**STATE WATER POLICY (DRAFT)**

1. **Preamble:**

Water is life. It is a precious resource so vital for sustaining life on earth. Mankind has been using water since its appearance on earth. Civilizations grew and thrived in the proximity of water. It is a scarce resource and is fundamental to life, livelihood, food security and sustainable development. Though 3/4th of the earth is covered with water, only a very miniscule fraction is fresh water and available for utilization of mankind.

India has more than 18% of the world’s population and 2.4% of the world’s land area and only 4% of the world’s renewable water resources. Goa though endowed with copious rainfall has a lot of constraints for utilization of the water resources, with rivers prone to tidal variations upto 40 kms inland.

Government of India had adopted the National Water Policy in 1987 which was updated in 1998 due to the various issues and challenges that emerged. Accordingly to give an impetus to the protection, development and regulation of this precious resource, i.e. water, Government of Goa adopted the State Water Policy which encompassed the site specific issues of the State.

Government of India due to the changing scenarios of growing population, impacts of climate change, water utilization being under strain, increase in water and water related conflicts, etc circulated the National Policy 2012 with a view to take cognizance of the existing situation and propose a framework for creating a system of laws and institutions and adopting a plan of action with a unified national perspective. The same was adopted by the National Water Board in 2012.

To supplement the National Water Policy and also to bring out the state specific issues and also remodeling the existing laws/rules there is also an ardent need to adopt the State Water Policy 2015 which would supplement the National Water Policy as well bring out the various aspects of protection, development and regulation of the water resources in the State of Goa.

The National Water Policy deals river basins all over the country and at National level, all the smaller river basins get clubbed together in a particular region.

The Geographical area of the State of Goa is 3702 square kilometers and has nine river basins. The west flowing rivers were clubbed under Tapi (Gujarat) to Tadri (Karnataka) with a total basin area of 55,940 square kilometers. The details of the nine river basins are as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| **Sr No** | **River Basins in Goa** | **Basin Area in Sq kms** | **% of basin area of Tapi to Tadri** |
| 1. | Terekhol | 71.00 | 0.13 |
| 2. | Chapora | 255.00 | 0.46 |
| 3. | Baga | 50.00 | 0.09 |
| 4. | Mandovi | 1580.00 | 2.82 |
| 5. | Zuari | 973.00 | 1.74 |
| 6. | Sal | 301.00 | 0.53 |
| 7. | Saleri | 149.00 | 0.27 |
| 8. | Talpona | 233.00 | 0.42 |
| 9. | Galjibag | 90.00 | 0.16 |
|  | **Total** | **3702.00** | **6.62** |

Compared to the combined area of west flowing rivers from Tapi to Tadri, the geographical area of the State of Goa is only 6.62% and the state specific issues would not be addressed. None of the rivers in the State are snowfed as a result of which there is a huge disparity between monsoons and summer months. Though the State receives a copious rainfall, the steep topography and eco-sensitivity of the western ghats, variation of rainfall with respect to time and also areal extent, very short river lengths, tidal variations felt right up to 40 kms inland, unique physiography, geology, bio-diversity, soil, vegetation, saline intrusion reducing the yield of the rivers, protection of khazan lands, mining activities are some of the issues which are state specific.

Out, of the nine rivers, five exclusively flow within the state boundaries, whereas main rivers like Terekhol, Chapora (Tillari), Mandovi (Mahadayi) and Zuari are inter-state rivers and have to be harnessed and managed to the best advantage to the State considering the necessity to maintain ecologically healthy environment for the welfare of the State and Environment. Goa may be one of the states to be hydrologically land locked. The cropping pattern, land use, hydrological conditions and environmental needs of the State of Goa are distinctly different from that of the country as a whole. Hence the need for a State Water Policy. The State Water Policy will complement the National Water Policy.

