

CHAPTER – I

INTRODUCTION

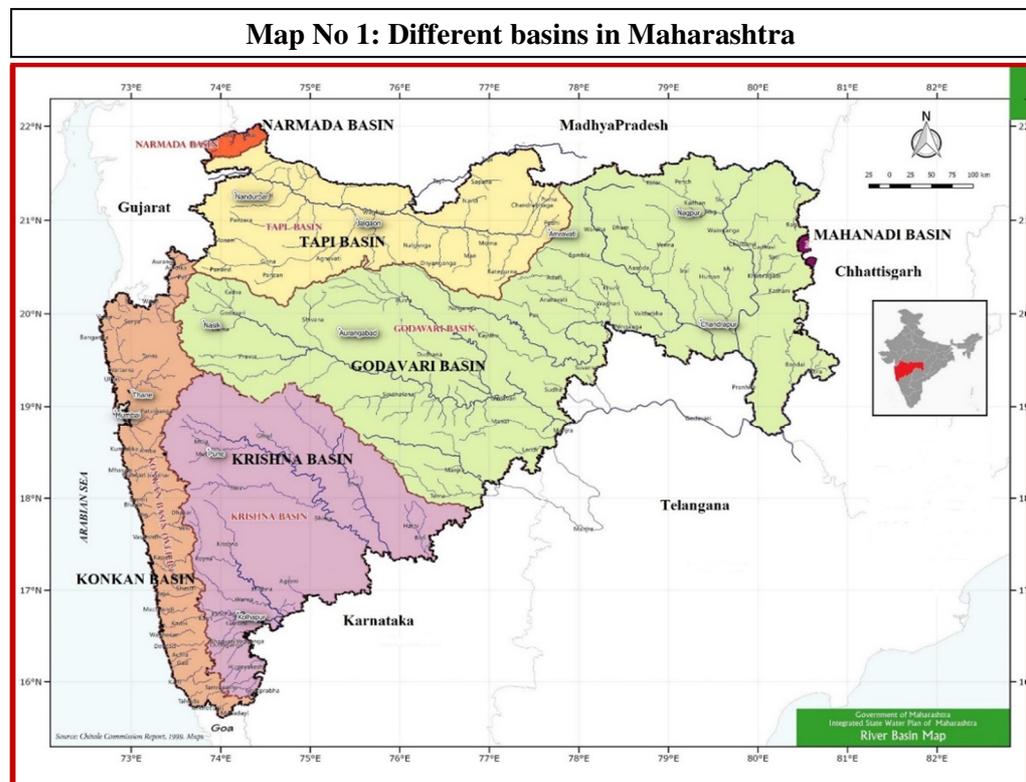
CHAPTER I

1. INTRODUCTION

Maharashtra is the second most populous state in India with a population of 112.4 million, as per Census 2011. By geographical area it is the third largest State with an area of 308 lakh hectare (*ha*). It is a highly urbanized State with 45.2 *per cent* of the population residing in urban areas.

The State enjoys tropical monsoon climate and is semi-arid with extreme spatial and temporal variation in the rainfall pattern. The average annual rainfall in the State ranges from 400 millimetre to 6000 millimetre. Almost, 42.5 *per cent* area of the State is drought prone. As per Economic Survey of Maharashtra¹ 2021-22, the gross cropped area in the State, for the year 2020-21, is 235.70 lakh *ha* and net sown area is 167.22 lakh *ha*. The principal crops grown in the State are rice, wheat, jowar, bajra, cereals and pulses, sugarcane, cotton and groundnut. The irrigation potential created as of June 2020 by major, medium and minor irrigation projects was 54.15 lakh *ha*.

The area of the State is covered under five major river basins namely Godavari, Krishna, Narmada, Tapi and other west flowing river basins. A small area of North-Eastern part of the State also comes under the Mahanadi basin.



