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THE LAW AND PRACTICE OF GROUND WATER CONSERVATION; WITH SPECIFIC REFERENCE TO THE STATEOF UTTAR PRADESH

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Abstract -The State of Uttar Pradesh is the largest and most densely populated state of India. Traditionally an agricultural state has high volume of surface under cultivation. The state has faced deprivation of development until late. Owing to these reasons, the twenty-first century saw a sudden increase in water consumption in the state. For most of it's requirements, the State has been dependent on ground water only. In the first decade of the 21st century a sharp decline in ground water levels was observed in the State and efforts were on to revive the ground water levels. Increasing food grain requirement increases the agricultural requirement, growing urban and industrial infrastructure causes unsustainable consumption patterns. All these factors make it difficult to maintain the ground water levels and to recharge it. Present paper presents the important concerns of the state and analyzes the state water policy for its completeness and effectiveness. The state policy update and analysis aims at evaluating the policy and suggesting further measures.

Introduction

Water is an essential for survival, directly and indirectly. Directly because the living organisms can't sustain in absence of a minimum regular intake of water and indirectly because many of the other survival needs depend on water. For example, agriculture ensures the availability of food and agriculture is dependent on water. State of Uttar Pradesh being an agriculture fed state, has always had a high demand of water. Irrigation is the major-most water consumption in Uttar Pradesh since earlier and about 43.8 Billion Cubic Meters of surface water and about 27 Billion Cubic Meters of ground water was utilised out of the total of about 161.70 Billion Cubic Meters of surface water and about 72 Billion Cubic Meters exploitable (Total replenish able 84 Billion Cubic Meters) ground water resource at the beginning of the twenty first century[3].

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[3] The Uttar Pradesh Water Policy, 1999 available at ielrc.org/content/e9904.pdf visited on 17th august 2020

By the end of twentieth century, about 70 percent of the total surface area of the state was allocated to agriculture. Presently, 17.6 million hectares of surface under cultivation[4]. For a projected population of 270 million by end of year 2020 the food grain requirement has been assessed as 63 million tones. With the present irrigation and other inputs a productivity level of about 1.7 tones per hectares has been achieved. A productivity level of 3.4 tones per hectares will have to be achieved to meet the projected food grain requirements[5]. In order to achieve this target, in addition to other inputs, irrigation facilities shall have to be adequately provided by harnessing the untapped potential as well as by bringing about improvement in the management of water resources.

Availability and Consumption of Groundwater in Uttar Pradesh-

Earlier known as the Joint Province of Agra and Awadh, it became Uttar Pradesh in 1950. After separation of Uttarakhand as a new and separate state, Uttar Pradesh has 241000 square kilometres of surface area[6] with 75 districts and is still the largest province in India. It has an average annual rainfall of 1279 millimetres. Hydro-geologically, the State of Uttar Pradesh can be seen in five parts viz. bhabar, tarai, central gangatic fields, marginal alluvial fields and southern peninsular zone. Regarding available of water in these zones, the governmental statistics provide-

"The first is in the outrageous north followed progressively by the rest southwardly. The yield of tubewells tapping Bhabar and Tarai zones ranges between 100-300 cubic meters per hour and 100-200 cubic meter per hour, individually. The water level is somewhere down in Bhabar whereas in Tarai regions auto stream conditions are seen with piezo metric head of 6-9 meters above ground level. The Central Ganga plain is described by low help and various alluvial highlights. There are four significant springs in the profundity scope of 700 meters below ground level. The yield of these tube wells ranges from 90 to 200 cubic meters per hour. The thickness of silt in Marginal alluvium is 50-300 m and yield of tube wells is between 35 to 70 cubic meters per hour. The yield possibilities of Vindhyan and glasslike rocks in the southern peninsular locale are constrained".7

Dynamic Ground Water Resources in Uttar Pradesh[8]:

Annual Replenishable Ground water Resource	76.35 Billion Cubic Meters
Net Annual Ground Water Availability	70.18 Billion Cubic Meters
Annual Ground Water Draft	48.78 Billion Cubic Meters
Stage of Ground Water Development	70 %

In the irrigation sector,[9] which is currently the most important consumer, about 43.8 Billion Cubic Meters of surface available water and approximately 27 Billion Cubic Meters of ground water has

[4] Uttar Pradesh Statistical Diary, 2018 p-129, available at http://updes.up.nic.in/esd/reports/dbank_april19/Statistical_Diary_2018_English.pdf visited on 17th August, 2020

[5] The Uttar Pradesh Water Policy, 1999 available at ielrc.org/content/e9904.pdf visited on 17th august 2020

