

GOVERNMENT OF ASSAM

STATE WATER POLICY OF ASSAM (DRAFT)



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Draft prepared by



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STATE WATER POLICY OF ASSAM

(DRAFT)

1. PREAMBLE

Water is a natural resource, fundamental need of living being and invaluable national wealth. Planning, development and management of water resources need to be governed by national perspectives. Under the constitution, water resource is primarily a 'State Subject', with legislation and administration substantially framed within the context of State boundaries. In the developmental planning of any State, water is a decisive and multifaceted component. For environmental balance, skilful and planned management for all types of developmental activities, economic use on the equitable basis and in view of the prime importance of water for all human and other living beings, an effective and sound water policy, which is responsive to the State's future needs, is necessary. The State Water Policy of Assam is prescribed in accordance to the guidelines and general directions in the National Water Policy – 2002, keeping in view the specific necessity for the State of Assam. In view of the inter-State water disputes, the State Water Policy has specific importance. The Policy envisages a long-term water resource management program designed to develop a critical mass of indigenous productivity with the requisite technical, economic and socio-cultural means for sustainable development.

2. VISION STATEMENT

The vision of the State Water Policy of Assam is to make every subject of the State water-secured on a sustainable basis.

3. APPROACH

The approach to achieve this vision is a holistic management of water as a resource through decentralized but coordinated planning of water resources. A nodal agency and an administrative mechanism will take an overall view of water sector instead of the current fragmented approach.

4. STRATEGY

The State Water Policy of Assam adopts integrated water resource management as a core strategy, based on the principles of water as a finite resource, need to use a participatory approach, the crucial role of men and women, ensuring clean water for human health and looking at water both as an economic and social good. The first priority in the strategy would, however, be development of a systematic knowledge base to examine the current understanding of integrated freshwater management quantitatively and qualitatively.

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5. GEOGRAPHICAL PROFILE OF ASSAM

Assam, located in the tropical latitudes (24°08'N & 27°59'N) and eastern longitudes (89°42'E & 96°01'E), is the most populous State in the North-East India covering an area of 78, 523 sq. km. It is surrounded on three sides by hills and mountains with boundaries with Arunachal Pradesh, Nagaland, Manipur, Mizoram, Meghalaya, West Bengal, Bangladesh and Bhutan. The State of Assam consists of 27 districts for administration. The geology has endowed the State with many hills and rivers. These have tremendous influence on the soil quality, drainage pattern, land-use, vegetation pattern, population pattern, culture, etc.

The State can be divided into three distinctive geographic parts. The first one being the long and comparatively long and narrow Brahmaputra valley or Assam valley. The river Brahmaputra flows from east to west for about 700 km within the State and has great role in the land formation, hydrology, ecology, population distribution, culture and economy of the valley and the State. The Barak, another largest river of the State has created the Barak Valley in the southern end of the State. Barail range and Karbi Plateau has separated these two river systems.

6. OVERVIEW OF WATER RESOURCES

6.1 Rainfall

Bulk of the water in the State, both surface and groundwater is obtained from rainfall. Assam experiences the predominant influence of the south-west tropical monsoon which reigns from April to October with occasional winter showers. The low clouds of the southwest monsoon after being intercepted by the N.C. Hill range and Naga Patkai range, cause heavy rainfall in the southern part of Assam and precipitate in the Brahmaputra valley; their intensity increasing towards the foothills of the Himalayas. The approach of the monsoon is marked by strong winds, overcast skies and occasional thunder showers, hailstorm and cyclones during April and May and it starts its full play of heavy showers from June. The average annual rainfall in the State varies from 1780 to 3050 mm.

6.2 Surface Water Availability

Water resources of the State as a whole are substantial. About 8251 sq km, which is 10.5% of the total geographical area of the State, is occupied by surface water bodies. Of this about 6503 sq km is occupied by the river systems including the mighty Brahmaputra and 1748 sq km by natural wetlands including seasonal and permanent waterlogged and marshy areas and man-made

reservoirs and tanks of size more than 2.5 ha. In addition there are innumerable tanks and ponds, mostly man-made, which are smaller than 2.5 ha in size. The total surface water resources of the State is estimated at about 600 billion cubic metre.

6.3 Groundwater Availability

As per "Dynamic Groundwater Resources of India – 2004", prepared by Central Ground Water Board, Ministry of Water Resources, Govt. of India, the Annual Replenishable Groundwater Resource of the State has been estimated as 27.23 billion cubic metre and Net Annual Groundwater Availability 24.89 billion cubic metre. The Annual Groundwater Draft is estimated as 5.44 billion cubic metre of which 4.85 billion cubic metre is for irrigation and 0.59 billion cubic metre is for domestic and industrial uses. The overall Stage of Groundwater Development in the State is 22% - with the lowest figure of 2% in Cachar District and highest 56% in Bongaigaon District – and has been categorized as 'safe'.

