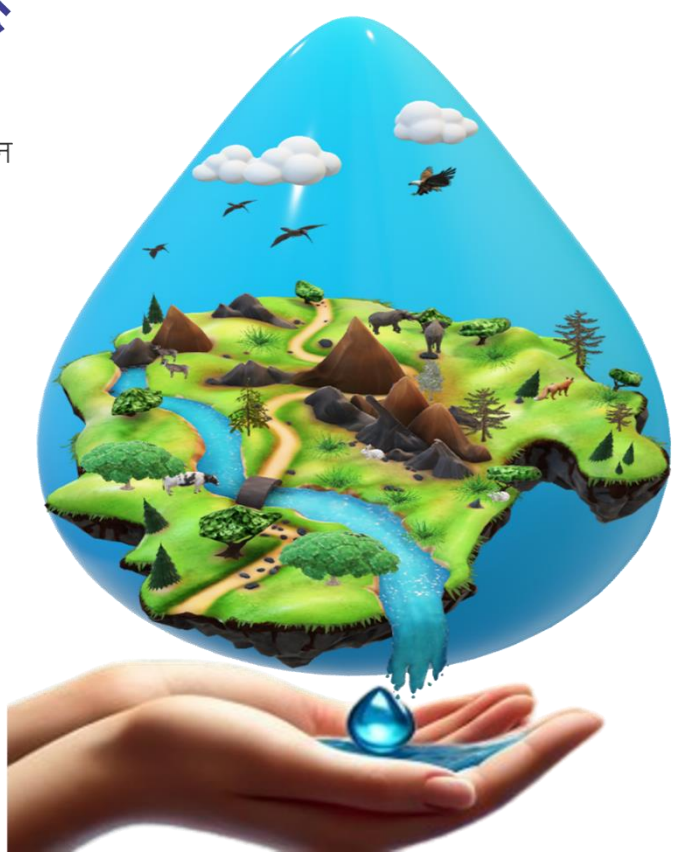
WATER CONSERVATION STRATEGIES FOR UTTARAKHAND

उत्तराखण्ड शासन



Water for Welfare: An Uttarakhand Initiative

Prepared by

Department of Hydro and Renewable Energy

Indian Institute of Technology Roorkee

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Abbreviations

JSA	Jal Shakti Abhiyan
RD & GR	River Development and Ganga Rejuvenation
DoWR	Department of Water Resources
UTs	Union Territories
CGWB	Central Ground Water Authority
NOCs	No Objection Certificates
BCM	Billion Cubic Metres
NGOs	Non-governmental Organizations
PSUs	Public Sector Undertakings
IEC	Information, Education & Communication
NRM	Natural Resources Management
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
PMKSY	Pradhan Mantri Krishi Sinchayee Yojana
IWMP	Integrated Watershed Management Programme
CADWM	Component and Command Area Development & Water Management
PMKSY WDC	Pradhan Mantri Krishi Sinchayee Yojana – Watershed Development Component
DoLR	Department of Land Resources
MBBL	Model Building Bye-Laws
ABHY	Atal Bhujal Yojana
DO	Demi Official
ICICI	Industrial Credit and Investment Corporation of India.
GIS	Geographic Information System
WWF	Worldwide Fund for Nature
LIS	Lift Irrigation Scheme
STPs	Sewage Treatment Plants
WUAs	Water User Associations
SHGs	Self-Help Groups

ISO	International Standards Organization
MoHUA	Ministry of Housing and Urban Affairs
CPHEEO	Central Public Health and Environmental Engineering Organisation
BIS	Bureau of Indian Standards
SDG	Sustainable Development Goals
IWRM	Integrated Water Resources Management
CGM	Chief General Manager
MD	Managing Director

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1. INTRODUCTION

Water is an essential component of human life, constituting approximately 60% of our body weight. However, access to clean and fresh water is increasingly becoming a global challenge. Despite Earth being predominantly covered by water, most of it is saltwater and requires desalination for human consumption. Droughts further exacerbate water scarcity, limiting access to this vital resource. Water scarcity is a critical challenge in India, a nation blessed with abundant water resources. India, with 16% of the global population, possesses only 4% of the world's freshwater resources, making it particularly vulnerable to water scarcity. This scarcity is further compounded by the fact that half of India's rural population, which constitutes 70% of the country, relies on water sources contaminated with toxic bacteria. This contamination contributes to significant health issues, with 600,000 Indian children succumbing to diarrhea or pneumonia each year, often linked to poor water quality and hygiene.

This escalating demand, coupled with inefficient water management practices, pollution, and the impacts of climate change, has resulted in a severe water crisis across many parts of India. Rising global temperatures are accelerating glacial melt in the Himalayas, altering river flow patterns, and reducing the natural availability of freshwater during dry seasons. Furthermore, the increase in heatwaves and high temperatures intensifies evaporation rates, decreases surface water levels in lakes and reservoirs, and increases overall water demand, especially in agriculture and domestic use. Climate change has also led to erratic and unpredictable rainfall patterns—long dry spells followed by sudden, intense rainfall events—making it difficult to effectively manage water resources and causing both droughts and flash floods. These climatic extremes not only disrupt agriculture but also damage water infrastructure and lead to soil erosion and reduced groundwater recharge.

The agricultural sector, which consumes nearly 80% of the country’s freshwater, is particularly vulnerable. It requires an estimated 1550 liters of water to produce just 1 kilogram of wheat. This high-water demand, when combined with a growing population and climate-induced stress on water availability, puts immense pressure on India's finite water resources. Moreover, the declining availability of clean water is creating significant challenges across various sectors of the

economy. Industries, especially those reliant on consistent and quality water supply, like manufacturing, are facing operational difficulties, leading to reduced productivity and employment losses.

In view of the rapidly growing population, over-exploitation of groundwater resources, pollution of water bodies, and the worsening impacts of climate change—such as glacial retreat, increased heat, and disrupted rainfall—there is an urgent need for a holistic and integrated approach to water conservation. This includes optimizing water use efficiency, promoting wastewater treatment and reuse, adopting sustainable agricultural practices, and increasing public awareness on water conservation. These actions must be prioritized at both policy and community levels to ensure long-term water security and sustainability in a changing climate. In this report, we will be discussing various water conservation practices as well as the existing regulations and policies for water conservation. Based on this analysis, the most suitable and effective practices that can be implemented specifically in the context of Uttarakhand will be proposed.

2. WATER CONSERVATION METHODS

Water demand has historically exceeded supply, and with a rapidly growing global population, water conservation has become more critical than ever. Freshwater resources are under increasing pressure due to urbanization, industrial growth, and changing lifestyles, particularly in water-stressed countries like India. Cities such as Bengaluru have already faced severe water shortages, relying heavily on water tankers for daily needs. Despite the pressing nature of this crisis, water conservation remains a neglected priority, and urgent action is needed to ensure long-term availability.

Both large-scale technological solutions and small-scale everyday practices can significantly contribute to water conservation. While advanced technologies like water-saving appliances and conservation systems offer significant long-term benefits, the majority of water-saving measures can be implemented at minimal cost by individuals in their daily lives. Advanced innovations such as greywater recycling systems allow households to reuse water from showers, basins, and laundry for secondary purposes like toilet flushing and irrigation. Rainwater harvesting provides an alternative water source for non-potable uses, while efficient irrigation systems, such as smart controllers and drip irrigation, minimize outdoor water wastage. Water-efficient fixtures, including low-flow toilets, aerated taps, and water-saving showerheads, help reduce household consumption, while pressure-reducing valves and insulated pipes prevent unnecessary water loss.

In industries, treated wastewater can replace freshwater in cooling systems, boiler feed, and cleaning processes, reducing dependence on limited freshwater resources.

At an individual level, simple lifestyle adjustments can lead to significant water savings. Upgrading to ultra-low flush or dual-flush toilets can reduce indoor water use by 30% while using washing machines only for full loads and choosing energy-efficient models can cut water consumption by up to 50%. Taking shorter showers, fixing leaking faucets and pipes, using a bucket instead of a hose when washing cars, and turning off the tap while brushing teeth are all low-cost yet highly effective conservation measures.

Water is a finite resource, and ensuring its conservation requires collective responsibility. Engineers, policymakers, and urban planners must integrate water-efficient technologies into infrastructure, while individuals must adopt mindful consumption habits in their daily lives. Only through a combination of innovation, policy interventions, and behavioral changes can we secure water availability for future generations and prevent the worsening of global water scarcity.

3. NATIONAL SCHEMES AND ACTION PLAN FOR WATER CONSERVATION

(i). The government of India launched Jal Shakti Abhiyan (JSA) in 2019, a time-bound campaign with a mission-mode approach intended to improve water availability, including groundwater conditions in the water-stressed blocks of 256 districts in India. In this regard, teams of officers from the Central Government, along with technical officers from the Ministry of Jal Shakti, were deputed to visit water-stressed districts and to work in close collaboration with district-level officials to undertake suitable interventions. 'Jal Shakti Abhiyan – Catch the Rain' campaign for the year 2021 was launched by the Hon'ble Prime Minister of India on 22 March 2021. 'Jal Shakti Abhiyan – Catch the Rain-2022' was launched by the Hon'ble President of India on 29.03.2022.

(ii). National Water Policy (2012) has been formulated by the Department of Water Resources, RD & GR, which advocates rainwater harvesting and conservation of water and highlights the need to augment the availability of water through direct use of rainfall. It also inter-alia, conservation of rivers, river bodies, and infrastructure should be undertaken in a scientifically planned manner through community participation. Further, encroachment and diversion of water bodies and drainage channels must not be allowed, and wherever it has taken place, it should be restored to the extent feasible and maintained properly.

(iii). The Ministry has circulated a Model Bill to all the States/UTs to enable them to enact suitable groundwater legislation for the regulation of its development, which also includes the provision of rainwater harvesting. So far, 19 States/UTs have adopted and implemented the groundwater legislation.

(iv). Central Ground Water Authority (CGWA) has been constituted under Section 3(3) of the "Environment (Protection) Act, 1986" for the purpose of regulation and control of groundwater development and management in the Country. CGWA has advised states/UTs to take measures to promote/adopt artificial recharge for groundwater/rainwater harvesting. CGWA grants No Objection Certificates (NOCs) for groundwater abstraction to Industries, Infrastructure units, and Mining projects in feasible areas in certain States/UTs where regulation is not being done by the respective states/UTs. The latest guidelines for the control and regulation of groundwater extraction with pan-India applicability were notified by the Ministry on 24 September 2020.

(v). The Master Plan for Artificial Recharge to Groundwater- 2020 has been prepared by CGWB in consultation with states/UTs. It is a macro-level plan indicating various structures for the different terrain conditions of the country, including estimated costs. The Master Plan envisages the construction of about 1.42 crore Rainwater harvesting and artificial recharge structures in the Country to harness 185 Billion Cubic Metres (BCM) of monsoon rainfall.

(vi). CGWB has taken up the Aquifer Mapping and Management Programme under the scheme of Ground Water Management and Regulation. The Aquifer Mapping is aimed to delineate aquifer disposition, and their characterization for the preparation of aquifer/area-specific groundwater management plans with community participation. The management plans are shared with the respective State governments for taking appropriate measures/implementation.

(vii). Best practices of water conservation by various entities, including private persons, NGOs, PSUs, etc, have been compiled and put on the website of the Ministry for the benefit of the general public. An interactive link on best practices has also been created for receiving inputs from the public, which, after necessary evaluation/validation, are put on the website for the benefit of the public.

(viii). Department of Water Resources, RD& GR has instituted National Water awards to incentivize good practices in water conservation and groundwater recharge.

(ix). Mass awareness programs (Training, Seminars, Workshops, Exhibitions, Trade Fares, Painting Competitions, etc.) are conducted from time to time each year under the Information, Education & Communication (IEC) Scheme of DoWR, RD & GR in various parts of the Country to promote rainwater harvesting and artificial recharge to groundwater. The Ministry of Rural Development, in consultation and agreement with the Department of Water Resources, RD & GR, and the Ministry of Agriculture & Farmers' Welfare, has developed an actionable framework for Natural Resources Management (NRM) titled "Mission Water Conservation" to ensure gainful utilization of funds. The Framework strives to ensure synergies in Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), erstwhile Integrated Watershed Management Programme (IWMP), now PMKSY- Watershed Development Component and Command Area Development & Water Management (CADWM), given their common objectives. Types of common works undertaken under these programs/ schemes are water conservation and management, water harvesting, soil and moisture conservation, groundwater recharge, flood protection, land development, Command Area Development & Watershed Management.

(x). Central Government supports the construction of water harvesting and conservation works primarily through the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) and Pradhan Mantri Krishi Sinchayee Yojana – Watershed Development Component (PMKSY WDC).

(xi). A joint advisory of the Department of Rural Development (DoRD), Department of Water Resources, RD & GR (DoWR, RD & GR), Department of Land Resources (DoLR), and Department of Drinking Water & Sanitation (DoDWS) has been issued on 24.04.2020 to all States/UTs to emphasize efforts in the area of water conservation and water management in the country. The activities include augmentation of existing water sources(s), groundwater recharge, rainwater harvesting, and greywater management and recharge.

(xii). Model Building Bye Laws (MBBL) 2016, circulated by the Ministry of Housing & Urban Affairs, include provisions for Rainwater Harvesting, and it has been shared with all the

States / UTs. So far, 35 states / UTs have adopted the provisions for rainwater harvesting in the MBBL 2016.

(xiii). Atal Bhujal Yojana (ABHY), a Rs.6000 crore scheme with World Bank funding for sustainable management of groundwater with community participation, is being taken up in the identified over-exploited and water-stressed areas fall in the States of Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan, and Uttar Pradesh. This scheme is expected to contribute significantly towards the water and food security of the participating States.

(xiv). The Hon'ble Prime Minister launched the Amrit Sarovar Mission on 24th April 2022. The Mission is aimed at developing and rejuvenating 75 water bodies in each district of the country as a part of the celebration of Azadi ka Amrit Mahotsav.

(xv). A D.O. letter M-11015/124/2021-CB dated 31st March 2022 has been written by the Secretaries of Department of Health & Family Welfare, Ministry of Panchayati Raj, Department of Drinking Water & Sanitation, Ministry of Women & Child Development, Department of Agriculture and Farmers Welfare, Department of Water Resources, RD & GR, Department of Land Resources and Department of Rural Development to Chief Secretaries of all States/UTs bringing out the urgent steps needed to make the villages in the country water sufficient by engaging the communities through participatory mode.

(xvi). The 1st All India Annual States' Ministers Conference on Water 'Vision@2047' was organized during 05-06 Jan 2023 at Bhopal with an objective to deliberate on Water Vision for India for the next 25 years and to discuss the way forward to optimally utilize water resources for holistic economic and human development in a sustainable manner.

4. BEST WATER CONSERVATION PRACTICES IN INDIA

4.1 Rooftop Rainwater Harvesting Initiatives

A rooftop rainwater harvesting structure collects and stores rainwater from building roofs. This sustainable system channels rain through gutters into storage tanks or recharge pits, reducing water runoff, replenishing groundwater, and providing a supplementary water source for domestic or agricultural use, promoting efficient water management and conservation. Rooftop rainwater harvesting involves collecting and storing rainwater from building roofs for future use. This eco-

friendly method reduces dependence on groundwater, minimizes runoff, and helps conserve water. The collected water can be used for irrigation, household purposes, or groundwater recharge, promoting sustainability and reducing water scarcity issues.

The plain region of Uttarakhand faces severe water shortages due to deforestation, changing agricultural practices, population growth, and other human activities. To address this, the ICICI Foundation installed 100 rooftop rainwater harvesting structures in government schools of Udham Singh Nagar in 2024. These systems, capable of saving 23 lakh liters of water annually, not only store rainwater but also raise awareness about water conservation and contribute to groundwater recharge. In Udham Singh Nagar, schools are pioneering innovative rooftop rainwater harvesting systems to combat water scarcity and foster sustainability. These systems collect rainwater from rooftops, directing it through filtered pipes into storage tanks. This filtered water is used for non-potable purposes like sanitation and gardening. Furthermore, excess water is channeled into groundwater recharge pits to replenish the local aquifer. By implementing these systems, schools are reducing reliance on external water sources while educating students about environmental conservation and sustainable water management practices.

Furthermore, IIT Roorkee has implemented a rainwater harvesting system featuring both Rainwater Harvesting and Storage and Recharge models (Fig. 1). The Rainwater Harvesting-Storage Model, covering 425 sq.m, utilizes Recharge Pits and Shafts to demonstrate indirect recharge methods, with an anticipated annual storage capacity of 3.5 Lacs Liters (0.35 ML). The Recharge through Tube Well model, spanning 915 sq.m, is expected to recharge an estimated 7.5 Lacs Liters (0.75 ML) of water annually. These initiatives at IIT Roorkee serve as excellent examples of how rainwater harvesting can be effectively implemented to address water scarcity and promote sustainable water management within educational institutions. The successful implementation of rooftop rainwater harvesting systems in Udham Singh Nagar schools demonstrates its potential across Uttarakhand. Expanding this approach to residential areas, commercial establishments, agricultural lands, and all government buildings, including educational institutions like IIT Roorkee, can significantly reduce reliance on external water sources, alleviate pressure on groundwater, and promote water conservation. To effectively implement this, the state can incentivize adoption through subsidies and tax breaks, conduct public awareness campaigns, provide training programs,

and address technical challenges like water quality and infrastructure. This multi-pronged approach can ensure the widespread adoption of rooftop rainwater harvesting, making it a cornerstone of sustainable water management in Uttarakhand.

Fig. 1: Rooftop rainwater harvesting system installed at the Department of Water Resources Development & Management, IIT Roorkee. The system utilizes a combination of recharge pits and recharge shafts for effective groundwater recharge, as illustrated in images (a), (b), and (c).