[6] Uttar Pradesh Statistical Diary, 2018 p-24; available at http://updes.up.nic.in/esd/reports/dbank_april19/Statistical_Diary_2018_English.pdf visited on 17th August, 2020

[7] Central groundwater Board, Ministry of Water Resources, Government of India http://cgwb.gov.in/gw_profiles/st_up.htm visited on July 23rd, 2020

[8] Central groundwater Board, Ministry of Water Resources, Government of India http://cgwb.gov.in/gw_profiles/st_up.htm visited on July 23rd, 2020

already been utilized, out of the approximate aggregate of about 161.70 Billion Cubic Meters of surface available water and approximately 72 Billion Cubic Meters of water still available. Total rechargeable 84 Billion Cubic Meters groundwater available is reported as available in the state. Beyond this, about 27.8 Billion Cubic Meters of surface water is likely to get utilized after completion of ongoing projects. 43.2 Billion Cubic Meters is the amount of water that cannot be utilized currently. Therefore, there is only about 22.2 Billion Cubic Meters of water which is still available for future irrigation purposes after putting away about 24.7 Billion Cubic Meters for other purposes. Uttar Pradesh has approximately 20 million hectares of land under cultivation; out of which almost 17.4 million hectares is currently cultivated.[10] For an estimated population of 270 million by the end of year 2020 the food grain requirement is evaluated to reach around 63 million tonnes. With the present irrigation and other inputs, an output level of about 1.7 tones per hectare has been reached.[11] Yield level of 3.4 tones per hectares needs to be attained to satisfy the likely food necessities. To accomplish this goal, beyond other inputs, irrigation amenities shall need to be abundantly available by developing the untapped capability and by reaching further developments in the management of water resources. Water for drinking and domestic use has always been the highest priority at the time of allocating water resource in the state. The state has to have sufficient drinking water for it's population of humans and animals covering all regions, rural and urban, by the year 2025. Cleanliness and health amenities for whole of the population in urban areas and most of the rural areas also need to be supplied.[12]

Total inhabitants of Uttar Pradesh are about 23 crores[13]. It is majorly an agricultural state. Around 70 % of irrigated agriculture in the state is dependent on ground water resources.[14] Majority of the water needs for the purpose of drinking and industrial sectors are also to be catered from ground water resources.[15]

In the State, mostly the arrangement of ground water resources and their consumption, are such that 70 percent of total water consumption for Irrigation comes from ground water. Drinking water receives 80 percent of it's supply from ground water and the industrial sector of the state depends on ground water for 85 percent of it's total requirement[16].

Growing dependence on ground water resources can be discerned by the fact that the rate of ground water consumption, which was as 54.31 percent in the year 2000, has reached 72.16 percent in the year 2009. Consequently, the stage of over-extraction has arisen in many rural and urban localities of Uttar Pradesh and due to rising over-exploitation, pollution and ecological disturbance; this natural resource is seriously under threat of quick depletion. It is projected that for domestic, industrial and irrigation needs of increasing population, the level of ground water extraction will surge from 27 Billion Cubic Meters to 64 Billion Cubic Meters by 2025 i.e. need of ground water will be more than twice the existing level. Due to this, the number of over-exploited blocks may rise from 14 to 177 by

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[9] https://niti.gov.in/planningcommission.gov.in/docs/aboutus/committee/strgrp/stgp_irrig.pdf visited on July 23rd, 2020

[10] Charles Clift. "Progress of Irrigation in Uttar Pradesh: East-West Differences." *Economic and Political Weekly*, vol. 12, no. 39, 1977, pp. A83–A90. *JSTOR*, www.jstor.org/stable/4365953. Accessed 28 July 2020

[11] http://www.fao.org/3/x6905e/x6905e09.htm accessed on July 23rd, 2020

[12] http://upgwd.gov.in/MediaGallery/StateWaterPolicyUPID_1.pdf accessed on July 23rd, 2020

[13] According to 2012 census

[14] http://upgwd.gov.in/MediaGallery/ACT_ENGLISH.pdf? Accessed 28 July 2020

[15] https://www.oav.de/fileadmin/user_upload/5_Publikationen/5_Studien/170118_Study_Water_Agriculture_India.pdf accessed on July 23rd, 2020

[16] "Policy for ground water management, rain water harvesting and ground water recharge in Uttar Pradesh" (Issued by Government Order no.-280/62-1-2013-7WP-2004, TC-III, dated 18 February, 2013 and published in Uttar Pradesh Extraordinary Gazette, 2013)

the year 2025. For proper management of ground water resource which should ensure optimal utilisation and avoid over exploitation, the following concerns must be addressed[17]:

