

GOVERNMENT OF RAJASTHAN

STATE WATER RESOURCE PLANNING DEPARTMENT (SWRPD)

STATE WATER POLICY (DRAFT)

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INTRODUCTION TO RAJASTHAN WATER SCENERIO

- Rajasthan is the largest State of the country. The status of water in the State is most critical. Rajasthan with more than 10.4 % of the country's geographical area, supporting more than 5.5% of the human population & 18.70 % of the livestock has only 1.16 % of the total surface water available in the country. 2/3rd part of the State is a part of the Great Thar Desert which is bigger than most of the states except MP, UP, AP and Maharashtra. Out of the total 142 desert blocks in the country, 85 blocks are in the State of Rajasthan. This further aggravates the water crisis.
- The ground water condition is quite alarming. The condition has deteriorated very fast in the last two decades. The stage of ground water exploitation, which was just 35 % in the year 1984, has reached a level of 125 % in 2004. Out of 237 blocks in the state, only 32 blocks are in safe category. This calls for immediate remedial measures to address the critical water resources situation the State.
- Rajasthan has always been a water deficit area. The rainfall is erratic and there is a large variation in the rainfall pattern in the State. The average annual rainfall ranges from 100 mm in Jaisalmer to 800 mm in Jhalawar. Average annual rainfall of the State is 531 mm. For the 22 eastern districts, it is 688 mm whereas for the remaining western districts, the rainfall is only 318 mm. The State has witnessed frequent drought and famine conditions in the past fifty years. Ground water is not available in many parts even for drinking purpose. Sometimes water is being transported by trains, trucks and other means.
- With increase in population and water demand for various purposes, the State is heading towards absolute water scarcity. The per capita annual water availability in the State is about 780 cubic meter (Cum) against minimum requirement of 1000 Cum. It is feared that the availability would fall below 450 cum by the year 2050. As per the international accepted norms, availability of water below 500 cum is considered as absolute water scarcity. There is a sharp increase in drinking water demand with increase in population and greater consciousness about sanitary facilities. Correspondingly, non-agricultural water demand, which was 3.28 BCM in 1995, is expected to reach 8.07 BCM in 2045.
- Total surface water available in the State is 21.71 BCM, out of which 16.05 BCM is economically utilizable. State has so far harnessed 11.55 BCM which is 72% of

economically utilizable portion. In addition to it 17.89 BCM is allocated through Inter-State agreements.

- The available water is not enough to cater to the needs of the drinking, agriculture and non- agriculture demands.

Critical Issues in Water Sector

- **Growing imbalance between demand and supply of water:**
The availability of water in the State does not commensurate with the requirement of water. The deficit between demand and supply is 8 BCM at present and likely to increase to 9 BCM by 2015. Thus the availability of water in Rajasthan is about 780 cubic meter per person per year as against the internationally accepted standards of 1000 cubic meter per person per year and is likely to reduce to 450 cubic meter per person per year by 2045.
- **Uncertainty in availability of water:**
Rainfall in large parts of the State is not only inadequate but also varies sharply from year to year and place to place. The rainfall occurs only during two months of monsoon and the actual rainy days are numbered. The state has also to depend largely on the water allocated through Inter State Water Sharing Agreements, which depends upon inflows in the rivers.
- **Inequity in access of water:**
With vast variation in rainfall pattern and ground water availability, some difference in access to water is inevitable. Therefore stress is being laid on water management to remove inequalities in access to water amongst various water user sectors (drinking, agriculture, industry etc); head and tail reaches; urban and rural population and between rich and poor sections of the society.
- **Low operational efficiency of water resources systems:**
The problem of limited water availability is further aggravated by low operational efficiency. Two major users of water namely, drinking and irrigation both show avoidable losses. This situation calls for immediate remedial measures, which are being taken.
- **Depleting ground water resources and deteriorating quality of water:**
With increasing dependence on ground water, the ground water resources are depleting at an alarming rate. Nearly 90% of the drinking water and 60% of the water required in the agriculture sector is extracted from ground water reservoirs.

Thus not only the ground water has depleted to alarming levels but the quality of ground water has progressively deteriorated leading to serious health problems. Around 80% area of the State is now witnessing ground water depletion. Many areas experience severe drinking water shortage in summer due to heavy withdrawal of groundwater for Rabi crops.