4.2 Groundwater Recharge Initiatives

Groundwater recharge structures are designed to enhance the natural process of groundwater replenishment by directing surface water into the ground, allowing it to percolate through the soil and reach aquifers. The primary objectives of these structures include aquifer recharge, water conservation, flood mitigation, and water quality improvement. These structures have several impactful outcomes, such as increased groundwater levels, enhanced water availability, soil conservation, improved water quality, and sustainable water management, while also contributing to flood mitigation. Recent innovations in groundwater recharge, including Smart Recharge Systems,

Subsurface Dams, Recharge Shafts, Permeable Pavements, the utilization of Remote Sensing and GIS, and the restoration of wetlands, are helping to improve the efficiency and effectiveness of these efforts. Recognizing the importance of groundwater recharge, Swajal, Peyjal Nigam, and Rural Development initiated the construction of various recharge structures, including Recharge shafts, Recharge pits, Percolation Ponds, and Injection wells, under the Recharge of Groundwater Initiatives in Udham Singh Nagar in the year 2024 (Fig. 2).

Diversion of flood surplus water from Mettur dam to the dry tanks in the Sarabanga basin in Salem district by lift irrigation, implemented by the Water Resources Department, Government of Tamilnadu, is an innovative project that demonstrates a successful approach to addressing water scarcity in a region facing significant challenges. By effectively utilizing excess floodwater from a major reservoir, the initiative not only improves agricultural productivity and ensures water security for the local population but also contributes to environmental sustainability by replenishing groundwater resources. This model of inter-basin water transfer through a combination of pumping and gravity can serve as a valuable blueprint for other regions grappling with similar water scarcity issues, showcasing the potential for sustainable and equitable water resource management.

Fig. 2: Groundwater recharge structure constructed in Udham Singh Nagar. (Source: National Water Mission, Ministry of Jal Shakti, Department of Water Resources, RD & GR, Government of India).

Groundwater recharge techniques offer significant potential for mitigating water scarcity in various parts of Uttarakhand. In hilly regions like the Garhwal and Kumaon Himalayas, percolation ponds, check dams, and rainwater harvesting structures can be effectively implemented to

capture and store rainwater, replenish aquifers, and mitigate soil erosion. In urban areas like Dehradun, Haridwar, and Udham Singh Nagar, rainwater harvesting on rooftops and buildings, permeable pavements, and the creation of green spaces can significantly enhance groundwater recharge. In agricultural areas such as Udham Singh Nagar, techniques like contour bunding, terracing, and gully plugging can effectively reduce soil erosion and improve water infiltration. By strategically implementing these techniques in specific locations, Uttarakhand can effectively address water scarcity challenges, improve water security, and enhance the overall sustainability of its water resources.

4.3 Revival of Traditional Water Bodies

The revival of traditional water bodies is crucial for water conservation. Construction of Amrit Sarovars, enhancing the water storage capacity of minor irrigation tanks, Bawadi Renovation, Tank Desilting under Jal Ganga Samvardhan, and Restoration of Traditional Water Sources are some of the initiatives implemented in different areas under the revival of Traditional water bodies theme (Fig. 3). The major objectives include water conservation, increased irrigation area, increased groundwater level, community revitalization, environmental sustainability, tourism development, historical preservation, water table recharge, and improved health and hygiene. These initiatives not only increase water storage capacity but also recharge groundwater, enhance irrigation, and improve soil moisture. By restoring these traditional water sources, we can mitigate water scarcity, promote sustainable agriculture, and improve the livelihoods of local communities while also preserving valuable cultural and historical heritage.

Reviving traditional water bodies presents a vital strategy for water conservation in Uttarakhand. In the hilly districts of Uttarkashi, Chamoli, Pithoragarh, and Bageshwar, the restoration of springs (dharas) and naulas is essential for enhancing groundwater recharge and ensuring reliable local water sources. In regions such as Nainital and Almora, rehabilitating traditional ponds and tanks can significantly boost water storage capacity, support irrigation needs, and contribute to sustainable tourism initiatives. For agriculturally intensive districts like Udham Singh Nagar, improving the capacity of existing minor irrigation tanks and integrating them with rainwater harvesting systems can enhance agricultural productivity and mitigate water shortages during dry spells. Similarly, in the urbanizing districts of Haridwar and Dehradun, reviving traditional wells and linking them with rainwater harvesting infrastructure can help supplement the domestic and

industrial water supply. By restoring these traditional water bodies, Uttarakhand not only addresses growing water scarcity but also strengthens rural livelihoods, supports sustainable agriculture, and preserves the region's rich cultural and ecological heritage.

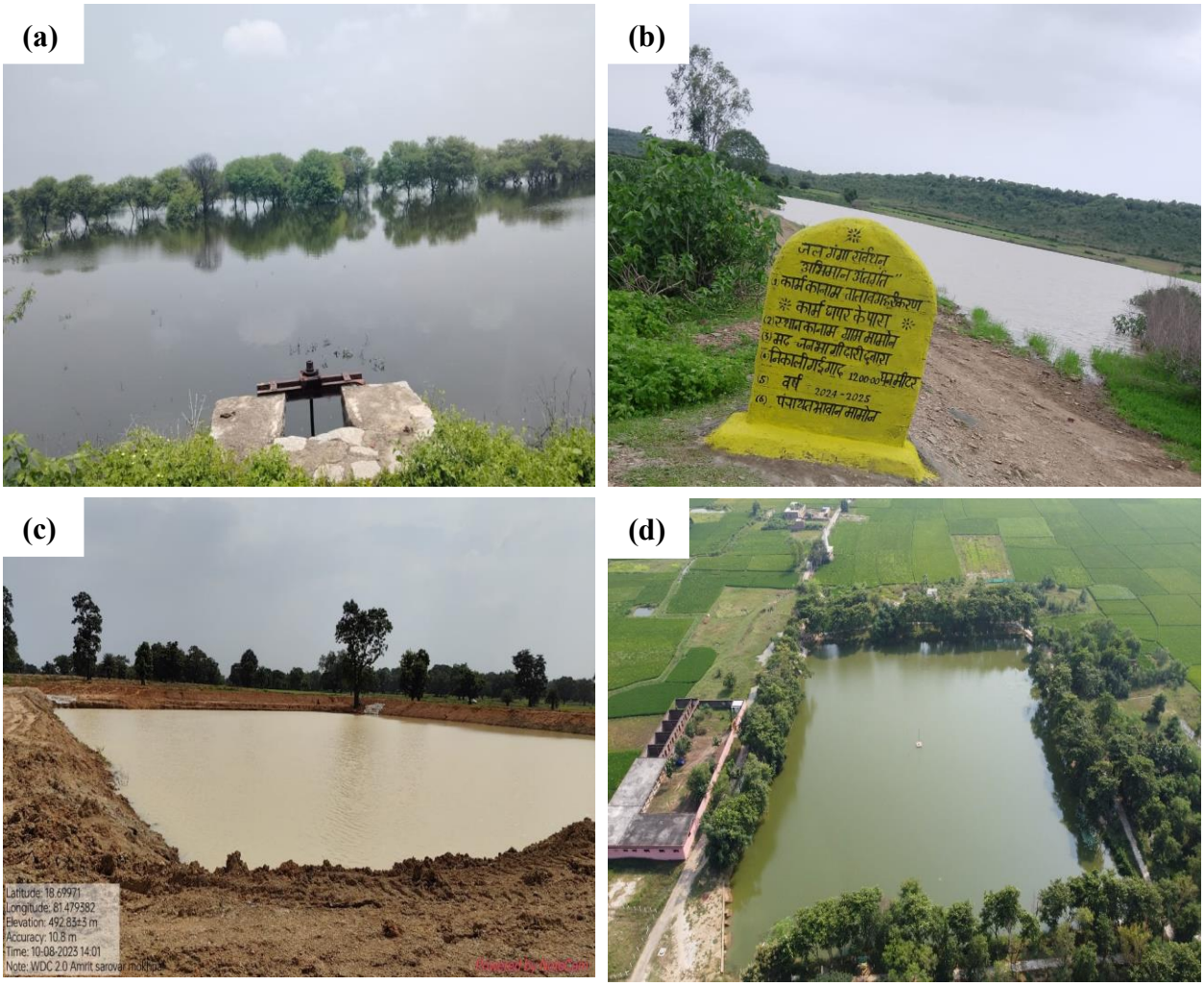

Fig. 3: Water body restoration initiatives, (a) & (b) Restored water tanks after de-silting in Yadgir (Karnataka) and Mamon (Madhya Pradesh). (c) & (d) Newly constructed Amrit Sarovars in Mokhpal (Chhattisgarh) and Buxar (Bihar). (Source: National Water Mission, Ministry of Jal Shakti, Department of Water Resources, RD & GR, Government of India).

4.4 Small River Rejuvenation Initiative

Small river rejuvenation initiatives are crucial for maintaining ecological balance, ensuring water security, and improving the overall quality of life in many regions. These initiatives focus on restoring the ecological integrity of small rivers and their surrounding ecosystems, which are often facing significant pressures from human activities such as urbanization, industrialization, and unsustainable agricultural practices. By addressing issues like pollution, habitat degradation,

and altered flow regimes, these initiatives aim to enhance water quality, improve biodiversity, and re-establish the natural functioning of riverine systems. A notable example of a successful rejuvenation effort is the multi-stakeholder initiative undertaken to restore the Aril River, a tributary of the Ramganga River in Uttar Pradesh (Fig. 4). Spearheaded by the District Administration of Bareilly in collaboration with WWF-India, this initiative highlighted the importance of wetlands in sustaining river health. It adopted a holistic and collaborative approach involving various stakeholders—government agencies, local communities, farmers, technical experts, and academic institutions. Through a comprehensive assessment of wetlands within the Aril River basin, key challenges such as siltation, invasive species, and pollution from agricultural runoff were identified. Based on this analysis, three priority wetlands were selected for restoration with a focus on improving water flow, enhancing biodiversity, and tackling the root causes of degradation.

A key feature of this initiative was its strong emphasis on community engagement. Local communities were actively involved in all stages of the project, from planning and implementation to monitoring and evaluation. This approach not only ensured the sustainability of restoration efforts but also empowered local communities to become stewards of their local environment. The results of this initiative have been significant. Wetland restoration activities, such as the creation of new inlets and the removal of invasive weeds, have improved water flow into the wetlands and enhanced their ecological health. These restored wetlands, in turn, have contributed to improved water quality and increased flows in the Aril River. Furthermore, the initiative has promoted sustainable agricultural practices among local farmers, reducing the negative impacts of agriculture on the river and its tributaries.

This case study illustrates the effectiveness of integrating scientific knowledge, participatory governance, and collaborative implementation for successful small river restoration. It serves as a valuable model for Uttarakhand, where numerous rivers—including the Ganga, Yamuna, Alaknanda, Dhauliganga, Kosi, Ramganga, and Tons—are facing similar ecological stress. Adapting this approach to Uttarakhand's context, with its unique topography, climate variability, and community dynamics, can help restore river health across the state. However, challenges such as mountainous terrain, rising temperatures, changing rainfall patterns, and the need for sustained community involvement must be strategically addressed.

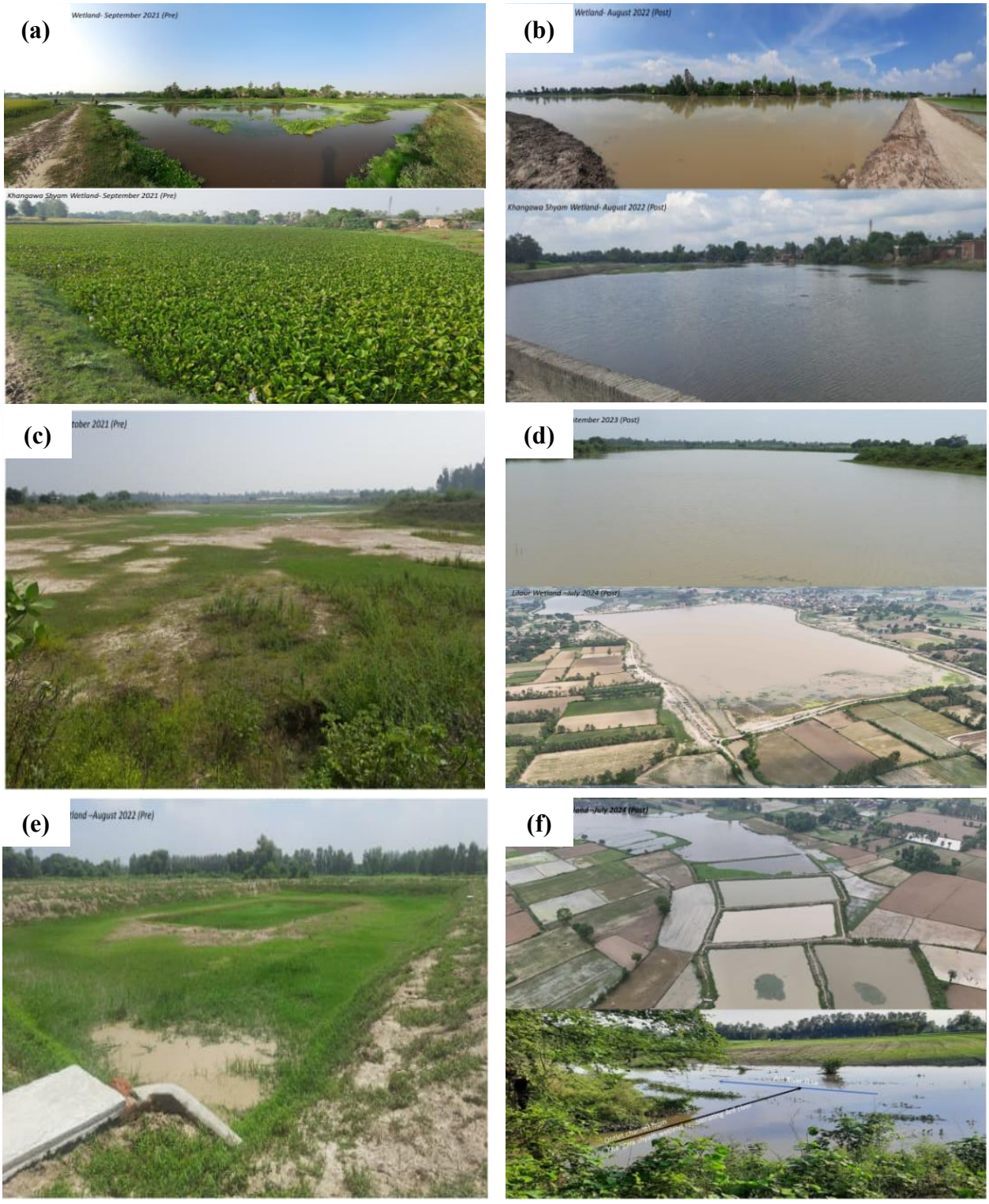

Fig. 4: Wetland restoration in river catchments, where (a), (c), & (e) depict pre-restoration and (b), (d), & € showcase post-restoration images of Khangawa Shyam wetland, Lilaur wetland, and Bahoda Kheda wetland, respectively. (Source: National Water Mission, Ministry of Jal Shakti, Department of Water Resources, RD & GR, Government of India).

By incorporating innovative techniques like bioengineering, strengthening monitoring systems, and fostering inclusive participation, Uttarakhand can work toward the long-term rejuvenation of its river ecosystems, strengthening both environmental sustainability and water security for its people.

4.5 Water Use Efficiency Initiatives

Water scarcity is impacting agricultural productivity and food security. To address this critical issue, innovative water use efficiency initiatives are crucial. These initiatives focus on optimizing water usage in agriculture by minimizing losses, maximizing crop yields, and promoting sustainable water management practices. One such promising example is the Mobile Lift Irrigation Scheme (L.I.S.) implemented in Boko, Assam, India (Fig. 5). This scheme utilizes solar-powered pumps mounted on a floating platform constructed from recycled materials. The mobility of this system allows farmers to efficiently irrigate different areas within a water source, optimizing water distribution and minimizing wastage. The Mobile L.I.S. in Boko serves as a valuable model for other regions facing water scarcity. By embracing innovative technologies, promoting sustainable practices, and engaging with local communities, water use efficiency initiatives can play a crucial role in ensuring food security and building resilient agricultural systems.

The Mobile L.I.S., which was successfully implemented in Assam, offers a valuable model for enhancing water use efficiency in Uttarakhand. This innovative system, utilizing solar-powered pumps mounted on a mobile platform, allows for efficient irrigation of different areas within a water source, minimizing wastage and optimizing water distribution. In Uttarakhand, where water scarcity is a growing concern, particularly during dry seasons, the mobile L.I.S. can be adapted to suit the unique needs of various regions. By embracing this technology, along with other water-saving practices and community engagement, Uttarakhand can significantly improve agricultural productivity, enhance food security, and build more resilient agricultural systems. However, its successful implementation in Uttarakhand's mountainous terrain faces certain challenges. These include accessibility issues due to rugged terrain and steep slopes, potential limitations in solar power generation due to variable weather conditions, logistical challenges in accessing remote locations for maintenance and repairs, the need for comprehensive farmer training, and the initial investment costs associated with the system. Despite these challenges, careful planning, site-spe-

cific adaptations, and government support can mitigate these issues and ensure the successful implementation of mobile L.I.S., contributing significantly to water conservation and agricultural productivity in Uttarakhand. By integrating innovative solutions like Mobile L.I.S. regions facing water shortages can optimize water use, reduce losses, and improve agricultural productivity. Implementing these technologies alongside policy support, farmer training, and infrastructure investments—can significantly contribute to water conservation and sustainable resource management.

Fig. 5: Solar-powered mobile lift irrigation scheme in Boko, Assam. (Source: National Water Mission, Ministry of Jal Shakti, Department of Water Resources, RD & GR, Government of India).