7. POLICY OBJECTIVES

Having realized the need for formulation of a State Water Policy the broad objectives of the State Water Policy of Assam are:

- (a) To ensure preservation of all water resources and to optimize the utilization of the available resources.
- (b) Development of all utilizable water resources, including surface water, groundwater and wastewater, to the maximum possible extent for optimal economic development and social well-being.
- (c) To maintain water quality, both surface and underground, to established norms and standards.
- (d) To bring about qualitative improvement in water resource management with inclusion of users' participation and decentralization of authority.
- (e) To promote formulation of integrated and multidisciplinary projects as far as and whenever and wherever possible on the concept of basin or sub-basin, treating both surface and groundwater as a unitary resource for the following main uses:
 - Drinking water and water for domestic use.
 - Water for irrigation.
 - Hydro power generation within the constraints imposed by others.
 - Water for industries including agro-based industries.
 - Water for recreation, health, navigation and other uses.

- (f) Judicious and economically sound allocation of water resources to different sectors, with drinking water supply as the first priority.
- (g) To optimize utilization of water resources to maximum production in all user sectors.
- (h) To emphasize and facilitate rainwater harvesting and recharging of groundwater aquifers.
- (i) To ensure ecological and environmental balance while developing water resources by minimizing adverse impacts of water resources development on the natural environment and on population affected by implementation of projects.
- (j) To ensure flood management and drainage as integral part of water resource development as well as to assure minimal supplies during drought and drought-like situations.
- (k) To ensure self-sustainability in water resource development.
- (l) To promote beneficiaries' participation in all aspects of water planning and management.
- (m) To motivate and encourage water conservation through appropriate and socially acceptable water rates, introduction of water-saving devices and practices in all sectors.
- (n) To generate water literacy and awareness among all users and user sectors.
- (o) To advance scientific and technological level of all personnel in the water sector through intensification of applied research, technology transfer, training and education.
- (p) To ensure well coordinated and efficient decision making, planning, design, execution and operation and maintenance activities.
- (q) To facilitate private initiative in development, operation and management of water resources projects.
- (r) To provide a substantive legal framework for management of water resources.
- (s) To provide a Management Information System for effective monitoring of policy implementation.
- (t) To provide a mechanism for the resolution of conflicts between various users.

8. POLICY INITIATIVES

8.1 Demand Management, Conservation and Efficiency of Utilization

The efficiency of utilization in all the diverse uses of water would be improved and an awareness of water as a scarce resource would be fostered. 'Conservation Consciousness' would be promoted through education, regulation, incentives and disincentives in the following ways in different sectors.

Domestic Sector:

- Introduction of domestic water saving device.
- Water meters on all consumers/group of consumers.
- Progressive water tariff structure.
- Auditing of water balance on each distribution system.
- Piping out separately the sewage and other domestic use to be treated, recycled and reused.

Industrial Sector:

- Progressive water tariff.
- Water recycling facilities.
- Treated urban sewage water for cooling and other processes.

Agriculture Sector:

- Water rates on volumetric basis would be pegged at an appropriate level to yield enough revenue for maintenance costs.
- Improvement in irrigation practices and reduction of water losses.
- Introduction of pressure irrigation system.
- Treated sewage water for non-edible crops wherever possible.

River Management for each Basin/sub-basin:

- Afforestation and soil conservation.
- Livestock management.

- Treatment before disposal of sewage.
- Prevention of pollution from agriculture use through use of bio-fertilizers and bio-pesticides.

8.2 Integrated Planning for Maximizing Water Usability

- 8.2.1 Water resources planning, development and management will be carried out adopting an integrated approach for a hydrological unit such as a river basin as a whole, or for a sub-basin, or for a watershed, multi-sectorally, conjunctively for surface and ground water and rainfall taking into account quantity, quality and environmental considerations. Because water in each such unit including rainfall, groundwater and surface water with storages in various structures, wetlands, etc. of all sizes can be used many times over for various purposes if planned, developed, operated and managed in an integrated manner.
- 8.2.2 All individual development projects and investment proposals will be formulated and considered within the framework of river or sub-basin plan or watershed plan so that the best possible combination of options can be made and sustained for poverty alleviation, increased productivity and incomes, equity, reduced vulnerability to natural and economic risks and costs.
- 8.2.3 Water allocation and planning will be done adopting a demand management approach.
- 8.2.4 Conservation through demand management, recycling and reuse after treatment, improvement of irrigation efficiency, and inter-basin transfers when needed will be considered among the steps needed to increase the availability of utilizable water.
- 8.2.5 Water would be made available to water-short areas by transfer from other areas including inter-basin transfer after taking into account the requirements of the areas/basins.
- 8.2.6 The integrated approach of development planning will include catchment area treatment and management, environmental and ecological aspects, the rehabilitation of affected people and command area development.
- 8.2.7 Study of the impact of a project during construction and later, on human lives, settlements, occupations, socio-economic environment and other aspects will be an essential component of project planning. All projects