- **High cost of service, low cost recovery and low level of expenditure on O&M.:**

The water rates do not convey a sense of scarcity among the stakeholders as such there is a need to rationalize the O&M charges to move towards full recovery of O&M charges for sustainable development of water resources.

- **Lack of ownership amongst the stakeholders:**

The construction and management in the water resources sector is the responsibility of the Government but with the inadequate resources, it has become increasingly difficult to manage the water resources by the Government on its own, as such the involvement of the stakeholders in construction, maintenance and revenue collection is a must for sustainable development of the water resources.

NECESSITY OF REVISION OF POLICY

The Rajasthan State Water Policy (1999), Draft State Water Policy (2005) and the National Water Policy (2002) are all similar documents, even to the extent of similar contents, sub-headings and, in some clauses, identical wording. These older documents have been progressively revised whilst conforming to essentially the same structure and rather general intentions.

In preparing this further revision of the State Water Policy all the substance and intent of the previous State Water Policies, together with the relevant substance and intent of the National Water Policy, have been retained and, in many cases, strengthened. In this respect the current document is an extension rather than a total revision of previous documents. Nevertheless, even a cursory glance at this policy will reveal a substantial change in format, together with substantive additional clauses.

Five guiding principles prompted these changes:

First, the National Water Policy, 2002, specifically states that:

“There is an urgent need of (a) paradigm shift in the emphasis in management of (the) water resource sector.”

To achieve this paradigm-shift following changes are necessary. These are all emphasized in this new draft:

1. The adoption of Integrated Water Resources Management i.e., IWRM
2. A more streamlined and responsive approach to water management by the various Government departments,
3. Interdepartmental Co-operation and Co-ordination
4. Greater cooperation between Government departments, and

Second, policies have previously been couched in rather general, non-specific terms, which were weak on specifics and key issues. Terms like ‘should’ or ‘may’, which have no imperative connotation, have been replaced by ‘will’ to denote definite commitments.

Third, this policy addresses plainly, and in detail, what needs to be done, rather than what is readily achievable without additional effort, new resources, or structural reform. In this respect, the suggestions and intent of the Expert Committee report are robustly incorporated in this policy, as opposed to the minimalist changes that were incorporated previously.

Fourth, each of these policy area are linked to the associated 'action plan', which states the implementing agency, timetable for action, detailed actions and associated deliverables. This will facilitate future evaluation of the effectiveness of water-sector departments.

Fifth, this policy lists the various clauses in a more logical order.

The most important new additions to the previous water policy are:

- Paradigm shift of Government from controller of water resources to facilitator
- Provision of formation of WUG's and RBO
- A very strong emphasis upon the urgency of implementing effective water resources management.
- Implementation of IWRM, and the changes that this will entail at community level.
- Introduction of reasonable limitations upon uncontrolled groundwater extraction
- Specifics involved in the establishment of an Management Information System (MIS).
- The provision of technical support for water management at community level.
- Improved water-sector communication, both horizontal and vertical
- Promotion of urban sewerage systems and Sewage Treatment Plant (STP) in urban areas.
- Introduction of an effective differential water tariff.
- Involvement of PRIs and NGOs in water sector
- Capacity building of all stakeholders.
- The necessity of legal provision enabling to achieve all of the above.

THE APPROACH TO THE FORMULATION OF THIS POLICY

In line with best international practices in the water sector, the Rajasthan Government has adopted a radical shift from predominantly engineering-based solutions to local community-based water management solutions. That is, a shift towards community-level empowerment and responsibility for their own water management under the umbrella process of 'Integrated Water Resources Management', or 'IWRM'. This largely involves a combination of 'bottom-up' decision-making and 'top-down' technical support within a much more holistic conceptual framework for water management. Under IWRM principles Government authorities will operate as multi-disciplinary 'technical service providers' rather than central control organizations. Many of the policy issues herein are intended to function from this new perspective. The main points of the proposed State Water Policy are as under:-