1. **Water Framework Law:**

Water is a State subject and there is a necessity to lead the way for essential legislation on water governance in the State to deal with the local water situation. The State has enacted two Acts namely, Goa Irrigation Act, 1973 for regulation of surface water resources and Goa Ground Water Regulation Act, 2002 for regulation of ground water resources. With the changing scenario, there is an ardent need to make necessary amendments in the existing Acts and draft new acts to plan, manage and regulate utilization of water resources in the basin in the State.

1. **Uses of Water:**

Water is required for domestic, agricultural, hydro-power, thermal power, navigation, environment, recreation, etc. The utilizations of all the diverse uses should be optimized and awareness should be encouraged at grass-root level for optimal utilization of this scarce resource. Priority should be given for providing potable water to all the citizens of the state, within easy reach of each household. The next priority would be to determine the Ecological needs of the river through proper and scientific study and whenever any development is envisaged, a portion of the river flows should be earmarked as e-flows for sustaining the ecological needs.

The rest of the needs should be decided after deducting the drinking water and ecological needs of the basin. The rivers and other water bodies should be considered for development for navigation as far as possible and all multipurpose projects over water bodies should keep navigation in mind right from planning stage.

Community who are the main stakeholders should be sensitized and encouraged to adapt and utilize water as per local availability, before resorting to long distance transfers. Village wells should be rejuvenated.

1. **Water Resources Data Base:**

Hydrological data base is the main foundation of any water resources project, may be for drinking water, irrigation, flood control, etc. Raingauges, river gauges and hydro-meteorological stations have been set up under Hydrology Project-II in the State and will be supplemented by horizontal and vertical expansions in the National Hydrology Project recently approved by the Government of India.

It is proposed to make available the data to other organizations for planning/designing their projects and also publish year books of the data collected for utilization in water resources projects. There is an ardent need to establish a State Water Informatics Center under Water Resources Department to collect, collate and process all the hydrological data from the various instruments set up under Hydrology Project regularly, conduct preliminary processing and maintain in open and transparent manner on a GIS platform.

In view of the climate change, various water related data like rainfall, geo-morphology, climate, geology, surface water, ground water, water quality , ecology, water extraction and use, irrigated area, etc. should be integrated with well defined procedures and formats to ensure online updation and transfer of data to facilitate development of database for decision making in water management.

1. **Adaptation to Climate Change:**

Climate change will in all probability affect the variability of the water resources of the state. Special impetus is therefore necessary to mitigate the issue by enhancing the capabilities of the community to adopt to the change. The mitigation measures such as increase of water storage in ponds, lakes, rivers, ground water, small or large reservoris should be envisaged. Eye should be on revival of traditional water harvesting structures and bodies.

Adaptation of better demand management like adoption of better and scientific agricultural strategies, cropping patterns, water application techniques, sprinkler and drip irrigation should be resorted to. The specific problems like flash runoff/floods, weak retention values of soils, recharge of hill sloping aquifers, should be addressed. Planning and regulation of water resources structures such as dams, flood embankments, tidal embankments, etc should be checked with scenarios of climate change. The design of bunds, ponds etc in the Khazan lands should also be looked into with changing conditions of climate change.

The ground water scenario and the salinity intrusion will also have to be modeled to evolve mitigation measures to protect the ground water resources. Implementation of rainwater harvesting measures need a look into.

1. **Enhancing water available for Use:**

The availability of water resources and its use by various sectors should be assessed scientifically and also reviewed at periodical intervals. The trends in availability due to climate changes should also be assessed.

In the State of Goa, despite of a copious annual rainfall, rivers have very low flow for the non-monsoon months resulting in scarcity of drinking water for the period especially in the months of april to start of june. Moreover, the narrow width of the state, steep slopes of western ghats, porous sub-stratum, non-uniform distribution of rainfall over time and space cause temporal imbalances of water availability in the state. This also explains the paradox that though Goa is situated in high precipitation zones, it has one of the lowest per capita fresh water availability.