Source: *Integrated State Water Plan for Maharashtra Vol III Maps, September 2018*

¹ Published by the Directorate of Economics and Statistic, Planning Department, GoM

The estimated average annual availability of water resources of the State is 198 billion cubic metre (BCM), which consists of 164 BCM of surface water and 34 BCM of groundwater. The storage capacity created through state water resources projects was 42.85 BCM as of June 2017. Except the West flowing rivers, Maharashtra shares the remaining four river basins with neighbouring states. Various inter-state river water disputes, tribunal awards/agreements and decisions on water sharing have limited the use of surface water resources of the State to 126 BCM, of which 69 BCM (55 *per cent*) contribution is of west flowing river basins. The cultivable area of this region is very limited (10.6 *per cent*), comprising a narrow strip of 50 km between Sahyadri ranges and the Arabian Sea. The entire water available in basins of west flowing rivers can neither be used locally nor can be transferred economically to other basins as the rest of the basins are separated by high altitude ridge (+610 m above sea level). On the other hand, the remaining four river basins having 89.4 *per cent* of the cultivable area have only 45 *per cent* of the water resources. Due to these constraints, about 42.50 *per cent* area of the State lies in deficit or highly deficit sub-basins.

The types of irrigation sources are surface water irrigation through canals, ground water irrigation through wells and the rain water irrigation. Surface irrigation involves distribution of water over the soil surface by gravity and is more reliable than the remaining two sources. Surface irrigation system draws water from rivers or tanks. The total gross area proposed to be irrigated in any irrigation project for different crops is the Irrigation Potential (IP) to be created for the project. The area proposed to be irrigated for more than one crop during the same year is counted as many times as the number of crops grown and irrigated. This becomes the IP created for the project.

The surface irrigation network broadly consists of:

- (i) Reservoirs including balancing reservoirs
- (ii) Main Canals
- (iii) Minors and sub-minors
- (iv) Distributary network

Irrigation projects are designated as major, medium and minor on the basis of command area they serve *i.e.* larger than 10,000 *ha*, between 2,000 to 10,000 *ha* and less than 2,000 *ha* respectively. Water Resources Department is entrusted with planning and development of irrigation facilities of major, medium and minor projects having Culturable Command Area² (CCA) of 250 *ha* and more. At the time of formation (1960) of Maharashtra State, IP was 3.86 lakh *ha*, which increased to 54.15 lakh *ha* by June 2020.

² It is the area which can be physically irrigated from a project and is fit for cultivation.

Table 1: Irrigation potential created by Major, Medium and Minor irrigation projects in the State as of June 2020

Sr. No.	Type of project	Number of projects	Irrigation Potential created (in lakh ha)
1.	Major and Medium	405	40.27
2.	Minor	3472	13.88
	Total	3877	54.15

Source: Economic Survey of Maharashtra 2020-21 and 2021-22, GoM

1.1 Organisational setup

The Water Resources Department (WRD) is headed by the Secretary and the implementation of various works in the WRD is carried out under the technical control of Chief Engineers (CEs). The CEs are assisted by the Superintending Engineers (SEs) of Command Area Development Authority (CADA) in-charge of the Irrigation Management Circles, who are responsible for supervising work execution. The Executive Engineers (EEs) under these SEs are in charge of the Divisions and are responsible for maintenance and repair works. Further, overall control of five Irrigation Development Corporation³ (IDC) rests with their respective Executive Directors.

1.2 Role of line departments

Apart from WRD, the line departments involved in the planning and execution of irrigation projects are Agriculture, Fisheries and Water Supply & Sanitation. WRD prepares the Detailed Project Report (DPR) of a project, for which inputs are derived from the line departments as detailed below;

Table 1.2: Line departments and their role

Sr. No.	Name of the line departments	Roles and responsibilities
1.	Agriculture Department	To propose cropping pattern for the project and estimation of income from crop yield.
2.	Fisheries Department	Estimation of revenue from fishing
3.	Water Supply & Sanitation Department	To submit the requirement of water for non-irrigation purpose (<i>i.e.</i> drinking and industrial use).