- Water Resources will be developed in a well planned way
- Priorities will be fixed for different uses of water distribution.
- Maintenance of the existing projects will be done along with the construction of new projects.
- This policy will be directed towards reducing irrigation water demand through both increased irrigation efficiency, and optimum utilization of the available surface water resource. Any imbalance will also be narrowed through the application of a wide variety of water conservation measures, including effective artificial recharge.
- For efficient water resources planning a well-developed information system will be initiated.
- Demand based water management will replace the supply based management in the water policy.
- To develop a sense of ownership on water resources, WUGs will be encouraged to participate in water management. A capacity building program of these WUGs will be undertaken with the help of NGOs.
- Necessary amendments will be enacted to control the constantly declining ground water table and efficient water management.
- Water pricing will be done in a rational manner.
- Capacity Building programme will be undertaken to enhance the working efficiency of water related departments.

THE POLICY

1. WATER SUPPLY AND DEVELOPMENT

1.1 Water Allocation Priorities

1.1.1 For water resources management and planning purposes the order of priorities of water allocation will be as follows:

(Highest priority)

- Human drinking water
- Livestock drinking water
- Other domestic, commercial and municipal water uses
- Agriculture
- Power generation
- Environmental and ecological
- Industrial
- Non-consumptive uses, such as cultural, leisure and tourist uses.
- Others

(Lowest priority)

Any departure from the above priorities will require consideration on a case-by-case basis.

1.2 Drinking Water Supply

1.2.1 The State Government will ensure the provision of potable drinking water to every citizen, both in urban and rural areas. In rural areas and small communities any available drinking water supply will be integrated with water management in general and while doing so appropriate management of traditional water sources will be dovetailed. Such water supplies will be decentralized, with adequately resourced community participation and ownership, and support in the form of technical assistance from the Public Health and Engineering Department (PHED).

1.2.2 Drinking water needs of humans and livestock will be the first charge on any available water source.

1.2.3 Minimum per-capita water supplies for both rural and urban areas will be provided as per the following norms:

S.No.	Particular	Quantity in Lpcd
(i)	Metropolitan & Mega cities provided with piped water supply where sewerage system is existing/contemplated	120
(ii)	Cities provided with piped water supply where sewerage system existing/contemplated	100
(iii)	Towns provided with water supply but without sewerage system	100
(iv)	Rural population - Desert area	70
(v)	Rural Population - Other than desert area	60

1.2.4 Future irrigation and multi-purpose projects will include a drinking water component wherever there is no dependable alternative source of drinking water.

1.3 Optimizing Water Availability

1.3.1 This policy aims to harness every drop of available water in the state. To this end a comprehensive inventory of potential and actual water resources, perennial and ephemeral will be fully identified and quantified. The SWRPD will develop capabilities to model these resources as a part of its strategic planning obligations. Funds will be provided, on priority basis, to implement programmes of optimum water utilization.

1.3.2 Data collection will be reviewed to assess and, if necessary, to upgrade the quality of, data collection.

1.3.3 Basin, sub-basin, aquifer and State-level water resources development and environmental plans will be prepared with stakeholder participation.

1.3.4 The impact of proposed new projects in the water sector will be assessed with respect to its adequacy, environment and water resources protection, continuously increasing groundwater with-drawl, impacts upon existing irrigation infrastructure, and social effects.

Surface Water

1.3.5 Preservation of traditional water harvesting structures and sources will be encouraged. Roof top rain water harvesting, storm-water harvesting, recycling and reuse of waste waters will be promoted,

- 1.3.6 Investigations will be undertaken to quantify the potential for evaporative suppression in storage structures. Studies will be conducted to evolve methods to suppress evaporative losses and projects will be implemented accordingly.
- 1.3.7 Efficient crop-water application and utilization practices shall be encouraged by adopting modern water conservation techniques.
- 1.3.8 The economic and technical potential for the re-use of treated wastewater will be assessed in all basins.

Groundwater

- 1.3.9 Exploitation of groundwater for agriculture and purposes other than drinking will be so managed as not to exceed the average long-term recharge potential.
- 1.3.10 Evaluation of the groundwater recharge potential will be undertaken, with particular emphasis on water-critical and over-exploited areas.
- 1.3.11 The cost-effectiveness of various technologies, under varying conditions, for desalination of saline and/or brackish groundwater will be explored. Pilot projects will be undertaken to evaluate these technologies under field conditions.
- 1.3.12 Groundwater will be better utilized by encouraging and facilitating pressure irrigation methods such as drip and sprinkler irrigation technique.

