

WATER GOVERNANCE IN UTTAR PRADESH: A STUDY OF LEGAL, POLICY AND INSTITUTIONAL FRAMEWORK[§]

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Abstract—The present paper intends to briefly discuss the policy, legislation, and institutional framework for Uttar Pradesh's water governance. The orientation and intent of the present paper is descriptive and explorative rather than analytic. Thus, an overview of UP State Water Policy, prominent legislations about different aspects of water governance and the institutions concerned with governance/ management of water resources have been briefly dealt with in the present paper.

Keywords: Water Policy, Water Laws, Surface Water Management, Ground Water Management, Water Pollution, Pollution Control Boards.

I. INTRODUCTION

The availability of adequate freshwater is critical for survival of humans and the survival of entire living organisms on earth. Human beings have the least human intervention in the natural hydrological cycle in the early phases of human civilisation. But with the advent of agriculture, there started trivial human intervention through drawing

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and diverting water from natural water bodies through his physical or animal force. Such trivial human interventions from ancient times to the modern era have increased to the extent of overexploitation, abuse and pollution of water resources through direct and indirect human conduct and ventures. Moreover, the exponential rise in population and the consequent increase in demand for water for drinking, personal hygiene, irrigation and industrial purposes have led to the freshwater shortage. Further, urbanisation and industrialisation have created immense pressure on the availability of freshwater.

Several studies have revealed the advent of water crises at global and national levels. Some studies have predicted that in the near future natural waterbodies will dry out. Even some studies have gone to the extent of expressing apprehension of third world war or civil war and riots in water-deficient countries. Such is the gravity of the situation that the survival of the entire human civilisation is at stake.

Thus, effective water governance is needed at all levels *viz.* global, national, state and local. Therefore, It is necessary to have adequate water governance in every states of India. The present paper discusses policy, legislative and institutional aspects of water management in the State of Uttar Pradesh.

II. POLICY FRAMEWORK

Since 'water' is a state list¹ subject, water governance's prime responsibility falls upon the states; therefore, each state should enact a comprehensive water law regime to suit the home conditions. Legislation for water governance at the state level allows the states to incorporate provisions suitable to their internal needs and requirements. Moreover, it provides them with the flexibility to amend these laws and the consequent regulations to streamline them to suit the changing needs of the time and conditions. Further, state-level legislation also allows the states to make budgetary allocations for implementing the programmes/projects and schemes meant to manage water resources in the home state. Finally, it gives them executive, financial, and administrative control for a swift formulation, implementation, feedback, adjustment and evaluation, and the policies, programmes/projects, and schemes employed for water governance.

The high degree of financial dependence of the states is upon the grants-in-aid and central assistance by centre for development purposes and a tendency of centralisation had not been much encouraged for states to have their policy

¹ Entry 17 i.e. 'water' has been put under State List of the Constitution of India, consequently governance of water falls under the legislative jurisdiction of respective States of Union of India. However, Entry 56 of Union List provides that "Regulation and development of inter-State rivers and river valleys to the extent to which such regulation and development under the control of the Union is declared by Parliament by law to be useful in the public interest".

and legislation on water governance. However, in most cases, several states have adopted policies, legislation, regulations, directions, programmes and schemes, forwarded by the central government.

The Indian Union government has been instrumental in formulating National Water Policy and its implementation through state authorities under the Union Ministry of Water Resources. Though state governments are free to legislate, develop water policy and implement an action plan, programs and schemes to realise their water policies, most states have adopted policies, legislation, regulations, guidelines and directions of the central government. Thus, State governments have acted merely for implementing national policies, plans, programs, projects, and water governance schemes. For the implementation of these, the state governments are provided with grants-in-aid or Central Assistance.

Such a situation has a negative impact on water governance in states who have developed a tendency to follow the centre's directions and guidelines that are not conducive to the conditions at the home state.

Observations: Given various constitutional provisions about 'water', a balanced and flexible approach has been adopted. A blend of top-down and bottom-up approaches has been adopted to deal with India's 'water' governance. This approach has been adopted by keeping in mind India's large geographical stretch with federal polity and huge geographical, climatic, social and economic diversity. Though the Constitution accords exclusive jurisdiction on 'water' to state governments as a local resource, it accords power to Parliament to legislate in the public interest when it comes to managing inter-state rivers, which may involve more than one state. Such a constitutional arrangement allows reaping the benefits of both a requisite degree of a centralised and unified approach and direction by the Union government and localised management and control by the respective state governments suitable to the conditions.

However, in practice, the top-down approach has been dominating, and most states merely acted as the implementing arms of the Centre government. Thus, adopted centrally-driven perspectives even in case of the subjects enumerated either in State List rather than actively devising and initiating the policy interventions conducive to their specific needs and conditions at home state.

Nevertheless, though states have not explicitly enacted comprehensive water resource legislation, they notified various rules and regulations to govern water resources. For example, in the State of the UP, several rules and regulations were framed concerning water resources. Besides, the state formulated the State Water Policy and Action Plan to implement the same.

A. Uttar Pradesh State Water Policy

The National Water Policy (NWP) in 1987 was adopted by the union government and was subsequently revised in 1998. However, it was felt that water resources planning has to be guided by development perceptions of the state, which would inter-alia account for geographical conditions, hydrological status (surface and underground water), water allocation priorities and other specific needs. Thus, the need for a State Water Policy (SWP) was felt. Consequently, in Uttar Pradesh, the State Water Policy, 1999 was formulated to address its specific requirements. However, it needs to align with the general guidelines and parameters laid down in the NWP.²

Objectives: The SWP of Uttar Pradesh has been formulated to ensure the preservation and optimum utilisation of the available water resources through user's participation with equity and social justice. The policy emphasises the maintenance of the quality of surface and underground water through established norms and standards. The policy also meant to ensure ecological and environmental balance while developing water resources sustainability. It also stressed upon creation of training facilities in the water resource sector. It also prescribes a Management Information System (MIS) for effective monitoring of policy implementation.

Main Features: For the achievement of the above objectives, the UPSWP policy suggests the following:

Water resource planning: Basin/sub-basin shall be treated as the development unit for water resource planning. This includes surface and groundwater conservation, multi-purpose projects; drainage management system; and reducing regional imbalances between surplus water to water-scarce areas.