would make the Environmental Impact Assessment, the Social Impact Assessment and Cost Benefit Analysis and will be open for public scrutiny and would examine alternate options before coming to a conclusion about the most appropriate strategy. Environmental Management Plan and compensatory actions would also be considered and would be made open to public discussion to ensure public participation in implementation and subsequent maintenance.

8.3 Water Allocation for Various Uses

In the planning and operation of the systems, water allocation priorities would be broadly as follows:

- Drinking and domestic use.
- Sustaining livelihoods – aquaculture, cottage industries.
- Sustaining environment, maintaining river systems, wetland systems and aquatic life.
- Irrigation and hydropower.
- Agro-based and rural industries.
- Thermal power and industries.
- Recreation and religious uses.
- Navigation and other uses.

Priorities can, however, be modified or added if warranted by the local area specific considerations.

8.4 Drinking Water and Water for Domestic Use

Adequate drinking water facilities would be provided to the entire population of the State both in urban and in rural areas. Irrigation and multipurpose projects would invariably include drinking and domestic water components to supplement locally developed sources. Drinking water needs of human beings and animals would be the first charge on any available water. The community would have the first right to use rainfall directly, store and recharge groundwater wherever possible.

Water would be allocated on per head basis. The standard with regard to water allocated per capita for drinking and domestic use would be calculated scientifically and would be the same for rural and urban areas.

8.5 River Life

A minimum good quality water flow would be ensured at all times as required for the life of the river and for sustaining livelihoods. This would include the allocation of water for various purposes including conserving the environment, supporting livelihood based on aquatic life and other uses of water, recreation, cultural activities like bathing and festivities. The requirement of water for these various purposes would be calculated scientifically.

8.6 Wetlands and Water Bodies

The structures of natural and traditional wetlands and water bodies, like *beels*, tanks, ponds etc., would be restored, maintained and used properly through adequate and scientifically prepared management action plans. Water bodies within the Reserved Forests, National Parks etc., would also be included within the ambit of forest and environment policies. All these water bodies would not be allowed to be encroached upon for any other land use.

8.7 Pollution and Environment

- 8.7.1 In project planning, implementation and operation, the preservation of the quality of the environment and the ecological balance would be a primary consideration. Adverse impact, if any, on the environment would be minimized and off-set by adequate compensatory measures. Effluents will be treated/made to be treated to acceptable levels and standards before discharging them in natural streams and other bodies. Details of all effluents generated by each industry or urban area would be maintained as a database in the State Water Resources Information System, the State Pollution Control Board and local administration and would be made available to the public.
- 8.7.2 Necessary legislation would be made for the preservation of the existing water bodies by preventing encroachment and deterioration of water quality. A list of defaulters in this regard with the extent of area under encroachment would be prepared and published annually by the State Pollution Control Board so that the social and legal pressure can be brought to bear on the defaulters.

8.8 Watershed Areas Management

8.8.1 Watershed management and minor irrigation projects would be allowed and encouraged to be developed in tribal and hill areas by the local communities, with technical and financial help from the government and NGOs. Special efforts will be made to investigate and formulate projects in areas inhabited by tribal and other specifically disadvantaged groups like scheduled castes and scheduled tribes. A lower benefit-cost ratio would be acceptable for such areas.

8.8.2 The planning of projects in hilly areas would take into account the need to provide assured drinking water, possibilities of mini- and micro-hydel development and the proper approach to irrigation in such areas. In the context of physical features and constraints such as steep slopes, rapid run-off, soil erosion and eco-fragility of hilly areas, the benefit-cost ratio of projects in such areas would be made acceptable even at a lower figure.

8.9 Flood Management and Drainage

Floods are the unfailing feature of the State. Almost every year the State experiences floods. Added with flood, problem of erosion assumes serious proportions.

