

WORKING DRAFT

GROUND WATER POLICY

UTTAR PRADESH STATE



BY JANHIT FOUNDATION, MEERUT

Prelude

As you are aware that Janhit Foundation is an independent, not-for-profit non-governmental organization, actively engaged in the promotion of human welfare through environmental protection since 1998. We work on several areas, primarily water, agriculture and education. Our key areas of work are as follow:

- Groundwater quality protection for human health
- Provision of safe drinking water to marginalized communities
- Protection of river water quality for aquatic ecosystems
- Enhancement of available water resources through water conservation measures
- Promotion of sustainable agriculture by organic farming methods
- Environmental education and empowerment of local communities

Janhit Foundation undertakes this work through scientific research, campaigns, advocacy and grass-root level community involvement.

We have done a number of researches on groundwater contamination in UP and Punjab. Two years back, our Founder Director, Lt. Mr. Anil Rana initiated the process of preparing this draft with the objective that it would be useful for the State of Uttar Pradesh to formulate its groundwater policy. This draft has been carefully prepared in close consultation with several experts and various stakeholders like scientists, agricultural scientists, NGOs, policy makers and legal experts. The document is the outcome of several brainstorming sessions held with the stakeholders in the last two years. We are grateful to them for giving us the crucial inputs and helping us in framing this draft.

Janhit Foundation is glad to share this document with you. We are confident of the government's proactive approach in incorporating grass root realities in its policy documents. Hence we sincerely hope that the key points flagged by us after diligent research and consultation with various stakeholders, will be incorporated in the State government's groundwater policy.

(Anita Rana)

Director

Janhit Foundation

PREAMBLE:

Groundwater is the major source of water on the planet. Its conservation is also emerging as a critical issue for cities and towns around the world. Sustainable and equitable use of ground water over millennia has been ensured by cultural adaptation to water availability through water conservation technologies, agricultural systems and cropping patterns adapted to different climatic zones, and conservation-based life styles. Groundwater irrigation worldwide has been found difficult to curb and regulate. And often, resource depletion has been countered by augmenting water supply. Search for ways to augment water supply in closing basins will remain an enduring element in the strategy of coping with groundwater depletion. However, high capital costs and paucity of resources will keep many countries from trying out these grandiose ideas for long time to come. In many situations, there are indications that water infrastructure in river basins is getting reconfigured by autonomous local action in private or community domain. Where groundwater stress has deepened enough to threaten life, there are some signs of people and local institutions shaking off their generally passive attitude of dependency on the government, and have taken charge of the resource. Such signs are most visible in western Indian states of Rajasthan and Gujarat which are most critically dependent on overexploitation of groundwater for sustaining their agriculture. However, even here, there is little accent on rule-making and demand management; but great mobilization has occurred around rain water harvesting and groundwater recharge in a decentralized format.

Water is a vitally important substance and its role in the evolution of life now is widely recognized. Uttar Pradesh is endowed with bountiful water resources but because of increasing demand for various purposes namely irrigation, drinking and domestic, power (thermal and hydro), industrial and other uses, its scarcity is becoming apparent and more pronounced with increasing population. Water is a prime natural resource, its planning and development needs to be governed by the development perceptions in the state. For the proper management of ground water resource which should ensure optimal

utilisation and avoid over exploitation, the following aspects should be duly addressed:

1. Demand side management and conservation through the spread of efficient irrigation technologies, such as piping drip and sprinkler irrigation is essential.
2. Opportunities for and constraints on the spread of low water intensity cropping patterns should be investigated as a component of demand side management.

Understanding Groundwater

Groundwater is water that is found underground in the cracks and spaces in soil, sand and rock. The ground beneath the soil can be divided into two main parts. Firstly, Unsaturated zone or zone of aeration and secondly, saturated zone or aquifer. The water in the zone of aeration does not flow in to the well. The upper surface of the zone of saturation is water table. In other words, the water table is the first occurrence of groundwater. However, groundwater is mainly stored in an aquifer. Aquifers are geological formations- layers of sand, gravel and rock-where significant amounts of water can be stored, transported or supplied to a well or spring

Water as a Matter of Right

Water has not been guaranteed as a matter of Fundamental Rights in our Constitution. However, courts by several judicial pronouncements have inferred that right to clean and safe water is an important aspect of Article 21 of the Constitution of India.