- Rationalizing demand by proper management and preservation by resorting to well-organized irrigation technologies, for example piping drip and sprinkler irrigation is necessary.
- Openings for and limitations on the spread of poor water intensity cropping patterns need to be examined as a factor for rationalizing demands.
- Diversification of sources: Diversification of water sources and minimizing load on ground water along with ground water recharge has to be oriented by the policy, practices and developmental ideologies. Enhancing the ground water by non-natural means, extra monsoon runoff between sub-basin within river systems should be attempted and preserved in the available aquifers, by deploying suitable recharge techniques such as, building of recharge ponds and percolation tanks and de-siltation of prevailing ponds, building of recharge shafts in the present ponds, introduction of gravity head recharge wells and development of present tube wells into gravity head recharge well, building of water conservation installations such as Nala Bunds, Contour Bunds, Gully plugs etc. Building of recharge basin etc. in the heavily stressed and stressed blocks may also be a step in the same direction. Despite all, while undertaking any recharge project, it should be ensured that such projects are not likely to contaminate the ground water aquifer.
- Regulation: Viewpoints to confine ground water usage in the areas wherein ground water is diminishing fast, must be worked on in light of other limitations.[18]

State water policies in Uttar Pradesh

Uttar Pradesh is an agrarian state, where surface under cultivation is high and irrigation resources are less. Situation can be understood by the fact that almost 70 percent of irrigated cultivation in Uttar Pradesh largely depends on groundwater.[19] 80 percent of drinking water and 85 percent industrial sector water demands are also fulfilled by groundwater resources.[20] In the state concerned, there are 12205, wells, 663 DLWR installed and 303 RF Stations[21]. However, Uttar Pradesh is blessed with abundant water availability; and it was thought sufficient at a time, but due to steadily increasing need of water for in all sectors including agricultural, domestic, commercial, industrial and other uses, adequacy of water is increasingly under question and the gap is likely to continue and even widen, because of increasing population. Water is a very important resource, an essential survival need and so it needs to be preserved. Preservation and deployment of water resources of the state must be guided and led by the overall development oriented ideas in the state.[22] The State Government have made efforts for environmentally sound and equitable management and conservation of water and in this regard, steps like rainwater harvesting, ground water recharge and aquifer management have been among the most important action points of the state.[23] The state level water policy in Uttar Pradesh, promulgated in 1999, focussed much of consumption of water for irrigation purposes. The policy looks at the growing demand of food grains vis-à-vis an increasing urban surface area. At the same time, it also sees a fast growing population. Therefore, the policy did not restrict the use of underground water for irrigation purpose. One more reason for this was that at the time when this policy was made, Uttar Pradesh was having good underground water level. A very serious decline of

[17] http://idup.gov.in/pages/en/leftmenu/other-useful-information/policies/water-policy/en-state-water-policy Accessed 28 July 2020
[18] http://upgwd.gov.in/MediaGallery/StateWaterPolicyUPID_1.pdf Accessed 28 July 2020
[19] ibid
[20] http://upgwd.gov.in/StaticPages/Bhoojal_Paridrishya.aspx Accessed 28 July 2020
[21] http://203.153.41.235:81/ Accessed 28 July 2020
[22] http://upgwd.gov.in/MediaGallery/StateWaterPolicyUPID_1.pdf Accessed 28 July 2020
[23] http://upgwd.gov.in/MediaGallery/ACT_ENGLISH.pdf Accessed 28 July 2020

underground water level took place in the state of Uttar Pradesh in the first decade of twenty-first century. Major reasons for this decline included: a) increasing numbers of tube-wells; b) highly subsidized electricity in rural areas led to exploitation of underground water; c) shortage of canal water; d) high dependence on more water consuming crops like rice and sugarcane.

In 2013, the Policy for Ground Water Management, Rain Water Harvesting and Ground Water Recharge in Uttar Pradesh, 2013 was promulgated to address the existing concerns of water conservation in the state. It promotes study and research for water conservation, ground water maintenance, ground water recharge, continuous monitoring of ground water levels and also authorizes the government to make rules for proper implementation of the objectives of the policy.

No doubt, that water needs to be wisely used and preserved for future; and so, it has to be an important component of development planning. The 1999 water policy of the state was very much in line with the National Water Policy of 1987, made under the auspices of "National Water Resources Counsel" as accepted by the states and union territories. However, this development could not see success but generated a wider debate for integrating water conservation policy with the very idea of development.