Water Resources Information System (WRIS): The SWP felt a need to set up a standardised information system. The water resource planning should be established with a network of data banks and databases, integrating and strengthening the existing Central and State level agencies and improving the quality of data and the processing capabilities through appropriate legislation. Besides, the state-level agencies should adopt standards for coding, classification, processing, and methods/procedures for data. The WRIS should, apart from the data regarding water availability and actual water use, the system should also include comprehensive and reliable projections of future demands of water for diverse purpose

A participatory approach to water resource management: By adopting a participatory approach, water resources management must be carried out. In other words, government agencies and other stakeholders' involvement in

² <www.ielrc.org/content/e9904.pdf> (accessed on 13 December 2019).

formulating various aspects of planning, design, development, and management of the water resources scheme is necessary. Necessary legal and institutional changes are required at multiple levels to ensure the implementation of the above objectives. Water Users Associations and the local bodies such as municipalities and *gram panchayats* should mainly be involved in the operation, maintenance and management of water infrastructures/facilities at appropriate levels.

Allocation priorities: The SWP accords the highest priority to drinking water; irrigation, hydro & thermal power, agro-industries, non-agricultural industries and Navigation & other uses have been accorded priorities consecutively. However, these priorities might be modified if necessary in a particular region concerning area-specific considerations.

Drinking water: The SWP asserts that all the urban and rural populations' drinking water and domestic needs shall be fully met by 2025. The projected demand for urban and rural people will be 3.2 BCM and 4.6 BCM, respectively. A perspective plan up to 2025 shall be prepared to meet this need, and adequate resources should have allocated in a phased manner both from state sources and by raising funds from various quarters. Furthermore, efforts shall be made to make the water supplies self-sustaining. For water supply and sanitation, measures to ensure more efficient accessible water resources and sewage collection, treatment and disposal with the ultimate aim to provide universal coverage shall be adopted and enforced.

Groundwater management (GWM): The SWP takes cognizance that by 2025, i.e. groundwater demand will get doubled, i.e., 64 BCM and owing to this, the number of over-exploited blocks may increase from 14 to 177. Consequently, the SWP asserts groundwater management and regulation for optimal utilisation and checks over-exploitation of groundwater. The policy emphasises drip and sprinkler irrigation technologies, promoting low water intensity cropping patterns and conjunctive management and groundwater recharge by applying different recharge techniques. For example, the construction of recharge ponds/ percolation tanks and desiltation of existing ponds, construction of recharge shafts in the existing ponds, construction of gravity head recharge wells and conversion of existing tube well/wells into gravity head recharge well, construction of water conservation structures such as Nala Bunds, Contour Bunds, Gully plugs etc., construction of recharge basin etc. in the dark and grey blocks.

Drought management: In water resource development projects, priority should be given to the needs of drought-prone areas. As a drought management strategy, the policy suggests— soil-moisture conservation measures, water harvesting practices, minimisation of evaporation losses, and development of the groundwater potential, including recharging and the transfer of surface water

from surplus areas where feasible and appropriate. In addition, pastures, forestry or other modes of action with relatively less water demanding should be encouraged.

Flood management: The policy also emphasises preparing a plan up to 2025 by prioritising the worst affected areas in terms of frequency and extent. The approach suggests that flood protection, waterlogging and drainage decongestion should be integral to water resources planning.

Legislation: Looking at the scarcity of water resources and conserving and preventing pollution from ensuring its most efficient use, legislation in the following areas needs to be considered.

- a) Regulation of exploitation of surface and groundwater for diverse uses.
- b) Regulation of discharges made into surface and groundwater sources by various agencies.
- c) Regulation concerning the bulk supply of water for irrigation and other purposes to associations.
- d) Creation of water rights in favour of users.
- e) Transfer of irrigation systems to users, especially in respect of small and marginal farmers.

Observation: Since the adoption of the state water policy in UP in 1999, it has been about two decades. It is quite a reasonably long time to evaluate its implementation, outcomes and impact.

The policy prescribed an integrated approach for managing water resources, but it could not be adopted even after more than a decade since SWP, 1999. The integrated approach in the formulation and execution of groundwater conservation programmes lacks at the state level as most schemes are being undertaken in isolation. As a result, the expected benefits have not been achieved. The main reason is that there is no concrete plan for groundwater management in the state.³

Despite the explicit provision for water data management in national and state water policy, no reliable data can be relied upon for scientific water management exists so far. It is one of the primary obstacles that water management in India, and so is UP suffering.

³ Ground Water Management, Rain Water Harvesting & Ground Water Recharge in Uttar Pradesh, 2013, Ground Water Department Uttar Pradesh, Uttar Pradesh Extraordinary Gazette, 2013 (accessed on 29 February 2020 from: <http://upgwd.gov.in/MediaGallery/ACT_ENGLISH.pdf>.

It took about 20 years since the adoption of SWP in 1999 to enact separate legislation for groundwater regulation; this was also compelled by several state areas' severe groundwater crises. Thus, the lack of timelines in the SWP has affected its effectiveness.

B. Policy for Sustainable Ground Water Management in UP, 2013

Owing to the uncontrolled exploitation, pollution and ecological imbalance of groundwater is seriously endangered. Resultantly, the over-exploitation of groundwater has emerged in many rural and urban areas of the state. Though the preparation Action Plan guidelines for water conservation and groundwater recharge programmes were formulated in 2005, groundwater management's comprehensive policy came in 2013. However, the policy document confessed that groundwater management has been challenging in the absence of a concrete plan and a lack of an integrated approach in conducting most schemes in the state.⁴

A 'Comprehensive Ground Water Management Policy' was formulated in Uttar Pradesh to implement rainwater harvesting and recharge programmes in an integrated manner and minimise groundwater extractions through efficient water use techniques. The policy emphasises aquifer mapping and aquifer based groundwater management. The policy asserts the need for rainwater harvesting, groundwater recharge and conservation, and continuous groundwater monitoring. It suggests preparing a district-wise water management plan and managing groundwater data with inter-departmental coordination and implementation of schemes in a time-bound manner. It prescribes the preparation of a separate Groundwater Act for the urban areas based on the Chennai Metropolitan Area Ground Water (Regulation) Act-1987. The policy stipulates the Constitution of Ground-Water Monitoring and Review Committee for monitoring and reviewing the implementation progress. The approach also emphasises groundwater studies and research, training, and awareness generation to help groundwater management.

