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GUJARAT STATE WATER POLICY-2015

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1.0 Need for the State Water Policy:

1.1 Preamble:

Water is a must for sustaining all life forms and it is a precious natural resource. Water resources are limited in Gujarat State. Importance of water is undisputed for strong economic position of the State. Water Resources are going on depleting (reducing) day by day due to adverse changes being taking place in the environment, scanty and erratic rainfall, increasing industrialization, population rise, exploitation of ground water, increasing demand for domestic purposes etc. Natural distribution (availability) of the water resources over the different regions of the State is uneven due to kaleidoscopic diversity in topography. In these circumstances, it is extremely indispensable to plan, develop, distribute and manage water resources in efficient and equitable manner after assessment so that scarcity of water resources may not become an acute problem in future.

Need has been developed, for benefits of the State, for formulation and development of the State Water Policy on the basis of the National Water Policy.

1.2 Present Status of Water Resources:

Gujarat has four distinct regions namely (1) South (and Central) Gujarat i.e. South of the Sabarmati River, (2) North Gujarat (3) Saurashtra (4) Kachchh. About 95 % of total annual rainfall occurs during few days of monsoon period (June to September) due to Seasonal winds from the South-West direction. There is wide variation in availability and distribution of rainfall across the State and number of rainy days are also very limited. There are total 185 river basins in the State. Availability of quantum of water resources in the State varies widely from region to region.

1.2.1 The total available water resources (surface and ground water) of Gujarat are estimated to be about 55,600 MCM (38,100 MCM surface water and 17,500 MCM ground water). About 88 % water is supplied for irrigation, 10% for domestic uses and 2 % for industries. The current trend of increase in water supply from all users will outstrip available supplies significantly by the year 2025. Further, inadequate maintenance of existing irrigation infrastructure has resulted in wastage and under-utilization of available resources. There is a wide gap between irrigation potential created and utilized. Growing pollution of water sources, especially through industrial effluents, is affecting the availability of safe water besides causing environmental and health hazards. In many parts of the state, certain stretches of rivers are both heavily polluted and devoid of flows to support aquatic ecology, cultural needs and aesthetics.

Most of Ground water resources of the State are limited to only 1/3 area of the State (alluvial area inclusive of sand stones) i.e. Central Gujarat, North Gujarat, Surendranagar District and some parts of the Kachchh. The State has to suffer from frequent droughts due to scanty and erratic rainfall. During previous century, the State had to suffer from droughts for every third year. As a result, groundwater

is utilized as the main source for agriculture, industries and domestic purposes. Hence, groundwater table is being depleted at the rate of 3 to 5 m per year as the abstraction of groundwater is more than the recharge in these regions. As a result, quantity of groundwater resources goes on decreasing and quality also goes on deteriorating in some areas along with coastal areas.

Groundwater, though part of hydrological cycle and a community resource, is still perceived as an individual property and is exploited inequitably and without any consideration to its sustainability leading to its over-exploitation in certain areas. Natural water bodies and drainage channels are being encroached upon, and diverted for other purposes. Groundwater recharge zones are often blocked. Access to water for sanitation and hygiene is an even more serious problem. Inadequate sanitation and lack of sewage treatment are polluting the water sources.

There is 2125 km long coast line in the Western side of the State that is about 1/3 of the total coast line of the nation. In the coastal areas of the Saurashtra and Kachchh, as abstraction of the ground water is more than the recharge, sea water is intruded in the aquifers and salinity gets increased and ground water gets polluted. In contrary to this, more water is utilized through canals for irrigation. Hence, water logging and salinity is increased in soils of these areas and culturable land is converted into non-fertile areas.

Climate change may also increase the sea levels. This may lead to salinity intrusion in ground water aquifers / surface waters and increased coastal inundation in coastal regions, adversely impacting habitations, agriculture and industry in such regions. Characteristics of catchment areas of streams, rivers and recharge zones of aquifers are changing as a consequence of land use and land cover changes, affecting water resource availability and quality.

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

As surface and ground water resources of the State are extremely limited, it has become necessary to develop the water resources of the State through integrated planning. Thus there is plenty of water in one region of the State, while the North Gujarat, Saurashtra and Kachchh suffer from acute scarcity of water for domestic and irrigation purposes.

In every State, activities related to the development, regulation and control and management of surface and ground water resources are required to be looked after by the State Government. General guideline has become necessary for various aspects like environmental feasibility, project affected persons, rehabilitation of people, public health, dam safety in addition to the Socio-economic aspects for planning and implementation of the water resources projects. For equitable distribution of water, social justice and resolution of the complex disputes become necessary to be taken into consideration. The public agencies in charge of taking water related decisions tend to take these on their own without consultation with stakeholders, often resulting in poor and unreliable service characterized by inequities of various kinds. Regulation and control have become necessary by taking stringent actions for scientific management and efficient utilization of water against over exploitation of ground water resources in some parts of the State. For above

matters, formulation of general Water Policy and rules has become necessary.