In Narmada Bachao Andolan v. Union of India the Supreme Court said that:

Water is the basic need for the survival of human beings and is part of right to life and human rights enshrined in Article 21 of the Constitution of India.

In FK Hussain v. Union of India the court was of opinion that an administrative agency could not be permitted to function in such a manner as to make inroads into the Fundamental Right guaranteed under Article 21 of the Constitution. The right to sweet water, and the right to free air are the attributes of the right to life. They are the basic elements that sustain life.

Right to water can be further inferred from Article 15(2) of the Constitution which states that no citizen shall be subjected to any limitation with regard to the use of wells, tanks, bathing ghats.

Right to Groundwater

It is customarily accepted across India that a well on a piece of land belongs to the owner of that land, and others have no right to extract water from the well or restrict the landowner's right to use water. Interpretation of the Transfer of Property Act of 1882 and the Land Acquisition Act of 1894 support the position that a landowner has proprietary rights to groundwater, it is connected with dominant heritage and cannot be transferred apart from the land. *However, government can restrict these rights in the larger public interest as right to property is not fundamental right in India.*

The Doctrine of Public Trust

The recent judicial pronouncements have clearly stated that deep underground water is the property of the State under the Doctrine of Public Trust. The holder of land has only a user right towards the drawing of water in tube wells.

In M.C.Mehta v. Kamal Nath the Court declared that:

The State is the trustee of all natural resources, as a trustee the State has a legal duty to protect the natural resources and these resources meant for public use cannot be converted into private ownership.

In M.C.Mehta v. Union of India, the Court observed that:

Groundwater is a social asset, and the right of the citizen to the use of water, air and earth are protected under Article 21 of the Constitution. It further states that the environmental balance should be maintained and wherever groundwater is required for domestic and agriculture needs, priority is to be given to these.

Policy Context

The National Water Policy 2002 and the Uttar Pradesh State Water Policy have both identified groundwater protection as an important component of

water resources management in general. The National Water Policy states that “the development and overexploitation of groundwater resources in certain parts of the country have raised the concern and need for judicious and scientific resource management and conservation”. The Policy recommends several measures on groundwater management - periodical reassessment of the ground water potential on a scientific basis, regulation of ground water so as to not exceed the recharging possibilities as also to ensure social equity; artificial recharge for the augmentation of groundwater resources, for integrated planning of surface and ground water resources incorporating quantity and quality aspects as well as environmental considerations. *For judicious groundwater use and management, the Uttar Pradesh Water Policy prescribes demand side management and conservation through the spread of efficient irrigation technologies and low water intensity cropping patterns, conjunctive surface and ground water management, ground water recharge and regulation of groundwater abstraction. **The current policy framework recognizes the importance of groundwater resources and recommends several measures for the protection of groundwater quantity and quality.***

Legislative Framework

As a result of Government of India’s initiatives on the conservation and protection of the environmental resources of the country, an elaborate legal framework exists for the protection of groundwater in tandem with other water resources and the environment in general. These laws are applicable in Uttar Pradesh as well and shall be taken full recourse to in conjunction with this policy for the protection of the groundwater resources of the state. In addition there are several statutes of Uttar Pradesh that are of relevance to groundwater management and that need to be modified to include the objectives and strategic measures listed in this policy.

These Central and State laws are the following :-

1. The Water (Prevention and Control of Pollution) Act, 1974 as amended in 1988
2. The Water (Prevention and Control of Pollution) Rules, 1975

3. The Water (Prevention and Control of Pollution) (Procedure for Transaction of Business) Rules, 1975
4. The Water (Prevention and Control of Pollution) Second Amendment Rules, 1976
5. The Water (Prevention and Control of Pollution) Cess Act, 1977 as amended by Amendment Act, 1991
6. The Water (Prevention and Control of Pollution) Cess Rules, 1978
7. The Water (Prevention and Control of Pollution) Amended Rules, 1989
8. The Environment (Protection) Act, 1986
9. The Environment (Protection) Rules, 1986
10. The Environment (Protection) Amendment Rules, 1987
11. The Environment (Protection) Third Amendment Rules, 1987
12. The National Environmental Tribunal Act, 1995
13. The National Environment Tribunal Rules, 1995
14. Notification on Emission Standards and Guidelines for Location of Industries, mining operation etc. for various areas.
15. The Public Liability Insurance Act, 1991
16. The Public Liability Insurance Rules, 1991
17. Hazardous Waste (Management and Handling) Rules, 1989 (amended in 2000)
Batteries (Management and Handling) Rules, 2001
18. Manufacture, Storage and Import of Hazardous Chemical Rules, 1989
19. Manufacture, Use, Import, Export and Storage of Hazardous Microorganisms, Genetically Modified Engineered Organisms or Cells Rules, 1993
20. Hazardous Microorganisms and Genetically Modified Organisms (Manufacture, Use, Import Export and Storage) Rules, 1999.
21. Bio-Medical Waste (Management and Handling) Rules 1998
22. Municipal Solid Waste (Management and Handling) Rules, 1999
23. Recycled Plastics Manufacture and Usage Rules, 1999
24. Guidelines for seeking Environmental Clearance
25. National Conservation Strategy and Policy Statement on Environment and Development, 1992
26. Ecomark Criteria for 16 Product Categories

