

**TECHNICAL MANUAL**  
**FOR**  
**PREPARATION**  
**OF**  
**STATE WATER PLAN**  
**FOR**  
**A**  
**BASIN**

**Maharashtra Water Resources Regulatory Authority**  
**April 2007**

## **1.0. INTRODUCTION**

1.1. Water resources development has many facets – irrigation, drinking water supply (rural & urban), industrial use, hydro power, ecology, recreation, pisciculture and so on. Each is dealt by a different department whereas the resource is the same viz. water. Hitherto water resources development has proceeded in the country in general and in Maharashtra in particular with a project oriented (part to whole) approach marked by lack of coordination among the user departments. Major cities, towns and industries were discharging untreated effluent into nearby streams and rivers leading to unacceptable pollution levels in the waters of these streams and rivers. Unplanned expansion of urban areas and rapid industrialization has led to competing and conflicting demands on water whose main user is irrigation resulting in even curtailment of irrigation and conflicts among the various categories of users. Irrigation itself has been afflicted by several maladies like imbalanced regional development, low water use efficiency, low productivity and incomplete utilization of created potential. No effort was made to conduct ex-post facto evaluation of completed projects to assess their actual performance vis-à-vis designed outputs. Too many projects have been launched without tying up of funds for their completion leading to unproductive locking up of tax payers money. Irrigation development & management has remained a domain of the government while world-over the trend is to involve the stake-holders in this exercise. On the financial side, irrigation water charges are low and collection efficiency poor leading to inadequate allocation for O&M with attendant deterioration in the condition of the canal infrastructure. Successive droughts have shifted dependence to ground water from surface water leading to its critical depletion of aquifer in some pockets. Over-exploitation of ground water has led to water quality problems with deleterious effect on the health of rural population who depend mainly on ground water as a drinking water source.

An integrated and holistic approach as proposed in National & State Water Policy adopted by State in 2003 is therefore required to be adopted in regard to water resources planning, development and management to address the situation through preparation of basin-wise State Water Plan (SWP) and their subsequent integration.

## **2.0. OBJECTIVES OF A STATE WATER PLAN FOR A BASIN.**

2.1. The objectives of a State Water Plan for a basin are :

- a. To prepare a long term integrated plan for the development of the basin's surface and ground water resources
- b. To identify and set priorities for promoting water resources development projects
- c. To formulate a short term action plan consistent with financial allocations and priorities of the State Government.
- d. To identify steps to promote water conservation and preservation and enhancement of water quality.

## **3.0. NATIONAL and STATE WATER POLICY**

3.1. The National Water Policy (Revised 2002) has the following provision relating to basin planning

***“3.3. Water resources development and management will have to be planned for a hydrological unit such as a drainage basin as a whole or for a sub-basin, multi-sectorally, taking into account surface and ground water for sustainable use incorporating quantity and quality aspects as well as environmental considerations. All individual development projects should be formulated and considered within the frame work of such an over all plan keeping in view the existing agreements / awards for a basin or a sub-basin so that the best possible combination of options can be selected and sustained.”***

3.2. The State Water Policy (2003) has the following similar provision.

***“2.1. Objectives of the Maharashtra State Water Policy***

### ***2.1.1. Integrated, Multi Sectoral and River Basin Approach***

***To adopt an integrated and multi sectoral approach to water resources planning, development and management on a sustainable basis taking river basin / sub-basin as a unit.***

***The water resources of the State shall be planned, developed managed with a river basin and sub-basin as the unit, adopting multi-sectoral approach and treating surface and sub-surface water with unitary approach.***

***The management of the water resources of the State shall be decentralized to the lowest practicable level on the basis of hydrological or water shed units. The State shall be divided into 5 river drainage basins and appropriate river basin agencies shall be established within each river basin. Water Resources Development Corporations shall be established within each river basin.***