4.6 Water Conservation in Hilly Areas

Water conservation in hilly areas is crucial due to the unique challenges posed by the terrain. Steep slopes, high rainfall intensity, and rapid runoff can lead to soil erosion, landslides, and water scarcity during dry seasons. Effective water conservation practices in these regions are essential for sustainable agriculture, maintaining ecological balance, and mitigating the impacts of climate change. The implementation of a check dam in Tatalgera, a hilly region of Karnataka, India, exemplifies a successful water conservation strategy (Fig. 6). Faced with challenges such as rapid runoff, soil erosion, and depleted groundwater levels, the construction of the check dam has

effectively mitigated these issues. By slowing down the flow of water, the check dam has significantly reduced soil erosion, increased groundwater recharge, and improved water availability for agricultural purposes. This has resulted in increased crop yields for local farmers and recharged borewells, providing a reliable source of water for irrigation and domestic use. This case study demonstrates the effectiveness of simple yet impactful interventions like check dams in conserving water resources and enhancing the livelihoods of communities in hilly areas.

The successful implementation of check dams in Tatalgera, Karnataka, provides a valuable model for water conservation in Uttarakhand's hilly terrain. By mitigating rapid runoff and soil erosion, check dams effectively increase groundwater recharge and improve water availability for agriculture and domestic use. In Uttarakhand, where steep slopes, high rainfall intensity, and seasonal water scarcity are prevalent, check dams can significantly enhance water security. Careful site selection, appropriate design, community participation, and regular maintenance are crucial for the successful implementation and long-term sustainability of these structures. By integrating check dams with other water conservation measures like afforestation and rainwater harvesting, Uttarakhand can effectively address water scarcity and promote the overall sustainability of its water resources.

Another innovative solution for water conservation and efficient usage is the construction of the Rubber Dam. Rubber dams are designed to store water during high-flow seasons and release it during dry periods, ensuring a steady water supply for agricultural, industrial, and domestic purposes. Additionally, they play a crucial role in flood control by regulating water flow and mitigating flood risks. By slowing down river flow, rubber dams enhance groundwater recharge, improving the availability of water in surrounding regions[1] (Fig. 7). Moreover, these dams can be integrated with small-scale hydropower plants, contributing to renewable energy production. The potential applications of rubber dams extend to various sectors. In agriculture, they ensure a reliable water supply for irrigation, helping farmers increase crop yields and productivity. In urban and industrial settings, they support municipal water distribution systems by stabilizing water sources. Rubber dams are also valuable for reviving small rivers and traditional water bodies, ensuring their resilience to seasonal fluctuations. Additionally, they create reservoirs that can support eco-tourism

[1] Arun Kumar, 'Water Conservation Technologies', in *Hydraulic Rubber Dam: An Effective Water Management Technology*, 2018, pp. 11–24 <https://doi.org/10.1016/B978-0-12-812210-5.00002-X>.

and fisheries, providing socio-economic benefits alongside water conservation. Rubber dams contribute significantly to water conservation by reducing water loss, improving storage efficiency, and promoting sustainable water use. By retaining excess water during monsoons and gradually releasing it when needed, rubber dams prevent wastage and reduce dependency on over-extraction from groundwater sources. Their ability to support multiple sectors, including agriculture, energy, and urban water supply, makes them a key technology in enhancing water use efficiency.

Fig. 6: Check dam in Telangana. (Source: National Water Mission, Ministry of Jal Shakti, Department of Water Resources, RD & GR, Government of India).

The implementation of rubber dams and check dams presents significant potential for water conservation in Uttarakhand, particularly in light of the region's growing water scarcity, climate

variability, and uneven rainfall distribution. Rubber dams, which are inflatable and flexible structures typically installed across small rivers and seasonal streams, offer a dynamic and efficient way to manage water. These structures can store excess rainwater during the monsoon season and release it gradually during dry periods, thereby helping to regulate river flow, prevent flooding, and ensure consistent water availability for agriculture, domestic use, and hydropower generation. Their ability to be inflated and deflated makes them highly adaptable to the topography and seasonal water flow variations common in Uttarakhand's mountainous regions. Moreover, rubber dams can play a key role in rejuvenating dried-up streams and supporting the restoration of degraded water bodies. However, their implementation requires comprehensive feasibility assessments, including geological and hydrological surveys, cost-benefit analysis, and long-term maintenance planning. Policy support and institutional coordination will also be essential to ensure their success.

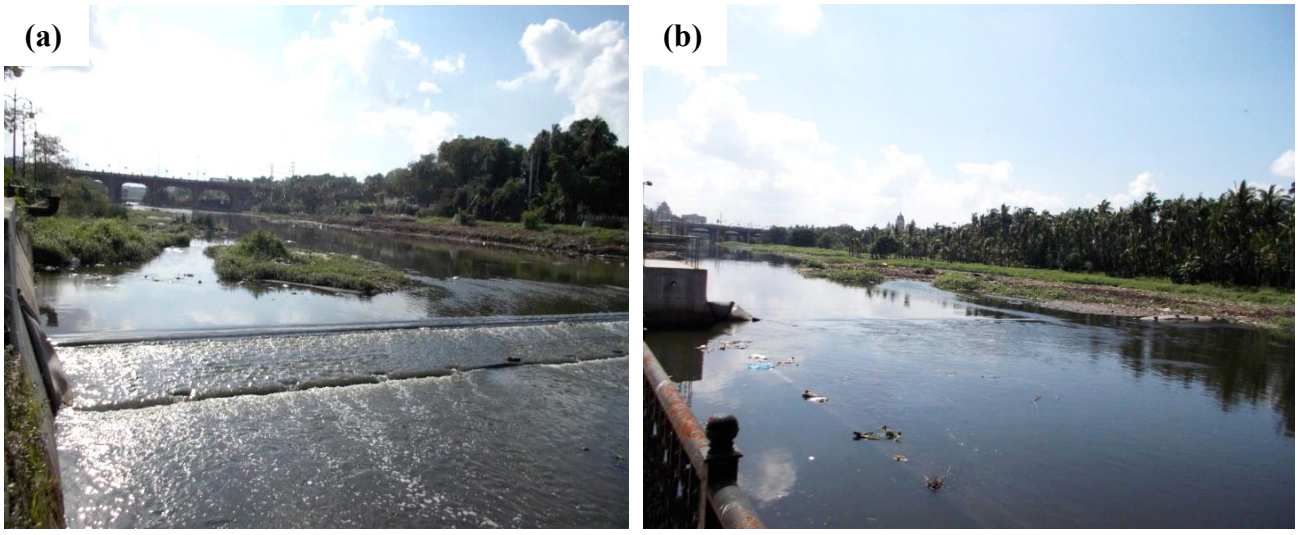

Fig. 7: Rubber dams in India on the Musi River, Hyderabad (a) Near S.J. Museum & (b) Near High Court[2].

In addition to rubber dams, the construction of check dams remains a proven and widely applicable method for water conservation in hilly areas. Check dams, which are small barriers built across streams, help slow down surface runoff, promote groundwater recharge, and reduce soil erosion. Strategically constructing check dams along key rivers such as the Alaknanda and

[2] Arun Kumar, 'Water Conservation Technologies', in *Hydraulic Rubber Dam: An Effective Water Management Technology*, 2018, pp. 11–24 <https://doi.org/10.1016/B978-0-12-812210-5.00002-X>.

Dhauliganga in districts like Uttarkashi and Chamoli can significantly enhance water storage capacity and stabilize river ecosystems. These efforts should be complemented by the rehabilitation of traditional water harvesting structures like naulas and dharas, the implementation of soil and water conservation measures such as contour farming, terracing, and gully plugging in areas like Nainital and Almora, and the promotion of agroforestry and drought-resistant crops. Encouraging rainwater harvesting, especially in water-stressed regions like Pithoragarh, will further strengthen community-level resilience to climate-induced water stress. Together, these integrated approaches—combining modern technologies like rubber and check dams with traditional knowledge and sustainable agricultural practices—can play a transformative role in ensuring long-term water security for Uttarakhand. They not only address immediate water needs but also help mitigate the adverse impacts of climate change, support local livelihoods, and contribute to the region's ecological and economic sustainability.

4.7 Intensive Afforestation

Afforestation plays a vital role in mitigating climate change, combating deforestation, and enhancing environmental sustainability. By planting trees on degraded land, we can sequester carbon dioxide, improve air quality, conserve soil, and enhance biodiversity. The "Intensive Afforestation for a Sustainable Future" initiative in Buxar district, Bihar, exemplifies a successful model for addressing these critical environmental challenges (Fig. 8). Recognizing the critical need to address the impacts of deforestation and climate change, this initiative focuses on large-scale afforestation through a collaborative effort involving government departments, schools, local communities, and women's self-help groups. This initiative also aims to rejuvenate ecosystems and promote sustainable land management practices by engaging local communities, school students, Jeevika didi's, public representatives, and others by executing different governmental schemes i.e., MGNREGA, Jal-Jeevan-Hariyali Mission, National Mission for Clean Ganga, National Rural Livelihood Mission etc., to foster a collaborative approach towards intensive afforestation. Key interventions include school-based environmental education, community-led tree planting drives, the empowerment of women's self-help groups in nursery management and tree care, and the utilization of government schemes for funding and support.

Fig. 8: Afforestation and greening initiatives in Buxer, Bihar: (a) and (b) depict the site before and after the afforestation efforts, respectively. (Source: National Water Mission, Ministry of Jal Shakti, Department of Water Resources, RD & GR, Government of India).

This multi-pronged approach emphasizes the long-term sustainability of planted trees through regular monitoring, maintenance, and community involvement. By effectively combining environmental education, community engagement, and government support, this initiative has not only enhanced green cover but also empowered local communities and fostered a culture of environmental stewardship, making it a valuable model for other regions seeking to address environmental challenges. Building upon successful afforestation initiatives in other regions, Uttarakhand can significantly benefit from strategic afforestation programs. In hilly districts like Pithoragarh, Almora, Champawat, Uttarkashi, and Chamoli, focusing on afforestation along riverbanks and

slopes with species like oak, pine, and deodar can help stabilize slopes, prevent landslides, and regulate water flow. In urban areas like Dehradun and Nainital, urban afforestation initiatives, including planting trees in urban spaces, creating green belts, and promoting rooftop gardens, can improve air quality, reduce pollution, and enhance the livability of these cities. In agricultural areas like Udham Singh Nagar, promoting agroforestry by integrating trees into agricultural landscapes can enhance soil fertility, improve water retention, and provide shade for crops. Prioritizing the planting of native and climate-resilient tree species, actively involving local communities in all stages of the afforestation process, promoting agroforestry, establishing local nurseries, and implementing a robust monitoring and evaluation system are crucial steps. By leveraging technology such as GIS and remote sensing and conducting awareness campaigns to educate the public about the importance of afforestation, Uttarakhand can effectively enhance its forest cover, mitigate the impacts of climate change, improve water security, and create a more sustainable and resilient environment for its people.

4.8 Policy Initiatives in Water Conservation

Construction of check dam and farm ponds initiative aimed to recharge groundwater reserves, increase the availability of water for agricultural purposes, control the water velocity, and reduce soil erosion; stored water improves soil moisture of the adjoining area and improves land fertility, allowing percolation to recharge the aquifers. A farm pond project was implemented in Gamawada under the PMKSY-2.0 program as part of water conservation efforts (Fig. 9). This initiative aimed to address land degradation and improve the livelihood of the local community. The project involved the construction of farm ponds, which resulted in increased groundwater levels, expanded irrigation areas, and improved the overall socio-economic conditions of the community. These ponds now provide a reliable source of water for both human and animal consumption. The integration of fish farming into the project further enhanced its sustainability and provided additional economic benefits to the community.

A Check Dam project was implemented in Badekameli under the PMKSY-2.0 program as part of policy initiatives for water conservation in 2023. These structures, placed in waterways or ditches, effectively interrupt water flow, reduce water velocity, and trap sediments, minimizing

soil erosion. The primary objectives of this project included recharging groundwater reserves, increasing water availability for agriculture, and controlling soil erosion. The successful implementation of Check

Fig. 9: Water conservation structures: (a) Farm pond in Gamawada and (b) Check dam in Badekameli. (Source: National Water Mission, Ministry of Jal Shakti, Department of Water Resources, RD & GR, Government of India).

Dams have resulted in increased groundwater levels, expanded irrigation areas, improved soil moisture, and enhanced land fertility by allowing for better water percolation into aquifers. Consequently, farmers have experienced increased agricultural production and higher incomes. The incorporation of water lifts for irrigation purposes further enhances the efficiency and effectiveness of these structures.

The successful implementation of check dams and farm ponds in Gamawada and Badekameli under the PMKSY-2.0 program offers valuable insights for water conservation initiatives in Uttarakhand. In hilly regions, prioritizing the construction of check dams along major rivers and tributaries like the Alaknanda and Dhauliganga while promoting the construction of farm ponds in agricultural areas can effectively mitigate soil erosion, recharge groundwater, and enhance agricultural productivity. In urban areas, implementing modified check dams and retention ponds, along with encouraging rainwater harvesting in all buildings, can significantly improve water infiltration and reduce runoff. Active community involvement in the planning, implementation, and maintenance of these structures is crucial for their long-term sustainability. By implementing these strategies, Uttarakhand can effectively address water scarcity challenges, improve agricultural productivity, and enhance the overall resilience of its communities to climate change impacts.

4.9 Role of Women/Communities in Water Conservation

The leadership of women, communities, Water User Associations (WUAs), and Self-Help Groups (SHGs) is crucial for successful water conservation efforts. These groups possess unique insights, strong local knowledge, and a deep understanding of community needs, making them invaluable partners in water management initiatives. Women, often bearing the primary responsibility for water collection and management within households, must be actively involved in decision-making processes related to water conservation. Community-based organizations like WUAs and SHGs can play a vital role in planning, implementing, and monitoring water conservation measures, resolving water-related conflicts, and promoting sustainable water use practices. Empowering these groups through training, capacity-building programs, and by providing them with the necessary resources will ensure that water conservation efforts are locally driven, sustainable, and equitable, leading to a more secure and water-rich future for all.

The "Nari Shakti se Jal Shakti" initiative in Udham Singh Nagar exemplifies the crucial role of women, communities, WUAs, and SHGs in successful water conservation efforts (Fig. 10).

This initiative showcases a diverse range of activities, including rainwater harvesting, water quality training for 1645 women, community awareness campaigns led by 105 Women Self-Help Groups, afforestation projects involving significant women's participation, the allotment of 36 Amrit Sarovars and 37 ponds to women-led groups for maintenance, and the provision of 168 sprinkler sets to women farmers.

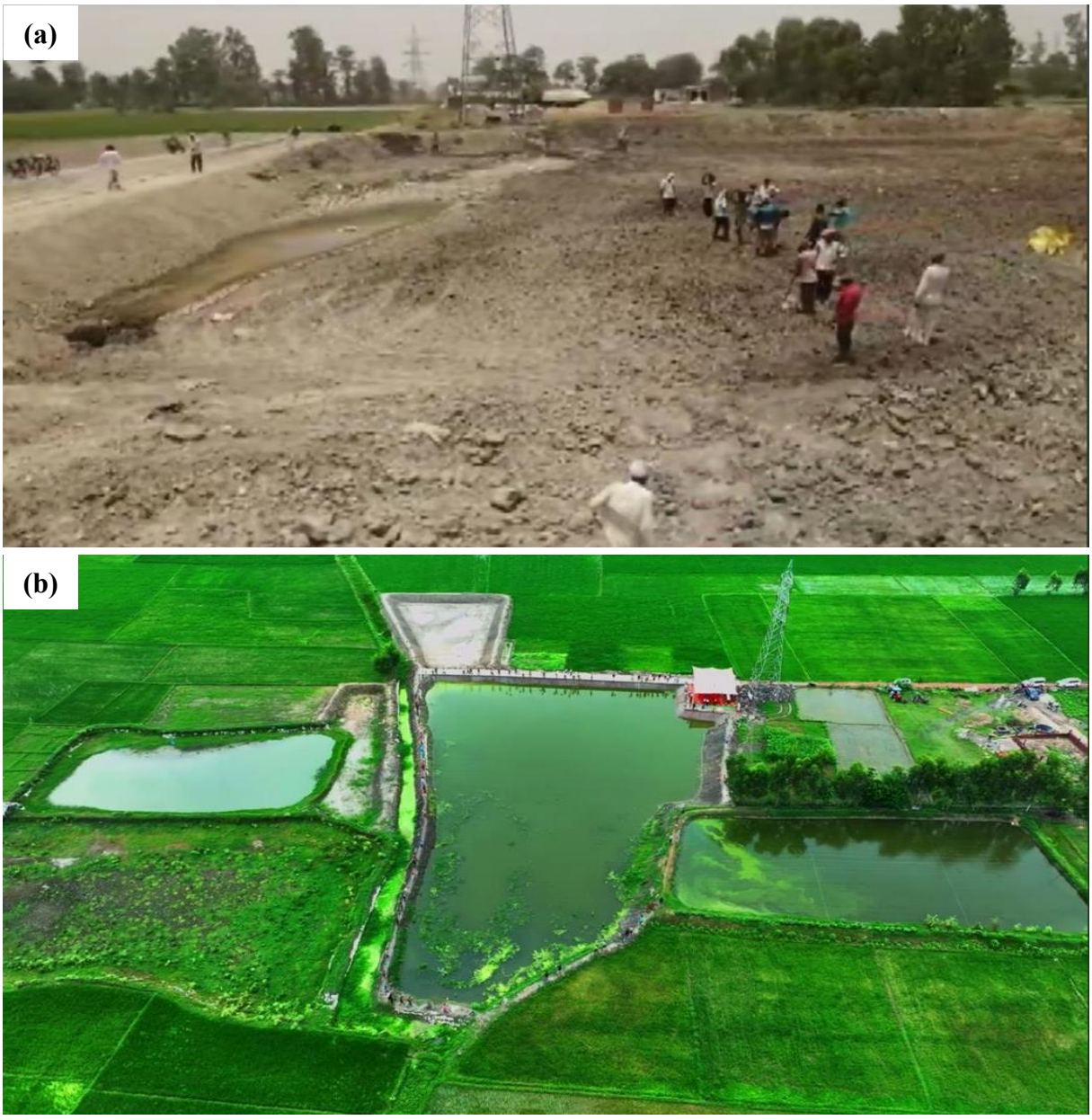

Fig. 10: Community-led water conservation initiatives in Udham Singh Nagar: (a) and (b) show the site before and after the successful implementation of rainwater harvesting and afforestation projects, respectively. (Source: National Water Mission, Ministry of Jal Shakti, Department of Water Resources, RD & GR, Government of India).