³ The five IDCs *viz.* Godavari Marathwada Irrigation Development Corporation (GMIDC), Konkan Irrigation Development Corporation (KIDC), Maharashtra Krishna Valley Development Corporation (MKVDC), Tapi Irrigation Development Corporation (TIDC) and Vidarbha Irrigation Development Corporation (VIDC). The projects selected for the performance audit were constructed and maintained by these IDCs.

The WRD calculates the Benefit Cost Ratio⁴ (BCR) of a project by considering all the inputs like cropping pattern, expected income of the crop yield and income expected from fishing. This is to be included in the DPR in terms of the guidelines for submission, appraisal and acceptance of Irrigation and Multipurpose Projects issued from time to time by the Central Water Commission (CWC) including provisions of the Maharashtra Minor Irrigation Manual of Works, 1983.

1.3 Main outcomes identified

The following broad outcomes were envisaged as per the DPRs and Administrative Approvals for the surface irrigation projects in the State:

- Irrigation in the seasons.
- Cultivation of crops.
- Increase in crop yield through creation of IP and change in cropping pattern.
- Achievement of the projected Benefit Cost Ratio (BCR) through agriculture produce, drinking water and pisciculture.

Details of these six projects are given in *Appendix I* and brief details are shown in **Table 1.3**.

Table 1.3: Brief details of the projects

Sr. No.	Name of the project	Month and year of administrative approval	Estimated project cost (₹ in crore)	Irrigable command area(in ha)	Crop intensity (in per cent)
1	Andhali	April 1977	1.15	1498	155
2	Pimpalgaon (Dhale)	June 1994	10.01	2400	141
3	Purna	July 1994	36.45	6275	160
4	Haranghat	February 1996	12.19	3651	160
5	Sondyatola	May 1995	13.33	9025	130
6	Wagholibuti	November 1993	9.50	3441	160

Source: Information furnished by respective divisions

1.4 Audit Objectives

The audit objectives were to assess whether:

- Project deliverables were planned, executed and managed in accordance with the intended outcomes.
- Co-ordination with all stakeholders was ensured at all stages of the project for sustainable extension of benefits to the targeted beneficiaries.

⁴ It is the ratio of annual benefits (includes net value of farm produce, income from drinking and industrial water supply and income from fisheries) to annual cost (includes interest on capital, annual energy cost, depreciation of the project, annual operation and maintenance charges, depreciation of pumping system) of the project.

1.5 Audit Criteria

The criteria used for the Performance Audit (PA) were:

- Manual of Minor Irrigation Works in Maharashtra State, 1983,
- Maharashtra Public Works Manual,
- Maharashtra Management of Irrigation Systems by Farmers Act, (2005),
- Government Resolutions, Circulars, Instructions/Orders issued by the GoM and Irrigation Development Corporations,
- Guidelines issued by CWC and DPR of selected projects.