***The river basin agencies shall have the responsibility and authority for the integrated planning, development and management of the water resources and water sheds of their respective river basins for flood management, drought management and operation and maintenance of water storage and delivery infrastructure. These river basin agencies shall prepare integrated river basin plans with effective inclusion and participation of representatives of all basin water user entities, categories of water users and other stake-holders. Such basin plan shall include a development plan, long term operation plan, a monitoring plan, a comprehensive water shed management plan, an efficient improvement and water conservation plan and a waste minimization and water quality management plan.***

### ***2.1.2. State Water Plan***

***Based on the water resources management and development plans developed by the respective river basin agencies, the State shall prepare a State Water Resources Plan to promote a balanced development and by proper coordination among diverse water uses, which shall include structural measures, operational***

***measures, watershed management measures, demand management measures such as conservation, scarcity scheduling and efficient technologies, water pollution control measures and monitoring measures that will assure comprehensive sustainable management of the water resources and equity in water distribution for the benefit of the State and its people.”***

#### **4.0. INTEGRATED RIVER BASIN DEVELOPMENT**

- 4.1. Integrated River Basin Development is the orderly marshalling of water resources of a river basin for multiple purposes to promote human welfare. Integrated Water Resources Management (IWRM) is a process which promotes the integrated development, management of water, land and related resources to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of the eco-system.
- 4.2. The need for integrated river basin development arises from the relationship between the availability of water and its possible uses in the various sectors of a basin. It is now widely recognized that individual water projects, single or multi purpose, cannot be undertaken with optimum benefit unless there is atleast the broad outline of a plan for the basin, for the coordinated and harmonious development of the various works (like irrigation and drainage, hydro electric power, flood control, navigation, pisciculture, water supply for domestic and industrial use, recreation, watershed development) in relation to all the reasonable possibilities of the basin.
- 4.3. While a basin plan is most relevant where the stage of development of the water resources is minimal, in basins where the stage of development is very high, the plan should focus on operation of projects for optimum benefit, water conservation and improvement of water quality prospects for import of water into the basin, conjunctive use to ease the pressure on surface water etc.

## **5.0. MAHARASHTRA WATER RESOURCES REGULATORY AUTHORITY**

- 5.1. One of the important functions of the Maharashtra Water Resources Regulatory Authority (MWRRA) envisaged in the MWRRA Act 2005 under Section 11 (f) is to review and clear water resources projects proposed at the sub-basin and river basin level to ensure that a proposal is in conformity with the integrated State Water Plan and also with regard to the economic, hydrologic and environmental viability and where relevant, on the State's obligations under Tribunals, Agreements or Decrees involving inter-state Entitlements.
- 5.2. Also as per Act, the Integrated State Water Plan is to be approved by the State Water Council on the recommendation of the State Water Board. The State Water Board is required under Section 15 (4) of the Act to submit its first draft Integrated State Plan within six months from the date on which the Act is made applicable in the state. The constitution of the State Water Board headed by the Chief Secretary is given in Section 15 (i) of the Act (Annexure-1). The constitution of the State Water Council headed by the Chief Minister is given in Section 16 (i) of the Act (Annexure-2). As per Section 16 (4) of the Act, the Council shall approve with such modifications as deemed necessary, the draft of the Integrated State Water Plan (ISWP) submitted by the Board within a period of six months from the date of submission of the draft keeping in view the directions given by the Governor for removal of regional imbalances.
- 5.3. For preparation of the ISWP, it is first necessary to prepare basin-wise State Water Plans (SWP) for the three main basins in the State viz. Krishna, Godavari and Tapi. For the west flown rivers of Konkan, separate plans will have to be prepared for each of the main river systems. Integration can be considered thereafter through inter basin diversions. The State Water Board and Council may thus have to first approve basin plans for individual basins which will form the basis for clearance of projects by the Authority.

## **6.0. TIME SPAN FOR THE PLAN**

6.1. The basin plan may be prepared considering a time span of 20 – 25 years. The Act provides for a review of the ISWP by the Council once in five years.