27. Temperature Limit for Discharge of Condenser Cooling water from Thermal Power Plant
28. Environmental Standards for Gas/Naphtha Based Power Plants
29. The Indian Forest Act, 1927
30. Forest Conservation Act, 1980
31. **Uttar Pradesh Soil and Water Conservation Act, 1963**
32. **UP Land Revenue Act 1901**
33. **U.P. Village Panchayat Act, 1947.**
34. **U.P. Kshetra Panchayat & Zilla Panchayats Act, 1961.**
35. **U.P. Minor Minerals Concession Rules, 1963.**
36. **U.P. Water Supply and Sewerage Act, 1975.**
37. **U.P. Water Supply and Sewerage Act, 1975.**
38. **U.P. (Regulation of Building Operations) Act, 1958,**
39. **U.P. Housing and Development Board Act, 1965,**
40. **U.P. Urban Planning and Development Act. 1973**
41. **U.P. Special Areas Development Authorities Act, 1986.**
42. **U.P. Municipal Corporation Act, 1959**
43. **U.P. Municipalities Act, 1916**

Why a need for Policy?

Over the years, State Irrigation Departments have aimed to store and distribute water to farmers in the dry season, so that at least two crops can be grown in a year. It is generally assumed that the monsoon brings enough water to go round and that farmers don't need help. This is not always true. Monsoons are erratic and sometimes do not bring the promised rainfall. Another fact is that the torrential monsoon rains bring vast amounts of water that are not needed for agriculture at that very moment. Most of the monsoon rains flood fields, filling rivers and streams that rush—unused—to the sea. This is the very water that could help the farmer year-round, if it could be diverted and its flows slowed down enough to percolate through to underground aquifers. Fast-flowing torrents wash away topsoil, and waterlogged fields are a farmer's nightmare for such crops as pigeon pea that cannot tolerate excessively wet conditions. From the farmers' perspective, having better 'crop security' for monsoon crops by making irrigation water

available to supplement an erratic supply of rain—and still having enough water stored in aquifers to grow another crop later—is an attractive proposition. But policy makers and water managers will have to clearly articulate the advantages and positive impact of the change if farmers are to be convinced. Farmers live with risks the year-round, so removing one of their main worries—the possibility of drought caused by monsoon failure—will give them the confidence to face their many other challenges. Farmers will need to be convinced that this new approach will work for them. If they can be sure that their hard-earned pumps will continue to find water in the aquifers after the monsoon, that the pumps will not need to be lowered into ever-deepening borewells, and that the stable water table means lower power costs, then they will support changing cropping patterns as part of a new groundwater recharge strategy.

There is still a need, however, to enact a special, consolidated law for groundwater conservation, protection and development in the state. Some of the basic policy measures can be adopted for Groundwater Policy in Uttar Pradesh.