Observations: The policy comprehensively provides almost every aspect of groundwater ranging from regulation, assessment, use, extraction, planning and technical management of groundwater resources. The policy stressed aquifer mapping and data-based scientific management of groundwater. Even the policy prescribes for Constitution of monitoring and review committee for assured implementation of the policy. The policy's major drawback is the lack of timelines to implement each of its components, which is a significant flaw. Though policy prescribes encouraging the adoption of water-efficient cropping patterns for ground water-stressed areas, it has not felt the need to enforce water-efficient cropping patterns through state intervention. Still, it looks like a

⁴ *Ibid.*

voluntary selection. Further, in-ground water-stressed areas, time-specific regulation of extraction and water-lean periods could have been part of the rules.

III. LEGISLATIVE FRAMEWORK AT STATE LEVEL

The provisions regulating different aspects of water governance/ management are scattered in various legislations and regulations, but no single comprehensive legislation dealing with all the aspects of water governance has not been enacted so far. Some of these legislations even date back to the pre-Independence period. However, legislation for the regulation and management of groundwater was enacted in 2019.

A. The Uttar Pradesh Groundwater (Management and Regulation) Act, 2019

Given the severe crises posed by groundwater depletion in many parts, the UP government has enacted The Groundwater (Management and Regulation) Act, 2019, to regulate groundwater extraction, conservation, and groundwater management. The Act contains penal provisions to punish unauthorised extraction/ use and pollution/ contamination of groundwater by commercial, industrial, and bulk groundwater users in notified areas. However, domestic and agricultural users have been exempted from the penal provisions of the Act.⁵

The Act mandated the Constitution of State Ground Water Management and Regulatory Authority, District Ground Water Management Council, Ground Water Management Committees at the Block Panchayat and the Municipal level and Gram Panchayat Level Ground Water Sub-Committee. The Committees are to be constituted within three months of the Constitution of the District Ground Water Management Council.

The Act contains the following provisions to sustain the quantity and quality of groundwater areas notified for regulation. These include provisions for—registration of existing commercial, industrial, infrastructural and bulk users of groundwater and fixation of limit for Ground Water Abstraction for each category of users and preparation and implementation of Ground Water Security Plans.

Observations: It is evident from the Act's above provisions that it covers almost all groundwater management aspects. It also provides penal provisions, but agricultural users who utilise a significant quantity of groundwater have been exempted from punitive requirements even if they are not required to take NOC. In such a situation, the groundwater situation seems difficult to be improved.

⁵ Preamble to the Uttar Pradesh Ground Water (Management, and Regulation) Act, 2019.

It has been reported in some studies that groundwater has been misused when there exists a significant subsidy on electricity used for irrigation, i.e. operating pump sets.⁶ It is to add here that tubewells are a prominent means of irrigation in the U.P. Therefore, exempting agricultural users from taking NOC for groundwater extraction and penal provisions may considerably defeat the Act's purpose.

The provisions concerning pollution and contamination of water resources already exist under central acts and state legislation. Still, no considerable improvement is visible in reducing pollution and contamination of water resources. The real problem is not the lack of legal provisions but their practical implementation and adequate enforcement.

As high levels of power subsidy discourage crop diversification programmes, the subsidy must be restructured to encourage a sustainable cropping pattern suitable to the region's agro-climatic conditions to save both water and energy.

A study⁷ suggests adopting pro-rata pricing of electricity supply to the farm sector inequitable, efficient and sustainable use of groundwater and reducing the burden of enormous electricity subsidy to the farm sector. Pre-paid metering to the farm sector may also increase water use efficiency.

For enforcing pollution control norms, civil penalties should be incorporated in concerning legislations, and these are implemented and collected swiftly to discipline defaulters under pollution control regime.

B. The Uttar Pradesh Participatory Irrigation Management, Act (2009)

The Union Ministry of Water Resources organised various conferences to increase consciousness in the States about the need for actively involving farmers in the management of irrigation systems. Consequently, most Indian States, including Uttar Pradesh, have enacted exclusive legislation for farmers' involvement in irrigation management.⁸

⁶ Gill, Sucha Singh and Kulwant Singh Nehra "Subsidy and Efficiency of Groundwater Use and Power Consumption in Haryana", *Economic & Political Weekly*, Vol. 53, Issue 50, 22 December 2018.

⁷ Singh, O.P. and Singh, Rakesh and Singh, Manish Kumar (2014), "Impact of Farm Sector Electricity Subsidy on Water Use Efficiency and Water Productivity in India," *Indian Journal of Agricultural Economics*, Indian Society of Agricultural Economics, Vol. 69(3), pp. 1-10.

⁸ Status of Participatory Irrigation Management (PIM) in India Policy Initiatives Taken and Emerging Issues, accessed on 12 February 2020 from: <http://mowr.gov.in/sites/default/files/CADWM_Status_of_PIM_0.pdf>.

In its State Water Policy, the State Government in 1999 resolved to adopt integrated water resources management through a participatory approach. Accordingly, the Uttar Pradesh Participatory Irrigation Management Act (2009) was enacted to empower the Water Users' Associations (WUAs) to play their role as effective instruments of participatory irrigation management through—equitable distribution of water and its efficient and optimum use; operation and maintenance of irrigation and drainage systems; promotion of conjunctive use of surface and groundwater; command area development; and protection of environment and ecology. The salient provisions of the Act have been presented below:

Water Users' Associations: The Act provides for the constitution, powers, functions and objectives of WUAs at different irrigation system levels. It mandated every WUA to be a corporate body that shall have the power to manage and maintain the irrigation system given in its charge and do all necessary, proper or reasonable, for the government's safety and security property under its control and management.⁹

Objectives:¹⁰ The water users' association's primary goal is to bring about water users' participation in water management and create a sense of ownership of the irrigation system in their area among the water users. More specifically, a WUA is mandated to promote and secure equitable, efficient and timely water distribution; motivate water users to adopt scientific and economical use of water; encourage intensified and diversified agricultural production systems, and protect the environmental ecology.