## **7.0. DATA REQUIREMENTS**

7.1. The data requirement for preparing a detailed and comprehensive basin plan cover a gamut of disciplines / subjects like

- Geography, demography
- Topography
- Soils
- Geology
- Hydrogeology
- Agriculture
- Hydrology and hydrometeorology
- Irrigation (including backlog)
- Water Conservation
- Drinking water (urban and rural)
- Industrial use
- Import and export of water into / outside basin
- Environment (water quality, sanitation)
- Hydro power
- Ground water
- Natural disasters (flood, seismicity, droughts)
- Legal (inter State agreements, Tribunals)
- Financial

7.2. Collection / compilation of the above basin specific data is a time consuming and cumbersome task requiring frequent inter action with the custodians of the data. This should be vigorously pursued with time lines to avoid the basin plan preparation getting unduly delayed. The various departments / agencies that may have to be contacted are

- Water Resources Dept.
- Agriculture Dept.

- Revenue Dept.
- Water Conservation Dept.
- India Meteorological Dept. (IMD)
- Groundwater Surveys and Development Agency
- Water Supply and Sanitation Dept.
- Environment Dept., State Pollution Control Board
- Industries Dept., Jal Pradhikaran, Municipalities and Corporations
- Agriculture Universities in the basin
- Energy Dept.
- Statistics Dept. (for district hand books)

7.3. Once the data collection reaches a satisfactory level, the preparation of the basin plan can be initiated. The plan should be cogent, well structured and give a holistic picture of the water resources of the basin, the present level of development and the balance available for future development vis-à-vis projected demands from various sectors. The plan should also cover the status of water quality in the basin, both surface and groundwater and action plans for preservation and enhancement of the quality. Maps, bar diagrams and pie charts should be used to pictorially depict some of the facts and figures, where appropriate.

## 8.0. **CHAPTERISATION**

The chapters of the basin plan could be named and sequenced as under

1. Introduction
2. River System
3. Geology and Soils
4. Hydrometeorology
5. Agriculture
6. Surface Water Resources
7. Ground Water Resources
8. Irrigation
9. Water Conservation



10. Floods
11. Drainage
12. Drinking Water (Municipal and Rural)
13. Industries
14. Legal issues (Tribunal Awards / Inter State Agreements)
15. Trans Basin Diversions
16. Other Special Requirements
17. Environmental Management and Ecology
18. Institutional Arrangements
19. Use of Modern Tools
20. Water Balance
21. Financial Aspects
22. Stakeholder consultation
23. Action Plans
24. Approval of State Water Council

A brief description of the suggested contents for each of the above chapters is given below :

**8.1. Introduction**

The introductory chapter may cover the location of basin (between latitude and longitude), the total catchment area, catchment in the State, the districts falling in the basin with area. District wise demographic profile may be given. Where only part of the district falls in the basin, the taluka could be used as a unit for arriving at basin figures. Topographical description of location and extent of mountain ranges may be given.

**8.2. River System**

The source of the river, total length and length flowing in the State may be given with names and catchment area of important tributaries and details where they meet the main river. Morphological studies of the river if done, may be detailed.

**8.3. Geology and Soils**

A broad description of the main geological formations followed by a more detailed information on soil types in the State based on available

soil survey data. Soil surveys are carried out to determine their fertility, crops that may be grown, yields that may be expected, irrigability of land, water delivery requirements, land development, needs such as drainage. Soil survey normally covers following viz. physical properties such as colour, texture, chemical properties such as pH, soluble salt, alkalinity salinity, soil erosion, infiltration, soil classification such as family, series, land capability classification, irrigability classification (class A,B,C,D or E).