The availability of water is limited, but the demand of water increases rapidly due to growing population, rapid urbanization, rapid industrialization and economic development. For this a few of the following or more strategies have to be evolved for better management practices in the state;

1. Utilization of storage sites for creation of storages in the state
2. Estimation of e-flows in the rivers and their tributaries and oversee that e-flows are maintained
3. Irrigation, Hydel schemes will be interlinked with urban and rural water supply schemes for integrated utilization of the resource
4. Renovation, Restoration and Rejuvenation of all the fresh water resources in the state like, tanks, lakes, springs, pois, etc. Land reclamation by filling up water bodies will be discouraged.
5. Areas frequented by drought or water scarcity will be identified and schemes envisaged to mitigate the problem will be envisaged and implemented
6. Water Conservation measures will be encouraged including contour trenching, contour bunding, check dams et al.
7. Life cycle of the rivers will be protected
8. Water saving techniques like drip and sprinkler irrigation will be resorted to wherever feasible and possible.
9. Leakages in distribution lines will be reduced to reduce the non-revenue water.
10. Emphasis and publicity will be given for roof top and other rainwater harvesting schemes.
11. Re-cycling of water for non-consumptive uses will be encouraged.
12. Ground water wells will be rejuvenated.
13. Aquifer mapping will be resorted to in conjunction with Central Ground Water Board.
14. Inter-basin transfers should be resorted to only in extreme cases, after providing for all the future requirements and needs of the basin including e-flows and after evaluating the environmental, economic and social impacts of such transfers.
15. Recharge areas should be kept without development for recharge of ground water.
16. Emphasis should be on saving water consumption and increasing the water availability by reduction of losses, reduction in evapo-transpiration, utilization of return flows in the rivers, aligning the cropping pattern, automizing the water distribution operation, reduction in the supply chain, etc.
17. **Ground water :**

The State of Goa was one of the foremost to implement the Ground Water Regulation Act. Whole state has been declared as a scheduled area for implementation of the act. Ground water Officers have been appointed for each district and Ground water Cell has been Notified under the act. The rates for withdrawals of ground water have also been notified and all the commercial withdrawals will be metered and charged. Though the Ground water Policy has been separately notified, the following are the issues addressed in the State Ground Water Policy which will also form a part of the overall State Water Policy