Sources of funds to WUAs: The Acts also provides a share as determined by the State Government in water charges recovered regarding water supplied by a WUAs as the primary source of funds. However, a WUA may also raise funds from other sources as well. These include income from assets and properties of the irrigation system in the area of operation, penalty and compounding of fees, contribution from landholders, donations, borrowings, interest from deposits and grants from State or Union Government.¹¹

Penalties for offenders: The Act also provides for liabilities in the form of a minimum fine extending to the cost of damage and imprisonment extending to six months. To be imposed upon guilty of damaging and altering irrigation system and water supply or for any other contravention of any other provisions of this Act.¹² Further, resolving disputes about the constitution, management,

⁹ S. 3 of the U.P. Participatory Irrigation Management Act, 2009.

¹⁰ S. 4 of the U.P. Participatory Irrigation Management Act, 2009.

¹¹ S. 27 of the U.P. Participatory Irrigation Management Act, 2009.

¹² S. 33(1) of *op.cit.*

powers, settlement of, and functions of a water users association has also been provided under the Act.¹³

Observations: Though the PIM Act and the consequent regulations provide an elaborate legal framework yet owing to specific difficulties¹⁴ in implementation, the full potential of PIM could not be explored. Some of the significant challenges in the practical implementation of PIM are briefed below:

The absence of adequate legal support and policy changes concerning—claim to get maintenance funds, collection of water charges and incentives to farmers etc., is responsible for the ineffective implementation of PIM in states.

Further, farmers are also apprehensive about how the WUA will arrange adequate resources required for the O &M cost of the irrigation system it manages. It becomes more critical given the various irrigation system deficiencies such as—corrosion of old control and measuring structures, seepage and leakages at multiple places, siltation and weed infestation, banks' erosion, etc. These deficiencies are discouraging farmers from taking over the system management on technical and financial considerations. Besides, water rates have not been revised for a long time in several states and the revenue collection is too meagre to maintain the irrigation system¹⁵. Thus, there is a dire need to rationalise water rates to meet the operation and maintenance (O&M) system's expenditure.

Uncertainty of water supply to WUAs by the irrigation agency discourages farmers from managing irrigation facilities. Besides, farmers who have their holdings at the head of the canal tend to draw more water than required, and the farmers at the tail end often fail to get their allocated share of water. Thus, head-enders tend to continue with their vested interest in such a situation, and tail-enders are not interested in constituting WUA. They remain apprehensive that the formation of WUA would ensure an adequate supply of water to their fields.

Lack of technical expertise with the farmers required for operation and maintenance of the irrigation system under their control also acts as a hindrance in taking over of the irrigation system by farmers. Lack of leadership skill, knowledge, and awareness about the PIM also hinder formation in WUAs. Further, lack of publicity and training is one of the main obstacles to the adoption of PIM. Given the marginal representation of women in WUAs,

¹³ Ss. 43 and 44 of *op.cit.*

¹⁴ Status of Participatory Irrigation Management (PIM) in India Policy Initiatives Taken and Emerging Issues accessed on 12 February 2020 from: <http://mowr.gov.in/sites/default/files/CADWM_Status_of_PIM_0.pdf>.

¹⁵ The Vaidyanathan Committee (1991) of the Planning Commission on Pricing of Irrigation Water mentioned that on an average the revenue collection was Rs 50 per ha as against the O&M requirement of Rs 250 per ha.

compulsory regulatory means are necessary to ensure proper representation of women in the WUAs at all levels.

C. Uttar Pradesh Jal Supply and Sewerage Act, 1975

Uttar Pradesh's water supply and sewerage services are governed by Uttar Pradesh Jal Supply and Sewerage Act, 1975. The Act provides for Uttar Pradesh Jal Nigam (UPJN) to regulate water supply and sewage services. UPJN is responsible for planning, designing and construction of schemes. The Act also provides for Jal Sansthan's establishment, responsible for the operation and maintenance of water services in the urban areas, including billing and collection from water users.¹⁶

Under this Act's provisions, Jal Sansthan was established for each of 5 regions, including Kawal Nagar, Bundelkhand, Garhwal, and Kumayun. At present Jhansi and Chitrkoot Jal Sansthan are working for Bundelkhand region. Garhwal and Kumayun Jal Sansthan are attached with Uttarakhand State. At present,

Jal Sansthan, established in five big cities, is merged with the respective municipal corporation of Lucknow, Kanpur, Varanasi, Allahabad, and Agra and regulates drinking water/watershed works by these bodies. In addition, Jal Nigam carries out construction work of water supply/watershed/pollution control of rivers in the state's urban and rural areas.¹⁷

Observations: In India, urban water management suffers from inadequate infrastructure or poor operations and maintenance of such infrastructure. Consequently, about 78% of wastewater remained untreated.¹⁸ Such a situation has been primarily responsible for severe water bodies' pollution due to the highly constrained sewage treatment infrastructure efficacy.

A considerable investment is required to treat used water that the state cannot solely meet due to existing financial constraints. Thus, an incubation cell¹⁹ should be constituted for evolving business models and revenue-generating wastewater treatment opportunities and reuse.

¹⁶ Accessed on 15 February 2020 from: <https://indiacode.nic.in/bitstream/123456789/5022/1/water_supply_and_sewerage_act.pdf>.

¹⁷ <<http://jn.upsdc.gov.in/page/en/history---background>> (accessed on 13 December 2019).

¹⁸ Center for Science and Environment 2016.

¹⁹ Khemka, Rochi "From Policy to Practice: Principles of Water Governance", EPW, December 24, 2016 Vol. 22.

D. The Uttar Pradesh Municipal Corporation Act, 1959

The Uttar Pradesh Municipal Corporation Act, 1959 provides a municipal corporation with the power for regulating all matters concerning the supply and use of water in a municipal area under its jurisdiction.²⁰ The corporation can construct, run or close waterworks²¹, impose water tax for water supply, prohibit fraudulent and unauthorised water use²², prohibit pollution or contamination of water by chemicals, etc.²³

E. Uttar Pradesh Panchayat Raj Act, 1947

This Act provides for the Constitution of Panchayat Raj Institutions (PRIs) in rural areas. As per provisions of the Act, Gram Panchayats (GPs) has been conferred with the following functions concerning water management in their respective jurisdictions.

