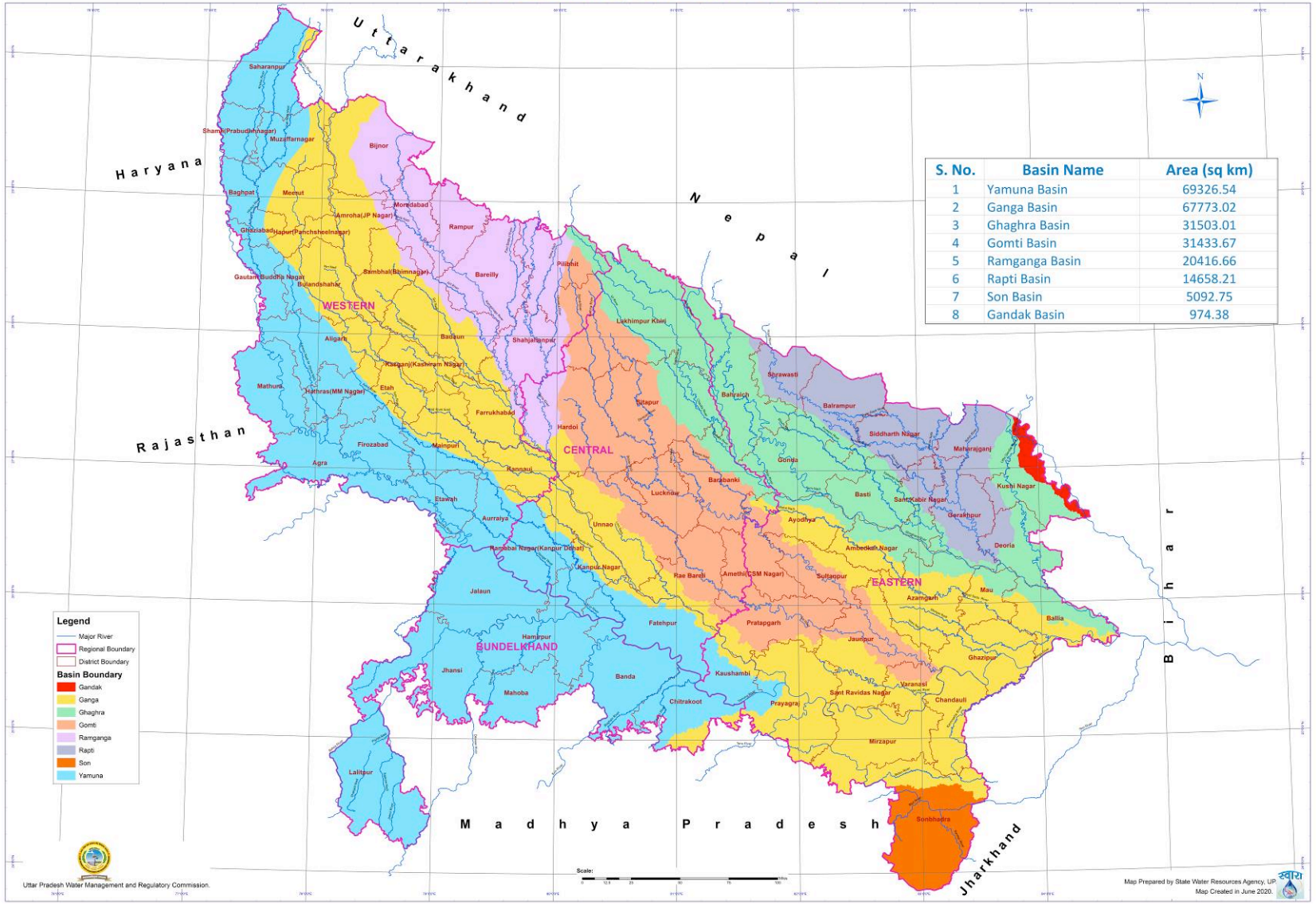
UTTAR PRADESH
STATE WATER POLICY
2020

Submitted by:
Uttar Pradesh Water Management & Regulatory Commission
(UPWaMReC)

River Basin Map of Uttar Pradesh



S. No.	Basin Name	Area (sq km)
1	Yamuna Basin	69326.54
2	Ganga Basin	67773.02
3	Ghaghra Basin	31503.01
4	Gomti Basin	31433.67
5	Ramganga Basin	20416.66
6	Rapti Basin	14658.21
7	Son Basin	5092.75
8	Gandak Basin	974.38

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1. History of Water Resources Management in Uttar Pradesh: A perspective for the State Water Policy

Water rights and water management find mention in the scriptures and the *Dharmashashtras* in India. In ancient times, the Mauryan Empire that included modern Uttar Pradesh (U.P) had well developed irrigation systems, inundation canals and embankments that also find mention in the *Arthashashtra.* During the medieval period, the Firoz Shah Canal constructed in the 14th century from the western Bank of the Yamuna River and extended until Delhi, was operational until 1707 A.D.

During British rule, the canal irrigation system in U.P was developed extensively. The Western and Eastern Yamuna Canals that were used for distributing floods and regulating flows were developed in 1817 and 1822 respectively. With the objective to enhance agricultural productivity in the Ganges and Yamuna regions, the construction of the Upper Ganga Canal was completed in 1845. The development of the low-cost canal system was also undertaken in U.P during this period. The construction of the Sarada Canal in the Gangetic plains of central U.P was carried out in 1920s and large capacity deep tube wells (DTWs) having the capacity to irrigate 150-200 hectare of land were installed in Western U.P. in 1934. During this period the British also established the Provincial Agriculture Departments, including in U.P with the aim to provide professional expertise on water and agriculture management

In the year 1880, development of irrigation for 40% of the total cultivable land in Bundelkhand was recommended by the First Drought Commission. Various other canals to provide irrigation for the drought prone districts, Jaluan and Hamirpur in Bundelkhand such as the Betwa Canal, 1886 and the Fatehpur Canal, 1898 were constructed. In addition to the construction of canals in the State, many dams such as, the Lehchura Dam on Dhasan River, 1910, the Dhuvka Dam and the Pahadi Dam, 1912 were built for the development of water resources in U.P. The Sarada Canal that extends irrigation facilities in the western parts of U.P. was completed in 1928.

After independence, the capacity expansion of irrigation and canal infrastructure was taken up at a larger scale in U.P through the Public Works and Irrigation Department established in 1954. Soon after its formation, the flood works in U.P were initiated in 1955 by the Irrigation Department. In 1961, the Irrigation Research Institution, Roorkee and the Control Design Directorate, Lucknow were established. This led to the expansion of large irrigation infrastructure in the State. The Matateela Dam, 1968, the Gandak Canal System, 1972, the Rajghat Canal, 1973, the Western Prayagraj Branch Canal, 1974, the Kanhar project, 1977, the Bheemgauda Dam and the Saryu canal, 1978, Lower Ganges Canal, 1984 and the Baan Sagar Project, 1996, were completed.

The Public Health Engineering Department was established in 1927 to provide drinking water supply and sewerage facilities in the State and was renamed as the Local Self Government Engineering Department (LSGED) in 1946. After the

enactment of the Uttar Pradesh Water Supply and Sewerage Act, 1975, the department was re-structured as the Uttar Pradesh Jal Nigam. The Department for the Management, Research and Exploration of Groundwater was established in the year 1975 with the objective to promote the planned use of groundwater resources in the State. In the year 1983, it was renamed as the Department of Groundwater. In 2004, the Ground Water Department was declared as the Nodal Agency for effective coordination and monitoring, research and exploration of groundwater in the State.

The modernization and capacity enhancement of the Irrigation Department in U.P. began with the establishment of the Infomation System Organization in 2012. As a part of this, a Supervisory Control and Data Acquisition (SCADA) System was established for the better monitoring of canal systems for Real Time Discharge. The application of remote sensing and web-based techniques in the Flood Information and Management System (FMISC) are being carried out since 2017.

With the objective to improve the management of irrigation systems and to provide for the governance of water resources, the State government of U.P has been formulating and modernizing its water policies based on the socio-economic needs and water related challenges. The first State Water Policy was adopted in 1987, followed by the State Water Policy, 1999. Continuing with the tradition of modernizing the State Water Policy, it has been realized that the growing water stress in the state needs to be addressed by way of an appropriate policy instrument that ensures people friendly water resources management and water security for the current and future generations in the State.

2. Preamble

2.1 **Need for a New Water Policy**

Water, a scarce and unevenly distributed natural resource, essential to sustain life, livelihoods, food security, development, and the environment, is a precious national wealth to be planned, managed, developed and utilized for beneficial uses by the States. Being the most populous State in the country, with a very large population dependent on water for agriculture and rising demands for water due to socio-economic developmental needs, the rich water endowments of Uttar Pradesh are experiencing overall stress which is likely to become more pronounced in the future due to the impact of human activities and climate change on water resources, straining availability and sustainability of utilizable water in the State.