Comprehensive law for Ground Water Management, Rain Water Harvesting & Ground Water Recharge in Uttar Pradesh[24]:

It takes very long to develop laws affecting traditionally settled lifestyle. Even if it does not, it is difficult to regulate certain aspects of life affected by such laws. Developing legal framework and policy on ground water management in the state, the Policy on Ground Water Management, Rainwater Harvesting and Ground Water Recharge was promulgated in 2013. Salient features and objectives of the policy include [25]:

"To ensure regulated exploitation and optimum & judicious use of ground resources, to initiate National programme of aquifer mapping and aquifer based management in the state in a planned way for overall ground water management, to implement ground water recharge programme on a large scale in an integrated manner and to bring over-exploited/critical blocks into safe category in a time bound manner, to effectively implement conjunctive use of surface water and ground water ,to promote efficient methods of water use in the stressed areas, to give priority to the river basin/watershed approach in ground water management planning and conservation, to identify ground water polluted areas in order to ensure safe drinking water supplies,to implement ground water conservation and recharging programmes by the concerned departments through participatory management approach in a co-ordinated and integrated manner & to promote research and training along with public awareness."

The action plan for Aquifer Mapping and Aquifer based Management needs to be scaled up on larger levels for proper results towards ground water conservation.[26] For better management of water resources, a plan of action for proper implementation of the schemes should be prepared with appropriate monitoring mechanism. To protect ground water resources in Uttar Pradesh, tangible steps are required for furthering equitable, efficient and optimum use and for its planned development. [27] Exclusive management plans for urban and rural locations should be prepared and implemented. The recharge schemes should be implemented in a consolidated design drawn on geo-scientific norms, so

[24] http://cgwb.gov.in/documents/MasterPlan-2013.pdf Accessed 28 July 2020
[25] http://upgwd.gov.in/StaticPages/Objective.aspx Accessed 28 July 2020
[26] https://www.downtoearth.org.in/blog/water/aquifer-mapping-programme-critical-to-raise-groundwater-levels-66790 Accessed 28 July 2020
[27] https://www.researchgate.net/publication/309630630_Aquifer_Mapping_Programme_of_India accessed on July 26 2020

that ground water availability could be enhanced. [28] Integrated mechanism for ground water recharge should be planned to bring critical blocks of the state into safe category.[29]

For suitably monitored and regulated consumption of ground water and its conservation in the state, formulation of practical and acceptable regulation process should be considered distinctly for rural and urban locations. To draw a consolidated strategy for mapping of ground water quality is planned to be drawn by the state ground water department. For this, GIS supported wide-ranging monitoring of ground water quality is to be conducted by relevant state department.[30] District-wise focussed 'Water Management Plan' is planned to be drawn with studies based on the local hydrogeological conditions, specifically for rural and urban locations.[31] At state and private levels, capacity building and training and awareness programmes are also to be conducted.[32]

Equitable Consumption of Ground Water and Planning for a Better Future:

Usually, in ground water based supplies a huge quantity of ground water gets wasted due to errors in the existing mechanism of water supply.[33] According to a study, in urban areas, huge quantities of drinking water is lost daily due to drips in water supply distribution network, whereas in villages also, ground water gets wasted because of field losses during commutation to fields from the tube wells.[34] Moreover, because of lack awareness, more irrigation than the required amount also leads to unnecessary extraction of ground water.[35] There are 630 urban bodies in the State, where most of drinking water supplies are fed by ground water. Consequently, ground water resources in many cities are subjected to undue extraction.[36] For sustaining the ground water sources in such over-exploited locations, special care should be given to achieve conservation. For this, the following actions are found worthwhile:

To curb losses due to water leaks during supplies, Jal Nigam should ensure proper maintenance of water transportation systems. This would save wasted and will also help in reducing excessive ground water extraction.[37]

To lessen the current level of ground water extraction in cities, domestic water usage should be assessed thoroughly and ground water withdrawal should be planned on a necessity basis.[38] Operative tube wells in major urban areas, extracting ground water from loaded aquifers, should be de-stressed phase-wise and new tube wells should be installed at alternate locations to lessen excess load on ground water without disrupting essential supply. For consistent drinking water supplies in the cities located on river banks on the Ganges, tube wells could be installed in the first aquifer group located