1.4 Project Planning and Implementation

- 1.4.1 Water resources development projects will be prioritized on the basis of economic, social, environmental and financial criteria.
 - 1.4.2 Wherever possible, projects will integrate surface and ground water resources.
 - 1.4.3 Quantitative estimates of future water demands will be estimated by stakeholders with line-departments technical assistance.
 - 1.4.4 Water project impacts, throughout the planning, construction and operational stages will be monitored by the project authorities, including social and environmental factors.
 - 1.4.5 Project commencement will be contingent upon the satisfactory completion of comprehensive investigation, detailed project designs, where in social and environmental issues will be addressed adequately.
 - 1.4.6 Ongoing projects will be critically appraised and their completion or foreclosure shall be ensured.
 - 1.4.7 Public Private Partnership in development & management of water resource project will also be encouraged.
- ### 1.5 Inter-basin and Inter-sub-basin Water Transfer
- 1.5.1 The potential for inter-basin water transfer, wholly within Rajasthan, from any areas with surplus water to water deficit areas, will be investigated. Local participation and environmental impact assessment will be included.

1.5.2 The case for full and sustained utilization of the State's share in all inter-state water agreements, including inter-linking of rivers will be pursued.

1.6 Command area development (CAD) works to be part of Project

1.6.1 Provision for command area works like On-farm-development, drainage and construction of water courses will be included in the original project for Major and Medium irrigation projects.

2.0 INTEGRATED WATER RESOURCES MANAGEMENT (IWRM)

2.1 Organization and Participation of Water Users

2.1.1 Integrated Water Resource Management (IWRM) approach will be adopted and PRIs will be adequately strengthened for this purpose.

2.1.2 Community level assistance will be provided by PRIs to WUGs to initiate, plan and execute water-related solutions within an IWRM framework.

2.1.3 Executive members of WUGs will be chosen by democratic means, with fair representation by large and small-scale stakeholders, including women.

2.1.4 As far as efficient operation allows, the framework for 'Integrated Water Resources Management' will develop and utilize intermediate level facilitation between the State Government and water-user associations.

2.1.5 The delegated organizations, will undertake comprehensive community awareness programs related exclusively to water conservation and water-related issues, with particular emphasis upon improved water management and the reduction of groundwater extraction in over-exploited and critical areas.

2.1.6 Water-user groups will be responsible for giving high priority to developing efficient water usage. Related WUG activities will include, but not be restricted to:

- community education in water issues,
- efficient and equitable water distribution,
- general water resources management
- infrastructure operation and maintenance,
- movement towards recovery of full water charges,
- cooperation in data collection
- appropriate usage of hydrologic data
- Water quality / public health protection.

2.1.7 The line-departments will supply water-related technical data, guidelines, information, etc., to water-user groups and other water-sector stakeholders. This will be maintained with efficient data distribution, continuity of data collection, and continuing data quality control.

2.2 Formation of River Basin Organization (RBO)

- 2.2.1 RBOs shall be created to act as an interface between WUGs and State Government. The RBO will have well defined functions & financial resources and will have active involvement of WUGs in their management.
- 2.2.2 For efficient use of ground water aquifer based management system will be developed.

2.3 Resourcing of Water User Groups

- 2.3.1 Technical, logistic and material support will be provided for organizing and training water-user groups in effective water conservation, water resource management, water quality protection.
- 2.3.2 Priority for rehabilitation and modernization of irrigation projects will be given to those projects where farmers are willing to organize into water-user group.
- 2.3.3 At the small community- based scale a rolling program of reform will be implemented to progressively transfer the management, operation, maintenance, and cost-recovery of water infrastructure to water-user groups.
- 2.3.4 Guidance and necessary support will be provided to assist WUGs to undertake responsibility for the management of large water infrastructure.