Since the adoption of the State Water Policy, 1999, incremental changes in the quality and quantity of freshwater sources, variations in water availability and increased frequency in climate-induced floods and droughts continue to undermine water security, growth and poverty alleviation efforts, whereas, the technical and institutional capacity to deal with these challenges at all levels of governance has lagged behind. Considering enormous challenges of ensuring current and future water security in the State and increasing expectations of people to have access to appropriate quantity and quality water, a ‘strategic

paradigm shift' is needed in water resources management in a way that a River Basin is taken as the hydrological unit for the planning, development and management of water resources. This would result in holistic integrated water resource planning and management that enables the leveraging of scientific and technological advancements in the management of water resources through institutional coherence and community involvement. Therefore, an effective State Water Policy that is responsive to the existing and future water needs and challenges and envisages progressive water governance towards a secure, sustainable and resilient water future for the State, is urgently needed.

2.2 **Vision Statement**

The Vision of the Uttar Pradesh State Water Policy, 2020 is to create a water secure, environmentally sustainable and climate resilient future for healthy life and socio-economic growth of all the people in the State.

2.3 **Policy Objectives**

The overall objective of the State Water Policy is to ensure cohesive, participatory and inclusive water governance by mainstreaming Integrated Water Resources Management (IWRM) and climate resilience into the Policy and institutional decision making processes on water governance.

The specific objectives of the State Water Policy are to:

(i) Recognize water as a basic need for life in all its forms and to provide for adequate quantity and quality of water for drinking and basic needs, livelihoods and ecology by making appropriate provisions.

(ii) Protect and maintain the health of water ecosystems by scientifically determining pollution levels and flows to prevent their further degradation and to protect, conserve and restore water ecosystems to their natural state to the extent possible.

(iii) Strengthen and institutionalize community-based water management, including the management of floods and droughts and towards this enhancing the capacity of water governance institutions and personnel through latest tools, technologies and appropriate training.

(iv) Promote, incentivize, institutionalize and integrate Water Use Efficiency (WUE) in agriculture, urban, commercial and industrial use of water in the State. Towards this, encourage village level water budgeting, planning and sensitizing communities to adapt for the utilization of water as per local availability rather than depending on water through long distance transfer.

(v) Promote and mainstream Basin/sub-basin level planning through enhanced inter-departmental coordination and synergies in the water sector programs and schemes by mainstreaming continuity, convergence and coherence using appropriate strategies.

(vi) Maximize and augment water availability at the local level for meeting water needs, especially in water stressed and drought prone regions in the State. Inter-basin Transfers, keeping in view the environmental safeguards, to be considered from water surplus regions to water deficit regions for meeting the water needs of people.

2.4 **The Strategic Pillars**

For ensuring the transition from a conventional water management approach to a river basin focussed, integrated, participatory and inclusive approach, water resources management and governance in the State will be based on the following Strategic Pillars:

i. **River Basin as the fundamental unit for water governance:** Based on the principle of the unity of the hydrological cycle that treats surface and groundwater as one and recognizes that their hydrological linkages are to be taken into account to inform decision making processes, a River Basin is to be taken as the fundamental unit for the planning, management and implementation of water resources projects towards achieving the goal of IWRM. To ensure this, an appropriate institutional mechanism in the form of River Basin Water Management Authorities having enabling powers and adequate capacity are to be set up. In order to facilitate the proper functioning of the River Basin Water Management Authorities, an overarching institutional mechanism consisting of a Governing Council and an Executive Board is to be established.

ii. **Enhancing Access to Water Supply for all**: Access to water supply for all by aligning state level initiatives with national programs and schemes such as the Jal Jeevan Mission (JJM) is to be ensured by enhancing the Operations and Maintenance (O&M) capacity of water utilities.

iii. **Equitable and Dynamic Water Allocation:** The allocation of water resources in the State is to be based on an equitable and dynamic criteria that adopts a flexible and dynamic approach to better align with national schemes and programs on access to drinking water such as the *JJM* and decentralized and participatory ground water management *(Atal Bhujal Yojna-ABY)*.

iv. **Integrated Data and Information Management:** Data collection, analysis, information and knowledge generation are critical to the management of water resources in the State. This needs to be

ensured through an integrated water resources information management system that includes assessments on water accounting, water balance and water budgeting carried out at the Zilla/city and Panchayat level.

v. **Ecosystems approach to ensuring environmental flows:** Qualitative improvement of water resources *(Nirmal Dhara)* and minimum environmental flows *(Aviral Dhara)* is to be ensured through an ecosystems approach to managing river systems. Small River/Tributary rejuvenation to be carried out through appropriate scientific interventions and community engagement.

vi. **Transforming Agriculture Water Use**: Maintaining low water demand in agriculture through planned measures is the key to ensuring water sustainability in the State. It is to be ensured that the twin objectives of agricultural growth and low water demand are achieved through increased economic and irrigation water productivity and a reduction of water use by the agricultural sector by 5% every five years with an aim of achieving 20% reduction in 20 years by adopting a combination of water use efficiency and management strategies.

vii. **Mainstreaming Participatory Ground Water Management:** Sustainable and participatory Groundwater management and augmentation in rural and urban areas by deploying a mix of strategies consisting of technology interventions, participatory approaches and change in mindsets is to be achieved in an integrated mission mode by aligning initiatives with national schemes such as ABY. Special attention is to be paid to regions with severe groundwater deficit such as the Bundelkhand and Vindhyachal regions.

viii. **Decentralized Flood and Drought Preparedness**: For the effective management of floods and droughts, the State is committed to strengthen the Early Warning Systems that increase the lead time and the effectiveness of *Preparedness Measures* through a multi-pronged strategy with a focus on capacity building for disaster risk resilience and advance action at the community level.

ix. **Equitable Water Pricing:** Equitable water pricing to improve productive efficiency and performance-linked services through partnerships is to be ensured.

x. **Democratization of Water Governance:** Democratization of water governance is imperative in bringing any meaningful and qualitative change in the management of water resources and is to be ensured through institutional restructuring to enable stakeholder participation and involvement at various levels.

xi. **Public Campaign:** A State-wide campaign *(Jal Chetna Abhiyan)* for involving all the people in the State towards sharing the Vision for achieving water security for the current and future generations is to be organized.

xii. **The Guiding Principles as the foundation:** The foundation of IWRM will be based on Guiding Principles and a long-term Vision that shall guide the planning, decision making and implementation of all the measures for improving water governance in the State.

2.5 **Guiding Principles**

The State Water Policy is guided by certain basic principles. The planning, coordination, development and management of water resources in the State shall be carried out within the framework of the following principles:

(i) *The Principle of the Unity of Hydrological Cycle* treats surface and groundwater as one and recognizes that their hydrological linkages are to be taken into account to inform decision-making processes while managing them at a basin level.

(ii) *Water as a common heritage of people held in Public Trust* by the government, for the use of all, not amenable to ownership by the State, communities or persons. The responsibility of the State government as a public trustee and protector of water shall remain even if some of the water related functions are entrusted to any public or private agency.

(iii) *The Principle of Equity, Social Justice and Good Governance* through informed and collective decision making must be used for the allocation, prioritization, distribution, planning and development of water resources in the State.

(iv) *Realization of water as an economic good* (over and above pre-emptive uses of drinking, sanitation and ecological needs) in conformity with the national policy perspectives on water must inform project planning and decision making so as to promote its conservation and efficient use.

(v) *Use of Participatory Approaches and Consultative Processes* in all stages of planning, development and implementation of projects and schemes.

(vi) *Gender sensitive water and sanitation planning and implementation* so as to recognize the disproportionate impacts of water scarcity on women and mainstream their role as key stakeholders of water and sanitation programs and initiatives at all levels.

2.6 **Approaches**

In addition to the broad based approach of scientific, participatory, inclusive and consultative water resource management, the following approaches will guide the implementation of the State Water Policy:

(i) An ecosystem-based approach to managing River Basins by integrating scientific and traditional knowledge on land and water resources management through people's participation.

(ii) Application of science, technology and hydrological modelling in water resource management and service delivery.

(iii) Integration of financing, cost recovery and life-cycle costs into the management framework for sustainable outcomes.

(iv) Encouraging private sector participation and Public Private Partnerships (PPPs).

(v) Monitoring policy implementation by integrating indicator-based tracking and multi-stakeholder based consultative processes.

3. Water Resources in Uttar Pradesh

3.1 **Geographical Variation in water availability**

Uttar Pradesh has four distinct geographical regions namely the Western, Eastern, Central and Bundelkhand Regions having distinct hydro-geological, climatic, agronomic and socio-economic conditions. Water availability and its management completely differ across these regions underlining the need for region specific strategies and institutional strengthening at the State, regional and local level. The State is marked by eight major river basins and 39 sub-basins. The eight major river basins are: Yamuna, Ganga, Ramganga, Rapti, Ghaghra, Gandak, Gomti and Sone, traversing along with their tributaries, a total length of 29,043 kilometres within the State.