These activities demonstrate the significant contributions of women and community-based organizations in water conservation. This approach can be effectively replicated across Uttarakhand by prioritizing women's participation in all stages of water conservation projects, strengthening WUAs and SHGs, promoting community-led initiatives, and integrating gender considerations into all water conservation policies and programs. By empowering women and strengthening community-led initiatives, Uttarakhand can effectively address water scarcity challenges, ensure equitable access to water resources, and promote sustainable water management across the state.

4.10 Awareness Generation Initiative

The aim of this initiative is to foster collaboration among diverse government departments and organizations to significantly enhance public awareness about the crucial importance of water conservation and preservation. This collaborative effort will involve key stakeholders such as Departments of Water Resources, Agriculture, Environment, Education, Rural Development, NGOs, and local communities. These entities regularly engage with various segments of society, including farmers, students, women, and rural communities, who are heavily reliant on water resources and possess the potential to become powerful advocates for water conservation. By streamlining efforts and leveraging existing networks, this initiative aims to create a widespread ripple effect within society, promoting responsible water use and fostering a culture of conservation. This increased awareness will empower local communities to actively participate in initiatives such as maintaining the cleanliness of water bodies (rivers, ponds, etc.) and adopting sustainable agricultural practices.

The Public Outreach Program for Water Conservation in Buxar District, Bihar, serves as a prime example of a successful awareness generation initiative. By fostering collaboration among diverse government departments and organizations, such as the National Mission for Clean Ganga, PM Krishi Sinchayi Yojana, and Jeevika, the program effectively leverages existing networks to reach a wide range of stakeholders, including farmers, students, and women. This collaborative approach, as emphasized in the generic framework, creates a powerful ripple effect within the community, empowering individuals to become active participants in water conservation efforts. The program's success highlights the importance of a multi-sectoral approach and community engagement in achieving meaningful and sustainable water conservation outcomes.

The Public Outreach Program provides a valuable model for enhancing public awareness about water conservation in Uttarakhand. By fostering collaboration among diverse government departments, NGOs, and local communities, and leveraging existing networks to reach a wider audience, Uttarakhand can effectively implement public awareness campaigns. This can involve organizing workshops and seminars, utilizing local media, and engaging in social media campaigns. Furthermore, encouraging community participation in water conservation initiatives, such as cleaning water bodies, planting trees, and adopting sustainable agricultural practices, is crucial. By implementing a multi-pronged approach that combines inter-sectoral collaboration, innovative communication strategies, and active community engagement, Uttarakhand can effectively raise public awareness about the crucial importance of water conservation and foster a culture of responsible water use among its citizens.

5. TRADITIONAL WATER SYSTEMS AND EMERGING CHALLENGES IN UTTA RAKHAND

Uttarakhand, India's 27th state, was formed on November 9, 2000, and carved out of the north-western districts of Uttar Pradesh. It covers 53,483 square kilometers, predominantly mountainous (86.07%), with 13.93% comprising plains. The state is divided into Kumaon and Garhwal divisions and has a diverse hydrological network, relying on glacier-fed rivers, perennial tributaries, and groundwater sources. The state receives an annual rainfall of 1330mm. Uttarakhand boasts a rich history of water harvesting, exemplified by traditional structures like Naulas, which collected and stored rainwater flowing downhills. These community-owned and managed systems, many of which still function today, demonstrate the wisdom of past generations in sustainable water management. The longevity of these Naulas can be attributed to strong community ownership and a holistic understanding of the local ecosystem. However, the Kumaon region, heavily reliant on Naulas, Dharas (springs), and Gadheras (small streams), is now facing challenges. Unplanned development, deforestation, and increased demand for irrigation are adversely impacting these vital water sources. Furthermore, climate change is altering rainfall patterns, impacting surface water discharge, and reducing groundwater recharge, further threatening the sustainability of these traditional water harvesting systems.

A report by G.B. Pant National Institute of Himalayan Environment and Sustainable Development, Almora[3], indicates that hilly districts largely depend on fragile sources such as Rivulets/Naula/Gadhera (48.02%) and Springs (14.04%) for water supply, with 56.8% of administrative blocks relying on these sources. In contrast, over 90% of water supply schemes in the plains depend on wells, either deep or shallow. Water supply schemes are unevenly distributed, with Pithoragarh and Chamoli having the lowest concentrations. Rainwater harvesting remains underutilized, and some blocks, notably Ghaat, Tharali, and Pokhra, face extreme water scarcity, primarily relying on springs. Pauri-Garhwal and Almora have the highest number of water-scarce blocks.

The uneven distribution of water across seasons and regions, coupled with increasing demand, poses serious concern in Uttarakhand. The hilly terrain and fragile ecosystems make water management even more complex. Climate change is further exacerbating these challenges, impacting rainfall patterns and glacial melt, leading to unpredictable water availability and increased risks of floods and droughts. These challenges underscore the urgent need for comprehensive water conservation efforts in Uttarakhand. By reviving traditional water harvesting systems, promoting sustainable agricultural practices, and implementing efficient water management strategies, the state can ensure the long-term availability of water for its people and safeguard its unique ecological heritage.

Addressing these concerns requires overcoming key challenges such as the lack of data on water discharge, extraction, and the status of existing schemes, which hampers effective planning and interventions. To tackle these issues, the report recommends rejuvenating springs by developing Water Sanctuaries (Jal Abhyaranya) in villages, integrating watershed development with water conservation, and implementing robust monitoring mechanisms to track water availability and quality. Ensuring equitable water distribution among domestic, agricultural, and industrial users is crucial, alongside optimizing allocation to meet growing demands. Additionally, establishing a GIS-based inventory of natural springs and a transparent data-sharing mechanism is necessary for effective water resource management. These measures, combined with policy support and community participation, can help secure sustainable freshwater availability in Uttarakhand.

[3] Kireet Kumar and others, 'Water at a Glance Uttarakhand Technical Report an Assessment of Water Scarcity', 2019 <www.gbpihed.gov.in>.

Table 1: The common water sources used for water supply in Uttarakhand[4].

S. No.	District	Generic Water Sources							
		I	II	III	IV	V	VI	VII	VIII
1.	Almora	Deep tube-well	Khadins / Nadins/ Tankas/ Ponds / Wells/ Ooranis	Infiltration well	River	Rivulet / Naula / Gadhera	Spring	Treated Surface Water	Streams
2.	Champawat	Deep tube-well	Khadins / Nadins/ Tankas/ Ponds / Wells/ Ooranis	Infiltration well	River	Rivulet / Naula / Gadhera	Spring	Treated Surface Water	Streams
3.	Bageshwar	Deep tube-well	Khadins / Nadins/ Tankas/ Ponds / Wells/ Ooranis	-	River	Rivulet / Naula / Gadhera	Spring	Treated Surface Water	Streams
4.	Nainital	Deep tube-well	Khadins / Nadins/ Tankas/ Ponds / Wells/ Ooranis	-	River	Rivulet / Naula / Gadhera	Spring	Treated Surface Water	Streams
5.	Pauri-Garhwal	Deep tube-well	Khadins / Nadins/ Tankas/ Ponds / Wells/ Ooranis	-	River	Rivulet / Naula / Gadhera	Spring	Treated Surface Water	Streams
6.	Chamoli	Deep tube-well	Khadins / Nadins/ Tankas/ Ponds / Wells/ Ooranis	-	-	Rivulet / Naula / Gadhera	Spring	Treated Surface Water	Streams
7.	Pithoragarh	-	Khadins / Nadins/ Tankas/ Ponds / Wells/ Ooranis	-	-	Rivulet / Naula / Gadhera	Spring	Treated Surface Water	Streams
8.	Rudraprayag	Deep tube-well	Khadins / Nadins/ Tankas/ Ponds / Wells/ Ooranis	-	-	Rivulet / Naula / Gadhera	Spring	-	Streams
9.	Dehradun	Deep tube-well	Khadins / Nadins/ Tankas/ Ponds / Wells/ Ooranis	-	-	Rivulet / Naula / Gadhera	Spring	-	Streams

[4] Kireet Kumar and others, 'Water at a Glance Uttarakhand Technical Report an Assessment of Water Scarcity', 2019 <www.gbpihed.gov.in>.

S. No.	District	Generic Water Sources							
		I	II	III	IV	V	VI	VII	VIII
10.	Tehri-Garhwal	Deep tube-well	Khadins / Nadins/ Tankas/ Ponds / Wells/ Ooranis	-	-	Rivulet / Naula / Gadhera	Spring	-	Streams
11.	Uttarkashi	Deep tube-well	Khadins / Nadins/ Tankas/ Ponds / Wells/ Ooranis	-	-	Rivulet / Naula / Gadhera	Spring	-	Streams
12.	Haridwar	Deep tube-well	Shallow tube-well	-	-	-	Spring	Treated Sur-face Water	-
13.	Udham Singh Nagar	Deep tube-well	Shallow tube-well	-	-	-	-	-	-

6. RECOMMENDED WATER CONSERVATION PRACTICES FOR UTTARAK HAND

Uttarakhand faces growing water challenges due to climate change, deforestation, unplanned development, and increasing demand for water in domestic, agricultural, and industrial sectors. Sustainable water conservation efforts must integrate traditional wisdom, modern techniques, and strong community involvement to ensure long-term availability. One of the key strategies is the revival and maintenance of traditional water harvesting systems, which have historically played a crucial role in sustaining local water needs. Regular desilting, afforestation around water sources, and community-based conservation initiatives can help restore these systems. Additionally, rainwater harvesting should be widely adopted through rooftop collection systems, check dams, and percolation pits to capture and store rainwater, particularly in areas experiencing seasonal water shortages.

Groundwater depletion is another major concern, making aquifer recharge and protection a priority. Constructing recharge wells, contour trenches, and percolation tanks can help replenish underground water reserves. Simultaneously, efficient agricultural water management is necessary to reduce excessive water consumption in farming. Techniques such as drip and sprinkler irrigation, mulching, contour farming, and drought-resistant crops can significantly enhance water use efficiency while maintaining agricultural productivity. Moreover, reusing treated wastewater for irrigation and industrial applications can help reduce dependence on freshwater sources, minimizing wastage and ensuring optimal resource utilization.

In addition to these measures, efforts must be made to rejuvenate small rivers and streams, which are essential for local water security. Conservation projects should focus on desilting riverbeds, removing obstructions, and afforesting riverbanks to stabilize soil and improve water retention. Given the state's hilly terrain, specialized strategies should be employed, including planting drought-resistant vegetation, using mulching techniques to retain soil moisture, and constructing small bunds and percolation pits to slow runoff and improve groundwater recharge. At the household level, simple conservation habits such as fixing leaks, using buckets instead of hoses, sweeping instead of washing driveways, and installing low-flow water fixtures can significantly reduce daily water consumption.

Beyond practical interventions, strong governance and data management are essential for effective water conservation. Developing a GIS-based inventory of water resources, implementing

transparent data-sharing mechanisms, and integrating climate adaptation strategies into planning can improve water resource management. Strict regulations should be enforced to prevent illegal groundwater extraction and pollution, while community awareness programs can empower local populations to adopt sustainable water practices. By combining scientific water management with policy support and local participation, Uttarakhand can work toward a future of sustainable and equitable water access, ensuring the protection of its precious water resources and fragile ecosystems for generations to come.

7. INVOLVEMENT OF PERSONNEL FROM HRED, IIT ROORKEE

1. Prof Sunil Kumar Singal, Professor & PI
2. Prof Sanjeev Kumar Prajapati, Head & Investigator
3. Prof Arun Kumar, Emeritus Fellow and Investigator
4. Prof Chandra Shekhar Pant, Assistant Professor & Investigator
5. Dr. Mamta Bhandari, Project Fellow

ANNEXURE

Government of India, Ministry of Water Resources

I. National Water Policy (2012)

1. PREAMBLE

1.1 A scarce natural resource, water is fundamental to life, livelihood, food security, and sustainable development. India has more than 18% of the world's population but has only 4% of the world's renewable water resources and 2.4% of the world's land area. There are further limits on utilizable quantities of water owing to uneven distribution over time and space. In addition, there are challenges of frequent floods and droughts in one or the other part of the country. With a growing population and rising needs of a fast-developing nation, as well as the given indications of the impact of climate change, the availability of utilizable water will be under further strain in the future with the possibility of deepening water conflicts among different user groups. Low consciousness about the scarcity of water and its life-sustaining and economic value results in its mismanagement, wastage, inefficient use, pollution, and reduction of flows below minimum ecological needs. In addition, there are inequities in distribution and a lack of a unified perspective in planning, management, and use of water resources. The objective of the National Water Policy is to take cognizance of the existing situation, propose a framework for creating a system of laws and institutions, and plan of action with a unified national perspective.

1.2 The present scenario of water resources and their management in India has given rise to several concerns, important among them are;

(i) Large parts of India have already become water stressed. Rapid growth in demand for water due to population growth, urbanization, and changing lifestyles poses serious challenges to water security.

(ii) Issues related to water governance have not been addressed adequately. Mismanagement of water resources has led to a critical situation in many parts of the country.

(iii) There is wide temporal and spatial variation in the availability of water, which may increase substantially due to a combination of climate change, causing a deepening water crisis and incidences of water-related disasters, i.e., floods, increased erosion,

and increased frequency of droughts, etc.

(iv) Climate change may also increase the sea levels. This may lead to salinity intrusion in groundwater aquifers/surface waters and increased coastal inundation in coastal regions, adversely impacting habitations, agriculture, and industry in such regions.

(v) Access to safe water for drinking and other domestic needs still continues to be a problem in many areas. Skewed availability of water between different regions and different people in the same region, and also the intermittent and unreliable water supply system have the potential to cause social unrest.

(vi) Groundwater, though part of the hydrological cycle and a community resource, is still perceived as an individual property and is exploited inequitably without any consideration for its sustainability, leading to its over-exploitation in several areas.

(vii) Water resources projects, though multi-disciplinary with multiple stakeholders, are being planned and implemented in a fragmented manner without giving due consideration to optimum utilization, environment sustainability, and holistic benefit to the people.

(viii) Inter-regional, inter-state, intra-state, and inter-sectoral disputes in the sharing of water strain relationships and hamper the optimal utilization of water through scientific planning on a basin/sub-basin basis.

(ix) Grossly inadequate maintenance of existing irrigation infrastructure has resulted in wastage and under-utilization of available resources. There is a widening gap between irrigation potential created and utilized.

(x) Natural water bodies and drainage channels are being encroached upon and diverted for other purposes. Groundwater recharge zones are often blocked.

(xi) Growing pollution of water sources, especially through industrial effluents, is affecting the availability of safe water besides causing environmental and health hazards. In many parts of the country, large stretches of rivers are both heavily polluted and devoid of flows to support aquatic ecology, cultural needs, and aesthetics.

(xii) Access to water for sanitation and hygiene is an even more serious problem. Inadequate sanitation and lack of sewage treatment are polluting the water sources.

(xiii) Low consciousness about the overall scarcity and economic value of water results in its wastage and inefficient use.

(xiv) The lack of adequately trained personnel for scientific planning, utilizing modern techniques and analytical capabilities, and incorporating information technology constrains good water management.

(xv) A holistic and interdisciplinary approach to water-related problems is missing.

(xvi) The public agencies in charge of taking water related decisions tend to take these on their own without consultation with stakeholders, often resulting in poor and unreliable service characterized by inequities of various kinds.

(xvii) Characteristics of catchment areas of streams, rivers, and recharge zones of aquifers are changing as a consequence of land use and land cover changes, affecting water resource availability and quality.

1.3 Public policies on water resources need to be governed by certain basic principles so that there is some commonality in approaches in dealing with planning, development, and management of water resources. These basic principles are:

(i) Planning, development, and management of water resources need to be governed by a common integrated perspective considering local, regional, state, and national contexts, having an environmentally sound basis, and keeping in view human, social, and economic needs.

(ii) The principle of equity and social justice must inform the use and allocation of water.

(iii) Good governance through transparent, informed decision-making is crucial to the objectives of equity, social justice, and sustainability. Meaningful intensive participation, transparency, and accountability should guide decision-making and regulation of water resources.

(iv) Water needs to be managed as a common pool community resource held by the state under public trust doctrine to achieve food security, support livelihood, and ensure equitable and sustainable development for all.

(v) Water is essential for the sustenance of the ecosystem, and therefore, minimum ecological needs should be given due consideration.

(vi) Safe water for drinking and sanitation should be considered as pre-emptive needs, followed by high priority allocation for other basic domestic needs (including needs of animals), achieving food security, supporting sustenance agriculture, and minimum eco-system needs. Available water, after meeting the above needs, should be allocated in a manner that promotes its conservation and efficient use.

(vii) All the elements of the water cycle, i.e., evapotranspiration, precipitation, runoff, river, lakes, soil moisture, groundwater, sea, etc., are interdependent, and the basic hydrological unit is the river basin, which should be considered as the basic hydrological unit for planning.

