crore households have been provided with tap water connections, thus increasing the tap water supply from 3.23 Crore (%) to more than 9.35 Crore (48.4%) rural households in the country.” Jal Shakti Ministry said in a press release. However, the programme can be considered successful only if it can achieve its daunting goal.⁸

Watershed and Water infrastructure development in recent years

Even though India has a large number of water resources, most of them are not in the right conditions. In some cases, the water does not percolate and in some cases, the water is not potable. Thus to solve this issue state level initiatives are undertaken by taking into confidence the local community, one such program is the Area Development Programme undertaken in Andhra Pradesh, Maharashtra, Odisha, Chhattisgarh and Bihar. Desilting of water, planting trees on the side of the embankment, covering open wells and using solar pumps to distribute water from such newly developed resources to households are some of the steps taken to rejuvenate the water body, the benefits of this scheme have helped more than 4000 households across these States.

Almora District in Uttarakhand had always lacked irrigation facilities due to the hilly terrain. However, in 2014 an integrated solar-based irrigation scheme was launched which has changed the face of how crops are irrigated. Most of the rivers flow downstream at a rapid speed thus it was necessary to create check dams and to collect water through the sedimentation process. Along with this solar panels of 3000 watt capacity were placed to pump water to the overhead tanks located in villages, from where HDPE pipes would bring them to the fields. With the available facilities, farmers have started growing vegetables and fruits which have substantially increased their incomes. After its success in Almora, it was even implemented in Dehradun and Pauri Garhwal districts.

⁷ [Press Information Bureau, Ministry of Jal Shakti](#)

⁸ [newsonair.com](#)

Jakhni is a thriving village with the most important crop being the water-intensive Basmati. Now Jakhni is located in the drought-prone Bundelkhand. One would wonder how a water-intensive crop like rice could be cultivated in such a drought-prone area, all thanks to the Sarvodaya Adarsh Jal Gram Swaraj Abhiyan Shakti, a local community-based committee which focused on developing traditional rainwater harvesting infrastructure, constructing several farm ponds, planting of trees near the ridges of agriculture fields, etc. All of these made Jakhni an epicentre of water sustainability and was declared a Model Jalgram by the Niti Ayog. Farmers now report harsher summers, increasing incomes and crop diversification and even less migration of youth.⁹

Irrigation Management-

There exists a huge gap between the irrigation systems created and the system utilized. This is because of a lack of proper irrigation management structure. It is very important to utilise thousands of litres of water stored in dams for irrigation and to ensure last-mile connectivity for farmers. There is an utter lack of coordination and collaboration among several government departments involved in irrigation. Similarly, the lack of accountability from the authorities and the inefficient distribution of water have led to discontentment among farmers. The proposed solution lies in making efforts towards Participatory Irrigation Management. A community-led initiative, Participatory Irrigation Management has been applied by several states in India like Maharashtra, Gujarat and Madhya Pradesh. The base structure for Participatory Irrigation Management lies in establishing the Water Users Association of Farmers. They are legally recognised bodies, who are given water use rights as well as significant authority to make decisions. While the state and the central government may focus on building heavy infrastructure like dams, and primary canals the Water Users Association would be responsible to develop minor structures and tertiary canals and laying down the piping work. They are allowed to retain a certain amount of Irrigation Service Fees which are collected by them and handed over to the state government. The retainer fee can be used by the Water Users Association for operations, modernization, rehabilitation and repairs of existing irrigation structure.¹⁰

Waghad and Pawla in Maharashtra are two of the several success stories that have come up because of Participatory Irrigation Management and its Water Users Association. The WUAs in both of these places focussed on cleaning the existing canals and started desilting the minor canals, also it made equitable distribution of water, which ensured that water reached the tail-end farmer.

Thus efficient use of existing irrigation structures can be made by adopting these techniques.

⁹ [NITI Aayog Compendium of Best Practices in Water Management 2.0](#)

¹⁰ [International Water Management Institute](#)

Policies and projects for urban water supply, sanitation and treatment

The biggest problem urban India faces is inadequate water supply. Most of the cities lack a 24/7 water supply. The reason for this is the lack of development of water sources. A solution to this was proposed by the Jawaharlal Nehru National Urban Renewal Mission, under this the urban local bodies were encouraged to ensure that every urban house or residential society should develop a rainwater harvesting structure, along with it it would be necessary to trace new sources of groundwater in urban areas and plants which can treat this hard water should be built, water sourced through these can be used for toilets, cleaning, and other non-drinking uses thus the burden on existing water bodies can be considerably reduced.