#### **8.4. Hydrometeorology**

Rainfall is the most important input for the water resources of a basin. A clear understanding of the rainfall pattern in the basin and its spatial and temporal variability is thus essential. The name, location and type of rain gauges in the basin needs to be identified. For each station, normal rainfall and 10 daily rainfall / monthly rainfall for last 30 to 60 years needs to be given. Location of stations measuring other agro-climatic and meteorological data like wind speed, normal sunshine hours, radiation, humidity, maximum and minimum temperature etc. needs also to be mentioned. An isohyetal map of the basin will be useful in understanding the rainfall pattern.

#### **8.5. Agriculture**

The land use pattern is the most important data to be presented viz. geographical area of the basin, forest area (reserved, degraded), cultivable area, net sown area, gross cropped area, fallow area etc. The gross cropped area may be detailed season-wise with type and area of coverage of major crops. Area irrigated under each crop may be mentioned with source (canal, groundwater). The productivity levels, both for rainfed and irrigated crops, achieved for important crops vis-à-vis State average for the same crop will be helpful in understanding the status of agriculture. Location of Agricultural Universities and ICAR stations in the basin may also be given. An assessment of available credit facilities through agricultural financial institutions and existing agricultural extension services will also be desirable.

### **8.6. Surface Water Resources**

This is the most important chapter in the basin plan. The chapter should begin with availability of flow data in the various river systems in the basin – location of river gauge station, organization maintaining the station, type of data observed (gauge, discharge, silt) and period for which data is available may be presented. Next the assessment of water resources of the basin at important points done by Irrigation Commission, Tribunal, CWC, State Government may be given (75% dependable, 50% dependable, Average). Imports / exports of water from the basin may be detailed. The existing network of gauge stations may be reviewed and recommendation for expansion made, if required.

### **8.7. Groundwater Resources**

Groundwater is an important source of water and the development is crucial especially in areas where surface water resources are scarce. Groundwater is the main source for rural water supply and a complementary source for irrigation (conjunctive use) and urban water supply. The availability of this resource depends on the type and location of aquifers and hence a discussion on the hydrogeology of the basin would be required. The annual rate of recharge district wise has been estimated by Central and State ground water agencies as also the utilizable quantum which can be economically developed. This data should be presented. Due to excessive withdrawal, some areas are identified as semi critical, critical or over exploited on a taluka / watershed basis. The present level of development district wise is also estimated and is available.

Quality of groundwater has an important bearing on health as harmful chemicals like fluoride, arsenic, iron, nitrate usually pollute groundwater. The quality of ground water needs to be discussed with reference to these chemicals.

The existing hydro meteorological network for monitoring ground water levels may be reviewed and their adequacy discussed.

### **8.8. Irrigation**

Irrigation is the most important consumer of water (about 80% of total use) through major, medium and minor irrigation projects. The existing, completed projects are first to be listed with location, name, live storage, cultivable / irrigable command area, design potential, potential utilized and annual water utilization including for drinking water and industries. A similar list of on going projects is to be then given with approval status. Projects which are inter-state or multi purpose may be identified. These two data give the total water use in the basin for irrigation and non-irrigation uses. Any committed water use for projects which could not be taken because of opposition, land problem etc. may also be listed. The list of planned projects together with similar information as for completed / ongoing projects may be given together with their status viz. under investigation, DPR prepared, administrative approved / approval awaited, status of environment and forest clearance where required. For planned projects, provision of drinking water should be done in consultation with MJP and for industrial use in consultation with MIDC. In the absence of such data, 15% reservation for drinking water and 10% reservation for industry in storage should be made for these uses.

If any sediment survey has been done for completed projects, the loss in live storage estimated in the survey may be indicated.

Extent of area under micro irrigation may be given. As regards ground water, the total wells in command and non-command and area irrigated by them may be given.

If any of the districts in the basin have an irrigation backlog then details of the physical and financial backlog with reference to Indicator and Backlog Committee estimation in 1994 and current backlog may be given.