1. Policy on Database, Technology, Research and Development

The first step that is of fundamental importance in groundwater regulation and management is the availability of a comprehensive and reliable database and information system on the basis of which appropriate decision making may be made. Data and information on groundwater needs to cover all land areas - rural residential areas, cultivated areas, waste lands, urban residential areas, urban waste lands, dumping grounds, government sites, institutional areas [government and private sector], industrial areas, forest areas, identification of vulnerable areas etc. Under this policy, a comprehensive data base and information system shall be established. All land areas of the state shall be mapped for ground water, surface water and land use. Where such data base and information systems exist through the aegis of other policy initiatives such as watershed maps/soil survey maps, etc. ground water information shall be factored into such data bases. An integrated approach of remote sensing, geophysics and GIS (Geographical Information System) shall be applied in

demarcation of the different ground water zones to delineate or map the land area that could contribute water and pollutants to the groundwater aquifers. Community groups such as environmental watch groups, non-government organizations, watershed organizations, resident welfare organizations, rural community organizations such as women's groups, youth groups, farmers' organizations, and farmer's cooperative societies can enhance the state's assessment by conducting site-specific inventories of potential pollutant sources that might not be on state databases or maps. Remote Sensing and GIS can provide useful information for large-area water and salt balances and identification of parameters such as evapo-transpiration, rainfall distribution, interception losses and crop types and intensities that can be used as indirect measures of salinity and water logging and as evidence for direct estimates. Interdisciplinary diagnostic studies involving field studies of the plant environment, farm management practices, water supply and removal, and institutional linkages are necessary to diagnose site related problems and potential solutions.

2. Policy on Quantity

The maintenance of quantity of groundwater requires a twin pronged approach – one, the protection from pollution, water below the ground surface in geological structures or formations known as 'aquifers', and secondly, the ecosystems from which these waters are recharged or into which they discharge. As such a coordinated approach to land-surface water – ground water protection is required and shall be ensured. In the identification and prioritization of aquifers/districts/blocks for groundwater development, groundwater quantity status shall be taken fully into account, and reflected in the Groundwater Management Plans. The concept of 'Critical Blocks' that is being adopted at present shall be modified to include levels of contamination/pollution in addition to degree of groundwater extraction. It shall be ensured that all developmental departments of government take into account groundwater quantity objectives in their policy and developmental planning.

3. Policy on Quality

Groundwater Information and Groundwater Quality Assessment and Monitoring Centres shall be set up in every block, with full access to the public for contributing to as well as for receiving information. These centres shall be functionally linked to similar centres at district level and to the State Ground Water Board to enable decision making at appropriate levels. Based on information provided by district level, Groundwater Information and Groundwater Quality Assessment and Monitoring Centres, prioritization norms shall be developed by the State Ground Water Board for selection of districts/blocks for development taking into account current levels of abstraction. Priority shall be given to blocks and districts that have low percentage of development to ensure equity in groundwater access. These norms shall be given wide publicity. For the purpose of groundwater quality protection, entry of the highest risk categories of pollutants shall be banned, while the pollution of groundwater by other categories shall be prevented until they are sufficiently treated as per norms laid down for this purpose. Or addressing pollution alleviation measures, the 'polluter pays' principle shall be adopted. In the identification and prioritization of aquifers/districts/blocks for groundwater development, groundwater quality status shall be taken fully into account, and reflected in the Groundwater Management Plans. Agricultural practices pose a risk to groundwater in many ways – such as improper storage of chemicals like diesel, seepage from livestock shelters, overflow from effluent tanks related to agro-based industries, fertilizer and pesticides leaching chemical compounds into surface and ground water, the disposal of waste in farm landfills, inappropriate drainage facilities, and seepage of farm run-off into groundwater via poorly protected, constructed and sited wells, etc.

4. Policy on Pollution and Polluters

Pollution assessment shall be undertaken on a state-wide basis comprehensively and rigourously. This activity will involve identifying potential sources of pollutants that could contaminate the surface or groundwater supply, resulting in a list and a map of facilities and activities within the delineated area that might release contaminants into the ground water supply (for wells) or into the watershed of the river or lake (for surface water sources). Potential pollutant sources are garbage or waste disposal sites, underground