1. All the ground water structures should be registered. Ground water officers should conduct a village level camps in a phased manner panchayat-wise to educate the citizens on the importance and judicious use of ground water and also register all the existing wells and seeking permissions for new wells in locality.
2. All the withdrawals of the ground water especially industrial, commercial and mining should be metered. No new permissions should be given without meters being installed. All the existing permissions should be metered in a phased manner. The meters should be fitted by the beneficiaries and the same should be checked by the ground water officer or his representative. The withdrawals especially for commercial, industrial and mining use should be of permanent nature, especially the pumps should be fixed with a permanent arrangement. The meters and withdrawals will be checked by the ground water officers periodically.
3. All the transportation carriers, especially the tankers should be registered by the ground water officers. Ground water Officers should issue a Pass with his signature which gives the details of the tanker, the registered number of tanker, the wells from which he draws water, etc which should be affixed on the wind screen of the tanker. Ground water Officers should carry out surprise inspections periodically of the same. Ground water Officers should take immediate cognizance of the complaints and carry out raids on illegal transportations of ground water. Police and R.T.O. will be instructed to confiscate tankers carrying water which do not carry the valid Pass.
4. Water Resources Department should undertake the study for delineation of aquifers in the State with the properties of the same. This would aid in studying the utilization pattern and granting of the permission in a more scientific manner.
5. Periodical monitoring of the ground water levels should be undertaken to demarcate the actual areas under stress. There are about 105 observation wells ( 65 open and 40 peizometers ) of the Water Resources Department which are set up recently under HP-II Project of World Bank and another 50 wells of Central Ground Water Board. The data from the same should be utilized for better management of the water resources in the State.
6. Stringent action should be taken for violators of the Ground water Act. Periodical and continuous monitoring should be taken up by the Ground Water Officers and their authorized representatives to implement the act in right spirit to protect the ground water resources for future generations.
7. Proper arrangements should be made by mining companies for dewatering including metering of the same and the same should be shown to the Ground water Officer before the withdrawals are made. Ground water officers should periodically monitor the withdrawals made by the mining companies and authenticate the same. Department should monitor the ground water levels in the mining belt. Peizometers or wells wherever necessary should be installed to record the levels in mining belt.
8. Rain water harvesting and recharging of the ground water resources should be encouraged where ever feasible. Department should render assistance and guidance for such proposals.
9. Water conservation measures like bandharas, inverted bandharas, percolation tanks, check dams, contour bunding, trenching, etc should be encouraged and propagated wherever feasible.
10. In canals or flow irrigation, conjunctive use of ground water along with surface water resources should be adopted to prevent wastage and conserve water.
11. In over-stressed areas, estimation of ground water resources on micro-level basis should be undertaken on need-based necessities.
12. Training on modern scientific technologies and tools should be imparted and made available to the ground water officers and managers for better visualization and decisions in ground water management.
13. In the State the permissions for septic tanks are given by health department. However whenever there is a water structure like a well, pond or nallah in viscinity of a building (within 100 meters), there is a need to evaluate the effect of the effluent from the soak pit to ground water structure and such cases should be referred to ground water officer for comments, which he should give within a period of 30 days.
14. Water quality of the ground water should be assessed and monitored periodically.
15. Pollution of ground water should be acted upon immediately as per Goa Groundwater Regulation Act.
16. All the bore wells will be drilled through registered bore well agencies registered with the Department as per the Act.
17. Spring is a contribution of ground water to surface water regime. It is also called interflow. Inventories should be prepared by the Department of all the springs in the state. Phase-wise surveys should be incorporated to investigate the present state and position of the springs, the quality of water being discharged and also the pollution aspect of the same. Attempts should be made systematically to rejuvenate the springs and improve the quality of water discharged. Department should prepare schemes for the same.
18. The rates of groundwater drawals and transportation for various uses will be reviewed every alternate year.
19. **Water Pricing:**

Pricing of water should ensure its efficient use as well as conservation. Efforts should be made to set up an independent Water Regulatory Authority.. Wherever possible the water charges should be determined on volumetric basis. The charges should be reviewed periodically. Water Users Associations have been given powers to collect revenue and retain a percentage based on collections. Overdrawals of groundwater should be minimized by regulating the use of electricity. Separate electric feeders for irrigation and commercial ventures maybe resorted to.

1. **Conservation of Water corridors, providing setbacks for water bodies, drainage systems:**

It should be endeavor of all to protect and conserve the rivers, river corridors, water bodies in the state. Efforts should be made to repair, rejuvenate and restore the water bodies by increasing their capacities, remodeling them or improving them for utilization. Encroachments of all water bodies, including rivers, lakes, nallahs, etc should be removed and discouraged. The water resources in vicinity of rapid urban development should be properly regulated to avoid pollution and contamination. The water bodies should be checked periodically for contamination/pollution and severe and stringent action should be envisaged in the acts. System of third party periodic inspections should be evolved and punitive action be taken against persons responsible for pollution. Urban settlements, encroachments and any developmental activities in the protected upstream areas of reservoirs/ water bodies, key aquifers recharge areas that pose a potential threat of contamination, pollution, reduced recharge and those endangering wild and human life should be strictly regulated by acts.

Quality of water and especially that of ground water should be monitored and maintained, since cleaning up of ground water aquifer is very difficult. Water infrastructures should be maintained properly and systematically to give the desired outputs/results. Suitable percentage of cost of infrastructure should be set aside for repairs and maintenance. Appropriate safety measures should be envisaged for the dams in the state, with proper dam break analysis and disaster mitigation measures.