2.0 Objectives of the Gujarat State Water Policy:

The objective of the Gujarat State Water Policy is to ensure the comprehensive multi-sectoral planning, development and management of the State's water resources, and effective, efficient, equitable and sustainable service deliveries for various water uses. In particular, the Policy aims the following:

- (i) Planning, development and management of water resources need to be governed by common integrated perspective considering local, regional, State and national context, having an environmentally sound basis, keeping in view the human, social and economic needs.
- (ii) Principle of equity and social justice must inform use and allocation of water.
- (iii) Good governance through transparent informed decision making is crucial to the objectives of equity, social justice and sustainability. Meaningful intensive participation, transparency and accountability should guide decision making and regulation of water resources.
- (iv) Water needs to be managed as a common pool community resource held, by the state, under public trust doctrine to achieve food security, support livelihood, and ensure equitable and sustainable development for all.
- (v) Water is essential for sustenance of eco-system, and therefore, minimum ecological needs should be given due consideration.
- (vi) Safe Water for drinking and sanitation should be considered as pre-emptive needs, followed by high priority allocation for other basic domestic needs (including needs of animals), achieving food security, supporting sustenance agriculture and minimum eco-system needs. Available water, after meeting the above needs, should be allocated in a manner to promote its conservation and efficient use.
- (vii) All the elements of the water cycle, i.e., evapo-transpiration, precipitation, runoff, river, lakes, soil moisture, and ground water, sea, etc., are interdependent and the basic hydrological unit is the river basin, which should be considered as the basic hydrological unit for planning.
- (viii) Given the limits on enhancing the availability of utilizable water resources and increased variability in supplies due to climate change, meeting the future needs will depend more on demand management, and hence, this needs to be given priority, especially through (a) evolving an agricultural system which economizes on water use and maximizes value from water, and (b) bringing in maximum efficiency in use of water and avoiding wastages.
- (ix) Water quality and quantity are interlinked and need to be managed in an integrated manner, consistent with broader environmental management approaches inter-alia including the use of economic incentives and penalties to

reduce pollution and wastage.

- (x) The impact of climate change on water resources availability must be factored into water management related decisions. Water using activities need to be regulated keeping in mind the local geo climatic and hydrological situation.

3.0 Strategies

3.1 WATER FRAMEWORK LAW

- 3.1.1 There is a need to evolve a State Framework Law in the line of National Framework Law which is as an umbrella statement of general principles governing the exercise of legislative and/or executive (or devolved) powers by the States and the local governing bodies. This should lead the way for essential legislation on water governance in the State and devolution of necessary authority to the lower tiers of government to deal with the local water situation.
- 3.1.2 Such a framework law must recognize water not only as a scarce resource but also as a sustainer of life and ecology. Therefore, water, particularly, groundwater, needs to be managed as a community resource held, by the state, under public trust doctrine to achieve food security, livelihood, and equitable and sustainable development for all. Existing Acts may have to be modified accordingly.

3.2 USES OF WATER

- 3.2.1 Water is required for domestic, agricultural, hydro-power, thermal power, navigation, recreation, etc. Utilisation in all these diverse uses of water should be optimized and an awareness of water as a scarce resource should be fostered.
- 3.2.2 The State and the local bodies (governance institutions) must ensure access to a minimum quantity of potable water for essential health and hygiene to all its citizens, available within easy reach of the household.
- 3.2.3 Ecological needs of the river should be determined, through scientific study, recognizing that the natural river flows are characterized by low or no flows, small floods (freshets), large floods, etc., and should accommodate developmental needs .
- 3.2.4 Community should be sensitized and encouraged to adapt first to utilization of water as per local availability of waters, before providing water through long distance transfer. Community based water management should be institutionalized and strengthened.

3.3 Priorities for Water allocation

Ultimate goal of State Water Policy is to preserve and enhance the availability of water resources of the State appropriately and to utilize the available water optimally. Priorities shall be allocated for utilization of water for various uses so

that the same may become a guideline for all actions for planning, development and utilization of water resources. Details are as given below.

1. Drinking water
2. Irrigation
3. Hydro-power and thermal power
4. Agro- Industries and non-agricultural industries
5. Ecology
6. Navigation, Fisheries and other uses

Prioritization impacts water-resource management and therefore demands careful balancing with a perspective for the future. Therefore, these priorities could be modified or added, if necessary keeping in view the characteristics and necessities for the concerned areas and regions. Water Supply priorities can be different for formulating water development projects for present users and for requirements for new users. During scarcity, appropriate quantity of water shall be allocated for different uses keeping in view the availability and demands of water (distress sharing)