or aboveground fuel storage tanks, residential or commercial septic systems, open and underground sewage drains, storm water runoff from streets and lawns, farms that apply pesticides and fertilizers, sludge disposal sites, industries and sewage treatment plants that discharge wastewater, hazardous waste sites, mining operations, particular land use categories (such as industrial, agricultural and urban areas), and various facilities that have environmental permits. The information so gathered on surface and groundwater sources shall be used to prepare an index of contaminated or potential contamination sites in terms of the risk they pose to human health and environment. Risk areas shall be prioritized on the basis of identified potential contamination sources or specific chemicals that could pollute the water. Water sources can be assigned ranking as high, medium or low depending on the threats to groundwater. This method of prioritization of water sources for groundwater protection is critical for decision making and shall constitute an input into the formulation of Groundwater Management Plans. In addition to identifying and prioritizing sites, the specific polluting substances shall also be listed based on toxicity, persistence and potential for bioaccumulation and then classified into specific categories, with some categories having higher polluting potential and therefore ranked higher. Waste is a significant threat to groundwater quality. In order to protect groundwater, it is important to ensure that waste is recovered or disposed of without harming human health or causing pollution of the environment, including groundwater. Waste management activities include the storage and handling of waste at the place of production and thereafter; the transfer/transport of wastes from one place to another; the treatment of wastes to reduce their quantity, hazardousness, and/or facilitate their handling or disposal; the disposal of waste (e.g. in landfills and incinerators). The risk to groundwater from waste varies in relation to toxicity, biodegradability and the mobility of pollutants in soil and groundwater. Waste management activities not only impact on groundwater quality, but also on groundwater quantity, e.g. by affecting groundwater flow direction or recharge rates. Policy initiatives shall be taken through the appropriate agencies to promote solar irrigation pumps on a wide scale to replace diesel operated pump sets in order to reduce pollution to groundwater from the transport and storage of this fuel.

Irrigation commands are a source of threat to groundwater quality as a result of the phenomena of water logging and soil salinization, which is a problem of significant proportion in Uttar Pradesh, needs restoration and rehabilitation. There is increasingly serious water logging, soil salinization and water quality deterioration in these commands. The water that is drained from irrigation commands undergoes a material degradation compared to the water that is applied. Salinization occurs as a result of evapo-transpiration, as well as due to the leaching of natural salts deposited in the soil and below ground. Through water draining from irrigated lands, the concentrated salts and other pollutants are conveyed to a receiving stream or groundwater reservoir. Remote Sensing and GIS can provide useful information for large-area water and salt balances and identification of parameters such as evapo-transpiration, rainfall distribution, interception losses and crop types and intensities that can be used as indirect measures of salinity and waterlogging and as evidence for direct estimates. The State Ground Water Board shall institute specific Task Teams for different policy issues connected with groundwater – such as waste management; pollution from agriculture; conjunctive surface and groundwater use and management; industrial groundwater use and pollution; education, training and capacity building; inter-sectoral coordination; eco-system protection, etc.

5. Policy on Right to Ownership

Since the right to groundwater is linked to land rights, landless communities – whether rural or urban - are at a disadvantage in terms of access to groundwater. The State has a responsibility to provide water supply to such communities. All state programs for supply of drinking water or irrigation shall be prioritized in favour of these communities. Legal rights to groundwater in the state vest in the owner of the land by virtue of the law of property. Indian Easements Act, 1882 describes groundwater right as a right attached to land. However, the nature of groundwater is such that it cannot hydrologically be confined to a particular piece of land and therefore to a particular owner. The abstraction of groundwater water by any individual or entity impacts on the rights of other right holders at all times. Therefore logically, the concept of absolute private rights to groundwater is without basis in the natural world.

There is a need to view groundwater as a public, common resource. Its use by any person needs to be regulated in common interest. There is no law at present in Uttar Pradesh for the regulation of this private right in the interest of sustainability and equity. Policy measures taken so far to regulate groundwater rights indirectly have not had the desired effect. The Government of Uttar Pradesh shall therefore enact a law for the purpose of regulating groundwater rights in public interest. The enactment of this law shall be on the basis of public consultations. Attempts will be made to bring about a public consensus to transfer groundwater resources to the public domain, taking example from many countries around the world which have done so in order to preserve this precious resource for future generations. Through such a law, policy measures outlined in the sections above on protection and development of groundwater resources shall be supported by legal provisions to ensure their implementation.

6. Policy on Water Right Market

Comparisons of efficiency and performance between the privatized companies and those that remained public are revealing: - private companies showed an improvement, while public companies' performance actually deteriorated. However, efficiency in water use is clearly superior in private companies than in public ones, and improvements were made at an astounding pace. As a result of adjusted water rates, consumers reduced would reduce their water use. Markets for water rights hold the potential to unleash significant entrepreneurial activity in water production and consumption. We need many additional entrepreneurs, whether small or large, to focus on water at all levels because many people lack access to clean and safe water – a number which “has held constant for decades”. In this environment, water rights have the potential to evolve into a more complex bundle than has so far been recognized with limited efforts to create water markets. Marketable water rights will acquire quality, temporal, and other characteristics, all of which would allow a wide range of transactions not currently possible. We cannot fully anticipate what these transactions will look like, because we lack all of the information necessary to do so. We do know that decentralized free markets

