

CHAPTER-I

Introduction

The present chapter deals with the means and coverage of irrigation facilities in Uttar Pradesh and outcome indicators to assess the performance of irrigation projects. Audit objectives, criteria, scope and methodology of audit have also been discussed in this chapter.

Brief snapshot of the Chapter

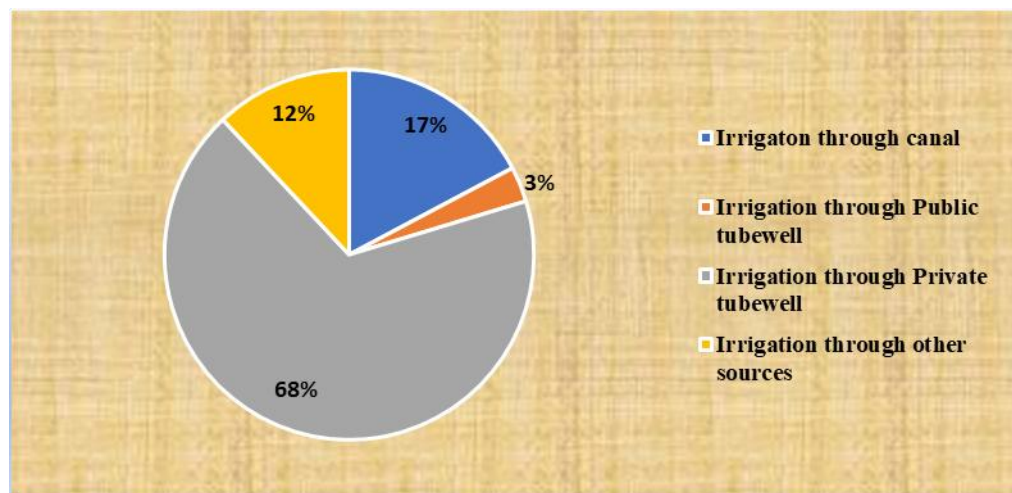
- Out of total 240.93 lakh hectare area of the State, 187.75 lakh hectare (78 per cent) is agricultural land, of which 143.89 lakh hectare (77 per cent) is the irrigated area;
- In Uttar Pradesh, canal irrigation is provided in 24.82 lakh hectare (17 per cent of irrigated area) through 75,466 km canal network.

1.1 Introduction

Uttar Pradesh is the most populous Indian State and the third largest State economy of the country. The economy of Uttar Pradesh is based mainly on agriculture and about 65 per cent of the total population is dependent on agriculture. Sustainable development of agriculture is, therefore, of the utmost importance for the overall development of society. Assured irrigation together with coordinated interventions including timely and sufficient availability of agricultural inputs help in achieving accelerated agricultural growth.

In addition to rain water, water for irrigation is obtained from both surface and underground water resources. Out of total 240.93 lakh hectare area of the State, 187.75 lakh hectare (78 per cent) is agricultural land, of which 143.89 lakh hectare (77 per cent) is the net irrigated area. The share of various irrigation sources in the net irrigated area of the State is depicted in **Chart 1.1**.

Chart 1.1: Sources of irrigation in the State

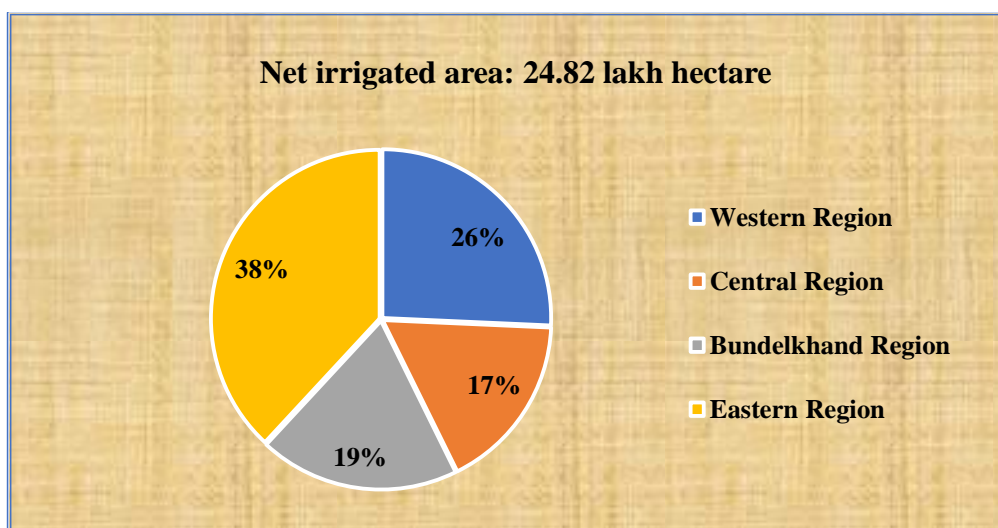


(Source: Statistical Data 2018, Planning Department, Government of Uttar Pradesh)

In Uttar Pradesh, canal irrigation is provided through 75,466 km canal network. Distribution of irrigated area through canals in four economic

regions of the State is depicted in *Chart 1.2* and region-wise details of districts is given in *Appendix 1.1*.