According to Section 15 of the Act, GPs shall perform minor irrigation, water management and watershed development²⁴ through (a) Managing and assisting in water distribution from minor irrigation projects, and (b) Construction, repair and maintenance of minor irrigation projects, regulation of supply of water for irrigation purpose. In addition, GPs shall also perform works concerning drinking water such as—construction, repair and maintenance of public wells, tanks and ponds for the supply of water for drinking, washing, bathing purposes and regulation of water supply sources for drinking purposes.

As per provisions of Section -17 of the Act, GPs can also undertake small irrigation projects²⁵ in addition to those specified by order under clause (u), section 15. In addition, they can also set apart any public water-course for drinking or cooking purposes and prohibit bathing, washing clothes and animals, or doing other acts likely to pollute the course so set apart.

Observation: It is evident from the ongoing discourse that provisions regarding governance/ management of water are scattered under different legislation which deals with a particular aspect of water governance. Yet, there is no comprehensive state legislation covering all aspects of water governance, both from the supply-side and demand-side of water management and the environmental sustainability of water resources. Thus, the need of the hour to enact

²⁰ S. 541 (2), U.P. Municipal Corporation Act, 1959.

²¹ S. 263, U.P. Municipal Corporation Act, 1959 (Substituted by S. 3 of Ch. II of U.P. Act 12 of 1994).

²² S. 270, U.P. Municipal Corporation Act, 1959.

²³ S. 402, U.P. Municipal Corporation Act, 1959.

²⁴ U.P. Panchayat Raj Act, 1947.

²⁵ With the sanction of the prescribed authority and where a canal exists under the Northern India Canal and Drainage Act, 1873; with the sanction also of such officer of the Irrigation Department as the State Government may prescribe.

comprehensive legislation with an integrative water management perspective is needed. However, enactment of The Ground Water (Management & regulation) Act, 2019 is a welcome step by the UP Government. It should include the provisions for the State Water Efficiency Commission and State Commission on Water Tariff constitution.

IV. INSTITUTIONAL FRAMEWORK

In Uttar Pradesh, water resources are being planned, developed and managed by different departments. The irrigation department controls surface water.²⁶ The Groundwater Department carries out estimation and exploration of the groundwater resource. Further, the Irrigation Department, Minor Irrigation Department and UP Jal Nigam undertake the water resources development. The utilisation of water is controlled by various departments viz. Agriculture, Urban Development, Rural Development, Power, Industries, Tourism, Environment, Pollution Control, Forests and others. Prominent Institutions engaged in water governance in UP have been briefly described in the present section.

A. UP State Water Board (SWB)

The State Government has created a State Water Board (SWB) under the Chairmanship of Chief Secretary, Government of UP and other officers²⁷ of the concerned department/ institutions. The State Water Board prepares policy and programmes, establishes coordination between various departments/ organisations dealing with water management. The board has been mandated several specific functions²⁸ for optimal water use available in multiple water sources. Further, for assisting the SWB, three State-level institutions viz. State Water Resources Agency (SWaRA), State Water Resources Data Analysis

²⁶ <<http://www.swaraup.gov.in/WebSite/Background.htm>>, accessed on 13 December 2019.

²⁷ These officers include– Additional Chief Secretary(UltraKhand), Agriculture Production Commissioner, Principal Secretary Irrigation, Principal Secretary Energy, Principal Secretary Finance, Principal Secretary Planning, Principal Secretary Industry, Chief Engineer Irrigation, Managing Director Jal Nigam, Director Ground Water, Nominated member of Central Water Commission, Nominated members of Central Ground Water Board as members and Chief Engineer (Design & Planning) as Member Secretary.

²⁸ The Functions include– Ensure formulation and implementation of the State Water Policy under the framework of National Water Policy adopted by Government of India; Policy formation for various uses of available water resources of the State and integrated planning, management and monitoring of all water sources; Policy formation for control on withdrawal and disposal of water from all rivers, drains, ponds and ground water within the State; Prioritization and allocation of the various water sources of the State for use in various sectors; Collation and analysis of surface and ground water data of the State and to make it available for various uses as per need; Establish a “Management Information System” for water resources.

Center (SWaRDAC) and UP Water Management and Regulatory Commission (UPWaMReC)²⁹. However, UPWaMReC was dissolved³⁰ in 2012.

- i) **State Water Resources Agency Uttar Pradesh:** The Agency was entrusted with the responsibility to provide technical and policy inputs to the State Water Board and UPWaMReC and undertake – planning, the inter-sectoral allocation for environmentally sustainable management of water resources and preparation of Decision Support System (DSS) for all the river basins of the State.³¹
- ii) **State Water Resources Data Analysis Center (SWaRDAC):** The Center was mandated to undertake the publication of data received from various departments for each basin; hosting of data on a website for the use of authorised users; provide data support to SWaRA and UPWaMReC; preparation of GIS-based water information Atlas and to undertake flood frequency analysis.³²

B. Irrigation and Water Resources Department Uttar Pradesh

The department is engaged with policy formulation, holistic planning, funding, and water resources coordination at the state level. Since the formation of the Irrigation and Water Resource Department in Uttar Pradesh, the department has been engaged in creating irrigation facilities through the development and construction of dams, canals, wells, and flood protection work. The department has created irrigation capacity by constructing dams and canals to store and supply surface water and establish state-owned tubewells to extract groundwater.

For effective and efficient use of the canal system, Water Consumer Committees (WCCs) have been constituted at different canal systems levels. As per the data provided by the Uttar Pradesh Debarment of Irrigation & Water Resources³³ 30592 Kulaba, 1937 Alpika, 66 Rajbha level WCC have been constituted in 19 districts by February 2019.

Groundwater contributes about 70 percent of the total water used for irrigation purposes in the state. Thus, it can be easily perceived that farmers in Uttar Pradesh mainly depend on groundwater for irrigation and state tubewells' play an essential in irrigation. Before planning years, there was a total of 2343 energised state tubewell. In 1989-90 total operating state tubewells were 26289

²⁹ The Commission was constituted under the provisions of U.P. Water Management and Regulatory Commission Act, 2008.

³⁰ The Commission was abolished by enacting U.P. Water Management and Regulatory Commission (Repeal) Act, 2012

³¹ State Water Resources Agency (SWaRA) as Per G.O. No. 2127, dated 7 June 2001.