### **8.9. Water Conservation**

Schemes with less than 250 ha irrigation are classified as local sector water conservation schemes. While schemes irrigation 100 ha to 250 ha are planned and implemented by the Water Conservation Dept. through their Corporation, scheme irrigating less than 100 ha are the responsibility of the Zilla Parishad. This chapter should contain the

number of schemes & type of schemes implemented so far and ongoing with potential, ultimate potential and balance potential as also the total utilization so far for completed schemes and planned utilization for ongoing schemes.

#### **8.10. Floods**

The flood prone areas / towns / cities in the basin may be identified with frequency of flooding. The average annual flood damage may be given with loss of life, loss of livestock, loss to agricultural production and loss to infrastructure. Present flood moderation capacity in reservoirs may be indicated.

#### **8.11. Drainage**

The adequacy of natural drainage in the basin may be discussed including farm drains taken up under CAD programme. If there are reports of water logging and soil salinity in the basin, the location and extent of such areas may be given.

#### **8.12. Municipal and Rural Drinking Water**

While the schemes linked to irrigation projects would be discussed in the irrigation chapter, this chapter will discuss only exclusively water supply schemes – completed and ongoing with data on source, size of scheme, population served and utilization. For new planned schemes, details may be obtained from MJP and Corporations.

#### **8.13. Industrial use**

Industrial water use varies widely among industries. Some industries like paper and pulp are water intensive. Location of all water using major industries needs to be collected together with type of industry and source. Total withdrawal for future industrial water may be obtained from Industries Dept.

#### **8.14. Legal Issues**

Most of the basins are covered under either Tribunal Awards or Inter-state agreements. Such Awards / agreements indicate the utilizable share of each co-basin State and in some cases the extent of return flow also. A copy of the Award / Agreement may be annexed to the basin plan.

### **8.15. Trans Basin Diversions**

Under the National Water Grid, some basins are identified as surplus / deficit basins and inter basin links have been planned. The Govt. of India has set up the National Water Development Agency under the Ministry of Water Resources for the purpose. Pre feasibility / feasibility reports have been prepared for all the identified links. In case the basin for which a plan is being prepared is included in the water grid, details of the link, quantum of transfer, area benefited may be given together with the status of the proposal.

### **8.16. Other Special Requirements**

Some basins may have other special requirements of water for navigation, recreation etc. If so, these may also be included.

### **8.17. Environmental Management and Ecology**

The subject is assuming importance due to dwindling fresh water sources on account of pollution from industries and human waste. The water quality status of the rivers and the action plans to improve the quality are to be discussed in the basin plan.

The State Pollution Control Board maintains water quality monitoring stations. The location of such stations, the parameters monitored, the frequency of monitoring and the data for last 5 years at each station along together with the norms may be presented to bring out whether quality is improving or deteriorating.

Next the location of all types of industries, the type of effluent they discharge, whether treatment done or not and point of discharge into rivers are to be indicated.

Towns along the river usually discharge treated / untreated sewage into river systems. The names of such towns, location, population, total sewage generated, quantity treated are to be described.

The Pollution Control Board and Municipalities / Corporations may have drawn up Action Plans to improve the water quality through effluent treatment / sewage treatment and use of treated sewage water for irrigation. The Action Plans may be discussed together with the financial implication and status of implementation. The expected status of water quality Post Action plan may also be given.

Low flow from ecological considerations is usually unavailable in peninsular rivers. The present low flow (minimum flow in summer months) may be indicated at various parts in the system along with the required flow recommended by Pollution Control Board.

#### **8.18. Institutional Arrangements**

As per the MWRRA Act, the Irrigation Development Corporation set up for the basin is to function as the River Basin Agency (RBA). This Agency is not only required to prepare the basin plan but also coordinate with various departments to implement the plan and monitor the implementation. The organizational structure of the RBA may be given along with the organization available in the basin for other allied departments like ground water, water conservation, rural water supply, Water Boards (urban water supply), pollution control, agriculture (including extension) etc. Strengthening of these organizations, where required, to discharge their assigned functions may be recommended.