1.6 Audit coverage and methodology

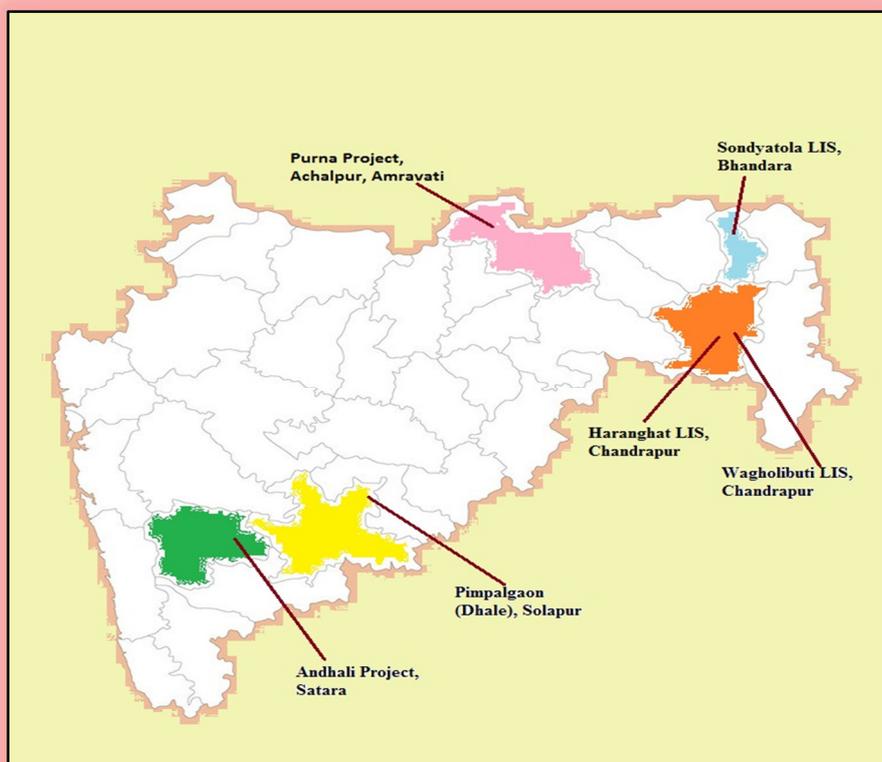
The PA was conducted between November 2019 and March 2020 covering the offices of the Executive Engineers (EEs) of Construction/Management Divisions of WRD and line departments *viz.* Agriculture, Fisheries and Water Supply and Sanitation. Audit also carried out joint physical verification of the projects along with the officials of the Divisions to ascertain the physical status of the irrigation infrastructure created. A beneficiary survey of 158 farmers⁵ of 35 villages willing to furnish information in a written format in selected villages (minimum 20 *per cent* of total villages) coming under the command area of the project was also conducted along with the officials of Agriculture Department. The audit period covered in PA is from 2014-15 to 2018-19.

The outcomes from an irrigation project can be evaluated only on completion of the project and its stabilization (over a period of at least two years). Hence, the projects selected in the audit sample are those, which were completed⁶ between January 2011 and March 2017. Audit analysed all the six medium irrigation projects (Lift Irrigation Schemes - Haranghat, Sondyatola and Wagholibuti, Andhali, Pimpalgaon (Dhale) and Purna), which were completed during the said period as per data furnished by the WRD.

⁵ Number of farmers surveyed project wise- Andhali-16, Haranghat-29, Pimpalgaon (Dhale)-22, Purna-39, Sondyatola-24 and Wagholibuti-28.

⁶ Projects handed over to the Management Division by the Construction Division.

Map No. 1.6 : Indicative map showing six selected medium irrigation projects in Maharashtra



The methodology, scope, objectives and criteria of audit were discussed in the Entry conference held with the Secretary, WRD in September 2019. Exit conference was held with the Secretary, WRD in November 2021 wherein audit findings were discussed. The reply furnished (November 2021) by the GoM has been suitably incorporated in the report.

1.7 Previous audit findings

Report of the Comptroller and Auditor General of India (C&AG) for the year 2013-14 included a Performance Audit on Management of Irrigation Projects. The key issues highlighted in this PA were;

- the fragmented and isolated approach to surface and ground water development,
- non-prioritizing the irrigation projects leading to thin spreading of financial resources among many projects,
- taking up projects without proper surveys, environment and forest clearances, acquisition of requisite land *etc.* resulting in time and cost overruns and delay in creation of the envisaged IP and its poor utilization,

- taking up Lift Irrigation Scheme (LIS) projects despite GoM instructions discouraging them, and
- weak monitoring and internal controls.

The PAC discussed the PA and issued (July 2019) 122 recommendations on which action taken report is awaited. However, as detailed in the succeeding paragraphs many of the deficiencies pointed out in the Report of the Comptroller and Auditor General of India (C&AG) for the year 2013-14 still persist.

1.8 Audit Constraints

During the conduct of the PA, the following information/records were not provided to audit.

- (i) DPR in respect of Andhali and Pimpalgaon (Dhale) projects and
- (ii) Data of project specific crop yield.

Project-wise data required to assess outcome of projects, was not maintained by the Department. In the absence of data and desired records with Departments, audit conclusions were drawn on the basis of information made available by the departments.