³² State Water Resources Data Analysis Center (SWaRDAC) as Per G.O. No. 2127, dated 7 June 2001.

³³ <<http://idup.gov.in/pages/en/topmenu/dept.-activities>>, accessed on 4 January 2020.

the number of state tubewells increased to 33375 by April 1 2016. From these state tubewells, a total number of 29.29 lac hectare irrigation capacity has been created. In addition to Irrigation tubewells, 29 state tubewells can supply water to canals in a water crises situation. Thirteen of the tubewells are in the Bulandshahar district, and 16 tubewells in the Aligarh district of Uttar Pradesh.³⁴

Observations: The construction of state tubewells has been put under the irrigation department, not within the groundwater department. It would have been better if the feasibility of constructing state tubewells in groundwater resources sustainability was decided by the groundwater department's expertise in groundwater management. It becomes more imperative, particularly in severe groundwater depletion in several blocks in the state. Overexploitation of groundwater without adequate supervision and concern for its sustainability has rendered many blocks to suffer groundwater crises in the State.

Further, there are issues with the working of the WCC constituted to maintain water infrastructure for the supply of canal water for irrigation within their respective jurisdiction. These WCCs face financial crises given the meagre rate of water charges, and they are not even able to recover operation and maintenance (O&M) cost.

C. Ground Water Department, Uttar Pradesh

Ground Water Department (GWD) acts as a 'nodal department' to address groundwater problems at the state level. The department is mandated to ensure regulated exploitation and optimum and judicious use of groundwater. It also formulates effective regulations for groundwater management. The department promotes efficient methods of water use in stressed areas. It identifies groundwater polluted areas to ensure safe drinking water supplies. The department is engaged with implementing groundwater conservation/ recharging programmes by the concerned departments through the participatory management approach. It is responsible for implementation of National programme of aquifer mapping and aquifer based management.³⁵ In this context, scientific management of aquifers mapping is required for areas where groundwater irrigation is the primary source of irrigation and is under private control. The conjunctive use of water should also be emphasised by developing surface water irrigation projects, which will help manage the sustainability of resources and facilitate better groundwater consumption.³⁶

³⁴ <<http://idup.gov.in/pages/en/topmenu/dept.-activities/mechanical/en-irrigation-by-tube-wells>>, accessed on 13 December 2019.

³⁵ Accessed on 13 December 2019 from <<http://upgwd.gov.in/StaticPages/Objective.aspx>>.

³⁶ Sinha; R.S., Baksh Mohi and others, "Sustainable Groundwater Management in Uttar Pradesh with Special Reference to Mapping and Management of Aquifers", accessed on 22 February 2020 from: <<https://www.researchgate.net/publication/318788365>>.

Observations: Since groundwater development and water conservation efforts have been stressed upon since the adoption of SWP in 1999, not concrete results are visible on the ground in the sustainability of groundwater resources in Uttar Pradesh. The depletion of groundwater to its critical level in several blocks in the state is the testimony of poor implementation of the SWP, guidelines on groundwater management and the programmes/projects and schemes meant to conserve groundwater resources initiated either at the state or national level. This fact also reflects the state's failure to implement integrated water management with conjunctive use of water resources to avoid groundwater depletion. What is the use of such policy formulations and guidelines that are loaded with theatrical conceptualisations but are not of much operative value and absence of clear action plan with timelines?

The policy formulations should always be backed by a sound action plan with timelines, including clearly defined accountability arrangements. Otherwise, the policies' concrete outcomes will not be visible on the ground, and such policies would be proved not more than paper-tigers.

D. Minor Irrigation Department

The Minor Irrigation department's primary objective (MID) is to enable farmers to be self-sufficient in irrigation facilities by creating private irrigation sources to ensure irrigation facilities for every agricultural field and farmer. The department provides financial aid and technical guidance to the farmers for developing their minor irrigation resources under various schemes. Given the severe groundwater crises, the department is undertaking rainwater harvesting and water conservation to increase groundwater levels through multiple methods.³⁷

The department implements the Minor Irrigation Program (MIP) with the co-operation of the farmers on the PPP model. The MIP of the state's total magnitude stands for almost one-third of all types of such programs being implemented throughout India. Minor irrigation sources account for about 78% of the state's total irrigated area as per the latest data. For implementing this program, the state's geographical land pattern has been divided into two categories, *viz.* Plain area and Plateau or Table Land Area. The state's plain site is alluvial and Shallow Boring is done upto the depth of 30 meters. At the same time, Medium Deep Boring is done in greater depth from 31 meters to 60 meters. A Deep Boring scheme is implemented in alluvial areas where the water level has reached more than the depth of 60 meters. The community tube well scheme is employed in alluvial areas where free of cost boring is not possible. In Plateau/Tableland Areas, the Blast Well, Heavy Ring Boring, Construction of Deep Tube Wells, Well boring by In-Well Ring, construction

³⁷ <<http://minorirrigationup.gov.in/StaticPages/Objective.aspx>>, accessed on 30 December 2020.

of check dam is implemented in the seven districts of Bundelkhand and cross Yamuna rocky areas of Allahabad.³⁸

The department implements various schemes under MIP as per the requirement of the geographical area in the state. These schemes include: Free of cost boring schemes, Scheme of Medium Deep Tube Wells, Scheme of Deep Tube Wells, Dr Ram Manohar Lohia Community Tube Well Scheme, Scheme of In-Well-Ring Boring in Plateaus areas/Tableland, Scheme Surface Pump Sets, Scheme for the Construction of Check Dams for Rain Water use & Ground Water Recharging, Blast Wells for Bundelkhand region, Prime Minister Agriculture Irrigation Scheme³⁹

Status of Minor Irrigation Works⁴⁰		
Sr. No.	Irrigation Sources	Numbers (till March 2016)
1	Irrigation Well	1,39,833
2	Ground Level Pump Set	30,128
3	Shallow Tube Wells	42,43,945
	(A) Electric Driven Tube Wells	5,01,305
	(B) Diesel Driven Tube Wells	36,41,149
	(C) Others	1,01,491
4	Deep Tube Wells	33,510
5	Medium Deep Tube Wells	49,480
6	Blast Tube Wells	855
7	Check Dam Construction	3,567
8	Community Blast Wells	8794
9	Dr Ram Manohar Lohia Community Tube Well Scheme (S.C.P.)	2176
10	Dr Ram Manohar Lohia Community Tube Well Scheme (General)	750

Observations: It is evident from the data that many minor irrigation facilities have been created in UP the State by the department. At the same time, the efforts of water conservation have not been implemented with the same vigour. Thus, these efforts remained ineffective in arresting the decline in groundwater levels in many areas leading to severe water crises. Therefore, sincere, planned, and scientific measures should be adopted to conserve groundwater along with groundwater development.