3.2 **Total Water Availability**

The total available water resources (surface and ground water) of Uttar Pradesh is estimated to be about 179 BCM (109.19 BCM surface water and 69.92 BCM ground water). However, utilisable water is much less due to various constraints such as the non-feasibility of surface storage because of flat terrain. About 92.2% of water is currently supplied for irrigation, 5.2% for domestic uses and 2.6% is given for industrial and commercial activities. The current trend in increase in water demand has outstripped the available water supply. The total demand from all users is 105.96 BCM while the total supply is 77.99 BCM. There is a wide gap between the irrigation potential created and utilized. The Surface water potential created 95.2 lac ha and potential utilised is 65.3 lac ha. The total groundwater recharge in the State is estimated to be about 70

BCM while the total extraction is estimated to be about 53 BCM. The Demand Side projections indicate that in the business as usual scenario, irrigation demand will increase from 97.8 BCM to 109.46 BCM.

As per present estimates, Uttar Pradesh receives on average an annual precipitation of about 228.28 Billion Cubic Meter (BCM), which is a basic water resource. Out of this, after considering the natural evaporation-transpiration, only about 161.64 BCM is the average annual natural flow through rivers. Only about 118.47 BCM is utilizable through the present strategies. Uttar Pradesh experiences the predominant influence of south west monsoon that ranges from the month of June to September. Almost 90% of the rainfall occurs in 3 months from June to September through the South West Monsoon, while the State receives only 10% precipitation from the North East monsoon.

4. Water Resources Management Scenario and Key Water Governance Challenges in Uttar Pradesh

4.1 Water Resources Management Scenario:

(i) Due to overexploitation, land use change, sand mining and unabated pollution of surface and groundwater resources, large parts of Uttar Pradesh have already become water stressed.

(ii) The rapid increase in demand for water due to population growth in rural and urban areas, unplanned urban growth, changing lifestyles coupled with the fragmented management of water resources have given rise to serious concerns on water security in the State.

(iii) The stream-aquifer interaction along the main stem of the River Ganga and its major tributaries in the State has been significantly impacted by groundwater exploitation and overuse resulting in a sharp decline of critical dry season base flow contributions that in turn leads to hydrological imbalance, overall decline in access to water and a growing mismatch between demand and supply.

(iv) Groundwater recharge zones are often blocked and polluted as a result of poor land use planning, impacting river health and aquifers.

(v) The wide temporal and spatial variation in the availability of water due to changes in the hydrological cycle exacerbated by climate change will act as a force multiplier for variability of water resources causing severe water crisis and incidences of water related disasters such as frequent floods and droughts in the State.

(vi) The environmental health of drainage and catchment areas in all river basins in the State has severely deteriorated due to the discharge of untreated industrial and municipal effluents. Not only

are large stretches of rivers heavily polluted and devoid of natural flows *(Aviral Dhara)* but other natural and manmade water bodies such as lakes, ponds, wetlands and wells are experiencing increased pollution and are at the risk of becoming unsafe for human health, cattle, flora and fauna.

(vii) Deterioration of smaller rivers/tributaries, drainage channels and other water bodies is widespread.

(viii) Geogenic pollution of surface and ground water is a serious water quality and health concern in the State.

4.2 **Key Water Governance Challenges:**

(i) Lack of coordinated planning and inefficient management practices without giving due consideration to optimum utilization, environment sustainability and holistic benefit to the people results in poor maintenance, conveyance inefficiency, wastage and underutilization of available water resources and poses a significant governance challenge.

(ii) Weak institutional capacity to co-evolve with emerging water management challenges requiring scientific planning with the use of modern information technology and lack of adequately trained personnel affects water supply, maintenance and services. The severe impact of these constraints is realized on access to water for drinking, sanitation and other domestic needs in many water stressed regions in the State.

(iii) Degraded water resource management infrastructure such as ageing dams, canals, embankments, water supply and distribution systems, effluent, wastewater and sewage treatment plants, wherever they exist, further constrain the efficiency and performance of water related service delivery institutions. Traditional water storage and harvesting structures are also under stress due to low public awareness and lack of maintenance requiring revival and rejuvenation for ensuring the augmentation and sustainability of water resources.

(iv) Lack of institutional coherence and policy convergence impair inter-departmental coordination necessary to deliver IWRM in the State but could not be achieved due to the lack of a vision for integrating the social, hydrological and ecological dimensions of water governance.

(v) The absence of an integrated data management system that includes water accounting, water balance and water budget assessments carried out at the Zilla/city and Panchayat levels is a constraint for water planning and management at the basin and state level.

(vi) Inter-State, inter-sectoral issues on sharing and allocation of water resources strain relationships among stakeholders and hamper the timely completion of planned measures and optimal utilization of water at a basin/sub-basin level.

(vii) Low public consciousness about the ecological and economic value of water and lack of public participation in water management results in its wastage and inefficient use leading to overall water scarcity.

5. Water Allocation Priorities

Rising demand and competing uses could impact water management outputs and therefore warrant careful balancing of water allocation and prioritization of water for use. Prioritizing water allocation is one of the methods for optimization of its use and is intended to guide all actions involving planning, development and utilization. Keeping in view the distinct water availability scenario in different regions in the State, the concerned area or region-specific allocation priorities may have to be evolved. Therefore, all water in the State shall be allocated based on the following priorities:

(i) **Drinking and Domestic Use**: The State and local governments are committed to ensuring access to a minimum quantity of potable water for essential health and hygiene to all its citizens, under all circumstances, available within easy reach of households.

(ii) **Environmental Flows (*Aviral Dhara*)**: Natural river flows are hereby recognized as necessary for hydrological and ecological balance. The State government is committed to ensuring dynamic environmental flow releases that are proportional to the natural flow regime through enhanced conservation measures such as catchment management. For rivers characterized by low or no flows, scientific assessments to determine the ecological needs of the rivers would be undertaken keeping in view the statutory and judicial position, as applicable.

(iii) **Irrigation:** Irrigation constitutes the largest consumptive use of water in the State. Being primarily an agricultural State, water for irrigation would be provided based on the equitable and judicious use principle.

(iv) **Thermal and Hydropower**: While recognizing the growing demand for reliable electricity, the impact of very large hydropower projects and dams on ecology and people is recognized and the decision on such allocation will be based on scientific and environmental values. Appropriate arrangements will made for the water needs of thermal power plants.

(v) **Industries, including agro industries**: In view of the need for equitable socio-economic development, agro based industries will be allocated water on a priority basis, followed by other industries.

(vi) **Navigation**: Keeping in view the increased focus on inland waterways from the national and State perspective, water may be allocated for ensuring navigation feasibility in national and State waterways on a case-to-case basis.

(vii) **Recreational, aesthetic and other uses**: Allocation for recreational and other uses shall lay emphasis on reuse and recycled water such as for parks, playgrounds and greening urban areas.

6. Comprehensive Mapping and Assessment of all Water Resources by adopting a Basin Management Approach

(i) For better understanding of the causes underlying the growing water stress in the State, comprehensive assessment of water resources for both availability and quality would be undertaken based on a river basin management approach.

(ii) The mapping of rivers, streams, reservoirs, wetlands, natural or artificial lakes known locally as *Jheels, Taals, and Kunds,* including those that have diminished due to anthropogenic or environmental stresses would be undertaken through technological measures such as Geographic Information Systems (GIS).

(iii) An assessment and inventory of all water resources projects in the State, both surface and groundwater to determine their existing capacities, performance and infrastructural health to meet current and future demand supply patterns would be carried out. The assessment will inform the need for upgrading or planning new projects to cater to the future demand and supply.

7. Climate Change Adaptation

(i) There is growing evidence that climate change will invariably affect water availability with significant impacts on the nine agro-climatic zones in the State having distinctive climatic diversity, rainfall and temperature. Therefore, impetus will be given to support and strengthen water stewardship through community capacity enhancement for adaptation to climate change.

(ii) Available climate projections indicate a rise in temperature by 2050 thereby underlining the high sensitivity of agriculture and water resources in Uttar Pradesh due to predicted altered precipitation pattern, impacts of glacial melting and recurring episodes of drought. This anticipated variability will be dealt with by promoting the "*cascade approach*" to incentivize rainwater harvesting,

groundwater recharge, revival of other traditional water conservation and storage infrastructure in rural areas, which inter-alia would result in the overall enhancement of local water availability and resilience.

(iii) Adaptation strategies to reduce the impacts of climate change on agriculture should include better demand side management and transformation in agricultural practices and cropping patterns with improved water utilization methods. Emphasis should be on climate vulnerable community participation in land-soil-water management with technical inputs from local, State and national agencies that have the requisite technical expertise.

(iv) Climate adaptation and resilience in urban areas would involve strategies such as storm water storage, rooftop rainwater harvesting and the use of grey water in urban greenery.