#### **8.19. Use of Modern Tools**

Modern tools like remote sensing and system analyzers make the planning exercise immensely purposeful. Remote sensing can be useful in land use, crop-wise area, assessment of irrigated area and siltation of reservoirs. System analyses give the operation policy for a system of reservoirs to optimize benefits. Such studies may have been carried out by institutions like CDO, IIT, Engineering Colleges, State RSC. These may be included, if available.

#### **8.20. Water Balance**

The chapter should give the water balance of the basin, preferably sub basin wise, after accounting for all types of uses, existing, ongoing and planned i.e. identified future projects. This will be guiding factor for clearance of further new projects in the basin not only with reference to water availability but also with reference to irrigation backlog.

#### **8.21. Financial Aspects**

This chapter will contain the total expenditure incurred so far in the basin, district wise, on major, medium, minor irrigation (completed and ongoing), funds required to complete new administratively approved

projects, the total potential achieved so far and likely to be achieved. Similar information is required for local sector water conservation schemes and water supply schemes.

The allocation for the Eleventh Plan and for 2007-08 may be given.

## **8.22. Action Plans**

The Action Plans will comprise

- **Development Plan** For new irrigation, water conservation, water supply schemes separately.
  
- **Flood Management Plan** For floods, proposed flood plain zoning with areas identified above 1 in 100 year flood line for future priority buildings like airport, railway station, defence installations etc. and that above 1 in 25 year flood line for public buildings, offices, residences. Rule curves for operation of major reservoirs to be developed in a fixed time frame which may be suggested in the plan.
  
- **Management Plan** For improvement in water use efficiency, fuller utilization of created potential and increasing productivity in existing projects, The Water Audit, Benchmarking and Irrigation Status Reports of the WRD need to be linked to this Plan in respect of projects in the basin figuring in these reports with the main findings and recommendations.
  
- **Water Quality Monitoring Plan** The Plan should cover the infrastructure requirements to monitor to the required levels the water quality and that required for improvement in quality to required standards viz. sewage treatment plants, effluent treatment plants.
  
- **Ground Water Plan** The Action Plan for ground water will not only focus on steps for development of the resource in potential areas but also on tackling quality problems in areas affected by fluoride, arsenic, salinity, iron and nitrate.



### **8.23. Stakeholder Consultation**

The draft basin plan including the proposed Action Plan will need consultation with stakeholders. This could be done at SE level through publicity of the plan in web sites, local news media and regional workshops / seminars. At this stage, the MWRRA may also be involved in vetting of draft and participation in the workshops. Based on the feed back, the plans need to be modified where considered appropriate and the Basin Plan with Action Plan finalized and submitted by RBA to WRD.

### **8.24. Approval of State Water Council :**

The WRD will thereafter process the Basin Plan for recommendation for approval of State Water Board (Annexure-I) and then to the State Water Council (Annexure-II) for approval. The approved Plan will be forwarded to the MWRRA for using the Plan as a reference for guidance in clearing new projects in the basin.

## **References**

1. Integrated River Basin Development - United Nations Report by a Panel of Experts (1958)
2. Guidelines for Preparation of Detailed Project Reports of Irrigation and Multi-purpose Projects - Central Water Commission (1980)
3. Guidelines for Preparation of River Basin Master Plan - Central Water Commission (1990)
4. Maharashtra State Water Policy (1993)
5. Report of the Maharashtra Water and Irrigation Commission (1999)
6. National Water Policy (Revised 2002)