³⁸ *Ibid.*

³⁹ <<http://minorirrigationup.gov.in/StaticPages/Scheme.aspx>>, accessed on 3 December 2020.

⁴⁰ <<http://minorirrigationup.gov.in/StaticPages/Computation.aspx>>, accessed on 13 December 2020.

E. Uttar Pradesh Jal Nigam (UPJN)

UPJN was constituted under the Uttar Pradesh Jal Supply and Sewerage System Act, 1975, with the primary objective of developing and regulating water supply and sewerage services.⁴¹ Thus, the prime goal of the UPJN is to provide safe drinking water and sewerage facilities by operating and maintaining rural water supply schemes and Sewage Treatment Plants (STPs) in urban areas on behalf of local bodies.⁴²

Observations: Though the household sector accounts for about 90 percent of water consumption in cities such as Varanasi, most households do not have proper metering facilities. And they are required to pay the nominal amount in the name of user charge as water tax which is itself included in the property tax.⁴³

Installation of water meters in each household and rationalising water user charges is essential to conserve water and prevent water misuse. Differential pricing may be adopted according to the class of size/class/area of the property. Besides, it will help augment state finances to develop water resources in the state. These finances can be utilised to establish new STPs for increasing sewage treatment capacity, which is entirely inadequate compared to the required capacity. This inadequacy is primarily responsible for severe water pollution of the main rivers in the UP state.

Studies exposed the gap between the expenditure on operation and maintenance of water infrastructure and the revenue generated from the water supply throughout India. Thus, rationalising user charges and water tariffs for different categories of water users, i.e., domestic, industrial and agricultural users, is needed. At the same time, water treatment activities can be made sustainable through various business models. For example, the treatment of sewage discharges to leverage technical and managerial capacity of the private sector can be utilised.

F. Uttar Pradesh Pollution Control Board (UPPCB)

UPPCB is a statutory organisation entrusted to implement environmental laws and rules within the State of Uttar Pradesh. Water Pollution Prevention and Control Board, constituted on February 3, 1975, initially under the Water (Prevention and Control of Pollution) Act, 1974, were consequently

⁴¹ <<http://jn.upsdc.gov.in/page/en/about-jal-nigam,-uttar-pradesh>> (accessed on 13 December 2020).

⁴² <<http://jn.upsdc.gov.in/page/en/objectives-and-activities>> (accessed on 13 December 2020).

⁴³ Singh, Arun K. "Urban Water Supply in Uttar Pradesh: A Case of Varanasi City" (accessed on 22 February 2020. from: <https://www.researchgate.net/publication/311729783_Urban_Water_Supply_in_Uttar_Pradesh>).

rechristened as UP Pollution Control Board on July 13, 1982, after the enactment of the Air (Prevention and Control of Pollution) Act, 1981. The board was also entrusted with the powers and functions under the Water (Prevention and Control of Pollution) Cess Act, 1977, along with other responsibilities under the Environmental Protection Act, 1986. UPPCB operates with its Head Office at Lucknow and through 25 Regional Offices spread all over the state.⁴⁴

As per the provisions of the Water Act, 1974 and Air Act, 1981, the board's primary function is to prevent, control, and reduce water and air pollution. Therefore, water and air quality monitoring are an essential part of environmental management, and the board regularly undertakes quality monitoring of the significant surface water bodies at 34 places. The UPPCB also provides background data needed for industrial placement and town planning.

The primary functions carried out by the UPPCB includes—assessment of the quality of inland surface waters; identification and evaluation of industrial and municipal pollution sources and control; notification of effluent and emission standards; instituting legal action against defaulters, among other functions⁴⁵ mandated under concerned Acts.

Industrial pollution control: UPPCB has played a critical role in controlling Industrial Pollution by controlling pollution from industries identified under Ganga Action Plan; Action Plan for Control of Pollution from 17 categories of highly polluting industries, and control of pollution from Grossly Polluting Industries (GPIs).⁴⁶

Thirty-four industries were identified⁴⁷ under Ganga Action Plan Phase-I as polluting industries in UP in 1985-86. Further, the CPCB has identified another list of 83 industries located in the UP, discharging their effluent directly into River Ganga besides the 34 industries identified under the Ganga Action Plan. Out of 83 industries, 59 industries are complying with the standards and 24 are lying closed.

⁴⁴ Accessed on 9 January 2020 from: <<http://www.uppcb.com/intro.htm>>.

⁴⁵ These include—Issue of No Objection Certificates from the environmental pollution point of view including adequacy of the site from the environmental angle; Issue of Consent under provisions of Ss. 25/26 of the Water (Prevention and Control of Pollution) Act, 1974; Assessment and Collection of Water Cess, under provision of Water (Prevention and Control of Pollution) Cess Act, 1977; Issue of Authorization under the Hazardous Wastes (Management and Handling) Rules, 1989; Identification of Isolated Storages, Onsite Crisis Management Plans, etc. under the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989; Implementation of Biomedical Waste (Management and Handling) Rules, 1998 and development of pollution control technologies.

⁴⁶ <<http://www.uppcb.com/ipc.htm>>. Accessed on 25.02.2020

⁴⁷ These industries were identified by The Ganga Project Directorate, Ministry of Environment & Forest Government of India.

In 1990, the Union Ministry of Environment & forest prepared an Action Plan for reducing pollution from 17 categories of highly polluting large and medium industries. So far, a total number of 476 enterprises have been identified under such 17 categories. Out of these 476 industries, 429 industries have installed water/air and hazardous waste treatment facilities and are achieving norms; 03 industries have installed pollution control facilities but still not achieving the board's standards, and 49 industries are closed.