(v) Urban Local Bodies and Panchayats in the State should be incentivized for mainstreaming climate change adaptation strategies through sensitization programs within their local jurisdiction. Incentives should also be extended to climate smart agricultural practices that demonstrate efficiency in water use, better land, soil and water management, protection of ecosystem services in the basin, catchment and command areas.

(vi) Flood forecasting is very important for flood preparedness and the services of the FMISC would be expanded extensively across the State linked to forecasting and climate models.

(vii) To make climate preparedness, adaptation and resilience effective and inclusive, the strengths and expertise of the private sector would be leveraged. This will be done to increase the adaptive capacity of the State by creating incentives for sharing industry best practices in industrial WUE, water conservation, pollution abatement, and recharging as well as recognizing water-positive industrial units.

(viii) Climate change is a shared problem and hence calls for partnerships to be forged between all stakeholders by creating and/or utilizing Multi-Stakeholder Platforms on climate resilience and water resources for information sharing and dialogues.

8. Achieving Water Use Efficiency and Water Conservation at the Basin level

River Basin Water Management Authorities will undertake planned and time bound measures to promote WUE across all sectors in the State and will comprise of two elements: (i) minimizing wastage and maximizing conservation by reducing water intensive activities, and (ii) adopting efficient technologies and other relevant processes and methods.

(i) Minimizing wastage, maximizing conservation:

(a) In order to minimize the wastage of water and maximize water conservation, enhanced conservation measures would be promoted through education, regulation, incentives and disincentives in a mission mode.

(b) Basin specific plans should be devised to identify rivers, reservoirs and other water bodies that are experiencing stress due to inefficiency and overexploitation. Appropriate actions will be initiated to conserve and rejuvenate small rivers and other water bodies through coordination among districts, towns and Panchayats involving all stakeholders. Increased focus should be placed on identifying activities that have a negative impact on the quantity or quality of water resources in a basin and a phase wise action plan to minimize such activities should be devised with broad timelines.

(c) Land and Water management should be integrated in the planning and implementation of schemes and programs such as catchment area management, protection and preservation of water resources and land degradation. For this, Catchment Area Management approaches should be incorporated in Basin specific plans to be implemented with community participation.

(d) For maximizing conservation and minimization of water wastage, emphasis would be on the sustainable harnessing of water resources in rural and urban areas through methods such the *Jal kund* and small-scale water storage structures prepared through traditional means and roof top rainwater harvesting respectively. The use of water so harnessed should be not only for basic needs but also for livelihood and income generation activities, preferably by collective decision-making processes. Progressively, mandatory provisions on rainwater harvesting and groundwater recharge under building bylaws or any other law adopted by the State government need to be enforced strictly. The State government through the Uttar Pradesh State Ground Water Management and Regulatory Authority will also explore methods of artificial groundwater recharge to augment the natural replenishment of ground water storage.

(e) Strong emphasis should be given to water budgeting for each river basin and adoption of best practices such as developing a web based ‘knowledge point’ for water budgeting and assessment in local language. Fit for purpose re-use and recycle of water will be encouraged across the spectrum of users as applicable.

ii) **Water Use Efficiency: benchmarking, regulation and institutionalization**

a) A system to mainstream and evolve benchmarks and standardization of water efficient technologies in view of the perspectives, approaches and targets on WUE under the National Water Mission would be adopted.

b) Mandatory water audit for water intensive industries and processes is recommended. Due opportunities for reuse, recycle and re-charge would be facilitated through incentives, assistance in making technology choices and effective monitoring. For commercial enterprises such as lodges, marriage halls, shopping complexes and similar establishments, Municipal Corporations should play a pro-active role in promoting WUE in urban and municipal water use. The overall approach should be to facilitate efficiency measures through awareness creation and assistance.

c) The cumulative impact assessment of the water footprint of all industries and processes in the State would be undertaken to understand their overall impact on the quantity and quality of water.

d) The concepts of 'basin' and 'project' WUE should be built into action planning and needs to be continuously evolved through consistent water accounting surveys and action research.

e) WUE in agriculture should be promoted through wider adoption of micro irrigation practices and technologies, including sprinklers and drip irrigation using a *more-crop-per-drop* approach.

f) Recycle and reuse of water, including return flows should be the guiding norm in all forms of water use.

g) WUE should be clearly linked with project financing which would be contingent upon efficient and economic use of water.

9. Water Accounting and Water Budgeting

(i) The absence of granular, real-time water balance data is a constraint for the effective management of surface, ground and wastewater. Water balance assessments would be carried out at the village/watershed/basin/sub-basin levels will aggregate and contribute to Zilla/city municipal level water balance accounts. An integrated water balance system that indicates how water is being utilized at the local, sub-basin and basin level would be established at an appropriate level.

(ii) Water Budgeting at the village level needs to be done through preparation of base line data incorporating both the quantity and

quality of water bodies in the village, assessment of surface and ground water resources, assessment of demand for various sectoral uses, preparation of Operational Plans for water management and training of water volunteers. The approach to water budgeting would be through awareness creation about water resources and the need for water conservation and community participation.

10. Floods and Droughts

10.1 Flood Management, Resilience and Flood Forecasting

(i) Recurring floods in all major rivers in Uttar Pradesh annually affect large numbers of people and millions of hectares of agricultural land in flood prone areas, undermining economic growth, development and poverty alleviation efforts. Due to the presence of very large and dynamic river systems in the State, a strategic shift from flood control to flood management that calls for deploying a mix of structural and non-structural measures including Nature Based Solutions (NbS) that integrate the ecological aspects of floods would be adopted.

(ii) A robust Early Warning System to help flood preparedness by blending digital elevation and flood models from existing initiatives of the Uttar Pradesh State Disaster Management Authority (UPSDMA) and FMISC through the integration of cutting edge technologies such as Artificial Intelligence (AI), Machine Learning (ML) and appropriate Hydro Metrological Advisory Systems, would be developed and expanded.

(iii) All efforts shall be made to integrate a GPRS/Internet-based dissemination mechanism to operationalize Community and Impact Based Early Warning Systems (CIBEWS) by involving communities in monitoring and preparedness. The system for flood forecasting and early warning developed through participatory bottom up approaches will identify vulnerable populations and zones, and establish linkages with flood-related disaster management strategies under the State Disaster Management Plan.

(iv) An extensive capacity building program on flood early warning systems by directly connecting available technical capabilities at the State level with the local level through participatory approaches by involving Village Disaster Management Committees (VDMCs) and other water management related committees such as Water User Associations (WUAs), Watershed Committees and Village Water Security Management Committees (VWSMCs) at the appropriate level would be launched. The intent would be to bridge the gap between top-down and bottom-up capabilities for flood management and to strengthen people's abilities to absorb information and take action.

(v) River health, diversion of water bodies, encroachment of flood plains and water channels should be regulated, both in rural and urban areas and wherever it has taken place, should be restored to the extent possible through public consultation and participation. Embankments, revetments and other appurtenant infrastructure should be surveyed, assessed, monitored and maintained. Any extension of embankments should be based on geomorphological/eco-hydrological studies integrating relevant safeguards warranted. Since climate change is likely to increase the rainfall intensity and soil erosion, structural and non-structural measures to prevent soil erosion should consider NbS and traditional knowledge, especially in rural areas. Water zoning with clear demarcations of floodplains should be done on priority.

(vi) Riverfront Development Projects, wherever planned, should be implemented based on Comprehensive Environment Impact Assessment.

(vii) A separate strategy for urban flooding and storm water management may be devised. There should be an emphasis on the design and maintenance of storm water drains, storm water storage and management. This should also extend to devising suitable management strategies to protect water infrastructure from the adverse impacts of floods and related disasters.

10.2 **Droughts**

(i) With spatial and temporal variability, limited access to piped water supply and erratic rainfall patterns, some regions in the State such as Bundelkhand and Vindhyachal are often prone to droughts. The risk of drought or drought like situations should be avoided by preparation and planning watershed management and rainwater harvesting, as well as the diversification of livelihoods to improve resilience.

(ii) Basin/sub-basin level planning especially in drought prone areas in the State should be done taking into account region wise assessments made by the Crop-Weather Watch Group constituted by the Department of Agriculture. Innovative drought management through financial instruments such as weather-based crop insurance may be considered. Climate smart agriculture practices and less water-intensive crops should be promoted through appropriate drip-to-market corridors.

(iii) Drought Control Measures deployed from the disaster management perspective including improvement of minor irrigation facilities, soil and water conservation works, integrated farm management and afforestation should be promoted. Synergies should be established with ongoing drought management programs by other government

agencies to strengthen policy, institutional and implementation linkages on key areas such as risk assessment and vulnerability analysis, applied research and technology application, awareness and training, institutional mechanisms specially the decentralized water committees at the village level, locating incentives, land use planning and regulation.

(iv) WUE is critical for drought prone areas and therefore maximization of irrigation through drip and sprinkler systems should be implemented on a fast track basis throughout the Bundelkhand and Vindhyachal regions.