can more effectively utilize information than even the most sophisticated administrative arrangement. Unless there are significant problems with markets, these advantages should create a presumption in favor of relying on markets. Without prices, administrative allocations often rely on crude proxies for use-value. Thus residential users often pay the same price for the water they drink and the water used for their lawns, even though watering a residential lawn would likely be a lower valued use. One of the most important aspects of markets is their dynamic nature. Market prices quickly respond to constantly changing information. The change in prices sends signals to participants about the impact of events on the goods and services sold in markets.

Markets allow the uses of water to vary with changes in knowledge and demand. Because they provide a dynamic – rather than a static – valuation, markets adapt to constantly changing circumstances. Markets encourage the production of new knowledge about water: new uses and new ways to think about these uses, new conservation methods, new delivery methods, etc. Thus, markets encourage investment in meeting human needs. Markets do not require large scale agreement among their participants on overall ends, allowing a diversity of individual ends to coexist peacefully. In large part, the argument about markets for water is about governance of resources more generally. Markets excel in generating positive-sum transactions that benefit all parties – precisely the situation in which we should all aspire to be.

In the absence of a market for water, one of the problems which hinder mutually beneficial trades between users (for instance, two figurative parties called Smith and Jones) is that they lack the information needed to know that the transaction is possible, and that the transaction will produce an increase in their own welfare.

7. Policy on Users

The UP State Water Policy recognizes the situation of inequity with regard to all water resources and has declared as one of its objectives, the promotion of equity and social justice among individuals and groups of users in water

resource allocation and management. A common but incorrect perspective among groundwater users is that groundwater is unlimited; users therefore do not include sustainability concerns in their water abstractions practices. Unless this perspective is changed fundamentally, user practice will continue to remain the same. In order to achieve public participation in groundwater conservation, a participatory approach to indicator development on sustainability of groundwater use shall be adopted. Public participation on this important task however may be mobilized only on the basis of appropriate information. Water users with respect to specific groundwater aquifers shall be consulted for this purpose for decision making on consensus on extent of groundwater abstraction and equitable use, based on scientific data on quantity and quality of groundwater provided to them. Statutory force shall be given to the guidelines and codes of practice developed for the abstraction of groundwater for domestic, agricultural, industrial and other purposes, with respect to registration of wells, regulation of depth, siting of wells, quantum of abstraction etc. An institutional framework to cover all groundwater users - individual, institutional, public or private – shall be promoted in the form of water user associations or aquifer associations in rural and urban areas, and associations shall be made legally accountable to local regulatory authorities. The mobilization of groundwater users shall be made utilizing existing legal procedures in relation to building/property construction, registration or property tax procedures or tenancy procedures. In rural areas, land titling and tax procedures, or in case of property less persons, procedures for provision of ration cards, election identity cards etc. shall be utilized for securing membership in groundwater user institutions. The State Ground Water Board shall prepare guidelines for roles and responsibilities for different categories of groundwater users and shall ensure that such guidelines are received and followed. Communication networks with user organizations shall be set up to monitor their response and actions.

8. Policy on Extraction, Recharge and Management

For the use and management of ground water, aquifer-based Groundwater Management Plans shall be prepared by the Local Elected Bodies in consultation and coordination with the State Ground Water Board, based on

the scientific data base generated on groundwater resources. Formulation of Groundwater Management Plans will also require the cooperation and coordination of a number of government agencies and key stakeholder groups. Groundwater Management Plans shall contain strategies for groundwater development taking into account equity issues geographically and community wise. They shall also contain strategies for preventing, stopping and curing groundwater pollution, based on latest available scientific technologies within affordable costs. The precautionary principle shall be adopted in decision making on groundwater development for future. Groundwater Management Plans so prepared shall be made available to the public for their information. Where necessary, experts and professionals in groundwater use and management and related scientific disciplines shall be consulted by state agencies and local bodies. Where Land and Water Management Plans or Watershed Development Plans or Strategies exist or are being developed, Groundwater Management Plans will form a vital input into these. Rain Water Harvesting shall therefore be an integral component of all Groundwater Management Plans, with the exception of areas subject to water logging. It shall be made mandatory in all urban development plans through legislative measures. In rural areas, Rain Water Harvesting shall be mandated through policy directives and through sectoral legislation wherever possible. The State shall promote institutions that provide training in urban and rural rainwater harvesting and shall also fund programs through Local Elected Bodies and civil society organizations on a wide scale for implementation for Rain Water Harvesting projects. It shall be ensured that water quality is taken into account while recharging groundwater reserves. If there is a risk of pollution in the catchments area of water bodies, groundwater recharge techniques such as recharging shafts shall not be constructed. The Minor Irrigation Surface Water Bodies in the State have been inventoried by the State Government. The traditional community and state constructed water bodies are critical for the purpose of groundwater recharge. Their rejuvenation and maintenance needs to be taken up on an urgent basis. The State Ground Water Board shall coordinate with the concerned department to focus on development programs in areas identified with groundwater depletion on a priority basis. At the same time, potential for groundwater pollution from such