(viii) Given the limits on enhancing the availability of utilizable water resources and increased variability in supplies due to climate change, meeting future needs will depend more on demand management, and hence, this needs to be given priority, especially through (a) evolving an agricultural system which economizes on water use and maximizes value from water, and (b) bringing in maximum efficiency in the use of water and avoiding wastages.

(ix) Water quality and quantity are interlinked and need to be managed in an integrated manner, consistent with broader environmental management approaches inter-alia including the use of economic incentives and penalties to reduce pollution and wastage. The impact of climate change on water resource availability must be factored into water management-related decisions. Water-using activities need to be regulated, keeping in mind the local geo-climatic and hydrological situation.

2. WATER FRAMEWORK LAW

2.1 There is a need to evolve a National Framework Law as an umbrella statement of general principles governing the exercise of legislative and/or executive (or devolved) powers by the Centre, the States, and the local governing bodies. This should lead the way for essential legislation on water governance in every State of the Union and the devolution of necessary authority to the lower tiers of government to deal with the local water situation.

2.2 Such a framework law must recognize water not only as a scarce resource but also as a sustainer of life and ecology. Therefore, water, particularly groundwater, needs to be managed as a community resource held by the state under the public trust doctrine to achieve food security, livelihood, and equitable and sustainable development for all. Existing Acts may have to be modified accordingly.

2.3 There is a need for comprehensive legislation for the optimum development of inter-state rivers and river valleys to facilitate inter-state coordination, ensuring scientific planning of land and water resources, taking basin/sub-basin as a unit with unified perspectives of water in all its forms (including precipitation, soil moisture, ground, and surface water) and ensuring holistic and balanced development of both the catchment and the command areas. Such legislation needs, inter alia, to deal with and enable the establishment of basin authorities, comprising party states, with appropriate powers to plan, manage, and regulate the utilization of water resources in the basins.

3. USES OF WATER

3.1 Water is required for domestic, agricultural, hydropower, thermal power, navigation, recreation, etc. Utilisation in all these diverse uses of water should be optimized, and an awareness of water as a scarce resource should be fostered.

3.2 The Centre, the States, and the local bodies (governance institutions) must ensure access to a minimum quantity of potable water for essential health and hygiene to all its citizens, available within easy reach of the household.

3.3 The ecological needs of the river should be determined through scientific study, recognizing that the natural river flows are characterized by low or no flows, small floods (freshets), large floods, etc., and should accommodate developmental needs. A portion of river flows should be kept aside to meet ecological needs, ensuring that the low and high flow releases are proportional to the natural flow regime, including base flow contribution in the low flow season through regulated groundwater use.

3.4 Rivers and other water bodies should be considered for development for navigation as far as possible, and all multipurpose projects over water bodies should keep navigation in mind right from the planning stage.

3.5 In the water-rich eastern and northeastern regions of India, the water use infrastructure is weak and needs to be strengthened in the interest of food security.

3.6 Community should be sensitized and encouraged to adapt first to the utilization of water as per local availability of water before providing water through long-distance transfer. Community-based water management should be institutionalized and strengthened.

4. ADAPTATION TO CLIMATE CHANGE

4.1 Climate change is likely to increase the variability of water resources, affecting human health and livelihoods. Therefore, special impetus should be given towards mitigation at the micro level by enhancing the capabilities of the community to adopt climate-resilient technological options.

4.2 The anticipated increase in variability in the availability of water because of climate change should be dealt with by increasing water storage in its various forms, namely, soil moisture, ponds, groundwater, small and large reservoirs, and their combination. States should be incentivized to increase water storage capacity, which inter alia should include the revival of traditional water harvesting structures and water bodies.

4.3 The adaptation strategies could also include better demand management, particularly through the adoption of compatible agricultural strategies and cropping patterns and improved water application methods, such as land leveling and/or drip/sprinkler irrigation, as they enhance the water use efficiency, as also, the capability for dealing with increased variability because of climate change. Similarly, industrial processes should be made more water-efficient.

4.4 Stakeholder participation in land-soil-water management with scientific inputs from local research and academic institutions for evolving different agricultural strategies, reducing soil erosion, and improving soil fertility should be promoted. The specific problems of hilly areas, like sudden runoff, weak water holding capacity of soil, erosion and sediment transport, and recharging of hill slope aquifers, should be adequately addressed.

4.5 Planning and management of water resource structures, such as dams, flood embankments, tidal embankments, etc., should incorporate coping strategies for possible climate changes. The acceptability criteria in regard to new water resources projects need to be re-worked

in view of the likely climate changes

5. ENHANCING WATER AVAILABLE FOR USE

5.1 The availability of water resources and its use by various sectors in various basins and states in the country need to be assessed scientifically and reviewed at periodic intervals, say, every five years. The trends in water availability due to various factors, including climate change, must be assessed and accounted for during water resource planning.

5.2 The availability of water is limited, but the demand for water is increasing rapidly due to growing population, rapid urbanization, rapid industrialization, and economic development. Therefore, the availability of water for utilization needs to be augmented to meet the increasing demands for water. Direct use of rainfall, desalination, and avoidance of inadvertent evapotranspiration are the new additional strategies for augmenting utilizable water resources.

5.3 There is a need to map the aquifers to know the quantum and quality of groundwater resources (replenishable as well as non-replenishable) in the country. This process should be fully participatory, involving local communities. This may be periodically updated.

5.4 Declining groundwater levels in over-exploited areas need to be arrested by introducing improved technologies of water use, incentivizing efficient water use, and encouraging community-based management of aquifers. In addition, where necessary, artificial recharging projects should be undertaken so that extraction is less than the recharge. This would allow the aquifers to provide base flows to the surface system and maintain ecology.

5.5 Inter-basin transfers are not merely for increasing production but also for meeting basic human needs and achieving equity and social justice. Inter-basin transfers of water should be considered on the basis of the merits of each case after evaluating the environmental, economic, and social impacts of such transfers.

5.6 Integrated Watershed development activities with groundwater perspectives need to be taken in a comprehensive manner to increase soil moisture, reduce sediment yield, and increase overall land and water productivity. To the extent possible, existing programs like MGNREGA may be used by farmers to harvest rainwater using farm ponds and other soil and water conservation measures.

6. Demand Management and Water Use Efficiency

6.1 A system to evolve benchmarks for water uses for different purposes, i.e., water footprints and water auditing, should be developed to promote and incentivize the efficient use of water. The 'project' and the 'basin' water use efficiencies need to be improved through continuous water balance and water accounting studies. An institutional arrangement for promotion, regulation, and evolving mechanisms for the efficient use of water at the basin/sub-basin level will be established for this purpose at the national level.

6.2 The project appraisal and environment impact assessment for water uses, particularly for industrial projects, should, inter-alia, include the analysis of the water footprints for the use.

6.3 Recycle and reuse of water, including return flows, should be the general norm.

6.4 Project financing should be structured to incentivize efficient & economic use of water and facilitate early completion of ongoing projects.

6.5 Water saving in irrigation use is of paramount importance. Methods like aligning cropping patterns with natural resource endowments, micro-irrigation (drip, sprinkler, etc.), automated irrigation operation, evaporation-transpiration reduction, etc., should be encouraged and incentivized. Recycling of canal seepage water through conjunctive groundwater use may also be considered.

6.6 Use of very small local-level irrigation through small bunds, field ponds, agricultural and engineering methods and practices for watershed development, etc, needs to be encouraged. However, their externalities, both positive and negative, like the reduction of sediments and the reduction of water availability downstream, may be kept in view.

6.7 There should be a concurrent mechanism involving users for monitoring if the water use pattern is causing problems like unacceptable depletion or building up of ground waters, salinity, alkalinity, or similar quality problems, etc., with a view to planning appropriate interventions.

7. WATER PRICING

7.1 Pricing of water should ensure its efficient use and reward conservation. Equitable access

to water for all and its fair pricing for drinking and other uses, such as sanitation, agriculture, and industrial, should be arrived at through an independent statutory Water Regulatory Authority set up by each state after a wide-ranging consultation with all stakeholders.

7.2 In order to meet equity, efficiency, and economic principles, the water charges should preferably / as a rule, be determined on a volumetric basis. Such charges should be reviewed periodically.

7.3 Recycle and reuse of water, after treatment to specified standards, should also be incentivized through a properly planned tariff system.

7.4 The principle of differential pricing may be retained for the pre-emptive uses of water for drinking and sanitation, and high priority allocation for ensuring food security and supporting livelihood for the poor. Available water, after meeting the above needs, should increasingly be subjected to allocation and pricing on economic principles so that water is not wasted in unnecessary uses and could be utilized more gainfully.

7.5 Water Users Associations (WUAs) should be given statutory powers to collect and retain a portion of water charges, manage the volumetric quantum of water allotted to them, and maintain the distribution system in their jurisdiction. WUAs should be given the freedom to fix rates subject to floor rates determined by WRAs.

7.6 The over-drawal of groundwater should be minimized by regulating the use of electricity for its extraction. Separate electric feeders for pumping groundwater for agricultural use should be considered.

8. CONSERVATION OF RIVER CORRIDORS, WATER BODIES, AND INFRA STRUCTURE

8.1 Conservation of rivers, river corridors, water bodies, and infrastructure should be undertaken in a scientifically planned manner through community participation. The storage capacities of water bodies and water courses and/or associated wetlands, flood plains, ecological buffers, and areas required for specific aesthetic, recreational, and/or social needs may be managed to the extent possible in an integrated manner to balance the flooding, environment and social issues as per prevalent laws through planned development of urban areas, in particular.

8.2 Encroachments and diversion of water bodies (like rivers, lakes, tanks, ponds, etc.) and

drainage channels (irrigated area as well as urban area drainage) must not be allowed, and wherever it has taken place, it should be restored to the extent feasible and maintained properly.

8.3 Urban settlements, encroachments, and any developmental activities in the protected up-stream areas of reservoirs/water bodies, key aquifer recharge areas that pose a potential threat of contamination, pollution, reduced recharge, and endanger wild and human life should be strictly regulated.

8.4 Environmental needs of Himalayan regions, aquatic ecosystems, wetlands, and embanked flood plains need to be recognized and taken into consideration while planning.

8.5 Sources of water and water bodies should not be allowed to get polluted. A system of third-party periodic inspection should be evolved, and stringent punitive actions be taken against the persons responsible for pollution.

8.6 Quality conservation and improvements are even more important for groundwater since cleaning up is very difficult. It needs to be ensured that industrial effluents, local cess pools, residues of fertilizers and chemicals, etc., do not reach the ground water.

8.7 The water resources infrastructure should be maintained properly to continue to get the intended benefits. A suitable percentage of the costs of infrastructure development may be set aside along with collected water charges, for repair and maintenance. Contract for construction of projects should have inbuilt provision for longer periods of proper maintenance and handing over back the infrastructure in good condition.

8.8 Legally empowered dam safety services need to be ensured in states as well as at the center. Appropriate safety measures, including downstream flood management, for each dam should be undertaken on top priority.

9. PROJECT PLANNING AND IMPLEMENTATION

9.1 Considering the existing water stress conditions in India and the likelihood of further worsening situations due to climate change and other factors, water resources projects should be planned as per the efficiency benchmarks to be prescribed for various situations.

9.2 Being inter-disciplinary in nature, water resources projects should be planned considering

social and environmental aspects, in addition to techno-economic considerations, in consultation with project-affected and beneficiary families. The integrated water resources management with emphasis on finding reasonable and generally acceptable solutions for most of the stakeholders should be followed for planning and management of water resources projects.

9.3 Considering the heavy economic loss due to delay in the implementation of projects, all clearances, including environmental and investment clearances, be made time bound.

9.4 Concurrent monitoring of projects at the state and central levels should be undertaken for timely interventions to avoid time and cost overruns.

9.5 All components of water resources projects should be planned and executed in a pari-passu manner so that intended benefits start accruing immediately and there is no gap between potential created and potential utilized.

9.6 Local governing bodies like Panchayats, Municipalities, Corporations, etc., and Water Users Associations, wherever applicable, should be involved in the planning of the projects. The unique needs and aspirations of the Scheduled caste and Scheduled Tribes, women, and other weaker sections of the society should be given due consideration.

9.7 All water resources projects, including hydropower projects, should be planned to the extent feasible as multi-purpose projects with the provision of storage to derive maximum benefit from available topology and water resources.

10. MANAGEMENT OF FLOOD & DROUGHT

10.1 While every effort should be made to avert water-related disasters like floods and droughts through structural and non-structural measures, emphasis should be on preparedness for floods/droughts with coping mechanisms as an option. Greater emphasis should be placed on the rehabilitation of natural drainage systems.

10.2 Land, soil, energy, and water management with scientific inputs from local research and scientific institutions should be used to evolve different agricultural strategies and improve soil and water productivity to manage droughts. Integrated farming systems and non-agricultural developments may also be considered for livelihood support and poverty alleviation.

10.3 In order to prevent loss of land eroded by the river, which causes permanent loss, revetments, spurs, embankments, etc., should be planned, executed, monitored, and maintained on the basis of morphological studies. This will become increasingly more important since climate change is likely to increase the rainfall intensity and hence, soil erosion.

10.4 Flood forecasting is very important for flood preparedness and should be expanded extensively across the country and modernized using real-time data acquisition systems and linked to forecasting models. Efforts should be towards developing physical models for various basin sections, which should be linked to each other and to medium range weather forecasts to enhance lead time.

10.5 Operating procedures for reservoirs should be evolved and implemented in such a manner to have flood cushion and to reduce trapping of sediment during flood season. These procedures should be based on a sound decision support system.

10.6 Protecting all areas prone to floods and droughts may not be practicable; hence, methods for coping with floods and droughts have to be encouraged. Frequency based flood inundation maps should be prepared to evolve coping strategies, including preparedness to supply safe water during and immediately after flood events. Communities need to be involved in preparing an action plan for dealing with the flood/ drought situations.

10.7 To increase preparedness for sudden and unexpected flood-related disasters, dam/embankment break studies, as also preparation and periodic updating of emergency action plans/disaster management plans should be evolved after involving affected communities. In hilly reaches, glacial lake outburst floods and landslide dam break floods studies with periodic monitoring along with instrumentation, etc., should be carried out.

11. WATER SUPPLY AND SANITATION

11.1 There is a need to remove the large disparity between stipulations for water supply in urban areas and in rural areas. Efforts should be made to provide an improved water supply in rural areas with proper sewerage facilities. Least water-intensive sanitation and sewerage systems with decentralized sewage treatment plants should be incentivized.

11.2 Urban and rural domestic water supply should preferably be from surface water in conjunction with groundwater and rainwater. Where alternate supplies are available, a source

with better reliability and quality needs to be assigned to domestic water supply. Exchange of sources between uses, giving preference to domestic water supply, should be possible. Also, reuse of urban water effluents from kitchens and bathrooms, after primary treatment, in flush toilets should be encouraged, ensuring no human contact.

11.3 Urban domestic water systems need to collect and publish water accounts and water audit reports indicating leakages and pilferages, which should be reduced, taking into due consideration social issues.

11.4 In urban and industrial areas, rainwater harvesting and desalination, wherever techno-economically feasible, should be encouraged to increase the availability of utilizable water. Implementation of rainwater harvesting should include scientific monitoring of parameters like hydrogeology, groundwater contamination, pollution, and spring discharges.

11.5 Urban water supply and sewage treatment schemes should be integrated and executed simultaneously. Water supply bills should include sewerage charges.

11.6 Industries in water-short regions may be allowed to either withdraw only the makeup water or should have an obligation to return treated effluent to a specified standard back to the hydrologic system. Tendencies to unnecessarily use more water within the plant to avoid treatment or to pollute groundwater need to be prevented.

11.7 Subsidies and incentives should be implemented to encourage recovery of industrial pollutants and recycling/reuse, which are otherwise capital-intensive.

12. INSTITUTIONAL ARRANGEMENTS

12.1 There should be a forum at the national level to deliberate upon issues relating to water and evolve consensus, cooperation, and reconciliation amongst party States. A similar mechanism should be established within each State to amicably resolve differences in competing demands for water amongst different users of water and between different parts of the state.

12.2 A permanent Water Disputes Tribunal at the Centre should be established to resolve the disputes expeditiously in an equitable manner. Apart from using the "good offices" of the Union or the State Governments, as the case may be, the paths of arbitration and mediation may also be tried in dispute resolution.

12.3 Water resources projects and services should be managed with community participation.

For improved service delivery on a sustainable basis, the State Governments / urban local bodies may associate the private sector in public-private partnership mode with penalties for failure, under regulatory control on prices charged and service standards with full accountability to democratically elected local bodies.

12.4 Integrated Water Resources Management (IWRM) taking river basin/sub-basin as a unit should be the main principle for planning, development, and management of water resources. The departments/organizations at Centre/State Governments levels should be restructured and made multi-disciplinary accordingly.

12.5 Appropriate institutional arrangements for each river basin should be developed to collect and collate all data on a regular basis with regard to rainfall, river flows, area irrigated by crops and by source, utilizations for various uses by both surface and groundwater, and to publish water accounts on ten daily basis every year for each river basin with appropriate water budgets and water accounts based on the hydrologic balances. In addition, water budgeting and water accounting should be carried out for each aquifer.

12.6 Appropriate institutional arrangements for each river basin should also be developed for monitoring water quality in both surface and ground waters.

12.7 States should be encouraged and incentivized to undertake reforms and progressive measures for innovations, conservation, and efficient utilization of water resources.

13. TRANS-BOUNDARY RIVERS

13.1 Even while accepting the principle of the basin as a unit of development, on the basis of practicability and easy implementation ability, efforts should be made to enter into international agreements with neighbouring countries on a bilateral basis for the exchange of hydrological data of international rivers on a near real-time basis.

13.2 Negotiations about the sharing and management of water of international rivers should be done on a bilateral basis in consultative association with riparian States, keeping paramount the national interest. Adequate institutional arrangements at the Centre should be set up to implement international agreements.