(v) Preparation of Gram Panchayat-level water budgets and water security plans for rationalizing water usage, increasing water-use efficiency and promoting participatory micro-level water management in drought prone areas will be undertaken. This would be done within the framework of the ABY.

(vi) There should be an increased focus on conjunctive water use and augmenting surface water storage through the rejuvenation of traditional water bodies after systematic identification, mapping and geo-tagging of reservoirs. Participatory community-based maintenance of reservoirs should be promoted, targeting improvements in water retention capacities through effective catchment area treatment.

(vii) Groundwater authorities would facilitate Artificial Groundwater Recharge in drought-prone blocks by injecting rainwater into the existing subsoil water table after due assessment and care to avoid aquifer pollution. This will prevent the overexploitation of subsoil aquifers and increase water availability during droughts.

(viii) Decentralized community driven measures for protecting, conserving, and harnessing local run off and other locally available water sources should be promoted and supported through wider campaigns in Drought prone areas including in the Bundelkhand-Vindhyanchal Regions. Success stories with gender dimensions such as women-led self-help groups (SHGs) like *Jal Sahelis/ Pani Panchayats* and other such identified good practices shall be mainstreamed and technically supported towards the goal of transforming water scenarios in the State.

10.3 **Dam Safety**

(i) The State has large and dynamic river systems that carry devastating floods in the upstream and downstream on an annual basis that threaten the safety of dams and irrigation infrastructure. Enactment of dam safety legislation in conformity with the central legislation on dam safety should be considered. This is to ensure

proper inspection, maintenance and surveillance of the existing dams and proper planning, investigation, design, construction and safety of new dams.

(ii) The State government should prepare Dam Safety and Irrigation Infrastructure Guidelines by involving specialists within the ambit of the Jal Shakti Ministry at the State level for ensuring safety of storage dams and other water related structures. These guidelines would be reviewed and updated periodically.

(iii) A system would be established to undertake the safety audit of dams, embankments, maintenance of reservoirs and appurtenant infrastructure in the State at periodic intervals.

11. Sustainable Agricultural Water Use

11.1 Agricultural-Water Use Management

(i) The activities that enhance water productivity in canal command areas across the State through increased participation and coordination between WUAs, private sector agencies including input suppliers to achieve improved off-farm and on-farm WUE should be promoted.

(ii) Water saving technologies such as micro-irrigation (drip, sprinkler, sub-surface drip etc.) should be promoted actively to achieve reduction in agricultural water demand. With the availability of adequate irrigation facilities, a large proportion of subsistence cultivators could be transformed into commercial producers, thus changing the conventional agrarian economy into a dynamic market driven agrarian economy. Micro irrigation should be made mandatory for crops such as sugar cane with very high levels of consumptive water use. The resources available through schemes such as the Micro Irrigation Development Fund, the Pradhan Mantri Kisan Sinchayee Yojana (PMKSY), the Agricultural-Infrastructure Fund, part of the stimulus package, announced by the Government of India (GoI) should be fully utilized for promoting drip sprinkler systems and drip irrigation in the state.

(iii) Piped Irrigation Networks for increasing conveyance efficiency should be promoted where possible, realizing the advantages of the scale and integration of micro irrigation for increased field application efficiency (90%). The O&M of canal/water channels repair and rehabilitation works should be undertaken in consultation with WUAs and should be carried out before the onset of the cropping season.

(iv) Building farmer awareness to promote strategies such as supplying minimum quantities of water to a crop, known as critical irrigation as an alternative to flooding in districts with high irrigation potential, should be pursued. Critical irrigation for crops would

provide water supply less than the crop's full requirements, allowing for mild stress during the stages of growth that are less sensitive to moisture deficiency and impacts on yield. Critical irrigation with adequate extension support could be offered to crops that have a high consumptive use in districts that indicate a lower productivity of such crops.

(v) Improved agronomic management practices that help achieve water productivity without compromising the economic returns of the farmers should be promoted. Proven water-efficient practices need to be promoted in agriculture including promoting the System of Rice Intensification (SRI); promoting Alternate Wetting and Drying (AWD); dry seeding rice over transplanted rice; promoting water-efficient sugarcane innovations; and adopting affordable moisture-sensors at the WUA level etc.

11.2 **Crop diversification for agricultural water use efficiency**

(i) Shifting the cropping pattern and sowing practices to incentivize progression to a less water-intensive, high value cropping pattern would be promoted. Crop planning, integrating basin-level water budgets should be pursued through central schemes such as PMKSY. The planning objective should focus on achieving higher water productivity in areas with higher irrigation development and cropping intensities.

(ii) Interventions such as procurement and price-support mechanisms including the Public Distribution System (PDS) should be utilized to incentivize farmers producing less-water intensive crops. Firm measures to enhance the coverage of Minimum Support Price (MSP) for non-cereal and less water-intensive crops should be adopted. In addition, convergence should be achieved with the GoI schemes to facilitate an enabling environment for inputs, rural advisory services and procurement arrangements.

(iii) Market linkages and private sector participation across the value chain for less water-intensive crops to create economically viable alternatives should be promoted. Crop diversification as an adaptation strategy focusing on resilient mixed farming models may be encouraged. Identification and integration of areas growing less water-intensive crops with the national electronic market network (e-NAM) should be promoted.

11.3 **Soil fertility management for agricultural water use efficiency**

(i) Soil characteristics have an important role in increasing water productivity. Integrated farming models that incorporate soil improvement should be promoted in rain-fed dryland regions such as Bundelkhand and Vindhyachal on priority.

(ii) Campaigns targeting water productivity should also invariably focus on improving soil productivity to leverage the benefits of water availability through soil management.

(iii) Excessive groundwater draft in areas with salinity and heavy metal contamination should be avoided to manage the concentration of alkaline salts and heavy metals affecting farm profits.

11.4 Demand side management for agriculture water use efficiency

(i) Market risks for alternative crops of small holders must be minimized by encouraging private sector participation in operating and expanding off-take.

(ii) Demand-side measures should include replacing inefficient pumps, or using micro irrigation to produce more crop per drop of water. Demand-side-management approaches for agriculture should look at how both the water and energy demand can be addressed when implementing new technologies. Such Demand-side management interventions should also have a community capacity building element.

(iii) PPPs for increased adoption of sustainability standards in sugarcane production, which will in turn reduce the environmental/water footprint of the crop and help farmers earn a higher premium should be explored.

12. Rural Water Supply and Sanitation

(i) Rural water supply in the State would be strengthened in alignment with the JJM, a national flagship program aimed at providing 100% HouseHold Tap Connections (HHTCs) to all rural households by 2024.

(ii) At the village level, Village Water and Sanitation Committees (VWSCs) will be strengthened with at least one-third representation of women at the Panchayat level for actively participating in the planning, execution and maintenance of rural water supply infrastructure. Active participation of Gram Panchayats (GPs), VWSCs, and Gram Sabhas should be facilitated to seek local wisdom and community ownership in designing and building rural water supply infrastructure.

(iii) Large villages with a population of more than 10,000 people should be provided with decentralized wastewater collection and treatment systems. GPs should be responsible for the O&M of such systems with community and local private sector participation, wherever such systems are installed and operated.

13. Urban Water Supply and Wastewater Treatment

(i) In order to ensure safe, affordable and adequate drinking water to all in the urban areas/cities in the State, universal household tap and sewerage connections, including for urban houses in slum areas would be facilitated.

(ii) Systematic Efforts would be made to achieve reliable water supply in all towns and cities in a phased manner for which the capacity of Urban Local Bodies (ULBs) would be developed and *Jal Sansthans* restructured as utilities.

(iii) Monitoring and evaluation of service deliveries would be done on a regular basis as per indicators set for the purpose by the State government, which may be region/area specific.

(iv) All ULBs with a population of more than one lac would be required to adopt 100% metering, in a phased manner, which would also facilitate ascertaining the performance of water supply services in urban areas, since urban water supply systems are under stress and require regular technical services. ULBs will also be encouraged to use services of the private sector in the water supply, maintenance and operation services ensuring appropriate arrangements and models such as PPP models.

(v) For recovering the O&M cost of urban water supply services, the tariff for urban water supply should be determined on a telescopic basis, with a low/nil price for basic consumption which increases thereafter, based on use slabs. The aim is that the tariffs, other municipal taxes and grants available to ULBs should cover 100% of O&M financing. The ULBs should create a separate budget head for O&M accounts to enable the better monitoring of O&M financing.

(vi) Reduction in Non-Revenue Water (NRW) should be ensured in a specified time frame through a detailed NRW Action Plan aimed at a 20% reduction. The NRW Action Plan to be prepared by ULBs//Municipal Corporations in the State under the overall guidance of the Uttar Pradesh Water management and Regulatory Commission (UPWaMReC) and should be linked with the WUE measures and targets in urban areas and industrial zones.