3.4 DEMAND MANAGEMENT AND WATER USE EFFICIENCY

- 3.4.1 A system to evolve benchmarks for water uses for different purposes, i.e., water footprints, and water auditing should be developed to promote and incentivize efficient use of water. The 'project' and the 'basin' water use efficiencies need to be improved through continuous water balance and water accounting studies. An institutional arrangement for promotion, regulation and evolving mechanisms for efficient use of water at basin/sub-basin level will be established for this purpose at the state level.
- 3.4.2 The project appraisal and environment impact assessment for water uses, particularly for industrial projects, should, inter-alia, include the analysis of the water footprints for the use.
- 3.4.3 Recycle and reuse of water, including return flows, should be the general norm.
- 3.4.4 Project financing should be structured to incentivize efficient & economic use of water and facilitate early completion of ongoing projects.
- 3.4.5 Water saving in irrigation use is of paramount importance. Methods like aligning cropping pattern with natural resource endowments, micro irrigation (drip, sprinkler, etc.), automated irrigation operation, evaporation-transpiration reduction, etc., should be encouraged and incentivized. Recycling of canal seepage water through conjunctive ground water use may also be considered.
- 3.4.6 Use of very small local level irrigation through small check dams, deepening of ponds, boribunds, agricultural and engineering methods and practices for watershed development, etc, need to be encouraged. However, their externalities, both positive and negative, like reduction of sediments and reduction of water availability, downstream, may be kept in view.

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

3.5 ENHANCING WATER AVAILABLE FOR USE

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

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

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

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

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

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

3.6 ADAPTATION TO CLIMATE CHANGE

3.6.1 Climate change is likely to increase the variability of water resources affecting human health and livelihoods. Therefore, special impetus should be given towards mitigation

at micro level by enhancing the capabilities of community to adopt climate resilient technological options.

- 3.6.2 The anticipated increase in variability in availability of water because of climate change should be dealt with by increasing water storage in its various forms, namely, soil moisture, ponds, ground water, small and large reservoirs and their combination. States should be incentivized to increase water storage capacity, which inter-alia should include revival of traditional water harvesting structures and water bodies.
- 3.6.3 The adaptation strategies could also include better demand management, particularly, through adoption of compatible agricultural strategies and cropping patterns and improved water application methods, such as land levelling and/or drip / sprinkler irrigation as they enhance the water use efficiency, as also, the capability for dealing with increased variability because of climate change. Similarly, industrial processes should be made more water efficient.
- 3.6.4 Stakeholder participation in land-soil-water management with scientific inputs from local research and academic institutions for evolving different agricultural strategies, reducing soil erosion and improving soil fertility should be promoted. The specific problems of hilly areas like sudden run off, weak water holding capacity of soil, erosion and sediment transport and recharging of hill slope aquifers should be adequately addressed.
- 3.6.5 Planning and management of water resources structures, such as, dams, flood embankments, tidal embankments, etc., should incorporate coping strategies for possible climate changes. The acceptability criteria in regard to new water resources projects need to be re-worked in view of the likely climate changes.
- 3.6.6 There is need to take up massive programmes of awareness generation on climate change for the general public, students, local level functionaries and other stakeholders at block and panchayat levels in the state so as to enhance their coping capacity.

3.7 Planning of Water Resources

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

There should be multi-disciplinary and integrated efforts for planning and implementation of projects including aspects like command area development, the rehabilitation of project affected persons and livestock, ecological and environmental balance ,dam safety and catchment area treatment in consultation with project affected and beneficiary families. The planning of water resources project shall be carried out in hilly areas according to priorities to provide assured drinking water, possibilities of hydro- power development and the proper approach to irrigation in such areas, in the context of physical features and constraints of the basin such as steep slopes, rapid run-off and the incidence of soil erosion. The economic evaluation

of projects in such areas should also take these factors into account.

- 3.7.1 Water** resources planning for development and management of water resources projects in the state would be done, as far as possible, for multi-purpose uses. The provision for drinking water would be the primary consideration.
- 3.7.2** Inter-basin transfer of water with top priority to the projects of inter- linking of river basin with surplus water to the river basin with scarce water keeping in view the geographical characteristics of the State.
- 3.7.3** The drainage system should form an integral part of any irrigation project right from the planning stage. For drainage line treatment, nala bunding, field outlets, gabions, etc. shall also be considered.
- 3.7.4** Adequate safe drinking water facilities shall be provided to the entire population both in urban and in rural areas. Planning shall be done considering provision for drinking water as primary requisite in the irrigation and multi-purpose projects to come up in the future. Available water shall be provided on priority basis for use for human and livestock where there is no facility for assured drinking water supply at present. .

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

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

- 3.7.5** Time and cost overruns and deficient realization of benefits characterizing most water related projects should be overcome by upgrading the quality of project preparation, management and monitoring. The inadequate funding of projects should be obviated by an optimal allocation of resources on the basis of prioritization, having regard to the early completion of on-going projects as well as the need to reduce regional imbalances. Increase shall be made in the provisions in the budget for qualitative gradual improvements in the distribution of water for domestic and livestock uses in the urban and rural sectors

3.8 Groundwater Development:

- 3.8.1** Groundwater abstraction should not be more than its recharge to maintain environment balance. Exploitation of groundwater shall be regulated and controlled to prevent environmental adverse effect.