## Annexure-I

### Constitution of the State Water Board

- |  |   |
|--|---|
| (a) the Chief Secretary of the State   | <i>ex officio</i> President;            |
| (b) the Principal Secretary, Planning Department                                   | <i>ex officio</i> Member;               |
| (c) the Principal Secretary, Finance Department                                    | <i>ex officio</i> Member;               |
| (d) the Secretary, Water Conservation Department                                   | <i>ex officio</i> Member;               |
| (e) the Secretary, Water Supply Department   | <i>ex officio</i> Member;               |
| (f) the Secretary, Urban Development Department                                    | <i>ex officio</i> Member;               |
| (g) the Secretary, Energy and Environment Department                               | <i>ex officio</i> Member;               |
| (h) the Secretary, Water Resources Department (Command Area Development Authority) | <i>ex officio</i> Member;               |
| (i) the Secretary Agriculture Department   | <i>ex officio</i> Member;               |
| (j) Divisional Commissioners of all Revenue Divisions in State                     | <i>ex officio</i> Member;               |
| (k) the Secretary, Water Resources Department                                      | <i>ex officio</i> Member;<br>Secretary. |

Note : It is proposed to include Secretary, Industries Department also in the Board.

## Annexure – II

### Constitution of the State Water Council

The Council shall consist of the following Members, namely:-

- |   |  |
|---|--|
| (a) the Chief Minister  | <i>ex officio</i> President;           |
| (b) the Deputy Chief Minister   | <i>ex officio</i><br>Vice President;   |
| (c) the Minister, Water Resources   | <i>ex officio</i><br>Vice President;   |
| (d) the Minister, Water Resources<br>(Krishna Valley and Kokan Irrigation<br>Development Corporation)       | <i>ex officio</i> Member;              |
| (e) the Minister, Agriculture   | <i>ex officio</i> Member;              |
| (f) the Minister, Water Conservation  | <i>ex officio</i> Member;              |
| (g) the Minister, Water Supply  | <i>ex officio</i> Member;              |
| (h) the Minister, Finance and Planning  | <i>ex officio</i> Member;              |
| (i) the Minister, Urban Development   | <i>ex officio</i> Member;              |
| (j) the Minister, Industries  | <i>ex officio</i> Member;              |
| (k) the Minister, Environment   | <i>ex officio</i> Member;              |
| (l) the Minister (Representative for<br>Marathwada region)  | <i>ex officio</i> Member;              |
| (m) the Minister (Representative for<br>Vidarbha region)  | <i>ex officio</i> Member;              |
| (n) the Minister (Representative for Rest of<br>Maharashtra)  | <i>ex officio</i> Member;              |
| (o) the State Minister, Water Resources<br>Department   | <i>ex officio</i> Member;              |
| (p) the State Minister, Water Resources<br>(Krishna Valley and Kokan Irrigation<br>Development Corporation) | <i>ex officio</i> Member;              |
| (q) the Secretary, Water Resources<br>Department  | <i>ex officio</i> Member;              |
| (r) the Secretary, (Command Area<br>Development Authority),<br>Water Resources Department.                  | <i>ex officio</i> Member;<br>Secretary |

## **FOREWORD**

The Maharashtra Water Resources Regulatory Authority was set up in 2005 under an Act. The functions of the Authority include review and clearance of water resources projects proposed in a basin to ensure that the proposal is in conformity with the integrated State Water Plan (ISWP). For preparation of the ISWP, the Act has provided for constitution of a State Water Board which is required to submit for approval the draft ISWP to the State Water Council under the Chief Minister. Individual basin plans will have to be first prepared by the concerned River Basin Agencies (RBA) for the Tapi, Godavari, Krishna and west flowing rivers for their subsequent integration into the ISWP.

Preparation of a basin plan is a challenging task given that the demands on water come from many competing users viz. irrigation, water conservation, drinking water, industrial use, hydro power, ecological requirements, pisciculture and recreation. To assist and guide the RBAs in this exercise, the Authority has brought out this technical manual. The manual not only covers the gamut of data requirements for a basin plan but also its suggested chapterisation and Action Plan. It is hoped that the manual will be found useful by RBAs in preparation of basin-wise State Water Plans on behalf of the State Water Board.

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Mumbai  
Date : 16<sup>th</sup> April 2007