8.9.1 Insurance against floods requires local action as well as national coordination. It is realized that floods and their negative consequences can only be managed, they cannot be controlled. The seasonal floods in the State are largely a consequence of the concentration of heavy rainfall within a period of few days/weeks during the monsoon months and low flows. The flood management policy within the State Water Policy would recognize this fact and would begin with the premise that people are prepared to live with the floods in ways that are least disruptive and harmful to them.

8.9.2 Flood protection would be considered as an essential component while planning water resources of a basin, or sub-basin, or watershed.

8.9.3 A number of systematic measures, that would include the adoption of suitable policies, operational and managerial steps, disaster preparedness, flood forecasting, ecological measures and international river water sharing agreements, would be taken to deal with floods in such a way that their intensity is moderated and negative consequences on flood-prone populations are minimized. The planning for flood

management would be done in a holistic manner so that the needs during the non-flood season are also taken care of.

8.9.4 Measures for Flood Management:

- There would be a master plan for flood control and management for each flood-prone area.
- Where flood control is one of the key purposes of multi-purpose dams, it would be ensured that the dam intercepts significantly in the catchment/drainage above the affected area. Wherever dams and reservoirs exist or contemplated for multi-purpose benefits, flood management would be integrated among its purposes. In highly flood prone areas, flood management would be given overriding consideration in reservoir policy even at the cost of sacrificing some irrigation or power benefits.
- While physical flood protection works like embankments and dykes may be necessary, increased emphasis would be laid on non-physical measures such as flood forecasting and warning, flood-plain zoning and flood proofing, for minimization of losses so as to reduce the recurring expenditure on flood relief.
- Land-use regulation would be integrated with flood-plain zoning to avoid inappropriate land-use in flood-plains and other flood-prone areas and consequent damages and relief costs in the long run. Flood prone areas would be demarcated at different probability levels and appropriate development measures and economic activities would be devised for flood prone areas.
- Unabated encroachment in the flood plains and riverbeds as also cultivation in riverbeds and drainage courses during the flood period would be prevented.
- Watershed management through extensive soil conservation measures, such as check dams, contour trenches etc., preservation of forests, increasing the forest cover, etc. would be promoted to reduce the intensity of floods. The traditional flood management systems of respective flood prone areas would be revitalized, maintained, revived and encouraged. Thus the government policy would build on people's resolve to live with floods and aim at dealing with floods so as to minimize losses and hardship while obtaining certain benefits.
- Construction of embankments would be considered only after careful detailed studies and investigations as a part of a package. Regular and adequate maintenance of embankments would be ensured with the involvement of people. In existing embankments

arrangements for adequate drainage of the area behind would be made through appropriately located sluices.

- Development works such as roads, railways and housing construction would take into account natural waterways and adequate natural drainage would be provided without creating an afflux upstream.

8.9.5 Drainage

Due considerations to provide proper drainage would be given

- To get rid of bad quality water from sewage and industrially used water. This can be avoided by treating the water and then reusing.
- To recover land area from water logging and make it fit for various uses. Wetlands and other water bodies, both natural and man-made, would be used without reclaiming these for land-use without water. These would be used for aquaculture, recharge of groundwater, maintaining ecology, etc.
- To get rid of excess water during monsoon season due to sudden heavy rainfall.
- To moderate the intensity of flood.

8.10 Control of Erosion

Land erosion, river bank erosion in particular, is prevalent in Assam due to the dynamic nature of the Brahmaputra and its tributaries resulting in changing pattern of channel configuration, frequent shifting of river banks leading to breaching embankments, disrupting road-rail communication and heavy bank erosion at places along the courses bringing good agricultural land and human habitation in its folds.

In fact, erosion scenario has throttled the basic economic development of the State. Different from most other rivers, river bank erosion along the Brahmaputra River is a severe all-year-round phenomenon and not limited to the flood period alone.

Since 1954 to 2004 a total area of 386 thousand ha has been eroded, at an average rate of about 8000 ha per year. This accounts for about 7 per cent of the total geographical area of the plain districts of Assam. Effect of river erosion was moderate to severe in 130 reaches while 25 were most severely affected. About 90,700 families of 2534 villages and 18 oil installations/tea gardens/important towns/heritage sites were brutally affected due to erosion within this period.

The socio-economic impact of river bank protection is considered positive as it reduces vulnerability to erosion and flood damages. Specifically poorer section of the society is more affected by such disasters and they need more time to recover. Large scale bank stabilization, therefore, is expected to have a direct impact on poverty reduction. Overall, a more stable environment with reduced vulnerability encourages economic development which has the potential to further reduce poverty.