3.8.2 Efforts shall be made so that utilization of surface water can be increased instead of utilization of groundwater resources by transferring surplus quantity of water from surface water reach river basin to the river basin having over exploitation of groundwater by storing monsoon flood water through check dams with or without peoples participation and deepening of tanks to increase recharge of groundwater and to improve the quality of groundwater. Thus, planning shall be done to increase the quantity of groundwater and to improve the quality also.

3.8.3 Planning shall be done for integrated development and balanced utilization (conjunctive use) by mixing surface and groundwater in existing irrigation projects and implementation of new irrigation projects. Planning shall be done so as to store the rainwater and reduce the abstraction of groundwater by constructing structures like check dams, bandhara and tidal regulators.

3.8.4 Care shall be taken for utilization of groundwater recharged through storage of water due to rainfall through water conservation measures. Care shall also be taken for regulating the crops like Sugarcane and Banana having intensive water requirements and also for agriculture using systems of drip and sprinkler irrigation. Groundwater should be reserved separately for drinking water purpose in areas where surface water is not available and where there is no alternative arrangement even for supplying surface water through pipelines.

3.8.5 Efforts shall be done for regulating and controlling drilling of tube wells carried out by private companies in areas falling in dark category and in areas falling in over-exploited category having abstraction of groundwater more than recharge. The Gujarat State Groundwater Authority established by the Government of Gujarat shall prepare Master Plan for groundwater development of the State. Following issues and aspects shall be taken into consideration for utilization and management of groundwater resources.

- 1) Regulation and control through Acts for utilization of groundwater.
- 2) Utilization of groundwater through drip and sprinkler systems for irrigation in areas where surface water irrigation is not feasible.
- 3) Planning for efficient and economic utilization of surface and groundwater right from planning stage of new irrigation projects and integrated development of groundwater resources.
- 4) Planning on technological and scientific basis by checking measurers for increasing artificial recharge in groundwater resources. Special attention for recharging confined aquifers located at more depths.
- 5) To prepare master plan for maximum groundwater recharge by transferring

in the North Gujarat, Saurashtra and Kachchh by preventing flood water of big rivers like the Narmada, Mahi, Damanganga and Tapi emptied into the sea.

- 6) Over- exploitation of ground water should be avoided especially near the coast to prevent ingress of sea water into sweet water aquifers.

3.9 Management of Water-resources

The State recognizes the need for optimal management of existing water and irrigation infrastructure to ensure effective service delivery and sustainability of the resource base. Adequate provisions be made for maintenance of wells and ponds, which should be owned and managed by the local community.

- 3.9.1 Service Delivery:** The State will take appropriate measures to ensure effective, timely, and cost-effective delivery of water-related services, including drinking water, irrigation, hydropower, thermal power, industrial, environmental, fisheries, and community services.

The policy of the State is to give water for irrigation in regulated quantity, distributing water on volumetric basis and eliminating imbalances amongst farmers living in initial reach and tail end without conflicts and disputes amongst big and small marginal farmers on the basis of Warabandhi system with social justice and equity in the distribution of irrigation water. Efforts shall be done to utilize fully the existing irrigation potential.

Protection shall be provided to the Kharif crops in agricultural areas dependent upon rainfall through undertaking the works like boribundh, deepening of existing tanks, new percolation tanks, etc. with or without people's participation.

- 3.9.2 Rehabilitation of Existing Water Resources Infrastructure:** The State will ensure that existing water infrastructure is appropriately rehabilitated and modernized to ensure that it performs to its optimal level and recognizes multi-purpose dimensions of the assets.

3.9.3 Operation and maintenance of water resources infrastructure and water pricing:

- 3.9.3.1** Pricing of water should ensure its efficient use and reward conservation. Equitable access to water for all and its fair pricing, for drinking and other uses such as sanitation, agricultural and industrial, should be arrived at through independent statutory Gujarat Water Regulatory Authority, set up by the State, after wide ranging consultation with all stakeholders.