water bodies shall be assessed and appropriate action taken. The Government of Uttar Pradesh shall enact a law to regulate groundwater extraction. The identification and assessment of risk to groundwater from agricultural fields shall be included in Groundwater Management Plans along with appropriate strategies to address these risks. Government of UP shall formulate guidelines and enact necessary legislation to control and regulate those agricultural practices that pose a risk to groundwater. Organic farming practices shall be given a major policy emphasis. The State Groundwater Board shall provide information to the relevant department of government on groundwater bodies at risk, for focusing resources in promotion of organic farming. The State Ground Water Board shall prepare guidelines for other sectoral organizations for necessary policy and legal steps to be taken for protection of quantity and quality of groundwater resources. Legislative measures shall be taken to ban on tapping age old reservoirs to protect historical reserves of water, to prevent structural changes in aquifers and consequent landslides or land subsidence.

9. Policy on Distribution and Pricing

Measures for efficiency improvement in groundwater and surface water irrigation to reduce demand shall be implemented through the promotion of appropriate information and technologies. In collaboration between the energy and groundwater departments and agencies, an appropriate economic incentive structure through power pricing and supply policy shall be introduced to promote ground water conservation.

10. Policy for Effective implementation of Laws

The most common problem lies with the implementation of law. Therefore there is need for the laws and the law enforcing agencies to meet the issues and challenges of the ground water.

11. Policy on inter Departmental Coordination

It shall be ensured that all developmental departments of government take into account groundwater quality protection objectives in their policy and developmental planning. Information on identified pollutants and risk sites

shall be shared with such departments to influence decision making on development planning. Coordination will be established with the State Land Use Board, Pollution Control Board, Irrigation Department, Drinking Water Agencies, Forest Department, Urban Development Department, Revenue Department, Industries Department, Geological Survey of India, GIS/Remote Sensing agencies for the preparation of groundwater aquifer maps in conjunction with land use and surface water uses and for the preparation of Ground Water Management Plans. Coordination will be established with Urban and Rural Local Bodies including Zilla Panchayats, Kshettra Panchayats and Village Panchayats for the collecting of direct evidence on groundwater and related issues for the preparation of Groundwater maps and for the preparation of Ground Water Management Plans. It shall be ensured through inter-sectoral coordination at state level that norms for including geological and hydro-geological factors and groundwater quantity and quality in urban and rural planning policy and development planning are introduced. Such norms shall include the refusal of permission for development where there is significantly increased risk of groundwater pollution or over-abstraction. Systems for monitoring and reporting compliance with such norms shall be introduced and operated. Coordination will be established with civil society organizations, environmental groups, urban residential associations, research institutions etc for mobilizing public opinion for groundwater protection as well as for providing inputs into the planning process. Coordination will be established with representative institutions of industry for promoting groundwater protection from pollution. Coordination will be established with electronic and print media in the state and private sector for state wide information campaign on groundwater issues, and to give publicity to the state Ground Water Policy.

12. Policy on Institutional Arrangements

Presently the water resource planning for various uses is being done by the respective departments. Realising the scarcity value of this resource as also the need for co-ordinate planned development, the state government has constituted a "State Water Board" under the chairmanship of the Chief Secretary.

13. Policy on Implementation Agencies

The State Ground Water Board shall be the nodal agency to facilitate the implementation of this policy. All State departments and agencies to play a facilitative and regulatory role. The State Ground Water Board shall be responsible for preparation of groundwater/surface water/land use maps in consultation and collaboration with local bodies. The State Ground Water Board shall implement programs systematically for capacity building of local elected body representatives and personnel attached to local bodies in all aspects of groundwater use and management on a scientific basis.