- 8.10.1 The erosion of land by river waters and storm waters would be minimized by suitable cost-effective measures.
- 8.10.2 By making the widest possible use of biological measures, endeavours would be made wherever possible to employ natural erosion control measures suited to the landscape. Control of this type would be oriented towards restoring the natural balance of solid matter in the given ecosystem and would constitute positive environmental action.
- 8.10.3 Physical erosion control aimed at directly safeguarding or protecting the existing infrastructure and which may allow beneficial environmental impacts would also be employed.
- 8.10.4 For ensuring safe discharge of water and preventing bank collapses, scour, etc., preference would be given to biotechnical or combined controlling measures wherever possible. Endeavours would be made to employ biotechnical stabilization in the form of a combination of natural building materials, building methods and plant cover.
- 8.10.5 Attention would be given to causes situated elsewhere in a watershed that constitute the triggering factors for erosion.
- 8.10.6 All requisite steps to ensure that indiscriminate occupation and exploitation of river strips of land are discouraged and that the location of economic activities in areas adjacent to rivers, especially in the erosion prone areas, is regulated.

8.11 Irrigation

- 8.11.1 Irrigation planning either in an individual project, or in a basin, or in a sub-basin, or in a watershed area as a whole, would take into account the irrigability of land, cost effective irrigation options possible from all available sources, including traditional ones, if any. The irrigation intensity would be such as to extend the benefits of irrigation to as large a number of farm families as possible, keeping in view the need to maximize

production and providing minimum sustainable income above the poverty level. Irrigation efficiency in irrigation projects would be improved to the maximum achievable.

8.11.2 Water allocation in an irrigation system would be done with due regard to equity and social justice. Disparities between head-reach and tail-end farms and between large and small farms would be obviated by adoption of a rotational water distribution system and supply of water on a volumetric basis to Water Users' Associations (WUAs) subject to certain ceilings. WUAs would have an important role to play in managing distribution, maintenance and recovery of service charges.

8.11.3 Emphasis would be given in completion of the already started projects and on modernization, up-gradation and improvement of existing projects.

8.12 Hydropower

8.12.1 In hydropower sector efforts would be made to accelerate the process of planning, development and establishment of new projects so that the available water resource are put to optimal use, especially by taking up multipurpose projects.

8.12.2 Micro-, Mini- and Small-Hydro schemes, up to 20 MW, which involve negligible storage, no considerable negative environmental impacts and no resettlement and rehabilitation problems would be encouraged.

8.12.3 Private Sector Participation in establishing micro-, mini- and small-hydro schemes would be encouraged within the ambit of Small Hydro Power Policy of Assam.

8.12.4 Planning of micro-, mini- and small-hydro development projects would take into account the need to provide assured drinking water and the proper approach to irrigation in nearby areas in addition to power generation.

8.13 Industry and Thermal Power

8.13.1 In order to meet the present and future requirements of the industry and thermal power sectors, the allocation of water resources would accommodate these requirements so that industrial development and power generation do not suffer on this account.

8.13.2 Thermal power houses and industries with heavy use of water would have to be located on the banks of rivers. They shall be required to meet the development cost and its maintenance along with the cost of water which shall be fixed from time to time. They would be encouraged to adopt processes with minimum use of water, recycle and reuse and discharge only treated and cooled water into the river to maintain its ecology.

8.14 Groundwater Management

8.14.1 The first right to groundwater would be to the concerned community and not to an individual on land-ownership basis. The respective community organizations would have the right to inspect and monitor the use of groundwater by private landowners to ensure that groundwater beyond permissible limits is not being withdrawn. Diversion of groundwater to urban areas or for industrial use without consent of the community would not be permitted.

8.14.2 Development of groundwater resources would be regulated so as not to exceed the recharging possibilities, as also to ensure social equity. The detrimental environmental consequences of over-exploitation of groundwater would be effectively prevented by legislation and its enforcement by State Govt.

8.14.3 In order to discourage excessive use of groundwater, the electricity and diesel would be supplied at the market rate and would not be subsidized.

8.15 Fisheries Development and Aquaculture

8.15.1 Culture based fisheries in closed wetlands and wetlands with a very brief period of connection with river would be encouraged with community participation through strategic stocking and recapture.

8.15.2 Capture fisheries to manage natural fish stock would be encouraged through community participation in wetlands with riverine connection for a reasonably long time by allowing recruitment by conserving and protecting the brooders and juveniles.

8.15.3 The growth over-fishing would be prevented by taking appropriate measures in gear selection and strictly observing the closed season to protect the brooders.