1. **Flood and drought management:**

Land, soil and water management with scientific inputs from local, research and scientific institutions should be utilized to evolve or formulate different agricultural strategies and improve soil water productivity to manage droughts. Integrated farming systems and non-agricultural developments may also be considered for livelihood support and poverty alleviation.

Though the state does not witness huge floods like that in the Ganga or Brahmaputra basins, heavy precipitation in conjunction with high tides create afflux in the tidal prone rivers resulting in flooding of the low lying areas. The length of the rivers are also short, thus the lead time is also short. Flood forecasting should be envisaged using real time data acquisition systems and linked to forecasting models. Real time Data acquisition systems should be provided to make flood level data available to concerned officials.

Operating procedures for reservoirs should be evolved and implemented with sound decision support system. Frequency based flood inundation maps should be prepared to aid in preparedness of the mitigation measures. Community based action plan should be evolved to deal or mitigate flood/drought situations.

1. **Water supply and Sanitation:**

There is a need to remove the disparity between stipulations in urban and rural water supply. Proper sewerage system should be evolved throughout the state which would stop the pollution to surface water bodies as well as ground water. Wherever sewerage system has not reached efforts should be made to provide for septic tanks with soak pits to avoid contamination of ground water or nearby water body.

The domestic water supply should be mainly dependent on surface water supply. Wherever Sewerage treatment plants are available, efforts should be made to utilize the re-used water for non-consumptive uses. The supply of the treated and re-used water may be in two different pipelines with proper universal colour codes. Wherever such arrangements are not possible, conjunctive use of surface and ground water may be resorted to. This would reduce the load on the treated water supply, which one should endeavor to make available for consumptive use only in the long run. The distribution lines should be scientifically designed for optimum use. Efforts should be also made to integrate the Treatment Plants so as to divert and mitigate water supply through different routes during emergency. Industries should be supplied with raw water or re-used as much as possible to avoid loading the drinking water systems in the State.

1. **Research and Training needs:**

There is an ardent need for continuing research and advancement in technology and addressing issues in the water sector in a scientific manner. Innovations in water sector should be encouraged, recognized and awarded. It is necessary to update technology, design practices, planning and management practices in the state. A re-training or continuing education program for technical and ministerial staff at all levels, both in private and public sectors should be encouraged. There is a need to establish an autonomous Center for Research in Water policy should be established to evolve policy directives for changing the water resources scenario.

1. **Institutional arrangements to implement State Water Policy:**

To implement the various programmes and provisions mentioned in the State Water Policy document, the following institutional and administrative measures will be taken up:

A Water Resources Control Board will be notified to verse and co-ordinate all the activities of the State Water Policy. The functions and composition of the Water Resources Control Board will be as per Appendix-I.

A Data Center will be made operational in the Water Resources Department to collect, store and analyse data of the various processes of Hydrologic cycle.

**APPENDIX I**

***Functions and Composition of Water Resources Control Board:***

**Functions:**

1. To help and co-ordinate amongst the stakeholder agencies to implement the program laid down in the State Water Policy and monitor necessary follow up plan.
2. To examine and approve major development plans prepared by various stakeholder agencies
3. To advise Government on Inter State concerns and matters

**Composition:**

The Water Resource Control Board shall have a Governing Body for overseeing the activities and plan and implement policies and an Executive Committee for developing specific activities as laid down in the State Water Policy

**Governing Body:**

1. Hon. Minister for Water Resources … Chairman
2. Principal Secretary (WR) … Member
3. Secretary (Agriculture) … Member
4. Secretary (Forests) … Member
5. Secretary (Science, Technology n Environment) … Member
6. Three eminent Engineers in field of water resources… Members
7. Chief Engineer (WRD) … Member Secretary

**Executive Committee:**

1. Chief Engineer (WRD) … Chairman
2. Chief Engineer, PWD … Member
3. Director, Agriculture … Member
4. Director, S.T.E. … Member
5. Professor, Goa Engineering College … Member
6. Two eminent water specialists nominated by GB … Member
7. Superintending Engineer, CPO … Member Secretary