Chart 1.2: Regional distribution of irrigated area through Canals



(Source: Statistical Data-2018, Planning Department, Government of Uttar Pradesh)

1.2 Organisational Set up

Irrigation and Water Resources Department is responsible for construction, operation and maintenance of the canal network in the State. The Department is headed by Additional Chief Secretary and the implementation of various works is carried out under the technical control of Engineer-in-Chief at the State level, Chief Engineer at Zone level, Superintending Engineer at Circle level and Executive Engineers at Division level.

Apart from Irrigation and Water Resources Department, other line Departments involved in the planning and operation of the irrigation projects are detailed in **Table 1.1**.

Table 1.1: Line Department and their roles

Line Department	Roles and Responsibilities
Agriculture Department	Agriculture planning regarding cropping pattern for the project, crop water requirement and targets of production and productivity
Ground Water Department & Minor Irrigation Department	Status of ground water availability for agriculture and its conjunctive use with the canal irrigation project
Horticulture Department	Cropping pattern of horticulture produce
Revenue Department	Estimation of production through crop cutting

1.3 Audit objectives

Performance Audit of Outcomes in Surface Irrigation of Bansagar Canal Project and Modernisation of Chaudhary Charan Singh Lahchura Dam Project was carried out to ascertain whether:

- Irrigation projects were planned in accordance with the intended objectives;

- The projects works were executed in an economic, efficient and effective manner and;
- The benefits contemplated in the projects were achieved and the same were delivered to the beneficiaries efficiently and effectively.

1.4 Audit criteria

The audit criteria have been drawn from the following:

- Guidelines issued by Central Water Commission (CWC) for preparation of Detailed Project Reports (DPRs), 2010;
- Government of India guidelines for Command Area Development and Water Management, 2015;
- Guidelines issued by CWC in respect of conjunctive use of ground water;
- Indicators for irrigation performance assessment suggested by CWC;
- DPRs of the selected irrigation projects;
- Uttar Pradesh Irrigation Manual; and
- Financial rules, State Government instructions relating to contract management for execution of works, procurements, rehabilitation, *etc.*

1.5 Scope of Audit and methodology

Audit intended to assess the effectiveness of the canal irrigation projects. The State Government, however, did not provide complete information of the irrigation projects under which these canals were constructed/operated¹. However, the Department provided (August 2019) details of 19 irrigation projects completed/partially completed during April 2011 to March 2017. These 19 irrigation projects included 12 major irrigation projects as detailed in Table 1.2.

Table 1.2: Details of major irrigation completed/partially completed during April 2011-12 to 2016-17

Sl. No.	Name of Project	Year of Approval	Status	Cost of the project (₹ in crore)	Expected Benefit (Th. Hac.)
1.	Rajghat Canal Project	April 1981	Commissioned in March 2012	542.00	138.60
2.	Modernisation of Chaudhary Charan Singh Lahchura Dam Project.	April 2003	Commissioned in March 2015	328.30	14.58
3.	Bansagar Canal Project (Uttar Pradesh)	February 1994	Commissioned in July 2018	3420.24	150.13
4.	Saryu Canal Project	July 1978	Ongoing ²	10003.12	1404.00
5.	Arjun Sahayak Project	March 2010	Ongoing ³	2655.29	44.38

¹ As per data of Central Water Commission (CWC) there are 118 major and medium (including Extension, Renovation and Modernisation) irrigation projects in Uttar Pradesh as of 2020.

² The project was subsequently commissioned in December 2021.

³ The project was subsequently commissioned in November 2021.

Sl. No.	Name of Project	Year of Approval	Status	Cost of the project (₹ in crore)	Expected Benefit (Th. Hac.)
6.	Madhya Ganga Canal Project (Phase II)	June 2007	Ongoing	4234.11	146.00
7.	Badayun Irrigation Scheme	October 2011	Ongoing	2100.16	37.45
8.	Bhaurat Dam Project	November 2007	Ongoing	612.77	16.00
9.	Kanhar Irrigation Scheme	January 1979	Ongoing	2239.55	35.00
10.	Kachnauda Dam Project for Balance Work	January 2007	Ongoing	594.46	10.85
11.	Umarhut Canal Second Stage	January 2011	Ongoing ⁴	149.60	25.66
12.	Project for construction of Rampur Barrage on River Kosi and Modernisation of Kosi Canal System in District Rampur	November 2014	Ongoing	629.80	24.25