8.15.4 Fisheries would be made part of an integrated water resources management system including navigation and recreation, bird sanctuary, aquaculture and open water fisheries as a part of holistic development which would benefit the local people and help retaining the biodiversity of the water system and the environment.

8.16 Navigation, Water Tourism and Recreation

8.16.1 In order to save energy and reduce our dependence on petroleum products, the major portion of which are imported, navigational transport in rivers is required. Emphasis would be made on maintenance of minimum flow and depth in specific river reaches to facilitate navigational transport.

8.16.2 Water-tourism opportunities and adventure sports potential of the Brahmaputra-Barak system would be harnessed by developing water-tourism sites for adventure sports like para-sailing, water sports, river rafting, and angling etc. through Department of Tourism.

8.17 Resettlement and Rehabilitation

8.17.1 Although emphasis will be given in optimal management of water through sound micro watershed development program, sometimes it may be necessary to construct large storages. The consequent resettlement and rehabilitation of people in such cases would be governed by the national policy. The project-affected persons (PAPs) would be entitled to rehabilitation that precedes the project completion and compensation where payable would be both for appropriation of property as well as for livelihood.

8.17.2 Land for land in respect of agriculture would be the preferred option.

8.17.3 The compensation awarded to PAPs would match market rates, even if this means that the cost of resettlement & rehabilitation as percentage of the total project cost goes up.

8.17.4 The definition of PAPs would be such as to cover all the people who are actually affected by the project.

8.17.5 All water and power development projects would ensure that benefits of the project go to the local people first.

8.17.6 A separate Resettlement & Rehabilitation cell or wing would be created within the project management structure to be staffed with social scientists and extension/community workers besides engineers.

8.17.7 The State Govt. would appoint an independent agency outside the project implementation to monitor the resettlement and rehabilitation activities.

9. ACTION PROGRAM

9.1 Partnership with Communities in Water Resources Management

9.1.1 The management of water resources for diverse uses would be done by adopting a participatory approach, by involving the user communities through community based organizations in the various aspects of planning, design, development and management of water resources. Necessary legal and institutional changes would be made at various levels for this purpose. Water Users Associations and local bodies such as municipalities and *Gaon Panchayats* would particularly be involved progressively at appropriate levels in the operation, maintenance and the management of water infrastructures and facilities with a view to eventually transfer the management of such facilities to the community based organizations/local bodies.

9.1.2 When local communities or public utilities are neither able to invest nor able to efficiently manage water delivery systems, private participation in corporate sector may be invited. However, private participation in planning, development and management of water resource projects would be subjected to careful social scrutiny based on well-developed mechanisms of accountability and regulation and clearance by local community whose water resources are being tapped.

9.1.3 Involvement and participation of beneficiaries and other stakeholders would be mandatory at every stage of project conception, planning, implementation, operation and maintenance.

9.2 Water Quality and Quantity Monitoring

9.2.1 Water quality would be a very important aspect of this water policy. To ensure water quality pollution of water bodies will be prevented and 'polluter pays principle' would be introduced.

- 9.2.2 Both surface water and groundwater as well as soil quality would be regularly monitored for quality and a phased program would be undertaken for improvement in water quality.
- 9.2.3 Periodical reassessment of surface water and groundwater potential on a scientific basis would be undertaken.
- 9.2.4 Steps would be taken to improve and modernize the existing mechanisms for monitoring water quality and quantity.
- 9.2.5 Improvements in existing strategies and the innovation of new techniques resting on a strong science & technology base would be emphasized to eliminate the pollution of surface and groundwater resources to improve quality and to step up recycling and reuse of water.
- 9.2.6 Realizing the importance and the pressure of demand on quality fresh water, quality assurance would be treated as an essential part of the environment for sustaining all life forms.

9.3 Financing Projects and Water Service Charges

- 9.3.1 It has increasingly become evident that government alone cannot provide the funds needed for financing of water resources projects. Local communities on one hand and the corporate sector on the other would have an important role to play in the better development and utilization of water resources. The Govt. of Assam would facilitate this by putting in place a suitable legal and administrative environment.
- 9.3.1 In government funding projects the full cost of operation and maintenance along with at least 50% cost of the capital would be recovered. The water charges would be increased gradually to reach that level within 10 years of operation.
- 9.3.2 In the case of private sector investments suitable means like commercial use of land or other means would be found to compensate for less recovery in the early stages of operation of the projects.
- 9.3.3 In areas where sanitation services are provided by the government the water user charges would be substantially enhanced in order to recover the capital cost and to generate funds for maintenance, extension and modernization of the sewage disposal system.