[28] https://jalshakti-ddws.gov.in/sites/default/files/JJM_Operational_Guidelines.pdf Accessed 28 July 2020
[29] https://www.indiawaterportal.org/questions/solution-exchange-discussion-roof-water-harvesting-urban-areas-groundwater-recharge-icef Accessed 28 July 2020
[30] http://cgwb.gov.in/documents/AR/SUCCESS%20STORIES%20OF%20AR.html Accessed 28 July 2020
[31] http://cgwb.gov.in/RGI/Tier%20III%20Trainig%20module%20English.pdf Accessed 28 July 2020
[32] http://cgwb.gov.in/documents/Manual%20on%20Artificial%20Recharge%20of%20Ground%20Water.pdf Accessed 28 July 2020
[33] https://www.sciencedirect.com/topics/earth-and-planetary-sciences/groundwater-management accessed 28 July 2020
[34] http://upgwd.gov.in/MediaGallery/ACT_ENGLISH.pdf Accessed 28 July 2020
[35] https://www.who.int/water_sanitation_health/dwq/monograph42.pdf Accessed 28 July 2020
[36] Roy, B. K. "Water in India with Reference to Agriculture and Population: Some Issues and Patterns - Dynamic Approaches Needed for Development." *GeoJournal*, vol. 20, no. 3, 1990, pp. 271–284. *JSTOR*, www.jstor.org/stable/41144642. Accessed 28 July 2020
[37] http://mowr.gov.in/sites/default/files/ESSA-NGMIP-29Sep2016_0.pdf Accessed 21 July 2020

[38] http://jalshakti-dowr.gov.in/sites/default/files/Report_on_Restructuring_CWC_CGWB_0.pdf Accessed 28 July 2020

up to 150m.[39] It has been observed in the scientific studies of Central Ground Water Board that prospective aquifers of regional level may be found identified on riverbanks of the Ganges on it's both sides.[40] For maintaining the desired drinking water availability, reliance on ground water is to be reduced and surface water based options should be promoted. For this purpose, identification of stressed ground water locations is important and regular ground water auditing is also very much required. For this, action is pending on the part of Jal Nigam, Urban Development Department and Housing & Urban Planning Department. Water management interventions for rural locations for maintaining irrigation supplies vis-à-vis fulfilling conservation needs is an indispensable requisite in this agrarian state.[41] Being easily available, ground water is taken up as major irrigation resource and in this way, ground water use has surged to uncontrolled levels and this has led to over-exploitation in many areas. Ground water is a limited resource and over-exhaustion may lead to sudden crisis affecting domestic supplies and other purposes including agriculture. To avoid this situation, newer options must be looked for and resorted to. More so, for the water needs of the populations and activities in the overloaded locations.[42] To make it sustainable, usage patterns should also be relooked and instead of uncontrolled supply for irrigation purposes, in the state tube well based irrigation, sprinkler system could be added on to lower the pace of supply so that consistent irrigation can be maintained without unnecessary ground water withdrawal. Combined use of canal water and ground water can also be a reliever of overload on ground water. Encouraging low water demanding crops in stressed areas, may also be looked into as crop rotation on water consumption basis can be planned and an integrated plan of agriculture and water conservation could be of much help, provided that such plans are found acceptable to both water conservation department and the Agriculture Department.[43] May be difficult but it is important that some crops or species, recommended appropriate should be planned for crop rotation for the reason of water conservation, as designed by agriculture department, especially in the over-exploited locations.[44]

Present Institutional Mechanism and Conservation Efficiency

There is a dire requirement to develop a well-defined, efficient institutional mechanism for ground water in Uttar Pradesh. To meet the growing need to conserve, manage and supervise the ground water in the state, the state Ground Water Department should be renewed with capability additions, latest technology and integration of relevant ideas and vision. [45]

- "In view of imminent climate change and new problems of ground water conservation, the reorganization and strengthening of other departments related to ground water is also imperative with the overall goal of strengthening of institutional system."
- "In the institutional system, such an arrangement would be considered for implementation, which may lead to integration of planning and development related to ground water. "

[39]https://www.prsindia.org/administrator/uploads/general/1455682937~~Overview%20of%20Ground%20Water%20in%20India.pdf Accessed 28 July 2020
[40] http://nihroorkee.gov.in/sites/default/files/Report-Peya-Jal-Suraksha.pdf Accessed 28 July 2020
[41]https://www.nabard.org/auth/writereaddata/tender/1806181128Water%20Productivity%20Mapping%20of%20Major%20Indian%20Crops,%20Web%20Version%20(Low%20Resolution%20PDF).pdf Accessed 28 July 2020
[42] http://mowr.gov.in/sites/default/files/Guidelines-DecliningGWTable_1.pdf Accessed 28 July 2020
[43] https://niti.gov.in/writereaddata/files/document_publication/BestPractices-in-Water-Management.pdf Accessed 28 July 2020
[44] http://upgwd.gov.in/MediaGallery/ACT_ENGLISH.pdf Accessed 28 July 2020
[45] ibid

- Almost all the departments of the state are dependent on ground water for their departmental schemes or fulfilment of water related needs, but presently, following departments are directly linked with ground water schemes:-
- Minor Irrigation Department
- Irrigation Department
- Irrigation (Mechanical) Department
- U.P. Jal Nigam
- Agriculture Department
- Housing & Urban Planning Department
- Urban Development Department
- Rural Development Department
- Drinking Water and Sanitation Mission
- U.P. Pollution Control Board
- Industrial Development Department
- Public Works Department
- Forest Department
- Construction Agencies under the control of State Government.