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

- 3.9.3.3 Recycle and reuse of water, after treatment to specified standards, should also be incentivized through a properly planned tariff system.
- 3.9.3.4 The principle of differential pricing may be retained for the pre-emptive uses of water for drinking and sanitation; and high priority allocation for ensuring food security and supporting livelihood for the poor. Available water, after meeting the above needs, should increasingly be subjected to allocation and pricing on economic principles so that water is not wasted in unnecessary uses and could be utilized more gainfully.
- 3.9.3.5 Water Users Associations (WUAs) should be given statutory powers to collect and retain a portion of water charges, manage the volumetric quantum of water allotted to them and maintain the distribution system in their jurisdiction. WUAs should be given the freedom to fix rates subject to floor rates determined by WRAs.
- 3.9.3.6 The over-drawal of groundwater should be minimized by regulating the use of electricity for its extraction. Separate electric feeders for pumping ground water for agricultural use should be considered.
- 3.9.3.7 The State will ensure provisions for full operations and maintenance requirements of water resources and irrigation infrastructure projects, through an appropriate combination of rationalization of water charges and budgetary subsidy support, to ensure that the quality of the service delivery is not allowed to suffer for want of system's O&M needs. The water resources infrastructure should be maintained properly to continue to get the intended benefits. A suitable percentage of the costs of infrastructure development may be set aside along with collected water charges, for repair and maintenance. Contract for construction of projects should have inbuilt provision for longer periods of proper maintenance and handing over back the infrastructure in good condition.
- 3.9.3.8 Water rates should be such that it should induce people to conserve the water. Appropriate incentives should be given to those users who take actions for conservation of water. Incentives should be given for water charges for water being utilized for drip and sprinkler systems of irrigation and water for crops having lesser water requirements. In urban areas water for domestic purposes should be supplied through meter systems. Water rates should be such that people may save the water, try to reuse the water and may prevent wastages and losses. Water rates for users of more water and users of lesser water shall be given due consideration. Institutional, legislative, administrative and technical mechanisms shall be taken into consideration for water traders, different sectors utilizing water and users. Incentives should be given who pay the water charges regularly. If dues are not paid in time then they shall be collected on the line of land revenue or in the manner prescribed in the relevant act. water rates shall be reviewed for water supplied for domestic purpose in urban and rural areas through Narmada based and other group water supply schemes.
- 3.9.3.9 Water should be supplied to the industries through meter system only.

Water should be treated as an economic commodity supplied to the

industries. Incentives should be given for recycling and reutilization of water by the industries. Incentives shall be given to the industries with 'Common Effluent Treatment Plant' and industries utilising treated sewage / effluent and green technology (zero waste water concept). Appropriate incentives should also be given to those industries that have either contributed to the costs of the projects or lifting water from the rivers by making arrangements at their own costs.

3.9.3.10 A water audit system shall be introduced on the line of energy audit.

3.9.4 Users' participation in irrigation management:

The state has already enacted an enabling legislation, namely, PIM Act, 2007, to provide a legal frame work for the formation of legally empowered Water Users Associations (WUAs) at various levels of the irrigation systems and to promote their involvement in the irrigation system management. The state would continue to promote and further strengthen these WUAs including participation of women to ensure their meaningful and effective involvement in a given irrigation command and that the quality of irrigation service deliveries are maintained and sustained.

Public awareness shall be created for utilization of water. Panchayat institutions and domestic water user associations shall be involved for participation in rural water supply system and taking proper decisions. Private and non-Government sectors shall be encouraged.

3.9.5 Asset Management: Project level Asset management will be ensured through the creation and updating of asset inventories, functional specifications, and asset management frameworks.

3.9.6 Best Management Practices: Best management practices will be ensured in the development of appropriate information, analysis, and communication systems and soliciting feedback from service delivery clients to improve performance. Appropriate benchmarking and auditing systems should be developed to monitor and improve service delivery efficiency through the use of modern management instruments. Particular attention will be paid to professional development of staff to effectively use modern technical and management practices.

3.9.7 Environmental Aspects: In the operation of water resources infrastructure, appropriate measures will be taken to ensure adequate provision of water to maintain ecosystem services and manage water quality in sensitive stretches. Adequate measures should be taken to address the substantial waterlogged areas that are present in many irrigation commands as well as to regulate over-abstraction of groundwater.

3.9.8 Private Sector Participation:

Private sector participation shall be encouraged in planning development and management of the water resources projects for diverse uses, wherever feasible. As participation of private sector can be helpful in aspects like introduction of innovative ideas and approaches, creation of financial resources, introduction of corporate management and improvement in the efficiency of services and accountability to the

users, etc., necessary actions shall be taken for the same. Depending upon the specific situations, after involving private sector participation in the construction of water resources projects, keeping ownership rights in the same, transferring the same for utilizing them on long term basis, etc. aspects shall be taken into consideration. Thus, facilities of the projects of water resources shall be increased. For scheme operations, management contracts shall be carried out involving private sector.

Suitability for attracting ' Private Sector Participation (PSP)' in the projects or a portion / part there of shall be scrutinized.

4.0 Key Focus Areas

4.1 Adoption of Science & Technology in Water Resources Development and Management:

The State would ensure that appropriate modern technology is utilized in the pursuit of the mandate of the water-related agencies. This includes the deployment of modern computer hardware and software, development of a modern knowledge base (using GIS, Remote Sensing, and MIS tools), interactive decision support systems and other analytical tools, modern data and voice communication systems, improved use of the internet, improved information flow arrangements, effective targeted research, and knowledge partnerships. These should be targeted to improve water-related agencies to improve performance, reduce overall costs, and reduce redundancies.

4.2 WATER SUPPLY AND SANITATION

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

4.2.2 Urban and rural domestic water supply should preferably be from surface water in conjunction with groundwater and rainwater. Where alternate supplies are available, a source with better reliability and quality needs to be assigned to domestic water supply. Exchange of sources between uses, giving preference to domestic water supply should be possible. Also, reuse of urban water effluents from kitchens and bathrooms, after primary treatment, in flush toilets should be encouraged, ensuring no human contact.