- 9.3.4 Adequate emphasis will be given to the physical and financial sustainability of the existing and new projects. Therefore, it would be ensured that the water charges for various uses would be fixed in such a way that they cover at least the operation and maintenance charges of providing the service and a part of the capital cost.
- 9.3.5 The water service charges would be directly linked to the quality of service provided.
- 9.3.6 The subsidy on water rates to the disadvantaged and poorer sections of the society would be well targeted and transparent.
- 9.3.7 An autonomous regulatory body to fix tariffs for the different uses of water may be set up.

9.4 Project Implementation and Monitoring

- 9.4.1 A system to monitor the performance and socio-economic impact of the project would be established. Such a monitoring process would take the community into confidence by involving them at every stage.
- 9.4.2 A close monitoring of the projects to identify bottlenecks and to adopt timely measures to obviate time and cost overruns would form part of project planning and execution.

9.5 Safety

- 9.5.1 A proper organizational arrangement within the ambit of State Water Resources Board/Council and the State Water Resources Development Authority would be made for ensuring safety of storage dams and other water related structures consisting of specialists in investigation, design, construction, hydrology, geology, etc.
- 9.5.2 Dam safety legislation would be enacted to ensure proper inspection, maintenance and surveillance of the existing dams and also to ensure proper planning, investigation, design, construction and safety of new dams. The guidelines would be kept under constant review and periodically updated and reformulated. There would be a system of continuous surveillance and regular visits by experts.

9.6 Disaster Management

Disaster management strategies for floods, breach of embankment, breach of dams and other water related structures and also in case of drought or drought like situations would be formulated.

9.7 Rainwater Harvesting and Water Conservation

- 9.7.1 Emphasis would be given to the improvement of efficiency of utilization of water in all sectors and fostering of awareness about water as a scarce resource and need for water conservation.
- 9.7.2 Conservation consciousness would be promoted through education, regulation incentives and disincentives.
- 9.7.3 Rainwater harvesting, both by modern scientific methods and traditional methods, would be encouraged and promoted through dissemination of information, demonstration and incentives.
- 9.7.4 Efforts would be made to modernize the traditional rainwater harvesting methods through proper input of modern science & technology.
- 9.7.5 Stress would be laid in recharging of groundwater through rainwater harvesting especially in water scarce and urban areas.

9.8 Legislation and Regulation

9.8.1 The existing rules, regulations, ordinances, legal and legislative measures related to the State's water sector would be critically examined specifically in aspects pertaining to water resources management, protection of water quality, flood protection, water rights, etc. and necessary measures would be taken in respect of:

- Amendments and additions to existing acts, rules, regulations, orders, decisions, etc.
- Ensuring responsibilities and powers of government agencies.
- Clearly spelling out the rights and obligations of individuals in the relevant laws and regulations.
- Ensuring that the legislation would allow for easy implementation of policy decisions while protecting the interests of individuals.
- Empowering appropriate agencies to carry out their obligations and responsibilities and spelling out the administrative procedures necessary for coordinated, equitable and efficient control, as well as the resolution of conflicts which may arise.

- Providing legal support for the formation of Water Users Associations and handing over to them the distribution of water for irrigation and the maintenance of canals.
- Establishing rules and regulations for the involvement of the private sector in development and operation of water related projects.
- Providing in the law for an effective participation of farmers in the planning and decision making processes which involve users and public authorities.
- Introduction of necessary legislation for a periodic amendment of water rates and tariff structures based as far as possible on volumetric metering of supplies.
- Establishment of effective conflict resolution, legal entities and procedures.

9.9 Training, Research and Science & Technology

9.9.1 For effective and economical planning and management of water resources of the State, the frontiers of knowledge would be pushed forward in several directions by intensifying research efforts with integration of modern tools of science & technology in various areas such as:

- Hydro-meteorology
- Assessment of Water Resources
- Groundwater Hydrology and Research
- Water Quality, Recycling and Reuse
- Prevention of Water Logging and Soil Salinity.
- Water Harvesting in Rural Areas in an Integral Manner.
- Water Harvesting and Groundwater Recharge in Urban areas.
- Economical and Easy-to-Operate & Maintain Designs for Water Resource Projects
- Seismology and Seismic Design, Safety and Longevity of Water Related Structures
- Sedimentation of Reservoirs
- River Morphology and Hydraulics
- River Erosion
- Effective Water Drainage System
- Soils and Materials Research
- Evaporation and Seepage Losses
- Construction Materials and Technology
- Use of Remote Sensing Techniques

- Better Water Management Practices and Improvements in Operational Technologies
- Risk Analysis and Disaster Management
- Crops and Cropping Systems
- Aquaculture and Fisheries Development
- Design of Less Consumptive Use of Water in Domestic Appliances
- Sewage Treatment on Smaller Scales and Reuse of Water after Treatment.