While formulating and implementing ground water conservation plans, area-specific hydrogeological conditions and technical guidelines should be followed, so that there is no detriment to ground water resources. Presently, there is no distinct arrangement in the concerned departments for devising ground water related schemes. Therefore, proper technical support integration and consolidation should be facilitated for formulation of such schemes. A 'Separate Cell' with specific relevant capability should also be established in Ground Water Department. All relevant functionaries viz. minor irrigation, agriculture, urban development, housing and urban planning, land development and water resources, rural development, panchyati raj, Jal Nigam, drinking water and sanitation mission, industrial development, pollution control board, environment, forest, concerned central departments, other stakeholders should maintain mutual co-ordination for achieving the objective of policy."

Latest Legal Development: An Evaluation Uttar Pradesh Ground Water (Management and Regulation) Act, 2019

In the state of Uttar Pradesh, Groundwater (Management and Regulation) Act was made in 2019 for proper management of groundwater. It defines certain important terms, lays down the measures for conservation and recharge of groundwater and penalty measures for violation of the standards. It defines Ground Water Quality Sensitive Zone[46] as:

"such an area where quality of ground water is affected with high levels/excessive concentration of chemical elements, physio chemical constituents, heavy metals and bacteriological contamination, resulted due to geogenic or anthropogenic causes"

It further defines 'Ground Water Resource Estimation Report[47] as:

[46] Section 2(n), Uttar Pradesh Groundwater (Management and Regulation) Act, 2019
[47] Section 2(o), Uttar Pradesh Groundwater (Management and Regulation) Act, 2019

"the latest approved report, based on the Ground Water Estimation Committee methodology, prepared by the Ground Water Department, Uttar Pradesh and Central Ground Water Board for block-wise assessment of ground water resources including categorisation of blocks into over-exploited, critical, semi-critical and safe categories."

According to the Act, Ground Water Security Plan[48] means:

"A plan to be progressively based on available hydro-geological in formations and shall include such measures/interventions which are area specific and hydro-geologically feasible"

Also Ground Water[49] means:

"the water occurring in its natural state below the ground surface in the zone of saturation and that can be extracted through wells or any other means or emerges as springs and base flows in streams and rivers."

According to the Act, User of ground water[50] means:

"a person or a class of persons or an institution who or which own or use or sell ground water for any purpose including domestic use made either on personal or community basis and includes an industry, a commercial user, a bulk user, a company or an establishment whether government or not but does not include a person or a class of persons or an institution who or which use ground water drawn from well by manual or animal devices such as hand pump, rope and bucket, Persian wheel, etc."

The Act attempts to consolidate the conservation efforts at smaller levels like the panchayat and the municipalities. It empowers Gram Panchayat, which is the lowest public unit in village localities, to conserve and manage ground water resources under the assigned functions by this Act. The Act mandates-

"the State Government shall, by notification in the Gazette, within three months of the constitution of District Ground Water Management Council, issue directions for constituting the Gram Panchayat Ground Water Sub-Committee"[51]. Further, the Act provides[52]-

"the functions of the Gram Panchayat Ground Water Sub-Committee shall be to collect information from all sources, to prepare the Gram Panchayat Ground Water Security Plan as provided under Section 3, to carry out such other functions, as may be prescribed."

Block Panchayat Ground Water Management Committee[53]: The Act provides for formation of a Block Panchayat Ground Water Management Committee. It is important because the ground level Committees operate at grass root level and they generate awareness among people of the locality. Having been educated about the state of ground water in their locality and the future prospects, people are more likely to work coherently with the conservation policy. This inclusive development may also create consciousness among the local people for the need to redefine their lifestyle. Possible impacts may be small but are positive in this way, led by the grass root level bodies. The Committee basically

[48] Section 2(p), Uttar Pradesh Groundwater (Management and Regulation) Act, 2019
[49] Section 2(q), Uttar Pradesh Groundwater (Management and Regulation) Act, 2019
[50] Section 2(ab), Uttar Pradesh Groundwater (Management and Regulation) Act, 2019
[51] Section 3, "Uttar Pradesh Groundwater (Management and Regulation) Act, 2019"
[52] Section 3(4), "Uttar Pradesh Groundwater (Management and Regulation) Act, 2019"
[53] Section 4, "Uttar Pradesh Groundwater (Management and Regulation) Act, 2019"

operates in the planning, implementation and monitoring of the plans for ground water conservation, safety and sustainability.