(vii) Concerted efforts should be made for Groundwater improvement, conservation and recharge by ensuring compliance with building byelaws in the State and the relevant provisions on rainwater harvesting in urban areas. Where technically and financially feasible, ULBs should shift to using surface water and reduce groundwater exploitation.

(viii) Wastewater Management in urban areas would be taken up on priority basis in polluted hotspots in all the major river basins and

sub-basins. Wastewater management plans at the basin level should target decentralized and cost-effective technical solutions. ULBs will systematically increase the use of treated wastewater for suitable applications in a specified period. The State government intends to formulate a 'Wastewater Management and Reuse Policy' for sustainable wastewater management.

(ix) For achieving the goal of effective and efficient urban water supply, concerned agencies shall encourage citizen engagement, accountability and conduct awareness drives through ward level committees. The urban water supply and wastewater treatment would be done in line with the overall framework of the Atal Mission for Rejuvenation and Urban Transformation (AMRUT).

(x) Census of Submersible Pumps will be carried out in cities to assess water consumption.

(xi) Storage of storm water through parks, underground structures and ponds will be explored.

14. Sustainable Groundwater Management and Conservation

In view of the deleterious impacts of unsustainable groundwater abstraction in the State, the following groundwater strategies will be undertaken:

(i) Detailed groundwater aquifer mapping should be conducted on a 1;10000 scale by involving agencies at the State, District and GP level and their capacity for such mapping should be built through continuous programs and partnerships with knowledge institutions and civil society groups, therefore allowing knowledge-based groundwater management.

(ii) Ground water extraction should be regulated and followed by aquifer-based use and management, notifying separate aquifers for drinking, agriculture, industrial and other users. At the decentralized level, community regulation of groundwater should be aided and facilitated by information and sensitization as provided under the Uttar Pradesh Groundwater Regulation Act, 2019.

(iii) Groundwater Recharge should be implemented on an integrated mission mode targeting over-exploited/critical blocks in a time bound manner adopting a decentralized convergence mode. This should further include adopting approaches to saturate micro watersheds. For large scale artificial ground water recharge, new technologies based on field driven projects and scientific principles such as Aquifer Storage and Recovery, Managed Aquifer Recharge, Recharge basin, Radial wells, Infiltration gallery, Large pressure head recharge wells as appropriate should be taken up on a pilot basis in the over-exploited and critical blocks to ascertain the feasibility of such measures and further replicate successes. Implementation of small

recharge and storage structures such as recharge trenches, rain pits, farm ponds, in-situ soil conservation measures, gabion structures, peripheral bunds, nalla bunds, check dams and vegetative measures should also be taken up along with the large-scale measures for minimizing surplus run-off.

(iv) All industries should ensure mandatory implementation of rainwater-harvesting and groundwater recharge, ruling out any possibility of contaminating the ground water sources. Recharge well methods should be adopted with due safeguards to avoid groundwater pollution. Submersible Pumps should be monitored and regulated for urban and industrial use in over-exploited and critical blocks. Industrial effluents should be treated for its maximum fit-for-purpose reuse and recycle.

(v) All industries which exceed water consumption thresholds set by the Uttar Pradesh State Ground Water Management Authority through a consultative process, should be required to publish annual water reports giving details of water budgeting, water consumption, water use per unit production, harvesting rainwater, water recycled and fresh-water consumption. The annual report should also highlight information with regard to effluents discharged into rivers after treatment and levels of treatment and these reports to be verified by the Uttar Pradesh Pollution Control Board (UPPCB). The same shall be required to be put in the public domain.

(vi) Tube well Management including identification, mapping and reallocation of existing tube wells should be conducted based on water availability and quality in aquifers. The conjunctive use of surface water should be also be promoted. Capping the depth and number of wells sunk in the region and notifying progressive adoption use of micro-irrigation in water-intensive crops should be pursued. In case of new agricultural tube well connections in Semi-critical blocks, adoption of micro-irrigation should be made mandatory.

(vii) A “Ground Water Research and Training Institute" should be set up to promote research & best practice studies, and to train personnel of the groundwater department. It would also conduct campaigns on Water Literacy and Awareness by partnering with institutions and civil society organizations (CSOs) using citizen science. Focus could also be placed on regionally relevant content for farmers raising awareness about the economic value of water and the crisis around water resources. To ensure effective management of ground water data in the state, a GIS based efficient “Ground Water Data Bank and Information System” (State Ground Water Informatics Centre) will be developed that will aid the preparation of groundwater security plans at the GP, Block, District and Municipal areas level.

(viii) Initiating participatory GP-scale Integrated Water Management Planning, learning from the ABY design - there should be a focus on effective implementation at the GP-level by adopting a bottom up approach (based on the local hydrogeological/hydrological and geomorphic settings). GP level water security plans should be collated at all block and district levels. Women-led SHGs at the GP level should be formalized with support from the State Rural Livelihoods Mission (SRLM) to make this a long-term sustainable effort. A lead Implementation Agency (IA) and/or a Capacity Building Agency (CBA) should be identified and on-boarded for every district, which may work towards community level mobilization to form and train such women-led SHGs.

(ix) Rainwater harvesting - In urban areas, roof top rainwater harvesting systems should be made mandatory for buildings along with 'Combined Recharge System' that should be implemented on priority in all urban and peri-urban areas. For rural areas, there should be a focus on systematically identifying, mapping and rejuvenating traditional water storage structures through a GIS system. Conjunctive use of these reservoirs is critical to maintain the water balance in over-exploited and critical blocks and the use of surface water should be prioritized especially in areas with issues around water logging. Development of wetland areas should be taken up for both urban and rural areas.

(x) The overexploitation of groundwater should be controlled by regulating the use of electricity for its extraction. Separate electric feeders for pumping groundwater for agricultural use should be considered. Further, groundwater management would be leveraged in conjunction with the Uttar Pradesh Ground Water (Management and Regulation) Act, 2019.

15. Water Pollution and Ecological Concerns

(i) Recognizing the widespread problem of water pollution in both ground and surface water, which is jeopardizing the health of citizens in the State, water quality and quantity need to be ensured and managed in an integrated manner, consistent with broader environmental management approaches. The threat to water quality in the State from multiple directions needs to be arrested on an urgent basis.

(ii) All three major sources of water pollution, i.e. municipal sewage, industrial effluents and agricultural run-offs, are contributing to the growing issues of pollution of water resources in the State. In addition to these sources, there are issues due to geogenic pollutants, such as Arsenic, Fluoride and other heavy metals that especially impact drinking water quality and impose health risks. These would be addressed with a concrete State-wide pollution abatement plan.

(iii) Comprehensive water quality monitoring, control and mitigation measures would be deployed to control the pollution of the State's water resources. The strategies to prevent and manage pollution would be multi-pronged including comprehensive water quality monitoring for the determination of pollution hotspots in all the basins, reduction of discharge of polluting water into clean resources, treatment of the polluting water before disposal into the environment, recycle and reuse, and maintaining minimum environmental flows.

(iv) *The Nirmal Dhara* Principle to control and abate pollution in Rivers, Streams and Lakes would be the overarching principle for controlling water pollution on a proactive basis and in a mission mode.

(v) To augment the statutory framework of pollution control at the State level in order to overcome the serious problem of water pollution, new strategies to control and abate pollution will include a combination of improved standard setting, greater investments and appropriate technologies.

(vi) Efforts should be made to incentivize decentralised and nature-based wastewater treatment plants, separation of grey water and black water and in situ treatment of grey water.

(vii) Incentives for dual plumbing would be provided for the reuse of treated water for flushing and technical training programs for those adopting these measures would be adopted.

(viii) Emphasis would be on multi-scale sewage treatment technologies, including in-stream treatment, lakeside/pond side treatment, and apartment/*mohalla*-level treatment.

(ix) The measures for treatment plants should ensure that sewerage connectivity is completed in parallel with sewage treatment plant (STPs), both new and existing. For new STPS, emphasis should be on low-energy and biological technologies wherever possible.

(x) Capacity utilization and enhancement of sewage treatment plants need to be carried out and private sector participation for ensuring services and accountability should be actively pursued. Private sewage treatment plant operators should be regulated through performance linked payment or incentive mechanisms to encourage quality services in sewage/municipal wastewater treatment.

(xi) Integration of sewage treatment plans with reuse plans and lake or wetlands management plans should be promoted. First charge on treated wastewater should be of green spaces and surface water bodies such as ponds and wetlands.

(xii) The government shall promote and strengthen a network of accredited laboratories for uniform water quality testing and monitoring in the State.

(xiii) Regulating pumping in affected areas, raising awareness and adopting technological solutions for pollution mitigation, shall control Geogenic pollutants such as arsenic, nitrate, and fluoride in the groundwater.