9.9.2 Since the overall thrust of the State Water Policy is towards people's participation at all stages, the highest priority would be accorded to the training of those who are to manage the water resources at all levels.

9.9.3 It would be ensured the technical empowerment of all local institutions and communities, viz., *Gaon Panchayats*, Water Users Associations, municipalities, NGOs, etc., who are to plan, develop and manage water resources.

9.9.4 The training programs would include information systems, sectoral planning, project planning and formulation, project management, project operation and maintenance, management of the water distribution systems, safety of physical structures and systems, etc.

9.9.5 All training programs would have a strong component on attitudinal and behavioral change.

9.10 Water Literacy and Awareness Generation

9.10.1 This policy realizes the need to quickly alter behavior of individuals, communities and institutions to ensure optimum utilization of the water resource. It is recognized that awareness is a key issue in changing attitudes and converting knowledge into desirable action. The initiatives under the State Water Policy would have this mandate of Statewide scientifically organized awareness campaign through booklets, posters, video and audio programs, radio and TV programs, street plays and other cultural media. A tested methodology with combination education and entertainment would be adopted for reaching the common man.

9.10.2 Impact analysis of the campaign would be done through independent groups/agencies and the results would be fed into the activities to be designed in subsequent phases.

10. REGIONAL COOPERATION

- 10.1 Assam and other Northeastern States and neighbouring countries are interdependent in a variety of trade-offs, including the thorniest water issue. While formulating major projects of integrated multipurpose water resources development certain general principles of information & data sharing, equity, fairness, no significant harm, optimum utilization, mutual accommodation and political climate for good neighbourliness would be enunciated.
- 10.2 All major integrated multipurpose water resources development projects would be revisited with water dialogue with neighbours to review options and strategies and build a synergy through regional cooperation specifically in respect of water sharing on scientific basis, flood cushioning in projects for the benefit of neighbours, flood moderation and navigation to regional benefit, addressing issues of negative effects in neighbouring States, evacuation of hydropower, etc.
- 10.3 Water disputes/conflicts with neighbouring States would be resolved on a national perspective guided by the National Water Policy and Inter-State Water Disputes Act. The trans-boundary conflicts would, however, have to be resolved through Central Government.

11. STRATEGIC ADMINISTRATIVE INITIATIVES AND INSTITUTIONAL MECHANISMS

11.1 State Water Resources Board/Council

At present the responsibilities of water issues of the State are fragmented between different departments without any formal mechanism to ensure coordination. For multi-sectoral water planning, planning of water development programs and projects, management decisions, inter-sectoral water allocation, and resolution of water resources issues in total coordination of different departments and agencies, a State Water Resources Board/Council, with the Chief Minister of Assam as the Chairman, will be established.

11.2 State Water Resources Development Authority

The State Water Resources Development Authority will be established to act as a technical secretariat of the State Water Resources Board/Council.

11.3 State Water Resources Data & Information Centre

The prime requisite for resource planning is a well-developed information system. A State Water Resources Data & Information Centre will be an essential

component of the State Water Resources Development Authority with a network of data banks and databases on availability of water resources, availability of water for different purposes, actual use sector-wise, projected future availability and demand by way of credible and broader projections, etc.

Present information and data system fragmented between different departments and agencies will be merged in a single State Water Resources Data & Information Centre. Emphasis will be given for greater use of Remote Sensing & GIS techniques for improved, broader, modern and effective processing capabilities.

Maintenance of all necessary data by users and regulatory departments would be made mandatory for compilation of data in the State Water Resources Data & Information Centre.

12. CONCLUSIONS

The water resources of Assam provide the springboard to make the State a happening place and catapult its people towards a brighter future. In view of the vital importance of water for human and other living beings, for maintaining ecological balance and for economic and developmental activities of all kinds, and considering its increasing scarcity in spite of availability of a considerable quantum of the resource in the State chiefly due to mismanagement, the planning and management of this resource and its optimal, economical and equitable use has become a matter of utmost urgency. Addressing the vast needs in this respect may be difficult immediately but it has been felt that there are several priority aspects that are essential to bring the current situation to a level of acceptability to start with any meaningful water resource management initiative. Government of Assam, therefore, felt the need of a State Water Policy, which would be responsive not only for the immediate needs but also to the State's future needs. The success of the State Water Policy will, however, depend entirely on the development and maintenance of general consensus and commitments to its underlying principles and objectives.

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