The second biggest problem is sanitation. Lack of sanitation is generally witnessed in most slums across metropolitan cities, to address this challenge National Sanitation Policy was enacted. Its recommendations were to build community toilets as much as possible and to cover most of the slums. The reason to encourage community toilets was that even though the government could encourage private toilets by providing subsidies, the poor people would be less likely to put their meagre resources into such. Also connecting and building sewerage lines for private toilets could be expensive and difficult.

More than 62% of sewage water is released without any treatment, This is the situation even though there are more than 900 Sewage treatment plants across the country. A policy framework was released by the Ministry of Housing and Urban Affairs, which has recommended several technology-enabled solutions to deal with faecal sludges and drainage water. These generally focus on decentralizing the sewage treatment plants, most smaller towns lack the financial resources to build huge treatment plants along with wide sewage lines, decentralized sewage treatment plants can be located in a particular residential area, or an industrial zone and the water-treated can be used for Agriculture, gardening, washing and cleaning, thus can create to the water demand for that particular zone or area, and also the cost of construction and its operation and management are very economical and thus can help to achieve economic efficiency.¹¹

Should there be a decentralised water supply at the Municipal level?

Most Indian cities have a complex structure of water supply, which is neither either completely centralised or decentralised. Municipalities and Municipal Corporations are responsible for water supply in the urban areas. While some of the responsibilities are in the hand of the apex department, some responsibilities are delegated at the ward level. For example in the case of Mumbai the Municipal

¹¹ [National Institute of Urban Affairs](#)

Corporation of Greater Mumbai has the responsibility to bring the water from the reservoirs situated outside Mumbai, the ward-level authority has to distribute and control the flow in the residential area and also ensure last-mile quality.

This distribution system has led to erratic water supply, with some areas receiving more water than required and some of them struggling to receive even sufficient water for drinking needs. The non-accountability has led to around 20% of water being lost due to leakages, at the time of its supply.

The solution to it lies in having a mixed approach of further decentralising water supply and ensuring accountability and professionalism at the water board level. Water supply boards at the municipal level should have themselves financed with debt bonds and loans from banks and financial institutions. This will make these boards more accountable, efficient and professional in their activities and developments.¹²

Decentralizing the water supply requires creating decentralised local sources. This factor creates a hindrance to the effective development of a decentralised water supply system. However, a dual system can be followed by supplementing the centralised water supply with decentralised groundwater and rain-harvested water supply. Municipal Authorities can delegate responsibilities to the local ward authority to create rules and regulations as well as undertake projects to build groundwater sources and undertake rainwater harvesting in as many urban buildings, localities and offices. They may undertake these works by assessing their local requirements and needs. Under this structure, the water supplied by the municipal bodies can be used for drinking purposes while for other purposes like cleaning, bathing, etc. ground water and rain-harvested water can be used. This kind of dual structure can reduce the load on the central water supply network and ensure sufficient water supply to all localities according to their individual needs.¹³

Analysis of water tariff structure in Mumbai and Delhi-

Water tariff structures in India differ from city to city. The water tariff structure in Mumbai is based on a uniform rate structure for each classification. The tariff rate classifies users on the basis of usage and socio-economic status. There are different tariffs for slums, high-rise buildings, and commercial and industrial areas. There are approximately 246000 metered water connections in the city. The cost for water supply is around Rupees 4 per litre and the prices charged vary from Rupees 11 to Rupees 3 per litre (2006) in accordance with the specific zone. Water benefit tax, as well as sewage benefit tax, has to be paid above the consumption charges. This is because the Municipal authorities have to

¹² [International Journal of Regulation and Governance](#)

¹³ [Sustainable Sanitation and Water Management](#)

manage sewage disposal at a high cost. This current system of cross-subsidizing of tariff rates has proved to be highly inefficient as it has failed to recover the cost involved. The solution to it lies in easing out the cross-subsidizing of tariff rates and uniform rate structure. The new tariff rates should be designed in such a manner that can recover the cost of water supply as well as ensure water conservation.¹⁴

Delhi Jal Board is responsible for providing water supply to the National Capital Territory of Delhi. It has the responsibility to set up tariff charges. Like in Mumbai water tariff structure in Delhi is classified into three categories. - Category 1- Domestic and residential, Category 2- Residential with commercial activity having non-intensive usage of water, and Category 3 - Commercial and industrial areas having intensive use of the water. The tariff rates are at the lowest for Category 1 and highest for Category 3. However, a different factor is that, unlike uniform rates that exist in Mumbai, Delhi has tariff rates according to monthly consumption. The range for monthly consumption has been 10 kilolitres, with tariff charges increasing at every range. This tariff structure can help to create incentives for consumers to reduce water consumption as the tariff range would increase. But recent policies announced by the Delhi government to provide free water up to 20-kilo litre can reduce this conservation incentive.¹⁵

Comparison of Water governance policies of India with China

In comparison with India, China is one such country which has similar levels of large and complex water resources. Both are developing countries, one is democratic and the other is socialist. One of the biggest challenges both countries face is water pollution, especially of the two most important rivers i.e. the Yellow River in China and the Ganga in India. It would be interesting to compare their water policies and analyze what one can learn from each other.