Municipal Water Management Committee[54]**-** Very much like the Panchayat and Block level Committees, the Statute attempts to create an institution for the municipal areas also. It is likely to have the same way grass root level action including awareness generation, planning, and implementation and monitoring. This Committee also includes elected public representatives, government officials and nominated experts. The statute demands formation of the municipal level committee in no later than three months of the constitution of District Ground Water Management Council. The working of the committee includes coordination, studies, planning, implementation, and monitoring and awareness generation. The committee operations being directly in touch with the local public and water consumers, is likely to create effective awareness which is more likely to work for reduction in wastage of water, proper planning, participation at planning stages and public support in some monitoring stages. It's a very positive feature of the Act that it tends to include consumers in the management of ground water. This may be a significant positive step in the longer run.

Other Statutory Measures for Groundwater Conservation:

A) **Prohibition on new wells**[55]**:** The Act prohibits construction of new wells in certain areas as notified by the appropriate authority. This way, it attempts to reduce load on groundwater however, it allows new wells by government for drinking water supplies and tree plantations. Contravention of this provision has been given penal consequence, to make it more effective. State government may lift this ban after the concerned locality gets de-notified. This lifting of prohibition needs affirmative advice and concurrence of Uttar Pradesh State Ground Water Management and Regulatory Authority, based on new Ground Water Resource Estimation Report on significant improvement in declining trend of urban ground water levels.

B) **Imposition of Fee on extraction of Ground Water**[56]**:** In the non-notified areas wherein there is no ban on construction of new wells, policy tends to discourage groundwater extraction. This is only a matter of balance that water being an essential life need, is allowed to be extracted through such bore wells even by private persons and entities. However, imposition of fee on such extraction is not for revenue generation; rather to discourage unnecessary extraction of groundwater. This is to regulate groundwater consumption that these wells are subject to payment of fee to be charged annually on the basis of quantity of ground water drawl. The fee is over and above the water cess charged under the Water (Prevention and Control of Pollution) Cess Act, 1977. For the purpose of measuring and recording the quantity of ground water extracted, meters are installed and it is presumed that the quantity recorded by the meter has been extracted by the said user, until the contrary is proved. An annual ground water audit is also conducted to check the actual extracted water against quantity of ground water allowed for extraction.

C) **Ground Water Pollution control measures**[57]**:** The State Ground Water Management and Regulatory Authority is responsible to make sure that no commercial, industrial, infrastructural and bulk user can pollute ground water. It shall ensure through respective District Ground Water Management Council to make installation of treatment plant

[54] Section 5, Uttar Pradesh Groundwater (Management and Regulation) Act, 2019
[55] Section 12(1), Uttar Pradesh Groundwater (Management and Regulation) Act, 2019
[56] Section 16, Uttar Pradesh Groundwater (Management and Regulation) Act, 2019
[57] Section 24, Uttar Pradesh Groundwater (Management and Regulation) Act, 2019

mandatory wherever necessary in such manner as may be prescribed. Where such user of ground water fails to set up treatment plant within the prescribed duration, the State Ground Water Management and Regulatory Authority shall have the right to get the necessary treatment plant constructed at such user's cost and proceed against such user under the provisions of sub-section (2) of Section 39.

D) **Restriction on use of wells for disposal[58]:** The Act lays down that no commercial, industrial, infrastructural and bulk user by operation or process or any treatment and disposal system can discharge or dispose waste water, sewage, trade and domestic effluent or contaminants into the well, or dump waste on the land which may lead to leaching or percolation of contaminants, toxins into the aquifer. Contravention of this provision is made punishable.

E) **Restriction on direct recharging from open areas into the aquifers[59]:** The law provides that-

"In the process of Artificial Recharge to Ground Water from rain water (except from rooftop) falling on open land, ground, roads (paved/unpaved), agricultural farms shall not be allowed for direct recharging into the aquifers through recharge well, bore well, recharge shaft, injection well, etc. Any person who contravenes the provision of sub-section (1) shall be liable to punishment."

F) **Prohibition on polluting of ponds, rivers, wells[60]:** "The Act prohibits and commands the relevant authorities to ensure prevention of disposal of contaminating matter into rivers, ponds, wells etc. The local bodies including block committee, panchayat committee and the municipal committee are also expected to generate awareness among local population in this regard. It can be easily construed that such prohibited action may not always be brought to knowledge of enforcement agencies. Informed and aware population is more likely to contribute to the cause by understanding such violations and informing it to the legal authorities. The intent of the law and constitution of the committees has to be seen in as commonly operating for the same purpose. Any person who contravenes the provision shall be liable to punishment. Appropriate Authorities shall take all measures to ensure that any waste from domestic household does not pollute ponds, rivers, wells, etc."