14. DATABASE & INFORMATION SYSTEM

14.1 All hydrological data, other than those classified on national security considerations,

should be in the public domain. However, a periodic review for further declassification of data may be carried out. A National Water Informatics Centre should be established to collect, collate, and process hydrologic data regularly from all over the country, conduct the preliminary processing, and maintain it in an open and transparent manner on a GIS platform.

14.2 In view of the likely climate change, much more data about snow and glaciers, evaporation, tidal hydrology and hydraulics, river geometry changes, erosion, sedimentation, etc., needs to be collected. A program for such data collection needs to be developed and implemented.

14.3 All water-related data, like rainfall, snowfall, geo-morphological, climatic, geological, surface water, groundwater, water quality, ecological, water extraction and use, irrigated area, glaciers, etc., should be integrated with well-defined procedures and formats to ensure online updating and transfer of data to facilitate development of database for informed decision making in the management of water.

15. RESEARCH & TRAINING NEEDS

15.1 Continuing research and advancement in technology shall be promoted to address issues in the water sector in a scientific manner. Innovations in the water resources sector should be encouraged, recognized, and awarded.

15.2 It is necessary to give adequate grants to the States to update technology, design practices, planning and management practices, preparation of annual water balances and accounts for the site and basin, preparation of hydrologic balances for water systems, benchmarking, and performance evaluation.

15.3 It needs to be recognized that the field practices in the water sector in advanced countries have been revolutionized by advances in information technology and analytical capabilities. A re-training and quality improvement program for water planners and managers at all levels in India, both in the private and public sectors, needs to be undertaken.

15.4 An autonomous centre for research in water policy should also be established to evaluate the impacts of policy decisions and to evolve policy directives for changing the scenarios of water resources.

15.5 To meet the need of the skilled manpower in the water sector, regular training and academic

courses in water management should be promoted. These training and academic institutions should be regularly updated by developing infrastructure and promoting applied research, which would help to improve the current procedures of analysis and informed decision-making in the line departments and by the community. A national campaign for water literacy needs to be started for capacity building of different stakeholders in the water sector.

16. IMPLEMENTATION OF NATIONAL WATER POLICY

16.1 The National Water Board should prepare a plan of action based on the National Water Policy, as approved by the National Water Resources Council, and regularly monitor its implementation.

16.2 The State Water Policies may need to be drafted/revised in accordance with this policy keeping in mind the basic concerns and principles as also a unified national perspective.

II. The Uttarakhand Water Management and Regulatory Act, 2013

[UTTARAKHAND ACT NO. 24 OF 2013]

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THE UTTARAKHAND WATER MANAGEMENT AND REGULATORY ACT, 2013

[UTTARAKHAND ACT NO. 24 OF 2013]

AN ACT

To provide for the establishment of the Uttarakhand Water Management and Regulatory Commission Bill to Regulate water resources within the State, facilitate and ensure judicious, equitable, and sustainable management, allocation, and optimal utilization of water resources of environmentally economically sustainable development of the State, fix the rates for water use for agriculture, industrial, drinking, power and other purposes and cess on land benefited by flood protection and drainage works from the owners of lands benefited through appropriate regulatory instruments according to State Water Policy and matters connected therewith or incidental thereto.

IT IS HEREBY enacted in the Sixty-fourth Year of the Republic of India as follows:-

CHAPTER-I

Preliminary

Short title, extent commencement, and applicable

1. (1) This Act may be called the Uttarakhand Water Management and Regulatory Act, 2013.

(2) It extends to the whole of the State of Uttarakhand.

(3) It shall come into force on such date as the State Government may, by notification in the Gazette, appoint on this behalf.

(4) The provisions of this Act shall apply notwithstanding anything to the contrary contained in the Northern India Canal and Drainage Act, 1873 or the Uttar Pradesh Water Supply and Sewerage Act, 1975 (as implemented in the State of Uttarakhand) or in any other law for the time being in force.

Definitions

2. In this Act, unless the Context otherwise requires-

(a) "Area of Operation" means the entire geographical area of Uttarakhand in which water is managed and supplied to different use sectors by a public or private agency or the area which is benefited by flood protection and drainage works;

(b) "Basin" means the area of land around a river from which streams run down into it;

(c) "Bulk water Entitlement" Means the Volumetric authorization given by the [Commission][1] to a share of water resource by a project, river system or storage facility, for a specific period of time as specifically provided in the order granting the entitlement;

1- subs. words "commission" by section 2 of Act no. 03 of 2016 of the Uttarakhand.

(d) **"Category of uses"** means classification of use of water for different purposes such as drinking and domestic, industrial or commercial, irrigation, power, agriculture and environmental, etc., and includes such other purposes as may be prescribed;

(e) **"Cess"** means an amount to be charged on lands benefited by flood protection and drainage work from owners/ leaseholders of such lands;

(f) **"Chairperson"** means the chairperson of the Commission;

(g) **["Commission"** means the Uttarakhand Water Resources Management and Regulatory Commission;][2]

(h) **"Entitlement"** Means any authorization by the [Commission][1] to use the water for the specified purpose under this Act;

(i) **"Groundwater"** means the water which exists in an aquifer below the surface of the ground at any particular location, regardless of the geological structure in which it is stationary or moving, and includes all groundwater reservoirs;

(j) **"Groundwater entitlement"** means an individual or bulk water entitlement to a volumetric quantity of water to be extracted from a tube well, bore well or other well or by any other means of extraction of groundwater, or a group or field or wells duly and legally permitted, registered and constructed in accordance with standards prescribed by the [Commission][1];

(k) **"Individual Water Entitlement"** means any authorization by the Commission to use the water for a specified purpose under this Act other than bulk water entitlement;

(l) **"Integrated State Water Plan"** means a water plan for the use of both surface and groundwater duly approved by the [Commission][1];

(m) **"License"** means a license granted by the Commission in such manner as may be prescribed;

(n) **"Licensee"** means an individual/organization which maintains the water supply system, supplies water, and collects the water tariff or which owns a tube well/ diesel pumping set or uses groundwater for any purpose, including domestic use by exploiting groundwater;

(o) **"Member"** Means a member of the Commission;

(p) **"Notified area"** means a unit/Nyay Panchayat falling under overexploited or critical category;

(q) **"Prescribed Commission"** means any Commission at various levels within the water resources management system that has been duly authorized by the Commission to determine and declare, on an annual or seasonal basis, the quota or amount of water available within a system for use as an unallocated percentage of the entitlements duly issued by the Commission;

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1. subs. words "commission" by section 2 of Act no. 03 of 2016 of the Uttarakhand.
2. subs. by section 3 of Uttarakhand Act no. 3 of 2016.

(r) **"Project level entity"** means a group of all water user entities from a common supply source within a water resource project;

(s) **"Quota"** means a volumetric quantity of water made available to an entitlement holder, which is derived by multiplying an entitlement by the annual or seasonal allocation percentage;

(t) **"Regulation"** means regulation made by the Commission under this Act;

(u) **"Selection Committee"** means a selection committee constituted under section 6 of Chapter-II;

(v) **"Sewerage"** means a system of collection of wastewaters from a community from its houses, institutions, industry, and public places; the pumping treatment, and disposal of such wastewater, its effluent sludge, gas, and other end products;

(w) **"State Water Policy"** means the State Water Policy Execute to this Act;

(x) **"Tariff"** Means a specific charge or set of charges applicable for providing water supply;

(y) **"Utility"** means any water user entity such as agency, company, person, director, etc., responsible for the management, treatment, and distribution of water for agriculture, horticulture, domestic, industrial, municipal/rural water supplies, and for any other purpose, and may be notified by the Commission.

(aa) **"User of groundwater"** means any person/persons, an institution, including a company or an establishment, whether government or private, who or which owns or uses groundwater for any purpose, including domestic use, made either on a personal or community basis.

(ab) **"Water"** means all surface and sub-surface water accruing in river or any part of a river, stream, lake, natural collection of water in aquifers or natural drainage channel, water recycled after treatment of sewage and industrial waste etc., that is to say water supplies and sewerage, irrigation and canals, drainage and embankment, water storage and water power and groundwater or, water in all states (solid, liquid or vapour) in storage or in flux within hydrologic cycle, that is necessary for a sustainable quality of life, as well as for sustaining the natural environment;

(ac) **"Water User Entity"** means any water user entity, including water users Association, utility Industrial users Association, or any other group or entitlement;

(ad) **"Water availability"** means the availability of surface or groundwater for use for a period or season of a year which is rechargeable;

(ae) **"Water Quality"** means accessed water which is safe for consumption for the purpose for which it is supplied as per norms set by the Bureau of Indian Standards

CHAPTER – II

Establishment of Commission

Establishment of Commission

3. (1) The State Government shall, by notification, establish a Commission within three months from the date of commencement of this Act, to be known as the Uttarakhand Water Resources Management and Regulatory Commission who shall exercise the powers conferred on, and to perform the functions assigned to him under this Act.][1]

(2) The Commission shall be a body corporate.

(3) The head office of the Commission shall be at Dehradun.

(4) The Commission shall consist of a Chairperson and such number of Members not exceeding two as may be notified by the State Government.][1]

(5) The Chairperson and the Member of the Commission shall be appointed by the State Government on the recommendation of the Selection Committee referred to in Section 6.

Qualifications for appointment of Chairperson and other members of the Commission

4. (1) Only such a person shall be appointed as the Chairperson or Member who possesses the qualifications mentioned hereunder: -

(a) ***Chairperson*** **–** The Chairperson shall be a person having a bachelor's degree from any recognized University/institute with administrative experience of not less than 25 years and must have held the post of Chief Secretary of the State Government or the Secretary of the Government of India or any post equivalent thereto and has experience of department related to water resources.

(b) The Member of the Commission shall be people of ability, integrity, and standing who have adequate knowledge or experience, or have shown capacity in dealing with problems related to engineering, finance, commerce, economics, law, or management;

Provided that at least one Member shall be formed amongst the members who are either holding or have held a post not below the rank of Chief Engineer or equivalent and having a qualification and at least 25 years of experience in the field of Hydropower Engineering.][2]

(2) The Chairperson or any Member of the Commission shall not hold any other office during his/her tenure as such.

(3) The Chairperson shall be the Chief Executive Officer of the Commission.

1- subs. by section 4 of Uttarakhand Act no. 03 of 2016.

2- subs. by section 5 of Uttarakhand Act no. 03 of 2016

(4) Where the chairperson is unable to discharge his functions owing to absence, illness, death, resignation, or any other cause or where any vacancy occurs in the office of the chairperson, any Member nominated by the Chairperson on his behalf and, in the absence of such nomination or where there is no Chairperson any member chosen by the member present among themselves, shall exercise the power and discharge the duties of Chairperson.

Disqualification for being the Chairperson or a Member

5. A person shall be disqualified for appointments as the Chairperson or a member if he: -

(a) has been adjudged as insolvent; or

(b) has become physically or mentally incapable of acting; or

(c) has been convicted and sentenced to imprisonment for any Offence involving moral turpitude; or

(d) has acquired such financial or other interest as is likely to affect his functions as the Chairperson or a Member; or

(e) has so abused his position as to render his continuance in office prejudicial to the public interest; or

(f) is a Member of Parliament, or of any State Legislature or any local Commission, or is a candidate for election thereto; or

(g) is an active member of a political party or holds a post therein.

Constitution and function of the selection committee

6. [**(1).** The State Government shall, by notification, constitute a Selection Committee for the purpose of making appointments of the Chairperson and Members under sub-section (5) of section 3. The Committee shall consist of:-

(a) The Chief Secretary, Government of Uttarakhand;	ex-officio Chairman
(b) The Chairman, Central Water Commission or his nominee, who shall be a member of the Central Water Commission;	ex-officio Member
(c) The Principal Secretary/Secretary as may be Finance, Government of Uttarakhand;	ex-officio Member
(d) The Director, Indian Institute of Management, Kashipur;	ex-officio Member
(e) The Principal Secretary/Secretary as may be Irrigation, Government of Uttarakhand;	ex-officio Member-Secretary.][1]

1- subs. by section 6 of Uttarakhand Act no. 03 of 2016.

(10) So long as a person holds the office of the Chairperson or a Member for a period of two years after he ceases to be the Chairperson or a Member for any reason whatsoever, he shall not acquire, hold or maintain, directly or indirectly any office, employment or consultancy arrangement or any financial interest in any of the businesses mentioned in sub-section (6) and if he acquires any such interest involuntarily or by way of succession or testamentary disposition he will divest himself of the interest within a period of three months of such interest being acquired.

(11) Before recommending any person, the selection committee shall satisfy itself that such person does not have any financial or other interest as referred to in sub-section (6) which is likely to affect prejudicially his function as the Chairperson or a Member.

(12) All decisions of the Selection Committee shall be made by a majority.

(13) The procedure for selection and appointment of the Chairperson and the Member shall be laid down by the State Government.

(14) No appointment of the Chairperson or a Member shall be invalid merely by reason of any vacancy in the selection committee.

Terms of Office and conditions of service of the Chairperson

7. (1) The Chairperson of a Member shall hold office for a term of five years from the date he enters upon his office:

Provided that, the Chairperson or a Member may be re-appointed but not for more than two consecutive terms:

Provided further that the Chairperson or a Member shall not hold office after he has attained the age of seventy years.

(2) The Chairperson or any Member may relinquish his office at any time, by giving in writing to the Governor a notice of one month or may be removed from his office.

(3) The Chairperson shall, before entering upon his office, make and subscribe an oath of office and secrecy before the Government or any other person nominated by him and every member before the Chairperson in such form as may be prescribed.

(4) The salary and allowance payable to, and other terms and conditions of the Chairperson or the Members shall be such as may be prescribed.

(5) The salary, allowances, and other conditions of service of the Chairperson and the Member shall not be varied to their disadvantage after appointment.

(6) The Chairperson or a Member ceasing to hold office as such shall not-

(a) Be eligible for further employment under the state Government for a period of two years from the date he ceases to hold such office, except with the permission of the State Government;

(b) Accept any commercial employment for a period of two years from the date he ceases to hold such offices; and

(c) Represent any person before the Commission in any manner.

Explanation: *- for the purposes of the sub-section --*

(i) "Employment under the State Government" includes employment under a local body or any other Commission within the territory of India under the control of any State Government or under any corporation or society owned or controlled by the State Government.

(ii) "Commercial Employment" means employment in any Capacity under or agency of, a person engaged in the commercial, industrial, or financial business in the water resources-related industry and also includes a director of a company or partner of a firm and it also includes setting up practice either independently or as a partner of a firm or as an advisor or a consultant.

Removal of the Chairperson or a member

8. (1) Subject to the provision of sub-section (2), Chairperson or any Member shall only be removed from his office by the State Government on the ground of proven misconduct after the panel or three inquiry officers appointed from the officers equivalent to Secretary of Government for this purpose on reference being made to them by the State Government, has on inquiry, held by the panel and in consultation with the leader of opposition reported that the Chairperson or the Member ought on any such ground to be removed.

(2) Notwithstanding anything contained in sub-section (1), the State Government may, by order, remove a member from his office if he becomes subject to any disqualification specified in section 5.

(3) Notwithstanding anything contained in sub-section (2), the Chairperson or a Member shall be removed from his office on the ground specified in clause (b), clause (d) or clause (e) of section 5 unless the enquiry officer on a reference being made to him this behalf by the State Government, his on an inquiry, held by him in accordance with the procedure specified in this behalf by the Chief Justice or such judge, reported that the member ought on such grounds to be removed.

(4) The State Government shall pass suitable order in accordance with the report referred to in sub-section (1) or sub–section (3), as the case may be, and the final decision of the State Government shall be communicated to the Chairperson or other Member concerned within a period of 30 days a receipt of such report.

Power of State Government to depute officers and employees to the Commission and their Service conditions

9. **(1)** The Commission may appoint a secretary to exercise and perform such duties, under the control of the Chairperson, as may be specified by regulation.

(2) [The Commission shall obtain necessary information from the concerned Departments of the State Government. The Commission may appoint such number of officers and employees as in considerations necessary for the performance of its duties and functions. Determination of the number of officers and employees in the Commission after the approval of the state Government.][1]

(3) The salaries and allowances payable to and other conditions of service of the Secretary, officers, and other employees of the Commission shall be determined by the State Government from time to time.

(4) Save as otherwise provided in the section, the terms and conditions of services of employees on deputation to the Commission shall not be less advantageous than those applicable to them immediately before deputation and shall not be varied to their disadvantage.

(5) The State Government shall appoint any Government officer or employee on deputation to the Commission on the proposal made by the Commission in this regard.

(6) The period of deputation of any such officer or employee to the Commission shall be three years except when any such person is required to be repatriated on the grounds, such as promotion, reversion, termination or superannuation or any other reason of deputation, he shall stand repatriated to service under the State Government :

Provided that during the period of such deputation all matter relating to the pay, leave, allowances, retirement, pension, provident fund and other conditions of service of the employee on deputation shall be regulated by the Uttarakhand Civil Services Rules or such other rules as may, from time to time, be made by the State Government.

Proceedings of the Commission

10. **(1)** The Commission shall meet at such time and place within the State as the Chairperson may think fit and shall observe such rules of procedure in the transaction of business at its meetings (including the quorum at its meetings) as may be determined by regulations.

(2) The Chairperson or, if he is unable to attend a meeting of the Commission, a member nominated by the Chairperson on his behalf and, in the absence of such nomination or where there is no Chairperson, any Member chosen by the Members present from among themselves, shall preside at the Meeting.

1- subs. by section 7 of Uttarakhand Act no 03 of 2016.

(3) All matters which come up before the Commission shall be decided by a majority of votes of the Members present and voting, and in the event of an equality of votes, the Chairperson or person presiding shall have the right to exercise a second or casting vote.