2.4 Technical Backup and Assistance at Community Level

- 2.4.1 The SWRPD will act as the primary source of water-related information, and will take the lead in planning and enablement of water-user groups.
- 2.4.2 Measures will be undertaken to aware communities of their legal entitlements, rights, responsibilities and general Resourcing in respect of water resources management at community level.
- 2.4.3 A high priority will be given to provide multi-disciplinary technical support for community water management. In addition, IWRM-based strategic planning, water resources modeling and direction for water management will be undertaken at river basin, sub-basin and aquifer-levels, as appropriate.
- 2.4.4. NGOs would be fully involved in water management related activities such as awareness building in communities, capacity building of Water Users Association/ Groups, design, construction of water harvesting structures and preparing IWRM Plan.

3 IRRIGATION WATER

3.1 Irrigation Practices

3.1.1 In the case of surface water delivery, the primary objective will be to irrigate as large an area of land as possible with the available water. In the case of irrigation with groundwater the primary objective will be to farm as much land as can be irrigated without a long-term decline in the water table. The current ethos of uncontrolled groundwater extraction as an 'individual right', will be discouraged. It will be replaced by an ethos of community responsibility for the long-term sustainability of the aquifer as a community resource.

3.1.2 Equitable and efficient irrigation will be implemented by the following:

- Water in irrigation systems will be allocated with equity and social justice.
- Disparities in the availability of water between head-reach and tail-end farms and between large and small farms will be minimized by the adoption of improved irrigation-efficiency in the upstream areas.
- A programme will be progressively implemented to allocate irrigation water on a volumetric basis.
- Farmers will be encouraged to adopt scientific water management through education and training in improved farm practices.

3.1.3 Methodologies will be developed with the help of Technical Experts, Agriculture Experts & Agriculture Universities with a view to assist farmers in minimising the use of water for irrigation and crop selection.

4 WATER RESOURCES INFRASTRUCTURE

4.1 Data Collection and Dissemination

4.1.1 A users' friendly but secured data base will be design and housed within the SWRPD. This data base will be in public domain with the arrangement of prompt supply of data on demand.

4.1.2 SWRPD will take the lead in data checking and entry, compilation of data, record backup, database security and management, transparency of database operation, and the provision of prompt output on demand.

4.1.3 The database will include hydro-meteorological, hydrologic, ground-water, water-quality, water-user, demographic and social data.

4.1.4 Hydrologic instrumentation and data collection throughout the state will be reviewed for reliability, observer resourcing (payment, training and mobility), instrumental efficacy and maintenance, continuity, maintenance of record, and other related factors. Recommendations will be prepared for upgrades or replacements as necessary.

4.1.5 A review of groundwater monitoring will be undertaken with a view to improve the network of observation borewells/piezometers and associated logistics.

4.1.6 Protocols will be developed to promptly pass on hydro-meteorological, surface-water and groundwater data to both water-user groups and to intermediate-level entities at block and district levels through internet or hard copies at nominal cost.

4.2 Management Information System

4.2.1 An inter-departmental 'Management Information System' (MIS) will be developed.

4.2.2 Water-related information will be collected, processed and presented according to the water users' requirements.

4.2.3 Continuity of data collection will be ensured, whilst the entire historical records will be entered into the database.

4.2.4 Prior to development of MIS, provisional mapping of groundwater, flood zones and environmental zones will be undertaken.

4.2.5 A new publicly accessible reference library for the water sector will progressively collect all available significant reports, both current and historic. A computerized listing of all these sources will be developed.

4.3 Efficacy, Maintenance and Safety of Structures

4.3.1 For the safety of dams there will be broad based Dam Safety Committee responsible for inspection and reporting and having authority to insist upon timely compliance of their observations.

4.3.2 Daily inflow, outflow, rainfall, storage levels and operational documentation will be maintained at all large dams. Evaporation will be observed at all major dams.

4.3.3 Communities downstream of major and medium dams will incorporate flood / dam-break warnings and emergency evacuation procedures into their activities. Emergency drills will be tested periodically by the district administration. The social readiness to respond rapidly to such emergencies will also be improved.

4.3.4 A periodic review of the maintenance and efficacy of all other water resources infrastructure, (such as small dams, canals, irrigation off-takes, weirs, and flood protection works) will be undertaken. A programme of improvement in infrastructure maintenance will be designed and implemented.