As per the Union Ministry of Environment and Forest criteria, the board has identified 420 GPIs in UP. These industries include— industries discharging effluent directly or indirectly into rivers and lakes; industries handling hazardous substances or effluent having a BOD. load of 100kgs per day or more.

A total number of 1500 such industries have been identified, out of which 1381 industries have installed requisite ETPs and have achieved norms; 329 industries are lying closed, and 54 industries are defaulters who have not achieved standards.

Observations: It is evident from the board's mandate and functions that there is no shortage of the legal and regulatory framework required for mitigating air, water, and land pollution. Nevertheless, the existing legal and institutional framework has not been entirely effective in reducing pollution, increasing at an alarming rate. It may be attributed to a lack of adequate infrastructural and financial support. For instance, growing water pollution is the discharge of untreated or ill-treated industrial and municipal sewage into waterbodies. The gap between the installed water treatment facilities and that of the required ones is enormous. Thus, treating sewage discharge with an inadequate capacity of STPs results in the discharge of untreated sewage into rivers causing massive pollution of water bodies. As per an estimate, 78 percent of wastewater is untreated nationally, of which 8,000 million litres per day of untreated sewage flows directly into the river Ganga.⁴⁸

Pollution of rivers and lakes has become a critical issue in water governance. The municipal and industrial discharge have been primarily responsible for the pollution of water bodies. Thus, it has become crucial to protect water bodies from water pollution.

Dereliction of duties on the part of employees of the pollution control board has been one of the causes of poor enforcement and compliance by defaulters. For instance⁴⁹, NGT directed UPPCB to take action against the Common

⁴⁸ The 2030 Water Resources Group (2017) Water for Growth, People and Environment India (National and State of Uttar Pradesh) (accessed on 10 March 2020 from: <https://www.2030wrg.org/wp-content/uploads/2017/11/WRG_India-Fact-Sheet_08_22.pdf>).

⁴⁹ Accessed on 12 March 2020 from: <https://www.business-standard.com/article/news-ani/ngt-issues-notice-to-up-pollution-board-over-illegal-operation-of-bio-medical-treatment-plant-119041200528_1.html>.

Bio-Medical Waste Treatment Plant (CBMWTP) if it was still running without permission. NGT had to issue a notice to the UPPCB directing it to report to the tribunal the actions taken against the (CBMWTP) operating illegally in Bareilly city in the State. The CBMWTP has not taken any NOC from UPPCB under the Environment Protection Act, Water Pollution Act and Air Pollution Act, which was mandatory under the law. It was alleged that the tribunal, despite being aware of the violations, Regional Officer had not taken any action on the matter.

Despite penal provisions from closing down to imprisonment of polluters, the PCBs have not effectively controlled water pollution. Therefore, rivers continue to be polluted, and the number of polluted river stretches has only risen.⁵⁰

The most critical cause responsible for the non-improvement of the river water quality is the weak monitoring and enforcement by the regulator. Further, the regulator does not take any strict action against the defaulters. There is on-ground connivance between the polluters and the regulator. Even if defaulters are punished, the severity of punishment is not enough to deter non-compliance.⁵¹

Performance of STPs is not satisfactory: A study about performance evaluation of 152 STPs spread over 15 states in the country. Having a total treatment capacity of 4716 MLD was conducted by CPCB. That revealed that only two-thirds, i.e., 3126 MLD, of the actual treatment capacity utilisation had been achieved. Besides, out of the 152 STPs, 9 STPs are under construction, 30 STPs are non-operational, and the performance of 28 STPs not satisfactory. Out of the 152 STPs, the treated effluent from 49 STPs exceeds the BOD standards and concerning COD, 07 STPs are violating the general criteria of discharge.⁵²

It is felt that a continuous and more vigilant monitoring mechanism needs to be devised and enforced to control pollution river water pollution. Defaulters must be punished with deterrent punishment. Furthermore, the accountability of government/regulatory authorities/functionaries at each level of implementation/execution need to be precisely fixed, monitored and enforced.

⁵⁰ Bansal; Neeru, "Will the 2018 NGT Order Lead to Improvement in River Water Quality?", Economic & Political Weekly Vol. 54, Issue 15, 13 April 2019.

⁵¹ Bansal; Neeru, "Will the 2018 NGT Order Lead to Improvement in River Water Quality?", Economic & Political Weekly Vol. 54, Issue 15, 13 April 2019.

⁵² Performance Evaluation of Sewage Treatment Plants under NRCD, Central Pollution Control Board, Ministry of Environment, Forest, and Climate Change, Government of India, New Delhi. Accessed on 13 March 2020 from: <http://www.yamunariverproject.org/assets/cpcb_2013-performance-evaluation-of-sewage-treatment-plants-under-nrcd.pdf>.

V. CONCLUSION

Water governance may be broadly understood in terms of supply and demand for water and water resources sustainability. Ensuring optimum utilisation of water resources on a sustainable basis requires a strategy focusing on equitable, efficient, and eco-friendly water management methods. Firstly, the importance of demands has to be fixed. Secondly, best practices, particularly in the agriculture sector and industries requiring a considerable quantity of water, have to be devised and popularised/ promoted/ enforced to use water to reduce waste and misuse efficiently. On the supply side, mechanism/ guidelines for efficient distribution of water resources has to be formulated. Decentralised and autonomous means of water supply have to be devised /promoted. Thirdly, technological interventions may be leveraged for groundwater recharge, micro-irrigation,⁵³ saline treatment, and used and contaminated water. Besides, real-time water data can help in various decisions pertaining to flood, drought and matching demand and supply of water at different times and different geographical locations. One of the essential verticals of water governance is awareness about water scarcity, conservation, efficient use, cropping pattern, etc., which needs to be incorporated into the water governance agenda.

⁵³ It refers to frequent application of small quantities of water directly above and below the soil surface; usually as discrete drops, continuous drops or tiny streams through emitters placed along a water delivery line. While through drip & sprinkler irrigation wastage of irrigational water could be minimized. The studies on different crops, has revealed that irrigation water is saved drastically. The conveyance losses caused by mainly see page & evaporation can be saved up to 25 to 40% through utilization of (High-density polyethylene) HDPE pipes. Initially the scheme can be proposed to be implemented in worst affected areas showing deepest water levels and significant declining trends.