G) **Rain water harvesting, Ground Water recharge and catchment conservation[61]:** The law demands the concerned authorities to encourage rainwater harvesting and catchment conservation; and to make it an integral part of Water Security Plans. The concerned body is expected to sensitize urban and rural users of ground water about the needs of conservation and suitable technologies for rainwater harvesting systems in stressed areas. Users must develop suitable technical drawing and design of Rain Water Harvesting System and get approval from concerned Authorities. It's an imperative to undertake all possible steps in integrated natural resources conservation, use and regulation for the augmentation of ground water resources.

[58] Section 27, Uttar Pradesh Groundwater (Management and Regulation) Act, 2019
[59] Section 28, Uttar Pradesh Groundwater (Management and Regulation) Act, 2019
[60] Section 29, Uttar Pradesh Groundwater (Management and Regulation) Act, 2019
[61] Section 31, Uttar Pradesh Groundwater (Management and Regulation) Act, 2019

There are many more provisions in the Act and other statutes to the effect that the management and maintenance of all Corporation waterworks and the construction or acquisition of new works necessary for a sufficient supply of water for domestic, industrial and commercial purposes[62]. The municipal corporation is also responsible to guard from pollution, water worthy of being used for human consumption and preventing use of polluted water[63]. Also, the municipalities are under obligation to have appropriate town planning and availability of services with enhancement of dwelling conditions in the entire jurisdiction including slum areas. It also has the responsibility to work on clearance, groundwork and implementation of accommodation schemes and arranging new streets.[64] Not only the municipalities but also the Panchayats are authorized to work for preservation of water resources. A Gram Panchayat also has control of the public passages and water-ways, other than canals[65] situate within its control, not being a private property or private passage; or water-ways not being under control of the State Government or the Zila Panchayat or any other authority under the State Government.

The Uttar Pradesh Ground Water (Management and Regulation) Rules, 2020

The Uttar Pradesh Ground Water (Management and Regulation) Act, 2019 authorizes the government to make rules for proper implementation of the purposes of the Act[66]. Exercising this power, the state government has promulgated the Uttar Pradesh Ground Water (Management and Regulation) Rules, 2020. These rules were approved and notified in February, 2020. Soon after the promulgation of the Rules, the COVID pandemic affected entire population and governmental institutions; therefore, analyzing the effectiveness of these Rules would be premature. However, the Rules are apparently attempting to control the use of ground water. The uncontrolled exploitation of ground water is brought within regulation and even the existing commercial and industrial units of ground water exploitation need to be registered. Positive side of the Rules include the compulsory implementation of rain water harvesting in all plots of larger size than 300 square meters[67]. This is a very important step towards recharging the ground water levels. The Rules also provide that non-compliance a punishable offence[68]. Further, the Rules are strengthening the local bodies by participation in ground water management and regulation. Even in rural areas, the local bodies are integrated with ground water management. This is a very positive step and is more likely to yield good result in the coming years.

The state laws are growing towards a complex set of laws governing use and conservation of ground water. However, given the incremental need to exploit the groundwater, these laws are destined to meet little success. The state needs to come up with alternate plans for meeting the water needs of population. This would be a major step in diverting the exploitation of groundwater. The current policy is majorly managing on the consumption patterns by preventing or minimizing misuse and strengthening the hydrological cycle for keeping intact

[62] Section 114, Uttar Pradesh Municipalities Act, 1964
[63] Section 114, Uttar Pradesh Municipalities Act, 1964
[64] Section 114, Uttar Pradesh Municipalities Act, 1964
[65] Section 3(1) of the Northern India Canal and Drainage Act, 1873
[66] Section 49, Uttar Pradesh Groundwater (Management and Regulation) Act, 2019
[67] Section 26, Uttar Pradesh Groundwater (Management and Regulation) Rules, 2020
[68] Section 26, Uttar Pradesh Groundwater (Management and Regulation) Rules, 2020

the existing resources. Different legislations and various institutions are working on the purpose but proper consolidation is missing. There has to be an umbrella agency to consolidate the functions of different institutions like municipalities, panchayats, pollution control boards and the different committees under the 2019 Act. Further, the same administrative authorities like the executive magistrates are given additional charge for such institutional offices. These positions should be held by experts of water conservation. Studies and research on water conservation, role of different stakeholders and its linkages with town planning and industrial planning must be encouraged and supported. Further, latest technology must be deployed by the state and subsidized for public for sustainable water consumption and for conservation of water. Day is not far when scarcity of water may lead to use of force. Within and beyond nations, appropriate legislations, effective implementation and suitable resource deployment may lead to good result. Above all, awareness is the key and consolidation of institutional functioning will optimize the results.