4.4 Drainage and Salinity

- 4.4.1 Existing or incipient salinity and poor drainage will be mapped.
- 4.4.2 Salinised and water logged areas capable of rehabilitation will be identified and investigated for economic viability of treatment. Advice will be given to WUGs as to the cost-effectiveness of rehabilitation. In the case of mild salinization and/or incipient water logging, local community/ water-user groups will be charged with limiting water application through improved irrigation efficiency, improving drainage associated with irrigation, and utilizing halophytic (salt-tolerant) crops.
- 4.4.3 Water conservation methods will be implemented to minimize salinization and water logging. New irrigation projects, comprising over 2000ha command area, will be required to consider the possible effects and extent of drainage whilst deciding the cropping pattern and to plan appropriate responses to incipient salinization and water logging as an integral part of the project.

4.5 Urban Water Supply and Sewerage

- 4.5.1 Basic water and sanitation services for all urban areas and localities will be planned and implemented. As a minimum service, this will include an adequate piped water delivery and sewerage network, and sewage treatment to at least primary level. Water usage will apply a progressive pricing regime and will move towards full recovery of operation and maintenance cost, together with a fully enforced ceiling on consumption.
- 4.5.2 A program will be prepared and initiated to heighten public awareness of the need for sewerage, STP and public health infrastructure in all urban areas.

5 WATER CONSERVATION

5.1 General Water Conservation

- 5.1.1 Awareness and practical use of water-saving technologies will be vigorously pursued. Improvement of water-use efficiency in all sectors will be encouraged through a continuing program of multi-media public awareness, school education, and technical assistance.
- 5.1.2 Appropriate mechanisms will be developed to beneficially utilize all forms of wastewater, including primary and secondary treated sewage, domestic grey-water, and recycled industrial water.
- 5.1.3 Roof top rain water harvesting will be promoted both in rural and urban area

5.2 Urban Water Conservation

- 5.2.1 A rolling program will be undertaken to prevent leakage and unauthorized withdrawal in all reticulated water supplies. Authorities responsible for piped

water supplies will take measures to reduce unaccounted-for-water. To achieve this, action will be taken to ensure that all water meters are in working order.

5.2.2 A program will be undertaken for remediation of water losses.

5.3 Municipal and Industrial Water Conservation

5.3.1 The re-use of treated sewage effluent will be promoted, with appropriate levels of treatment applying to municipal usage, industrial usage, other horticultural usage, beneficial surface discharge, and recharge to groundwater. Water intensive industries will be required to recycle their water.

5.3.2 The Mining Department, in cooperation with the Pollution Control Board and SWRPD will ensure that groundwater extracted in mining operations will be put to beneficial use, with remediation of chemical pollution where appropriate.

5.3.3 A rolling programme of water auditing will be undertaken for all industries large and small, to compile a register of industrial water usage. This audit will include the quantified water usage, the potential for water recycling and conservation, and actual and potential pollution associated with each site.

5.3.4 All water intensive industries extracting ground water will be required to install water meters and undertake ground water recharge activities.

5.4 Rural and Agricultural Water Conservation

5.4.1 A program of substantial improvement in irrigation efficiency will be formulated and initiated.

5.4.2 A rolling program to reduce irrigation water losses will be implemented.

5.4.3 Pressure irrigation systems will be promoted as an alternative to flood irrigation.

5.4.4 Re-use of irrigation drainage water will be encouraged.

5.4.5 All substantive water users will be required to install water meters on ground water extractions for irrigation.

5.4.6 Watershed management will be carried out in a organized manner for each basin.

5.5 Groundwater

5.5.1 The extraction of ground water will be suitably regulated through appropriate legal framework.

5.5.2 Special initiatives will be taken for ground water recharge and it will be obligatory upon bulk water consumers to adopt ground water recharge measures to compensate the water extracted by them.

5.5.3 All groundwater data, from all drilling rigs in the State, will be collected and entered on the water sector's database. Depletion in water level will be analyzed and reported annually.

- 5.5.4 Promotion of IWRM in selected areas will give prominence to the issue of groundwater decline, conservation, and sustainability.