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

4.2.3 In urban and industrial areas, rainwater harvesting and de-salinization, wherever techno-economically feasible, should be encouraged to increase availability

of utilizable water. Implementation of rainwater harvesting should include scientific monitoring of parameters like hydrogeology, groundwater contamination, pollution and spring discharges.

- 4.2.5 Urban water supply and sewage treatment schemes should be integrated and executed simultaneously. Water supply bills should include sewerage charges.
- 4.2.6 Industries in water short regions may be allowed to either withdraw only the make up water or should have an obligation to return treated effluent to a specified standard back to the hydrologic system. Tendencies to unnecessarily use more water within the plant to avoid treatment or to pollute ground water need to be prevented.
- 4.2.8 Subsidies and incentives should be implemented to encourage recovery of industrial pollutants and recycling / reuse, which are otherwise capital intensive.

4.3 Water Quality Management and Ecological Aspects:

- 4.3.1 There should be due consideration to maintain and enhance the environmental functions of the State's water resources. Adequate measures must be taken to ensure the prevention of pollution of the State's surface and ground waters, water bodies and coastal zones. Efforts should be undertaken to control point and nonpoint source pollution from industrial, domestic, agricultural, and other sources that pose that threat to public health and ecosystems. Integrated Pest Management and Integrated Nutrient Management practices and organic farming should be encouraged where appropriate to ensure sustainable agricultural practices are undertaken without compromising public and ecosystem health.
- 4.3.2 Regulation and control of pollution of surface and groundwater are done by the Gujarat Pollution Control Board' under the Environment Department. Pollution shall be decreased by enforcing Acts for control of pollution effectively and timely. Effective efforts shall be carried out for creating awareness in the people by giving knowledge and education regarding water pollution.
- 4.3.3 Science, technological skills and training play an important role in the development of general water resources. New Scientific and machine based systems shall be introduced for improving existing strategies and to eliminate pollution in surface water. Necessary actions shall be taken to improve the quality of ground water resources. Work system shall be introduced such that reuse of water can be done.
- 4.3.4 Effective programme shall be evolved to keep vigilance and evaluate quality of both surface and groundwater periodically and improvement in the quality. Monitoring shall be done for quality of surface and groundwater and soil. Time bound programme shall be framed for improvement in the quality. Third party periodic inspection should be evolved and stringent punitive actions be taken against the persons responsible for pollution.

- 4.3.5** Quality conservation and improvements are even more important for ground waters, since cleaning up is very difficult. It needs to be ensured that industrial effluents, local cess pools, residues of fertilizers and chemicals, etc., do not reach the ground water.
- 4.3.6** Measures shall be taken to treat the effluents up to acceptable and recognized standards and levels and then discharging the same into natural streams.
- 4.3.7** Appropriate measures shall be taken for maintaining minimum flow according to socio-ecological necessities in the perennial rivers and streams.
- 4.3.8** Necessary actions shall be taken for preservation of existing water bodies by preventing encroachment and deterioration of water quality.
- 4.4 Water Conservation:** Efforts should be taken to ensure effective water conservation, including promotion of demand side management, reducing losses in evaporation, conveyance, and distribution, and promotion of water saving technologies and practices. As agriculture represents the major user of water, special attention should be given to agricultural water conservation, including promotion of drip/sprinkler systems, SRI, cropping pattern changes to less water-intensive crops, etc. as appropriate.

Following actions shall be taken for increasing water conservation.

(A) Domestic Sector :

- (i) Knowledge dissemination regarding systems for water saving in domestic utilization.
- (ii) Provision of Water measuring devices for all the users.
- (iii) Maintaining balance in the distribution of water.

(B) Industrial Sector:

- (i) Provision of facilities for reuse after treatment of effluents.

(C) Agriculture Sector:

- (i) Encouragement to drip and sprinkler irrigation system.
- (ii) Improvements in shortcomings for irrigation systems and wastage and losses of water.
- (iii) Fixation of sufficient water charges for maintenance on the basis of income levels.
- (iv) Use of recycled water for cold storages, horticulture etc
- (v) Use of saline water in irrigation of crops with tolerance capacity.
- (vi) Use of saline water for non food crops like tobacco.
- (vii) Priority to kharif crops.
- (viii) Wherever commercially viable, wetlands should be preserved and developed for fishery and aquaculture.
- (ix) There is need to discover and introduce new crops, cropping pattern, water

efficient farming techniques, but minimizing the use of electrical energy, to deal with impacts of climate change

(D) Structural measures:

- (i) Construction of check dams, farm ponds, terrace talavdis, boribundhs, recharge wells and tanks.
- (ii) Maintenance of Step wells (Jal Mandirs)
- (iii) Catchment area treatment
- (iv) Forestry at appropriate locations.
- (v) Water harvesting in buildings
- (vi) Efforts for reducing evaporation from reservoirs
- (vii) Lining of canal systems

4.5 Flood Management: . While every effort should be made to avert water related disasters like floods and droughts, through structural and non-structural measures, emphasis should be on preparedness for flood / drought with coping mechanisms as an option. This includes provision of appropriate flood cushion in water storage infrastructure, flood risk identification, zoning, and regulation, modern flood forecasting and communications systems, and flood preparedness planning in vulnerable communities.