(4) All decisions, directions, and orders of the Commission shall be in writing, supported by reason, and shall be available for inspection by any person, and copies of the same shall also be made available in such a manner as the Commission may determine.

(5) The Commission shall regulate its own procedure.

(6) All orders and decisions of the Commission shall be authenticated by the Secretary or any other officer of the Commission duly authorized by the Secretary on this behalf.

Vacancies, etc., not to invalidate act or proceeding

11. No act or proceedings of the Commission shall be questioned or shall be invalidated merely on the grounds of the existence of any vacancy or defect in the constitution of the Commission.

CHAPTER-III

Powers, Functions and Duties of the Commission

Powers and function of the Commission

12. The Commission shall exercise the following powers and perform the following functions, namely:-

(a) to approve the Integrated State Water Plan/ Basin Plans developed by the Department of the State Government to ensure sustainable management of water resources within the parameters laid down by State Water Policy as amended from time to time;][1]

(b) to determine the allocation and distribution of entitlements for various categories of use of water at a utility, project levels, and also between various water user entities within the parameters laid down by the State Water Policy on such terms and conditions as may be prescribed for such a distribution;

(c) to lay down the criteria for modification in the entitlements for the diversion, storage, and use of surface and groundwater of the State;

(d) to review and accord clearance to new water resources projects proposed at the river basin/ sub-basin level by the concerned entity, ensuring that the proposal is in conformity with the Integrated State Water Plan, specially with respect to the water allocation of each entity, that is economically, hydro–geologically, and environmentally viable;

(i) to establish a system of enforcement, monitoring, and measurement of the entitlements for the use of water to ensure that the actual use of water, both in quantity and type of use, are in compliance with the entitlements as issued by the Commission;

1- subs by. section 8 of Uttarakhand Act no 03 of 2016.

(f) to monitor the conservation of the environment and facilitate the development of a framework for the preservation and protection of the quality of surface and groundwater resources as per establishment norms and standards;

(g) to withdraw the entitlement or take any action as deemed necessary in case any water user entity pollutes or causes to pollute any surface or groundwater source of water and thereby infringes the maintenance of established norms and standards for water quality;

(h) to impose a penalty on any organization or agency, whether Government or private, any individual or a group of individuals who change, alter, or cause to change the status of any surface or groundwater resources without the specific sanction or approval of the Commission;

(i) to periodically review the entitlement as and when considered necessary;

(j) to register and monitor bulk water entitlement by the Commission or its duly authorized representatives;

(k) to promote competition, efficiency, and economy in the activities of the water and wastewater sector to minimize wastage of water;

(l) to promote better water management techniques;

(m) to enforce rainwater harvesting to augment groundwater recharge.

(n) to fix and regulate a water tariff system and charges for the use of water after due consideration to all costs, including administration, operation, maintenance, depreciation, and subsidies;

(o) to review and revise the tariff/ water charges periodically;

(p) to determine and fix the rate of cess to be charged from the owner of lands benefited by flood protection and drainage works implemented under new projects;

(q) to enforce the decision or orders issued under this Act by a suitable agency authorized by the Commission or empower to any existing agency for this purpose;

(r) to aid and advise the State Government on any matter referred to the Commission by the State Government.

General Policies of the Commission

13. (1) The Commission shall work within the framework of the State Water Policy.

(2) The Commission shall promote and monitor sound water conservation and management practices throughout the State in accordance with State Water Policy through the implementing agencies in the State.

(3) The Commission shall support and aid the enhancement and preservation of water quality within the State in close coordination with

the relevant State agencies.

Power of the Commission

14. **(1)** The Commission shall, while performing its adjudicatory functions under this Act, have all the powers of a civil court trying a suit in respect of the following matters, namely:-

(a) summoning and enforcing the attendance of any person and examining him on oath;

(b) requiring the discovery and production of any document;

(c) receiving evidence on affidavits;

(d) requisitioning any public record or copy thereof from any court;

(e) issuing Commission for the examination of witnesses and documents; and

(f) such other matters any may be prescribed.

(2) Any person or class of persons or agency or utility shall:-

(a) Produce before an officer of the Commission such books, accounts, or other documents relating to any matter concerning water transference, distribution, and consumption, which may be required by the Commission for the purpose of this Act; and

(b) Furnish to any officer so specified such information in his possession, power, or control as may be required by the Commission for the purpose of discharge of its functions under this Act.

(3) Where, during any inquiry or proceeding under this Act, the Commission has any ground to believe that any books or documents of, or relating to, any unit or person to which such inquiry is being made or proceeding relates, or which the owner of such unit may be required to produce in such inquiry or proceeding, are being, or maybe, destroyed, by a written order, authorize any officer of the Commission to exercise powers of entry, search and seizure as may be exercised by an Inspector under section 240 and 240-A of the Companies Act, 1956.

(4) The Commission may, in the discharge of its functions, consult persons or groups of persons affected or likely to be affected by the decisions of the Commission.

(5) Every person to whom a notice may be issued this Act by the Commission shall furnish such information, details, books, accounts, and other documents as may be specified in such notice.

Powers to issue direction

15. The State Government may, from time to time, issue directions not inconsistent with this Act.

Water supply and overall performance

16. The Commission may, from time to time-

(a) Determine such standards of overall performance in respect of

standards

water supply services and promotion of the efficient use of water by consumers, as in its opinion, are economical and ought to be achieved by such licensees and different standards may be determined for different licensees; and

(b) Publish the standards so determined in such form and in such manner as the Commission may consider proper.

Information with respect to levels of performance

17. (1) On or before such date in each year, as may be specified by the Commission, every licensee shall furnish to the Commission the level of performance achieved by the licensee for each standard determined under section 16.

(2) The Commission may publish for general information the information received by it under sub-section (1), which it feels necessary.

Restriction on disclosure of information

18. (1) Save as otherwise provided in this Act, information in respect of any person or business which has been furnished to, or obtained by, the Commission without the consent of the concerned person or the person in –charge of the business:

Provided that such information may be disclosed to the Central Government, the State Government, the Accountant General of the State, or a person who requires it in connection with the discharge of statutory duties.

(2) The restriction contained in sub-section (1) shall not apply to the information related to tariff.

(3) Information in possession of the Commission shall be kept confidential and may be furnished to any person or agency only with the permission of the Commission.

CHAPTER-IV
Arbitration, offences, and penalties

Arbitration

19. Any dispute or difference arising between licensees or users in respect of matters specified in sub-section (2) of section 35 may be referred to the Commission for arbitration. The Commission may proceed to act as an Arbitrator or nominate an Arbitrator to adjudicate and settle the dispute. The Arbitrator shall follow the Procedure as laid down in the Arbitration and Conciliation Act, 1996.

Offences and penalties

20. (1) Whoever:-

(a) In contravention of the provisions of this Act, the rules or regulations made under this Act, engaged in the business of distribution or supply of water; or

(b) Refuses or fails without reasonable cause to comply with, or give effect to any direction, order or requirement made under this Act; shall be guilty of an offence under this Act.

(2) Any person guilty of an Offence under clause (a) of sub-section (1)

shall punished with imprisonment, which may extend to one year, or with a fine which may extend to rupees one Lakh or both, and a further penalty of rupees twenty thousand for each day after the first Offence during which the Offence continues.

(3) Any person guilty of an Offence under clause (b) of sub-section (1) shall punished with imprisonment, which may extend to Six Months or with a fine which may extend to rupees one Lakh or both, and a further penalty which may extend to rupees five thousand for each day after first Offence during which the Offence continues.

Offence by user

21. (1) A person makes an Offence under this Act, if the user, then in the time of Offence together the user for the dealing of his business, the in charge of user and responsible for that, every person shall also be a culprit for Offence and shall be responsible for the proceeding against him and shall be punishable accordingly:

Provided that any person shall not be punishable if he proved that such Offence should be made without his knowledge, or he takes reasonable quick action to prevent such Offence.

(2) Notwithstanding anything contained in sub-section (1), where any offence made by the user under this Act and it is proved that the offence made with the consent or the silence acceptance by any Director, Manager, Secretary or other Officer or such offence made with the reason of their negligence, then such Director, Manager, Secretary or Officer shall also be deemed culprit of offence and shall be responsible for the proceeding against him and shall be punishable accordingly.

Compounding of Offences

22. (1) The Commission may, for reasons to be recorded in writing, accept from any person who has committed or is reasonably suspected of having committed an Offence punishable under this Act a sum of money not exceeding rupees One Lakh by way of composition fee and compound the Offence.

(2) On the composition of any Offence under sub-section (1), no proceeding shall be taken or continued against the person concerned in respect of such Offence, and if any proceedings in respect of the offence have already been instituted against him in any court, the composition shall have the effect of the acquittal.

Cognizance of offences

23. (1) No court shall take cognizance of any offence under this Act except on a complaint in writing of an officer authorized in this behalf by the Commission.

(2) An offence under this Act shall be tried by a court not lower in rank than that of the Additional Chief Judicial Magistrate who has jurisdiction.

Penalties and proceedings

24. All proceedings and actions against a person under this Act shall be in addition to and not in derogation of any proceeding or action under any other law for the time being in force.

not to prejudice other actions

CHAPTER –V

Accounts, Audit, and Report

State Government to the Commission

25. **(1)** The State Government shall, after due appropriation made by the State Legislature by law on this behalf, pay to the Commission by way of granting such sums of money as the State Government may think fit for being utilized for the purposes of this Act:

Provided that expenditure in respect of Salaries and allowances of the Chairperson and other Members shall be charged on the Consolidated Fund of the State.

(2) The Commission may spend such sums as it thinks fit for performing the function under this Act, and such sums shall be treated as expenditure of the Commission.

(3) The fees, fines, or money thus received by the Commission are kept in the public account of the state.

Accounts and audit

26. **(1)** The Commission shall maintain proper accounts and other relevant records and shall prepare an annual statement of accounts in such form as may be prescribed by the Government in consultation with the Accountant General.

(2) The Accounts of the Commission shall be audited by the Accountant General, Uttarakhand, or any officer authorized by him on this behalf at such intervals as may be specified by the Government, and any expenditure incurred in connection with such audit shall be payable by the Commission to the Accountant General.

(3) The Copies of the annual Statement of accounts of the Commission, together with the audit report thereon, shall be forwarded to the State Government.

(4) A Copy of the annual Statement of accounts of the Commission, together with the audit report thereon, received by the State Government under sub-section (3), shall be laid before each house of the State Legislature.

Annual report of the Commission

27. **(1)** The Commission shall prepare, in such form and at such time, for each financial year, as may be prescribed, its annual report, giving a full account of its activities during the previous financial year, and copies thereof shall be forwarded to the State Government.

(2) The State Government shall cause the annual report to be laid, as soon as may be, after it is received, before the State Legislature.

CHAPTER VI

Miscellaneous

Amount recoverable as arrears of land revenue

28. Any amount payable under this Act, except an amount payable under this Chapter, may, on a Certificate of the Secretary of the Commission, be recovered as arrears of land revenue.

Application of fines and Charges

29. The Commission, while imposing any fine or charges under this Act, may direct that the whole or any part thereof shall be applied in or towards payment of the cost of the proceedings to a party.

Protection of Action of good faith

30. No suit, prosecution of other Legal proceedings shall lie against any person for anything which is done in good faith or intended to be done in pursuance of the provision of this Act or the rules or the regulations or the orders made thereunder.

Bar of Jurisdiction

31. No order of proceedings made under this Act shall be appealable except as provided in this Act, and no civil court shall have jurisdiction in respect of any matter which the Commission or any other Commission is empowered by or under this Act to decide.

Proceedings before the Commission to be judicial proceedings

32. All proceedings before the Commission shall be deemed to be judicial proceedings within the meaning of sections 193, 219, and 228 of the Indian Penal Code, and the Commission shall be deemed to be a civil court for the purposes of Section 195 and Chapter XXVI of the Code of Criminal Procedures, 1973.

Chairperson, Member, and Staff of the Commission to be public servants

33. The Chairperson, Members, and another employee of the Commission shall be deemed to be public servants within the meaning of section 21 of the Indian Penal Code.

Power to make rules

34. (1) The State Government may, by notification, make rules for carrying out the purposes of this Act.

(2) In Particular, and without prejudice to he generality of the power contained in sub-section (1), such rules may provide for all or any of the following matters, namely:-

(a) the procedure to be adopted by the selection committee for the selection and appointment of the Chairperson and the Members;

(b) the form and manner in which the accounts of the Commission shall be maintained, and any other matter which is required to be or may be prescribed.

Power to make regulation

35. (1) The Commission may make regulations not inconsistent with this Act or the rules made there for the efficient performance of its functions under this Act.

(2) In particular, and without prejudice to the generality of the provision of sub-section (1), such regulations may provide for all or any

of the following matters, namely:-

(a) the Administration of the affairs of the in the exercise of its functions;

(b) determination of the function to be assigned to licensees and other persons involved in the purchase, distribution, or supply of water, the manner in which such function shall be discharged, and the procedures to be adopted and enforced in regard to the operation and maintenance of the water supply system;

(c) the procedure and the conditions for the grant of licenses, the particulars and documents to be made available by the persons applying for licenses, the standards and general conditions subject to which the license shall be granted, the grant of exemption from the requirement of a license, the revocation and amendment of licenses and the effect thereof and all matters related thereto;

(d) the duties, power, rights, and obligations of licensees;

(e) the particulars to be furnished, and the form and manner for furnishing information, particulars, documents, accounts, and books by the persons involved in the water distribution and supply of use of water.

(f) the terms and conditions and the procedure for the determination of revenues and tariffs;

(g) the determination of the standard of performance of the persons involved in the distribution of supply of water in the State;

(h) the fees and charges payable by the licensee and the consumer of water.

(i) the amount of fines and penalties to be imposed for violation of the provisions of this Act, including the method and manner of imposition of fines and penalties and collection of the same;

(j) any other which is required to be, or maybe, provided by regulations.

Power to remove difficulties

36. (1) If any difficulty arises in giving effect to the provisions of the Act, the Government may, by order published in the Government Gazette, make such provisions not inconsistent with the provisions of this Act, as may appear to be necessary for removing the difficulty:

Provided that no order shall be made under this section after the expiry of two years from the date of commencement of this Act.

(2) Every order made under this section shall be laid, as soon as it may be after it is made, before the House of State Legislature.

III. The Uttarakhand Ground Water (Regulation and Control of Development and Management) Act, 2016

(Uttarakhand Act No. 12 of 2016) (Repealed by Uttarakhand Act No. 11 of 2017)

An Act

to regulate and control the development and management of groundwater and matters connected therewith.

Be it enacted by the Legislative Assembly of Uttarakhand Pradesh in the Sixty-seventh Year of the Republic of India, as follows:-

CHAPTER-I

Short title, extent, and commencement

1. (1) This Act may be called the Uttarakhand Ground Water (Regulation and Control of Development and Management) Act, 2016.

(2) It extends to the whole of the State of Uttarakhand.

(3) It shall come into force on such date as the State Government may, by notification in the Official Gazette, appoint.

Act to have an overriding effect

2. The provisions of this Act shall have an effect notwithstanding anything inconsistent therewith contained in the Kumaon and Garhwal Water (Collection, Retention, and Distribution) Act, 1975 and Uttarakhand Water Management and Regulatory Act, 2013 or in any other law for the time being in force or in any instrument having effect by virtue of any law other than this Act.

Definitions

3. In this Act, unless the context otherwise requires,-

(a) "Act" means the Uttarakhand Pradesh Ground Water (Regulation and Control of Development and Management) Act, 2016;

(b) "artificial recharge to groundwater" means the process by which groundwater reservoir is augmented beyond the natural condition of replenishment;

(c) "Authority" means the Uttarakhand Pradesh Ground Water Authority established under section 3 of the Act;

(d) "drinking water" means water for consumption or use by human population for drinking and for other domestic purposes, which shall include consumption or use of water for cooking, bathing, washing, cleansing and other day to day activities and shall include water meant for consumption by the livestock;

(e) "Government" means the Government of Uttarakhand;

Repeal- Repealed by section 2 of UK Act no 11 of 2017.

(f) "groundwater" means the water which exists below the ground surface in the zone of saturation and can be extracted through wells or any other means or emerges as springs and base flows in streams and rivers;

(g) "Municipalities" means an institution of self-government constituted under Article 243Q of the Constitution of India;

(h) "Panchayat" means an institution of self-government constituted under Article 243 B of the Constitution of India;

(i) "Prescribed" means prescribed by rules made under this Act

(j) "Rainwater harvesting" means the process of collection and storage of rainwater at the surface or in a subsurface aquifer;

(k) "Royalty" means the royalty payable to the authority under section 12 of this Act;

(l) "Sink" with all its grammatical variations and cognate expressions in relation to a well includes any digging, drilling, or boring of new wells or deepening of the existing wells;

(m) "User of groundwater" means a person or an institution, including a company or an industry or an establishment or a society, whether Government or not, who or which uses groundwater for any purpose;

(n) "Structure" means any structure constructed for the search or extraction of groundwater by any person, except the authorized officials of the State or Central Government, for carrying out scientific investigations, exploration, development, augmentation, conservation, protection or management of groundwater, this will include open well, dug well, bore well, dug-cum-bore well, tube well, filter point, collector well, infiltration gallery, recharge well, disposal well, or any of their combinations or variations or any mean by which groundwater, springs or surface water is tapped except any manually operated device for extraction of groundwater.

CHAPTER-II

Establishment of a Groundwater Authority

4. (1) The State Government shall, by notification in the official Gazette, establish, with effect from such date as may be specified in the notification, an Authority to be known as "The Uttarakhand Ground Water Authority"

(2) The Authority shall consist of the following,-

- An officer either in service or retired, not below the rank of Chief Secretary and having a minimum of one year of experience in the water sector. The Chairman shall be appointed

by the State Government for 3 years or up to the age of 65 years, whichever is earlier.