6 WATER QUALITY

6.1 Water Quality and Pollution

- 6.1.1 A review will be done to determine the departmental capacity to analyze, monitor and conform to the various water standards.
- 6.1.2 A review of basic water quality and/or analytical public health facilities will be undertaken at district level in collaboration with urban local bodies. A rolling program to improve the water analysis capability at district level will be initiated. The cost-effectiveness of public vs. private sampling and analysis of water will be considered.
- 6.1.3 A phased program of improved domestic water quality will be undertaken, in order of prioritized health risks involving implementation of filtration, chlorination, and de-fluoridation.
- 6.1.4 In view of high concentration of fluoride in ground water in certain areas, close review and monitoring of remedial measures will be undertaken, in case such water is used for drinking purpose.
- 6.1.5 A rolling inventory and prioritization of all point pollution sources will be compiled.
- 6.1.6 All effluent will be treated to conform to specification prescribed by Bureau of Indian Standards before discharging into natural streams or to groundwater recharge.
- 6.1.7 Industrial solid waste, with potential for water contamination, will be disposed off in designated facilities, through 'Integrated Waste Management'. Discharge of contaminated effluent to either groundwater or surface drainage will be forbidden.

6.2 Sewage

- 6.2.1 Sewage effluent will not be discharged to water courses, or to groundwater recharge, without primary treatment.
- 6.2.2 A program to design and construct sewage treatment plants will be implemented for all urban and high-priority rural areas in collaboration with local bodies. Treated effluent disposal will conform to established health standards. The standard of treatment will be determined by the beneficial re-use requirements of the wastewater.

7 ENVIRONMENTAL MANAGEMENT

- 7.1.1 Studies will be undertaken on climate trends, and their long-term implications for marginal and environmentally sensitive areas. These findings will be disseminated to the community level for appropriate IWRM planning.
- 7.1.2 Independent environmental impact studies will be undertaken for all proposed Major and Medium water resources projects. An inventory of high-priority ecological systems, particularly those of significant genetic diversity, will be prepared, and the human impact upon these systems assessed.
- 7.1.3 The environmental impact of substantive Major and Medium reservoir projects upon down stream users will be a primary consideration at the planning stage.
- 7.1.4 Lakes and wetlands will be conserved and managed to maintain ecologic continuity. Development of additional new wetlands will be considered.

7.2 Drought Management

- 7.2.1 In respect of water resources management the needs of drought prone areas will be given priority. Resilience to drought in the most vulnerable areas will be promoted through community-based IWRM, with technical assistance by concern water related department
- 7.2.2 Feasibility studies will be undertaken for new water resource development projects, with high priority being given to drought-prone areas.
- 7.2.3 Feasibility of less water consuming and economically viable crops will be studied with the help of Agriculture University and such crops will be promoted.

7.3 Flood Control and Water Storage

- 7.3.1 An effective flood forecasting system will be established on high discharge rivers.
- 7.3.2 Flood-plain zoning will be undertaken in appropriate areas to estimate relative risks. An emergency plan for flood control and management for each flood-prone basin/area will be prepared.

8 WATER PRICING

- 8.1.1 All water rates will be set so as to convey the scarcity value of water and to generally motivate economy in water usage. While deciding the tariff this would be kept in view that those who cannot afford to pay will not be deprived off minimum quantity of potable water.
- 8.1.2 Water tariffs will be set for progressively move towards full cost of operation and maintenance. This will be matched by a rigorous program of improvement in the efficiency of operation and maintenance.

- 8.1.3 For all water supplies a three or four-stepped water tariffs will be charged, with the highest rate for excessive use of water. This stepped water tariff will be set to ensure magnitude difference in water rates between the lowest and highest rates. For the first stepped rate of relatively cheap water, the set rate will be common to all water users.
- 8.1.4 Differing stepped water rates may be charged for agricultural, industrial, commercial, and municipal purposes. In all cases, the highest rate will be a strong disincentive for profligate water usage.
- 8.1.5 A program of water metering for water management purposes will apply to all significant water users irrespective of source and water ownership.