Water Policies of India	Water Policies of China
Water is a state subject and even though the central government can provide broad guidelines, the final operations and implementation stage is in the hands of the state-level authorities.	On the other hand, water is a central subject in China. Most of the policies and decisions regarding water management, infrastructure, and policies are taken by the centralized decision-making process.
The ownership of surface water bodies is in the hands of the state but the groundwater ownership is in accordance with the private ownership of land.	China is a Socialist state, all water resources are in the hands of the state.

¹⁴ [International Journal of Regulation and Governance](#)

¹⁵ [Delhi Jal Board](#)

Water Policies of India	Water Policies of China
<p>Building dams as a major solution to solve water issues has been tough for India, as it states lack financial resources, sophisticated technology, machinery and engineering but the biggest hindrance has been because of the democratic system of governance where there have emerged a large number of veto players like opposition parties, civil society bodies, etc.</p>	<p>China has built a large number of dams across the country. This serves a dual purpose where it aims to generate 15% of its energy needs from hydel sources and also to provide water to its growing cities.</p>
<p>India lacks integration of water policies with energy, agriculture and industries. The private sector participation and investment have been very low.</p>	<p>China has taken the approach of integrating water policies with energy, agriculture and industry. A huge investment of not only the private sector but even foreign direct investment has been encouraged.</p>

Thus there are a lot of aspects which India can learn from China. Especially with more direct investment in water-related infrastructure and integration of water governance and policies with other segments of the economy.¹⁶

Best Water Security Policies or practices across the World

A common global challenge we face is climate change. Frequent floods and droughts are bound to happen over the years, thus in response to these, the Organisation for Economic Cooperation and Development (OECD) countries have undertaken some unique policies which have focused on the efficient use of water and information and technology-based early detection of flood and steps to mitigate its effect.

One such solution adopted in Australia and the United States is to identify water disaster risks and accordingly create steps to detect them early, thus data visualization has been the key to it. Both of these countries, especially the United States, started working on flood defences and coastal embankments to protect them from hurricanes. Several countries like France and Australia have undertaken surveys to identify flood-occurring zones and drought-occurring zones, and have thus created policies to mitigate their effects by taking into consideration their local geographical aspects.

¹⁶ [Water Policy](#)

Since most of these advanced countries have a high degree of urbanization, they have focused on rationalizing the urban water prices and in this case, Denmark took the lead step to increase the water prices and has thus succeeded in reducing water conservation of up to 10%¹⁷

Often it is seen that developing countries have often not focused on solutions to mitigate water pollution but South Africa stands on a different note, where it has made a regulation which makes it compulsory for water to be first allocated to environmental use before any other use. Bolivia faces the biggest problem of water-borne diseases due to a lack of safe water sources and sanitation and hygiene. Here the community-led initiative undertaken by women across four municipalities of Bolivia undertook three steps- use solar-based water disinfectant to ensure clean water source, encourage washing of hands with soap and ending open defecation and right use of toilets, thus such basic steps coupled with women's participation helped more than 16 communities of Bolivia to free themselves from waterborne disease.¹⁸

Lessons India can learn in Water Governance

Even Though India has taken several noteworthy steps with regard to water governance, there are several areas where it has fallen short and one among them is irrigation. Since the onset of the green revolution irrigation has enabled crop self-sufficiency. However, in recent times the traditional methods of irrigation have led to excessive use and wastage of water. Thus it is necessary that India can learn from Israel several water-efficient irrigation projects. One such is the drip irrigation system, where Israeli agricultural research companies have made great strides. Drip irrigation is where pipes are placed at the root level and the water seepage takes place slowly, this ensures that only the required amount of water is consumed and the moisture level of the soil is maintained. This type of irrigation is most suitable for semi-arid states of India like Gujarat and Rajasthan. Another area where Israel is the pioneer is huge desalination plants. India has a huge coastline of 720km. Thus with a depleting source of freshwater, India can tap this potential. So a lot of agreement and technology sharing cooperation is agreed by both of the countries and there is even the possibility to establish a huge desalination plant in Mumbai.¹⁹

River sharing among states has impeded the full-scale development and rejuvenation of most of the rivers. Even though tribunals have existed they have failed to end disputes. Hence the only solution to it is to undertake surveys using the right data and information so as to arrive at adequate conclusions. The government needs to invest in creating a database of water resources including the river water

¹⁷ [OECD](#)

¹⁸ [UN.org](#)

¹⁹ [The New York Times](#)

basins, its tributaries, the community residing in these areas and so on. Compliance norms also should be made strict, with states not accepting the decision of tribunals to be reprimanded in a strict manner.