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

4.6 Safety of Water Infrastructure: Appropriate measures based on periodic inspection should be taken to ensure the safety of the water assets created. In particular, dam safety will be adequately monitored and enhanced in dams of all sizes. The recommendations of the RO&M Unit of CDO should be fully funded and implemented. Operating procedures for reservoirs should be evolved and implemented in such a manner to have flood cushion and to reduce trapping of sediment during flood season. These procedures should be based on sound decision support system.

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

4.7 Drought Management: The State is highly vulnerable to droughts. The risks of drought will be better managed through improved forecasting and communication, drought preparedness planning, appropriate watershed management and water harvesting, improved consideration of management instruments such as insurance, and diversification of livelihoods to improve climate resilience.

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

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

In addition, coastal erosion needs to be managed with appropriate measures to protect coastal zone assets. Effective measures like construction of bandhara, tidal regulators, check dams, dykes and bunds, etc. shall be taken to prevent erosion due to sea water in coastal areas. Comprehensive planning shall be done to eliminate pollution in coastal areas to minimize the damage to environment and ecosystems.

4.9 Water Zoning :

4.9.1 Availability of water in different regions of the State shall be improved with efforts like maximum storage of rainfall water, ground water recharge and to transfer the water from basin with surplus water to the water scarce basin, storage of flood water, etc. Programmes for economic development shall be prepared for agricultural, industrial and urban development taking into account changes in the water availability and its boundaries (in the configuration of water availability). Zoning of water shall be decided / identified in the State considering following points so that proper guidance may be available for future projects.

- x Zones with deteriorated surface water
- x Flood prone zone
- x Water logged area
- x Salinity Ingress zone
- x Drought prone zone
- x Watershed safety / protection zone
- x Environment protection zone
- x Potable water zone

4.9.2 Planning shall be done for agricultural, industrial and urbanization activities and economic development taking into consideration limited availability of water in the State. The planning and economic activities shall be guided and regulated in accordance with water zoning to be done at State / national level.

4.9.3 Planning of water zoning shall be done scientifically controlling utilization of water so as to achieve proportionate economic development taking into account agriculture, industries and urbanization.

4.10 Salinity Ingress Prevention: Planning for works for reducing increased salinity in

the groundwater of coastal areas through tidal regulators, bandharas, check dams, reservoir filling, Nala plugging and Spreading Channels.

- 4.11 Reutilization and recycling of water :** Water shall be reclaimed after treating (up to appropriate, prescribed standards and limits) the effluent generated through utilization for domestic purpose and flowing through sewerage in big cities and towns of the State and shall be put to reuse.

5.0 Governance and Institutional Arrangements

5.1 Institutional and Legal Aspects

The State recognizes the need to have appropriate regulatory institutional and legal framework in the water sector, and also of restructuring and capacity building of the existing institutions in the water sector in the state, and to achieve the above needs, the state would take the following actions.

- 5.1.1 Establishment of Regulatory Institutions in the Water Sector:** A Gujarat Water Resources Regulatory Authority (GWRA) is already established, under a state legislation to provide the regulatory institutional frame work at the state level.
- 5.1.2 Strengthening of Water User Organizations:** Water User Associations will be strengthened to assume greater responsibility in the management of water and irrigation infrastructure.
- 5.1.3 Gujarat State Water Resources Council :** Gujarat State Water Resources Council has been constituted under the chairmanship of Chief Minister of the State. This council shall take policy related decisions for the water sector.
- 5.1.4 Gujarat State Water Resources Committee:** Gujarat State Water Resources Committee has been constituted to consider the Action Programme in water sector. This committee shall make necessary arrangements for smooth implementation of items and matters related to water resources by creating co- ordination with all the departments related to various issues and aspects of water resources of the State. The committee shall submit its recommendations to the Council for approval after reviewing and evaluating actions of various water related departments responsible for allocations and utilization (supply) of water resources of the State.
- 5.1.5 River Basin Organizations (RBOs) :** Appropriate River Basin Organizations (State level) shall be established for the planned development and management of a river basin as a whole or for sub-basins wherever necessary. The department/ organisation should be restructured and made multidisciplinary accordingly. The RBOs shall be operationalised through active participation of water users and stakeholders keeping in view water requirement for various uses like domestic purpose, irrigation and industrial purpose, etc. and availability of surface and groundwater for effective management of water resources at river basin scale. If

found necessary the State may join in the Inter- State RBOs for inter- State rivers of the State.

For preparing ' Integrated River Basin Master Plans' for remaining river basins of the State and for preparation of the master plan for entire State (for planning, development and management of water resources), multi- disciplinary units shall also be created if found necessary.