(xiv) The Polluter Pays principle, codified under the National Green Tribunal Act, 2010 and widely applied in a number of judgments by the constitutional court represents the fundamental approach to deal with pollution by imposing costs and penalties that are proportional to the cost of pollution caused to rivers or ecosystems. The State government shall adopt the principle in its administrative functioning and support and strengthen the regulatory functions of the UPPCB. UP Water management and Regulatory Commission (WaMReC) and UP Ground Water Managment and Regulatory Authority for controlling and abating pollution with direct or indirect impact on rivers, water bodies, wetlands, catchments, river basins and sub-basins.

16. Small Rivers/Tributaries Rejuvenation

Numerous small rivers/tributaries in the State provide essential ecosystem services and functions. Networks of small rivers also serve as a natural drainage for floods and extreme events across the State. Changes in demography, land use and pollution have threatened the health of small rivers and tributaries. A comprehensive strategy for the revival of the smaller rivers adopting an ecosystem-based approach is thus urgently required. In order to revive and restore the smaller rivers/tributaries in the State, the Basin level River Water Management Authorities shall devise the Plan to:

(i) Geo-tagging of all small rivers/tributaries shall be completed within a specified timeframe.

(ii) Prioritize the rejuvenation of all such small rivers based on the deterioration levels; a system for determining the deterioration levels of these rivers such as critical, semi critical, stressed etc should be developed; the revival and rejuvenation to take into account the aquatic biodiversity and livelihood aspect. Identify sources of pollution in small rivers and tributaries including from accompanying drains and take remedial measures.

(iii) Maintain environmental flows in small rivers by regulated released from the proximate sources.

(iv) Remove diversions, encroachments and other activities that are detrimental to the health of small rivers by involving Panchayats, Municipalities and Nagar Nigams, wherever needed.

(v) Protect catchments of all such rivers through participation and community involvement in a time bound manner.

17. Environmental flows in rivers – *Aviral Dhara*

The policy recognizes the importance of ecological sustainability and the need for protection and conservation of riparian systems. Minimum environmental flows are necessary for maintaining the hydrological balance, improving water quality and ensuring the water security of the State. Maintenance of minimum environmental flow in river systems is essential for livelihood security, to ensure the biodiversity and sustainability of aquatic species and ecosystems, of floral and faunal or avi-faunal diversity dependent upon river water, and to support the spiritual and cultural needs of people. Ecological needs of the river should be determined, through scientific studies, with due recognition for the natural river flows and should accommodate the developmental needs. In order to maintain environmental flow regimes in rivers of the state, the state shall promote:

(i) Conservation of river corridors, water bodies and infrastructure should be scientifically planned integrating stakeholder participation. The storage capacities of water bodies and water courses and/or associated wetlands, the flood plains, ecological buffer and areas required for specific aesthetic recreational and/or social needs may be developed using the principles of IWRM in accordance with prevalent laws.

(ii) Programs for the protection of catchments that are within the state administration limits for all rivers of the state.

(iii) Multiple and conjunctive use of water including recycle and reuse of water in urban habitats and sustainable groundwater reuse would be promoted.

(iv) The state shall institute appropriate river-basin scale institutional arrangements for promoting scientific and unified management of the water resources in each river basin that will conserve and strengthen the e-flows in rivers.

18. Fisheries

(i) Uttar Pradesh has vast and varied inland fisheries and aquaculture resources which are at various levels of utilization. Fisheries resources are in the form of networks of rivers and rivulets, reservoirs, networks of irrigation canals and extensive floodplain wetlands. Fisheries would be made part of IWRM which would benefit people and help retain the aquatic biodiversity of the water system and the environment.

(ii) Existing policy or administrative overlaps in terms of lease including in the reservoirs should be clearly identified and resolved. Administrative overlaps would be resolved by the involvement of

various departments such as the Department of Irrigation, Department of Revenue and Department of Environment and Forest that hold and own water including for conservation of biodiversity, should be synergized and resolved.

19. Water Pricing

(i) Based on the principles of valuing water as an economic good and a common pool resource and in the wake of the growing demand for water, pricing is an important instrument for improving WUE, generate fair return on investments to maintain assets, improve service delivery and reflect the scarcity of water. Available water, after meeting the basic needs would be priced based on equity-economic principles.

(ii) Pricing for water and sewerage services in cities and urban areas will follow the differential and telescopic tariff system to recover full operation and maintenance (O&M) costs, while protecting the interests of the urban poor.

(iii) The UPWaMReC will play the central role in determining the tariff for both irrigation and drinking water on a normative and scientific basis taking into account the operational costs.

(iv) WUAs will be empowered to keep a share of water charges, manage the volumetric quantum of water allotted to them and maintain the distribution system in their jurisdiction. Additionally, water charges retained could be augmented by way of State budget support as incentive funds. Gender-managed WUAs will be encouraged and supported.

(v) A progressive water tariff structure for irrigation will be adopted following a normative and transparent manner taking into account the contextual and socio-economic conditions of the State. The decentralised local governments will be encouraged to recover costs and maintain assets.

(vi) Recycle and reuse of water, after treatment to specified standards, shall be incentivized through a properly planned tariff system.

20. Private Sector Participation

(i) In order to expedite the development of water infrastructure and for alternate financing and improved services in the water sector, the participation of the private sector, through PPP models, will be actively sought in the planning, financing, development and management of water infrastructure projects and for projects for last-mile delivery. The State would enable an ecosystem conducive for private sector participation.

(ii) For efficient implementation and management of water related infrastructure projects, new financial and implementation models including those that have been piloted by the Central Government, Agencies like the National Mission for Clean Ganga (NMCG), and other Sates would be considered.

(iii) In the case of new water projects, where possible, levy of appropriate user charges or water and sewerage taxes such that there is full recovery of operations and maintenance costs and partial recovery of capital costs would be pursued for exploring appropriate PPP models.

(iv) Endeavors shall also be made for the development of a wastewater reuse market, which would also make projects more commercially viable and sustainable in medium to long term.

(v) For additional investment needs, the State and ULBs should explore the feasibility of Municipal Bonds.

(vi) With the objective of securing additional financing for accelerating the improvement and expansion of investment and service delivery in the water sector, setting up a State level Financial Intermediary as a Special Purpose Vehicle (SPV) would be considered.

21. Data and Information Systems

(i) To achieve the State's Vision of water security through IWRM, significant data collection, analysis, information and knowledge will need to be generated and made available to all stakeholders. An IWRM information system should be developed for the integrated management of all water related data in the State, along three key dimensions: expanding water sector data gathering and access; creating systems of data analysis for decision support; and, knowledge generation and awareness building.

(ii) The nodal agency for data collection and management in the State, State Water Resources Data Analysis Centre (SWaRDAC) will facilitate the conversion of data into usable and actionable information at multiple levels. The analysis and decision support provided by SWaRDAC shall be in coordination with the digitization and data analysis efforts by various departments.

(iii) A dedicated State Ground Water Quality Assessment Program would be designed covering data points on ground water chemistry, periodic quality changes assessment and mapping the baseline.

(iv) An Open Data policy and data sharing programs should be encouraged for sharing available data with stakeholders to foster innovation.

(v) Special efforts such as Early Warning Systems for flood preparedness and accurate crisis response during floods and other disasters should be promoted.

22. Training and capacity building

(i) Water institutions are to be re-engineered to assume highly challenging sector responsibilities, professionally manage and improve service delivery and ensure cost effectiveness. In order to achieve this, training needs analysis of the Department needs to be carried out periodically.

(ii) There is a need to improve the quality of training and its outreach. The State shall identify potential institutions to be upgraded as 'centres of excellence' and support them in upgrading their infrastructure and other capacity to develop and impart state of the art training to different stakeholders, in a timely and effective manner. Such trainings shall also be made available on-line to enhance outreach.

(iii) Centres of Excellence will also be encouraged and supported to carry out action-research, on topics of importance, and use new knowledge for improving training content. They will also be supported partner with globally established training and research centres/ universities and international development organizations to bring global knowledge to the State.

23. Inter-State and Transboundary Rivers

(i) Water Resource Management with the Basin as the hydrological unit, would require cooperation with other basin States, especially for large basins such as the Ganga basin. Appropriate mechanisms including the alternative dispute resolution mechanisms for engaging States through arbitration or conciliation shall be promoted. All matters related with inter-State disputes over sharing, allocation, flow or transfer of pollution should be dealt with amicably within the legal and Constitutional regime on Inter-State Rivers under the Constitution of India, 1950.

(ii) Numerous trans-boundary/International Rivers and rivulets also flow into Uttar Pradesh from Nepal. A conducive and appropriate mechanism to participate in the Trans-boundary management and negotiating process should be evolved in consultation with the Central Government to protect the State from the adverse impacts of trans-boundary pollution, poor catchment management in the upstream, floods and disasters taking place in Nepal upstream.

24. The Institutional Framework

(i) In order to realize the Vision of this Policy to transform the State from a water stressed to a water secure State, a new knowledge based, transparent and participatory governance framework is needed by mainstreaming IWRM. Such a framework would confirm to the people's aspirations of democratization of water governance led by their elected representatives.