- A representative of the Central Ground Water Board to be nominated by the Chairman, CGWB;
- Five ex-officio members who will be representatives of the following departments which are concerned with survey, exploration, development and management of ground water to be appointed by the State Government—

• Minor Irrigation Department	An officer in the Minor Irrigation Department who has not been below the rank of a superintending Engineer.
• State Forest Department	Principal Chief Conservator of Forest
• Payjal Department	CGM/MD of Uttarakhand Jal Sansthan/Uttarakhand Payjal Nigam.
• Science and Technology Department	In charge, Uttarakhand Remote Sensing Application Centre.
• Department of Energy	An Engineer not less than the rank of Superintending Engineer.

- Such other members not exceeding five, who in the opinion of the State Government, have special knowledge or practical experience in matters relating to the management of groundwater resources.

(3) The terms and manner of filling the vacancies and other conditions of service of the Chairman and other members shall be such as may be prescribed by the State Government.

(4) The members will advise the Chairman, who will be the Chief Executive of the Authority.

Staff of the Authority

5. (1) In order to enable the Authority to properly function or exercise the powers under the Act, the Government may appoint such a number of technical personnel and other staff as it may consider necessary.

(2) The functions and the terms and conditions of service of such employees shall be such as may be prescribed by the State Government.

Power to notify areas to regulate and control the development and management of groundwater

6. (1) The Authority shall function under the overall control and supervision of the State Government.

(2) If the Authority, after consultation with various expert bodies, including Central Groundwater Authority, is of the opinion that it is necessary or expedient in the public interest to control and regulate the extraction or the use or both of groundwater in any form in any area, it will advise the Government to declare any such area to be notified area for the purposes of this Act with effect from such date as may be specified therein. This declaration will be notified in the official Gazette;

Provided that the date so specified in the notification shall not be earlier than three months from the date of the publication of the said notification.

(3) Every such notification shall, in addition to its publication in the Official Gazette, be published in not less than one daily regional language newspaper having wide circulation in the State, and also be served in such manner as the Government may think fit and all or any of the following modes may be followed in effecting such service, namely-

(a) by affixing a copy of the notification to some conspicuous part of the offices of the village Panchayats located in the said area;

(b) by proclaiming by beat or drum or by means of loudspeakers the contents of the notification in the said area;

(c) in such other manner as may be prescribed.

(4) If, in the opinion of the Authority, the availability of the groundwater has improved in a notified area, it may advise the State Government to de-notify such area, and the State Government may do so according to the procedure prescribed above under section 5(3) of the Act.

(5) The Authority shall take steps to ensure that exploitation of groundwater resources does not exceed the natural replenishment to the aquifers, and wherever there is a mismatch, steps shall be taken to ensure augmentation of groundwater resources in addition to regulatory measures.

(6) The Authority shall maintain and upkeep the database of groundwater-related information.

Grant of permit to extract and use groundwater in the notified area

7. (1) Any user of groundwater as defined under section 3(f) desiring to construct a structure the well in the notified area for any purpose either on payment of such fee as may be prescribed,

apply to the Authority for grant of a permit, and shall not proceed with any activity connected with such construction unless a permit has been granted by the Authority;

Provided that the person or persons will not have to obtain a permit if any well is proposed to be fitted with a hand-operated manual pump or water is proposed to be withdrawn by manual devices.

(2) Every application made under sub-section (1) shall be in such form and contain such particulars as may be prescribed by the Authority.

(3) On receipt of an application under sub-section (1), if the Authority is satisfied that it shall not be against the public interest to do so, it may grant, subject to such conditions and restrictions as may be specified, a permit authorizing the extraction and use of groundwater. The Authority may impose conditions for providing artificial recharge structures of appropriate size to be constructed by the applicant within a period as specified by the Authority:

Provided that no person shall be refused a permit unless he has been given an opportunity of being heard.

(4) The decision regarding the grant or refusal of the permit shall be intimated by the Authority to the applicant within a period of 90 days from the date of the decision.

(5) In granting or refusing a permit under sub-section (3), the Authority shall have regard to-

(a) the purpose or purposes for which water is to be used;

(b) the existence of other competitive users;

(c) the availability of water;

(d) quantity of groundwater to be drawn;

(e) quality of groundwater to be drawn with reference to proposed usage;

(f) Spacing of groundwater structures, keeping in view the purpose for which water is to be used;

(g) long-term groundwater level behavior;

(h) its likelihood of adversely affecting the water availability of any drinking water sources in its vicinity; and

(i) any other factor relevant thereto.

Registration of existing users of groundwater in the notified area

8. (1) Every existing user of groundwater in a notified area under section 6(2) in the State shall, within a period of 120 days from the date of notification of areas by the Government, apply to the Authority for the grant of a certificate of registration recognizing its existing use in such form and in such manner as may be prescribed;

Provided that the Authority may entertain any such application after the expiry of the said period of 120 days if it is satisfied that the user was prevented by sufficient cause from filing the application in time.

(2) The details to be furnished in an application under sub-section (1) shall include the following, namely-

- the description of the source of groundwater, such a type of well, and its exact location;
- the device used for lifting water;
- the quantity of groundwater withdrawal and hours of operation per day;
- the total period of use in each year;
- the purpose or purposes for which groundwater is being extracted.
- in case the requirement of groundwater is for the purpose of drinking water, the approximate population to be served;
- in the case of an irrigation well, the location and extent of the area irrigated, and
- in the case of State, Municipal, or community-run water supply schemes, the details of the services involved in addition to the quantities of groundwater extracted, the diversion or the pumping points, and their locations.

(3) On receipt of an application under sub-section (1), if the Authority is satisfied that it shall not be against the public interest to do so, it shall grant, subject to such conditions and restrictions as may be specified therein, a certificate of registration in such form as may be prescribed authorizing continued use of groundwater:

Provided that no person of groundwater shall be refused a certificate of registration without being given an opportunity to be heard.

(4) The decision regarding the grant or refusal of the certificate of registration shall be intimated by the Authority to the applicant

within a period of ninety days from the date of the decision.

(5) In granting or refusing a certificate of registration under sub-section (3), the Authority shall have regard to;

(a) the purpose or purposes for which water is to be used;

(b) the existence of other competitive users;

(c) the availability of water;

(d) quality of groundwater with reference to its usage;

(e) spacing of groundwater extraction structures keeping in view the purpose for which water is to be used;

(f) long-term groundwater level behavior; and

(g) any other factor relevant there to.

(6) The certificate of registration shall be in such form as may be prescribed.

(7) Pending the communication by the Authority of the decision on an application under sub-section (1), every existing user of groundwater in the notified area shall be entitled to the continued use of the groundwater in the same manner and to the same quantity as he was entitled prior to the date of his application.

(8) If a registered well becomes defunct, this fact should be immediately brought to the notice of the Authority by the user of groundwater.

Registration of drilling agencies

9. Every rig owner operating in the State shall register his machinery with the Authority in such manner and on payment of such fee as may be prescribed and shall follow the instructions issued by the Authority.

Power to alter, amend or vary the terms of the permit/certificate of registration

10. At any time after a permit or certificate of registration, as the case may be, has been granted, the Authority may, for technical reasons to be recorded in writing, alter, amend, or vary the terms of the permit or certificate of registration, as the case may be:

Provided that no change shall be made in the permit or certificate of registration, as the case may be unless the user of groundwater is afforded an opportunity of being heard:

Cancellation of permit/ certificate of registration

11. If the authority is satisfied either on a reference made to it on this behalf or otherwise that –

(a) the permit or certificate of registration granted, under sub-section (3) of section 7 of sub-section (3) of section 8, as the case may be, is not based on facts,

(b) the holder of the permit or certificate of registration has, without reasonable cause, failed to comply with the conditions subject to which the permit or certificate of registration has been granted or has contravened any of the provisions of this Act or the rules made thereunder,

or

(c) a situation has arisen which warrants limiting of the use or extraction of groundwater, then without prejudice to any other penalty to which the holder of the permit or of the certificate of registration may be liable under this Act, the Authority may, after giving the holder of the permit or certificate of registration, an opportunity to show cause, cancel the permit, certificate of registration, as the case may be.

Royalty in respect of the use of groundwater

12. (1) Every user of groundwater in a notified area shall pay to the Authority a royalty for the extraction of groundwater at such rates and in such manner as may be prescribed by the Authority with the prior approval of the State Government:

Provided that a user of groundwater who irrigates for Agriculture/Horticulture or Floriculture less than one hectare of land, whether owned or leased or both, shall be exempted from payment of royalty under this section.

(2) The Authority may assign such proportion of the royalty as may be prescribed for the maintenance of Water Supply Schemes and development of groundwater resources or any other purposes.

Powers of the Authority

13. (1) The Authority or any person authorized by it in writing on this behalf shall have power:-

(a) to enter any property (Private or government-owned) with the right to investigate and make any measurements concerning the land or the water located on the surface or the underground,

(b) to inspect the well, which has been or is being sunk, and the soils and other materials excavated therefrom;

(c) to take specimens of such soils or other materials or of water extracted from such wells;

(d) to order, in writing, the person sinking a well to keep and preserve in the prescribed manner specimens of soil or any material excavated therefrom for such period not exceeding six months from the date of completion or abandonment of the work, as may be specified by the Authority and such person

shall comply with such order;

(e) to inspect and to take copies of the relevant record or documents and ask any question necessary for obtaining any information (including diameter or depth of the well which is being or has been sunk; the level at which the water is or was struck and subsequently restored/ rested, the types of strata encountered in the sinking of the well and the quality of the groundwater struck, etc.) required for carrying out the purposes of this Act ;

(f) to direct the user of groundwater to install water measuring devices on any groundwater abstraction structures;

Provided that where the user of groundwater does not comply with the directions issued to him within a period of sixty days, the Authority itself may install such water measuring device and recover the cost from the defaulting user of groundwater;

(g) to seize any equipment/device utilized for illegal sinking and demolish the work executed fully or partly;

(h) to direct any user of groundwater who does not comply with the provisions of this Act and rules framed thereunder to close down the extraction of groundwater, disconnect its power supply, and demolish any hydraulic work found to be illegal according to the provisions of this Act and the rules framed thereunder;

(i) to enter and search with such assistance, if any, as it considers necessary, any place in which it had reason to believe that offence under this Act has been or is being committed and order, in writing, the person who has been or is committing the offence, not to extract or use the groundwater for a specified period not exceeding thirty days;

(j) to exercise such other powers as may be necessary for carrying out the purposes of this Act or any rules made there under.

(2) The power conferred by sub-section (1) of this section includes the power to break open the door of any premises where sinking, extraction, and use of groundwater may be going on:

Provided that the power to break open the door shall be exercised only after the owner or any other person in occupation of the premises, if he is present therein, refuses to open the door on being called to do so.

(3) The provisions of the Code of Criminal Procedure, 1973 (2 of 1974) shall, so far as may apply to any search of seizure under

this section as they apply to any search or seizure made under the authority of a warrant issued under section 93 of the said Code. (4) Where the Authority seizes any mechanical equipment/ device under clause (g) of sub-section (1), it shall, as soon as may be, report to the Magistrate and take his orders as to the custody thereof.

Service of orders, etc.

14. (1) Every order under clause (d) of sub-section (1) of section 13 shall be served:-

(a) by giving or tendering the order of notice or by sending it by post to the user for whom it is intended, or

(b) if such user cannot be found, by affixing the order of notices on some conspicuous part of his last known abode or place of business or by giving or tendering the order of notice to some adult member or servant of his family or by affixing on some conspicuous part of the land or building in which the well is being sunk.

Where the person on whom an order or a notice is to be served is a minor, service upon his guardian in the manner provided in subsection (1) shall be deemed to be service upon the minor.

Bar to claim compensation

15. No person shall be entitled to claim any damages or compensation from the Government or Authority for any loss sustained by him by virtue of any action taken under this Act.

Delegation of powers and duties

16. The Authority may, by general or special order in writing, direct that all or any of the powers and duties which may be exercised or discharged by it shall, in such circumstances and under such conditions and with such terms and conditions, if any, as may be specified in its order, be exercised or discharged also by any Municipality, Panchayat, Institution or any employee of the Authority specified in this behalf in the order.

Members and employees of the groundwater authority to be public servants

17. All members and employees of the Authority shall, when acting or purporting to act in pursuance of the provisions of this Act or of any rules made thereunder, be deemed to be public servants within the meaning of section 21 of the Indian Penal Code.

Protection against action taken in good faith

18. No prosecution, suit or other legal proceedings shall be instituted\ against the Government, the Authority or any other officer of the Government or any member or other employees of the Authority for anything done or intended to be done in good faith, under this Act, or the rules made thereunder.

Cognizance and trail of offences

19. (1) No prosecution for an offence under this Act shall be instituted without the written consent of the Authority or a person authorized in this behalf by the Authority.

(2) No court inferior to that of a Metropolitan Magistrate or a Magistrate of the first class shall try any offence under this Act.

CHAPTER-III

Rain harvesting water for groundwater recharge

20. (1) To improve the groundwater situation, the Authority may identify the recharge-worthy areas in the State and issue necessary guidelines for the adoption of rainwater harvesting for groundwater recharge in these areas. In rural areas, watershed management to facilitate groundwater recharge may be encouraged through community participation. The Authority may give appropriate directions to the concerned departments of the State Government to include Rainwater Harvesting in all developmental schemes falling under the notified areas. In urban areas, falling in notified areas, the Authority may issue directives for constructing appropriate rainwater harvesting structures in all residential, commercial, and other premises in a manner prescribed within the stipulated period, failing which the Authority may get such rainwater harvesting structure constructed and recover the cost incurred along with a penalty as may be prescribed.

(2) Notwithstanding anything contained in the relevant laws, the Municipal Corporation or any other local Authority, as the case may be, may impose stipulated conditions for providing rooftop rainwater harvesting structures in the building plan while according to approval for construction, and permanent water and electricity connections shall be extended only after compliance of the directions given in this regard.

(3) The Authority shall take steps for the promotion of Mass Awareness and Training Programmes on Rainwater Harvesting and Artificial Recharge to Ground Water through Government Agencies/Non-Government Organisations (NGOs)/ Voluntary Organisations/ Educational Institutions/ Industries/ Individuals.

CHAPTER-IV

MISCELLANEOUS

Power to remove difficulties

21. If any difficulty arises in giving effect to the provisions of this Act, the Government may, as occasion arises, by order, do anything which appears to it to be necessary or expedient to remove the difficulty:

Provided that no such order shall be made after the expiry of the period of two years from the date of commencement of this Act.

Offences and penalties

22. If any user of groundwater:

(a) contravenes or fails to comply with any of the provisions of this Act or any rule made thereunder,

(b) obstructs the Authority or any other person authorized by it to exercise any of the powers under this Act, He shall be punishable,

(i) for the first offence with a fine as prescribed by the Authority, and

(ii) for the subsequent offence, with imprisonment for a term which may extend to six months, or with a fine as prescribed by the Authority;

Provided that no court shall take cognizance of any offence except on a report in writing by the officers of the Authority.

Compounding of offences

23. Any offence under this Act may be compounded by the Authority as prescribed, either before or after the institution of the proceedings, subject to such conditions as may be prescribed.

Offences by Companies, Trusts and Societies

24. (1) Whenever an offences under this Act has been committed by a Company, every person who at the time of the commission of the offence was in charge of, or was responsible to the Company for the conduct of the business of the Company, shall be deemed to be guilty of the offence and shall be liable to be proceeded against and punished accordingly.

(2) Notwithstanding anything contained in sub-section (1), where an offence under this Act has been committed with the consent or connivance of, or is attributable to any neglect on the part of any Director, Manager, Secretary, or other officers of the company such Director, Manager, Secretary or other officers shall also be deemed to be guilty of that offence and shall be liable to be proceeded against and punished accordingly:

Provided that nothing contained in this sub-section shall render any such person liable to any punishment under this Act, if he proves that offence was committed without his knowledge or that he exercised all due diligence to prevent the commission of such offence.

Explanation - For the purpose of this section-

(a) "Company" means anybody corporate and includes a firm or other association of individuals; and

(b) "Director" in relation to a firm, means a partner in the firm.

Appeals

(25) (1) Any person aggrieved by a decision or action of the Authority under this Act may, within a period of sixty days from the date on which the action is taken or the decision is communicated to him and on payment of such fees as may be prescribed, prefer such an appeal to such Appellate Authority as may be specified by the State Government in this behalf;

Provided that the Appellate Authority may entertain an appeal after the expiry of said period of 60 days if it is satisfied that the applicant was prevented by sufficient cause from filing the appeal in time.

(2) On receipt of an appeal under sub-section (1), the Appellate Authority shall, after giving the applicant an opportunity of being heard, dispose of the appeal as expeditiously as possible.

Power to make rules

(26) (1) The State Government may, by notification in the Official Gazette, make rules to carry out the purposes of this Act.

(2) In particular and without prejudice to the generality of the foregoing power, such rules may provide for:

(a) the term of office and manner of filling vacancies and other conditions of service of the Members and Chairman of the Authority;
(b) the functions and the terms and conditions of service of the employees of the Authority;
(c) any other manner of effecting service of the notification under clause (c) of sub-section (3) of section 6;
(d) the form of application under sub-section (2) of section 7 and the particulars that may be furnished with these applications;
(e) the form of application under sub-section (1) of section 8;
(f) the form of the Permit and Certificate of Registration under sub-section (6) of section 7 and sub-section (6) of section 8;
(g) the manner in which the specimens of soils or other materials shall be kept and preserved under clause (d) of sub-section (1)

of section 12;

(h) specifying the Appellate Authority under sub-section (1) of section 25 and the fees to accompany the application for appeal;

(i) any other matter which is to be or may be prescribed.

(3) Every rule made under this section shall be laid, as soon as may be after it is made, before the Legislative Assembly.

HYDRO AND RENEWABLE ENERGY DEPARTMENT
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