Recommendations-

- Water pricing plays a significant role in affecting the use of water in big metropolitan cities like Bangalore and Mumbai. The water bill is directed in the name of either the residential society or a commercial complex. This does not incentivise the citizen to reduce his water consumption. The solution to it is to ensure household-level water meters in metropolitan cities, with household-level water bills, this will lead to efficient and minimum use of water at the individual level.
- Leakages, broken pipes and non-functional valves are some of the features of water infrastructure in urban areas, the reason for it is the usage of cast iron pipes and valves. Thus it is the need of the hour to switch to advanced piping technologies by using Corfit and foam core pipes which are now available in the Indian market. This can be possible only when the municipal bodies can allocate a significant amount of money for such a large-scale replacement. Foreign technologies, especially concerning pumps and valves should be brought in through collaboration with twin cities across the world. A panel should be created consisting of government officers, industrial bodies, engineers and institutes which would emphasise research and development under the above area. Also, periodic water infrastructure audits should be held to identify joints and leakages, this work however needs to be done in a speedy manner so as to avoid any kind of inconvenience.
- Traditional methods of water conservation like Bavadis and tanks that have been abandoned should be revamped and rebuilt. These conventional methods can act as great reservoirs of rainwater and even recharge groundwater. Thus it can perform the dual task of collecting water and even generating and ensuring seepage for groundwater preservation.
- Electricity subsidies are given to farmers so that they can use tube wells at a much lower cost. However, this has led to excessive usage as farmers don't worry about the cost. This has led to the depletion of groundwater level and has reduced the water table. The solution to it would lie in ending subsidies and instead providing direct benefit transfer in the farmer's account, this would ensure that the farmer would use the tube well efficiently. For example, if a farmer receives 3000 rupees per month in the form of a direct benefit transfer, he would still use the tube well but he will make sure to use water and electricity efficiently so that he can reduce his electricity bill, which can help him save a certain amount of that 3000 rupees for his other expenditures.
- Government can create price-based incentives to lure farmers away from excessive water-requiring crops. For example, it can provide a high minimum support price for Bajra,

Ragi and Jowar which require less amount of water and reduce the minimum support price for crops like rice, which drain the water table.

- Irrigation accounts for around 80 per cent of water consumption, this is because of the traditional flood method of irrigation. Water scarcity looms over India's irrigation system, and the best solution to this crisis can be drip irrigation technology. Under this method, the water reaches directly the root zone of the crop with the help of emitters and pipes. This can considerably reduce the water losses that happen because of distribution and evaporation. Water usage reduction means less use of tube well and hence less usage of electricity. Studies have found that water directly reaching the root zone of the crop in specific quantities can help in increasing crop productivity. A significantly lesser amount of fertilizer would be required by using the drip method, which can reduce the salinity of the soil. But the bigger challenge would be to reduce the cost of the equipment required for drip irrigation. Special loans can be provided to the farmers if they switch to the drip irrigation method for their water-intensive crops like rice and sugarcane. Domestic manufacturing of parts required for drip irrigation may be encouraged by bringing them under the Production Linked Incentive, which can help reduce the equipment cost.
- Data and technology will be the key to upgrading and improving any sector. Big databases, technology-enabled forecasting, water engineering, wastewater treatment, and desalination are some emerging technologies that can bring groundbreaking improvements in water security. The government here can play the role of facilitator and also allow private as well as foreign direct investment in bringing in further research and development in these technologies.

Conclusion-

The paper has elaborated on several water policies undertaken by the government over the years. Policies undertaken outside India, water infrastructure projects and much more, but what comes to the end of all of this is the importance of policymakers understanding the need to bring out the necessary changes. The recommendations provided would be meaningless unless the policymakers realize the utmost importance of water security and show their willingness and commitment to work for it. The biggest task for the country would be how it could integrate water policies with agriculture, environment and energy policies. Climate change and sustainable development will remain in focus over the next five decades. Here India has the opportunity to showcase itself as a responsible power, with necessary steps taken especially with regard to even providing basic facilities like drinking water, toilets, and construction of dams and canals can go a long way for India to be a leader in the other developing countries of Asia and Africa, who can imitate the Indian democratic model of sustainable growth. It all depends on how policymakers learn from their earlier mistakes, take new suggestions, bring in advanced technologies, and integrate the local community into the development programs.

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