9 LEGAL ENABLEMENT

- 9.1.1 A critical review of the laws related to water sector will be undertaken. Out-dated laws will be repealed, and necessary enabling laws will be framed and the existing laws will be amended to suit efficient IWRM.
- 9.1.2 The role, responsibility and authority of local water-user groups will be legally specified to allow them to manage their own water resources. Within this legislation provision will be made for socially inclusive groups such as farmers, the poor, and women to have a substantive voice in their local water-user group.
- 9.1.3 A legal framework will be developed for the regulation and management of groundwater extraction in general and in the 'Critical and Overexploited' zones in particular. Such legislation will also address the need for compensatory water conservation and recharge measures to be taken by the bulk water consumers.
- 9.1.4 A legal framework will be developed for dealing with conflict resolution within the water sector. This will start with community-based resolution, with subsequent appeal mechanisms at successively higher levels.
- 9.1.5 A legal framework will be developed to preserve existing water bodies from unauthorized construction, pollution and encroachment. In the event of significant pollution the local water-user group will be required to remedy the source of pollution, using technical and material assistance from the appropriate department.

10 CAPACITY BUILDING

- 10.1.1 Institutional capacity building will be implemented at community, mid-level and the State-level. Capacity building at all levels will involve reorientation of perceptions from the traditional State-controlled engineering approach of water management, to the holistic participatory-community based approach.

- 10.1.2 Community-based capacity building will include training for water-user groups, and other community-based stakeholders in the water sector, in their structural formulation, rights, and responsibilities.
- 10.1.3 Capacity building at Government level will be directed towards (a) broadening their skills-base, (b) reorienting their conceptual 'raison d'etre' towards the provision of more responsive technical services, (c) a new focus upon data processing, strategic planning and basin-level water resources assessment, (d) greater autonomy of action, and (e) a radical change in attitude from reactive vertical administration to proactive questioning, testing and analysis.
- 10.1.4 Deviating from the tradition of project planning and implementation the main function of Capacity building will be directed towards the provision of sound and timely technical advice and material assistance to water-user groups and other community based stakeholders in the water sector. Effective communication system will be developed for providing technical information between Government agencies and WUGs.
- 10.1.5 Concept of water as a critical resource in need of community-based water management, water conservation, and optimum water utilization will be integrated with school curriculum, starting with basic concepts at primary level.
- 10.1.6 'Awareness of water scarcity' will be followed by public education in the practicalities of community-based water management, improved water use efficiency, improved conservation methods, water-related public health and improved sanitation. Capacity building at community level will include a revised human framework for water resources management, and improved local ability to access information and resources from within the Government.
- 10.1.7 The State will encourage and support training across all disciplines within the water sector, including IWRM, water supply, social infrastructure, public health, chemical and microbiological water quality, environmental management, dry land and brackish agriculture.
- 10.1.8 The capacity of various Government authorities to collect appropriate, accurate and continuous hydro meteorological, hydrological, ground water, water-usage, and water quality data will be reviewed. Historic data will be examined for its accuracy, completeness, reliability, systematic / non-systematic errors and, methodologies applied to correct deficiencies.
- 10.1.9 Technical capacity building will be directed towards such areas as improved human and instrumental data collection, GIS-database-website development, GIS-applications, computer modeling (of groundwater, surface water and basin hydrology), new and improved ground-water recharge, water resource assessment and modification, and achieving improved irrigation efficiency.

11. RESEARCH

- 11.1 An emphasis upon applied water resources research, focused upon Rajasthan's most critical water-sector issues, will be promoted between academic and government institutions, and an ethos of cooperation between these two sectors will be promoted. The possibilities for both internal and external cooperation in research will be pursued, particularly with relevant specialist institutions, both inter-state and internationally.

12. MONITORING & EVALUATION OF WATER POLICY AND ACTION PLAN

State Water Resources Council and State Water Resources Committee shall be activated to monitor, evaluate and to provide overall guidance for formulation and implementation of the action plan.

Acronyms used within this document

GIS	Geographic Information System
IMS	Information Management System
IWRM	Integrated Water Resources Management
Lpcd	Litre per Capita per Day
NGO	Non-Government Organization
O&M	Operation and Maintenance
PHED	Public Health and Engineering Department
PRI	Panchayat Raj Institutions
STP	Sewage Treatment Plant
SWRPD	State Water Resources Planning Department
WHO	World Health Organization
WUA	Water Users Association
WUG	Water User Groups