Putting this type of approach into action requires a shift in a State's water policy and practice. Irrigation departments will have to move from supplying water only in the dry season to delivering adequate water during the monsoon, so that farmers can grow water-intensive crops, such as rice and sugarcane—where the water irrigates fields and simultaneously recharges groundwater aquifers. The water that is stored in the aquifers can then be pumped back up for a second post-monsoon cropping season. The advantages of this approach are that groundwater levels are maintained, farmers' annual yields are increased, pumping costs are reduced and waterlogging is minimized.

14. Policy on Awareness of Information

The primary responsibility for groundwater protection rests with any person, company or organization that is carrying out an activity that poses a threat to groundwater. Education and guidance are, therefore, seen as essential mechanisms to improve groundwater protection. A state wide educational campaign on groundwater shall be conducted involving civil society organizations, industry, educational institutions, research institutions etc. The State Ground Water Board shall function as a nodal agency for this purpose. Based on information provided by district level Groundwater Information and Groundwater Quality Assessment and Monitoring Centers, prioritization norms shall be developed by the State Ground Water Board for selection of districts/blocks for development taking into account current levels of

abstraction. Priority shall be given to blocks and districts that have low percentage of development to ensure equity in groundwater access. These norms shall be given wide publicity.

15. Policy on Monitoring and Evaluation

Systematic, scientific and state wide study and monitoring of impacts of over abstraction of groundwater on ecosystems, other water bodies and other wells shall be undertaken by the State Ground Water Board in collaboration with research institutions and other concerned departments and agencies of government.

16. Policy on Public Opinion

Coordination will be established with civil society organizations, environmental groups, urban residential associations, research institutions etc for mobilizing public opinion for groundwater protection as well as for providing inputs into the planning process.

17. Policy on Private-Public Partnership

Appropriate technical and management techniques shall be identified and implemented through the aegis of Local Bodies in collaboration with State technical agencies and private sector institutions wherever possible. Coordination will be established with representative institutions of industry for promoting groundwater protection from pollution. Coordination will be established with electronic and print media in the state and private sector for state wide information campaign on groundwater issues, and to give publicity to the state Ground Water Policy.

18. Policy on Infrastructure and Development

Interdisciplinary diagnostic studies involving field studies of the plant environment, farm management practices, water supply and removal, and institutional linkages are necessary to diagnose site related problems and potential solutions. The Uttar Pradesh State Water Policy sets out several measures for the treatment of waterlogging and salinity. Modernization and upgradation of irrigation channels, improved 'conveyance management' using

appropriate technology to enable quick adjustments of supplies as per requirements dictated by water availability and the priorities at the field, judicious use of canals, checking unauthorized use by cutting of canals and other means, leveling of fields, improvement and maintenance of water courses, improvement of drainage, adoption of improved irrigation and agriculture practices using appropriate technology to ensure optimal use of water for agriculture production, adoption of appropriate cropping pattern suitable for the area in question, strengthening of farmer institutional framework etc. Industrial pollution constitutes a major risk to groundwater resources. It sets out that the agencies, departments, institutions and organizations that are required to be coordinated in order to achieve the objectives of this policy. The Government of Uttar Pradesh has set up a State Water Board to coordinate all activities relating to water. The overall responsibility for achieving the objectives of this policy shall vest in the State Water Board. The State Ground Water Board shall be vested with the responsibility of facilitating and implementing the Groundwater Policy in coordination with all concerned institutions. The enactment of a Land Use Policy for Land Use planning is very essential in the context of groundwater protection. Coordination shall be established for this purpose with the concerned agency of Government.

19. Policy on Environmental Impact Assessment

Government shall ensure that risks to groundwater reserves are addressed in all cases wherein Environmental Impact Assessments are legally required. The requirement of a State to conduct Environmental Impact Assessments in respect of activities that are likely to significantly affect the environment has been reflected in Principle 17 of Rio Declaration on Environment and Development and Article 5 of the Legal Principle for Environment Protection and Sustainable Development. The objective of the EIA is to ensure that environmental aspects are addressed and potential problems are foreseen at the appropriate stage of project design. A should be effectively implemented before taking up any project effecting groundwater resources.