(ii) The State government will constitute an Inter-Ministerial Council to be called the Chief Minister's Water Security Council (*Mukhya Mantri Jal Suraksha Parishad*) to be headed by the Chief Minister with the Minister for Jal Shakti as the Convenor of the Council and will include the Ministers of Finance, Agriculture, Urban Development and Rural Development to take policy decisions and monitor the implementation of actions plans, strategies etc.

(iii) The existing State Water Board at the State level would be re-constituted as a Multi-Stakeholder Platform to be known as the Jal Shakti Committee (*Jal Shakti Samiti*) and be headed by Minister for Jal Shakti. It would comprise of the Additional Chief Secretary, Irrigation and Water Resources as the Convener and the Chief Secretary and other Secretaries from stakeholder departments and will have multi-stakeholder participation. The Jal Shakti Samiti will take all operational decisions as regards to the conservation, management of water resources in the State and will be supported by a Secretariat to aid and assist in the performance of its functions to be prescribed by the State government.

24.1 Restructuring of Jal Shakti Mantralaya

a) In view of the paradigm shift where River Basin is going to be the fundamental unit for the planning, management and implementation of water resources projects, a multi-tiered institutional structure is envisaged at the State level and Field level with eight River Basin Water Management Authorities devolving at a District, Development Block and Gram Sabha levels.

24.1.1 State Level Restructuring

a) The Jal Shakti Mantralaya, headed by the Minister for Jal Shakti, will have direct reporting by two Additional Chief Secretaries/Principal Secretaries: (i) Additional Chief Secretary/Principal Secretary for Water Supply and Sewerage (Urban and rural) and Namami Gange and (ii) Additional Chief Secretary/Principal Secretary (Irrigation and Water Resources).

b) Working under these two above officials would be Secretary level functionaries.

c) Heads of Department (HoDs) from functional departments such as Water Supply and Sewerage (urban and rural and Namami Gange), Minor Irrigation, Groundwater, Irrigation and Water Resources, Land Development and Water Resources, Parati Bhumi Vikas Vibhag and crop diversification, Micro-Irrigation and WUE. For schematic representation of the Jal Shakti Mantralaya State Level Reorganization please see Annex-1.

24.1.2 **Field Level Restructuring with four tiers**

a) Tier 1: A River Basin Water Management Authority would be set up for all the eight (08) main rivers (Ganga, Yamuna, Ramganga, Rapti, Ghaghara, Gandak, Gomti, Sone) of the State. This Authority will be a multi-departmental organization, which will include all departments related to water management. The River Basin Water Management Authority will also prepare River basin Management Plan for each of these rivers. The sub-basin level functionaries would work at a River Basin Management Authority level itself and assist the River Basin Management Authority in preparing basin and sub basin management plans. Officers of the basin authority and sub-basin units will be posted from the present departmental officers and minimum additional officers will be appointed.

b) Tier 2: The District Magistrate will implement the IWRM of the district as prepared by the River Basin Management Authority. There would be capacity enhancement of the concerned department officers. One officer of the water resources department will work as the Nodal officer for IWRM.

c) Tier 3: At the development block level, the Assistant Development Officer (IWRM) will implement the action plan of the development block with the help of officers posted at the development block level through Water Management Committees (WMCs)/ WUAs in the development block and all villages under it, in consultation with District level officers.

d) Tier 4: The Gram Sabha level action plan will be implemented through WMCs/ WUAs of the Village. Please see Annex -2 for a schematic representation of the Field Level Reorganization.

25. Legal Reforms

In view of the strategies including on participatory and inclusive governance involving private sector participation, amendments or alignment with the existing Acts, Rules, Byelaws and Notifications at the State level would be carried out, if found necessary after reviewing legal provisions across various Acts. An enabling legal framework to support the effective implementation of the State Water Policy would provide the necessary impetus for the desired outcomes.

26. State Water Policy Review

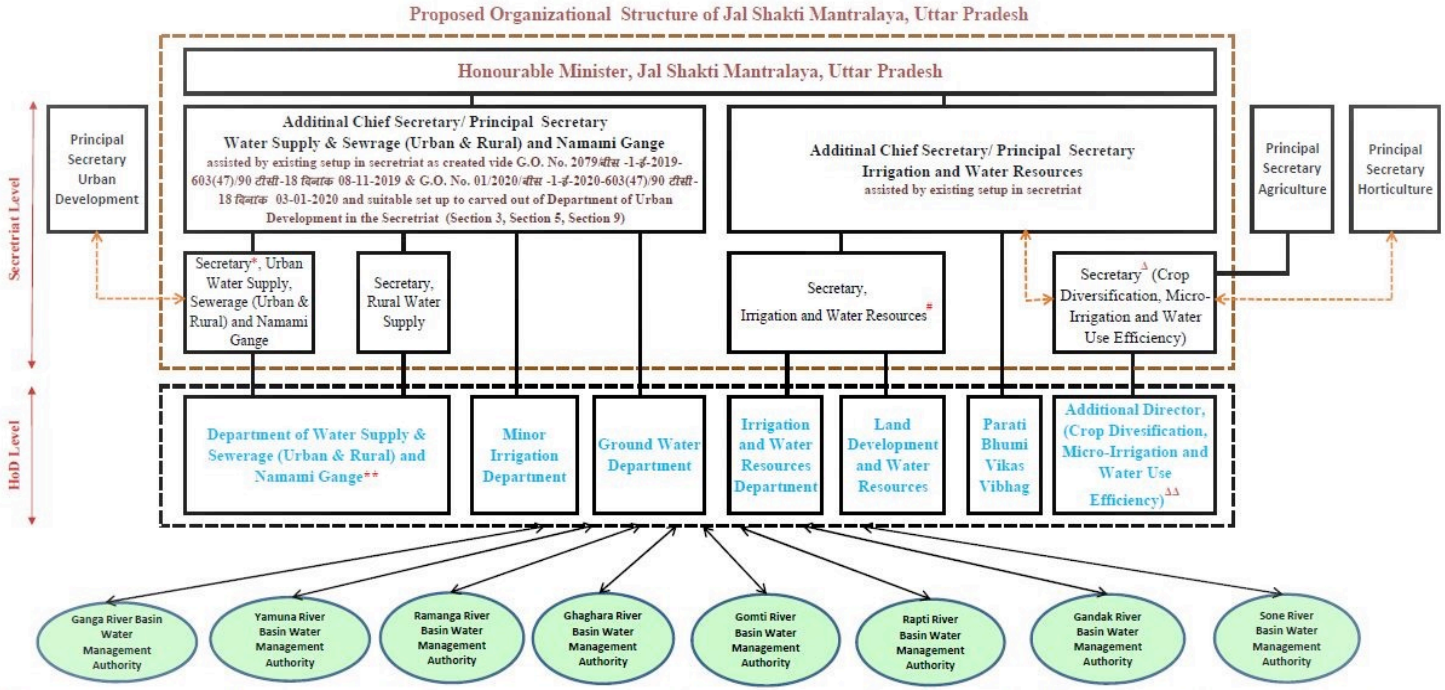
The State Water Policy Review is intended to be a dynamic policy document, to be revised periodically, to reflect future developments and management challenges in the water sector in the State.

27. Policy implementation plan

To ensure full-fledged, consistent and effective implementation of the State Water Policy, an implementation plan will be developed.

Annex-1

Jal Shakti Mantralaya State Level Restructuring



* Secretary, Urban Water Supply & Namami Gange will work under the adminastrative control of Principal Secretary [Water Supply & Sewrage (Urban & Rural) and Namami Gange], and also coordinate with Principal Secretary, Urban Development for smooth implementation of Water Supply and Sewerage works in Urban Local Bodies

Secretary, Irrigation and Water Resource will work under the adminastrative control of Principal Secretary, Irrigation & Water Resources and focus on IWRM, PIM, and Basin Managament Authorities

Δ Secretary (Crop Divesification, Micro-Irrigation and Water Use Efficiency) will work under the adminastrative control of Principal Secretary, Agriculture and also coordinate with Principal Secretary, Irrigation and Water Resources as well as Principal Secretary, Horticulture for smooth implementation of change in cropping pattern, micro-irrigation and water use efficiency as per approved Basin Management Pla

** Headed by a HoD. All officers posted at headquarter of Jal Nigam to be transferred to function in this department.

ΔΔ Additional Director (Crop Divesification and Water Use Efficiency) will work under Director, Agriculture and report through Secretary (Crop Divesification and Water Use Efficiency) to Principal Secretary, Agriculture and coordinate with HoD, Irrigation and Water Resources Department & HoD, Department of Horticulture.

Either work profile of Additioinal Director (Soil) in Agriculture department enlarged to included crop diversification and Water Use Efficiency
Or Work of Additional Director (Soil) & Additional Director (Extension) should be reorganized and one post of Additinal Director (Crop Divesification and Water Use Efficiency) shall be craeted.

Annex-2

Jal Shakti Mantralaya Field level Reorganization