5.1.6 Water Sharing amongst the States:

Necessary efforts shall be made for deciding sharing and distribution of water of inter State Rivers in respect of which there are no formal sharing arrangements keeping in view the national perspective. Performance evaluation of all interstate water sharing arrangements shall be carried out periodically by the State and necessary action initiated to protect the interests of the State.

5.2 Governance:

5.2.1 Research, Training and Human Resources Development: The frontiers of knowledge in water and allied sectors shall be pushed forward through focused action research, development and promotion of state of the art technology and training for effective and economic management of water resources. A perspective plan for training shall be worked out for Planners, Directors, Managers, designers and users, by coordinating with Water and Land Management Institute (WALMI) with Gujarat Engineering Research Institute (GERI), Staff Training College (STC), Gujarat Jal Training Institute (GJTI) and Hydrology Department of all Agriculture Universities and Engineering Colleges for getting optimum productivity and maximum utilization of water. Importance shall be given to the latest technological systems.

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

5.2.2 Data Management and Information System:

A well-developed data management and information system is a prime requisite for planning of any natural resource It is very important to have hydro-meteorological information like rainfall, runoff, changes in ground water tables, temperature, humidity, evaporation and evaporations and changes in water quality in coastal areas due to intrusion of sea water into ground water resources and other areas.

Some observations are recorded by the State Government through its various departments like Water Resources & Water Supply Department, Agriculture Department, Forest Department, Pollution Control Board, Revenue Department,

Roads & Buildings Department and by the Central Government through its India Meteorological Department and other relevant Departments. A 'State Water Data Centre' (SWDC) has been established at Gandhinagar by the Narmada, Water Resources, Water Supply and Kalpsar Department by keeping in view the basic requirement for implementation of system for investigation and assessment (at a single central place) by integration of all network of hydro-meteorological and weather stations of these departments for planning of water resources in the State. Standards for coding, classification, processing of data and methods and procedures for its collection shall be standardized and streamlined and subjected to periodic evaluation, correction and calibration. Data so generated shall be placed in public domain in order to ensure better transparency, utility and accountability.

Available water resources are required to be planned and allocated for bringing under maximum utilization by assessment (projections) of demand of water for various uses in the future.

6.0 Implementation of the Policy

6.1 The Government shall implement following programmes in the sectors related to the improvement in the systems of water resources, preservation of water resources, preservation and protection of water quality, flood control, drought management, water entitlement (rights).

- 1) Modifications in the existing laws and acts as per the necessities.
- 2) Clear definitions of capacities, duties, responsibilities, rights – powers and jurisdiction of all the Government Organizations.
- 3) Act shall be framed to implement policy, rules, etc. smoothly due to which rights of all the persons can be protected.
- 4) Legal and legislative protection to the Water Users' Associations (WUAs) and handing over of water distribution and maintenance of canals.
- 5) Act for involvement of private sectors in development and operations of water resources projects.
- 6) Planning for ensuring effective participation of farmers and their co-operation in decision making. There should be a citizen's council at state and district levels to check about the implementation of the policy.
- 7) Efforts to establish co-ordination amongst users and officers, arrangements and systems for exchange of suggestions, views etc.
- 8) Periodical review of water tariff so as to meet with operational and maintenance expenditures, distribution of water on volumetric basis, creating awareness for efficient use of water in users and to fulfill the needs of weaker sections of the society.

9) Implementation of legislative mechanisms for getting solutions of disputes.

Detailed strategies and operational Action Plans shall be prepared by various departments and agencies related to various sub-sectors of water sector based on the State Water Policy, and got approved from the Gujarat State Water Resources Council and shall regularly monitor its implementation to get desired results.

6.2 State Water Policy Review

The state water policy would be a dynamic policy document, and would be periodically reviewed, as and when needed, to meet the future water sector development and management challenges.

7.0 Conclusion

Water is critical for Gujarat. The gap between water supply and demand is rapidly growing due to the ever-increasing demand for water and its limited supply. The State Government has launched several innovative initiatives to augment water supply through conservation and people's participation. Huge infrastructure support has been provided for irrigation and power, in order to benefit the agriculture sector.

A mass awareness programme supplemented by appropriate technologies, policies, institutional arrangements and stakeholders' participation would increase water productivity, accelerate economic growth and assure safe and secure water in the present and in future. This would require an integrated approach at different levels in the Government and in the various regions. Micro-level water development, need-based priorities and planning will go a long way in enhancing water supply in a sustainable manner.

Gujarat State Water Policy is only a beginning. The challenge for the administration and the people is to build a secure water future for the State. The water policy aims to improve overall water productivity by removing constraints and providing institutional mechanisms. Water Policy suggests that effectiveness of the policy will be achieved through sectoral and cross-sectoral co-ordination and collaboration. The provisions of present policy would be implemented following step by- step approach with existing policy law and organisation. Mid-term review of the process would enable the implementation of Policy and achievement of its objectives.