In order to select a sample of projects, audit focused on two criteria, viz., the projects which were completed/partially completed during the period January 2011 to March 2017 and were providing benefits for at least last two years as well. Accordingly, two major irrigation projects, viz., Bansagar Canal Project, Uttar Pradesh (BCP) and Modernisation of Chaudhary Charan Singh Lahchura Dam project (Lahchura Dam Project) were selected out of 12 major irrigation project as detailed in **Table 1.2** for detailed review. Lahchura Dam, constructed to feed water to the Dhasan Canal System (DCS), receives water from the nearby Pahari Dam and Saprar Dam. Therefore, records in respect of Pahari Dam, Saprar Dam and DCS were also examined.

Records for the period April 2014 to March 2021 with backward/forward linkages were examined in the Department as well as field offices of the selected irrigation projects. Records were also examined and information collected from the concerned line departments, viz., Agriculture, Ground water, Horticulture, Minor Irrigation and Revenue. Department and field offices covered in the Audit are detailed in **Appendix-1.2**.

Besides, 29 canals (covering 119 villages) in both the selected Irrigation projects were selected using Simple Random Sampling without Replacement (SRSWOR) for detailed analysis of the outcomes. Evidence in respect of delivery of services were also collected through joint visits with departmental officers in the selected villages.

Audit objectives and criteria were discussed with the State Government in the Entry Conference held on 13 January 2020. The draft report was issued to the State Government in January 2022. Audit findings were also discussed in the Exit conference (30 July 2022) with the State Government. The replies of the

⁴ The project was subsequently commissioned in September 2021.

State Government on the draft report was received in July 2022 and September 2022, which have been suitably incorporated in the report.

1.6 Brief description of the selected irrigation projects

1.6.1 Bansagar Canal Project (Uttar Pradesh)

Bansagar Project is a joint venture of the three States, *viz.*, Bihar, Madhya Pradesh and Uttar Pradesh under which Bansagar Dam was constructed at River Sone in Madhya Pradesh. As per the agreement executed (September 1973) between the three States, Uttar Pradesh is entitled to utilise 1.0 MAF⁵ water from Bansagar reservoir and the cost of Bansagar Dam was to be shared in the proportion of water at the site to be utilised by Madhya Pradesh, Uttar Pradesh and Bihar, *i.e.*, 2:1:1, *i.e.*, 50 per cent, 25 per cent and 25 per cent respectively.

Bansagar Canal Project, Uttar Pradesh (BCP) envisaged construction of canal systems in Uttar Pradesh to utilise 0.78 MAF⁶ of Sone water from Bansagar dam⁷ with the objective to increase irrigation intensity of existing nine canal systems⁸ from 85 per cent to 150 per cent in the Culturable Command Area⁹ (CCA) of 2.32 lakh hectare (ha) in Prayagraj and Mirzapur districts after commissioning of BCP. The additional irrigation intensity of 1.50 lakh ha was to be augmented by providing additional water to these existing nine canal systems.

As a part of the project, the water share of Uttar Pradesh was to be brought through a common water carrier and common water feeder followed by a dedicated feeder canal up to Adwa Barrage, constructed in Mirzapur district. From Adwa barrage, water was to be provided to Adwa Dam and Meja Dam. From Adwa Dam, water availability was to be augmented in Adwa Sukhara canal system. Similarly from Meja Dam, additional water was to be provided to the five existing canal systems¹⁰ of Mirzapur district and three existing canal systems¹¹ of Prayagraj district.

Bansagar Dam, common water carrier, common water feeder and Bansagar feeder canal are situated in territory of Madhya Pradesh whereas the rest structures are situated in the territory of Uttar Pradesh. Government of Madhya Pradesh executed construction work of Bansagar Dam, common water carrier and common water feeder and the cost of these constructions was shared¹² by Government of Uttar Pradesh (₹ 517.56 crore).

⁵ Million Acre Feet.

⁶ Equivalent to 34,008 million cubic feet (mcft)

⁷ Out of allocated share (1.0 MAF) of Uttar Pradesh from Bansagar Dam, 0.22 MAF water was being utilised through Sone Pump Canal.

⁸ Belan canal (from Belan river), Tons pump canal (Tons river), Yamuna pump canal (Yamuna river), Adwa Sukhara canal (Sukhara reservoir), Baraundha Distributary canal (Sirsi reservoir), Harrai canal (Harrai wier), Lower Khajuri canal (Khajuri river), Garai canal (Dongia and Ahiraura dams) and Jirgo canal (Jirgo dam).

⁹ It is the area which can be physically irrigated from a scheme and is fit for cultivation.

¹⁰ Baraundha distributary canal, Harrai canal system, Lower Khajuri canal system, Garai canal system and Jirgo canal system.

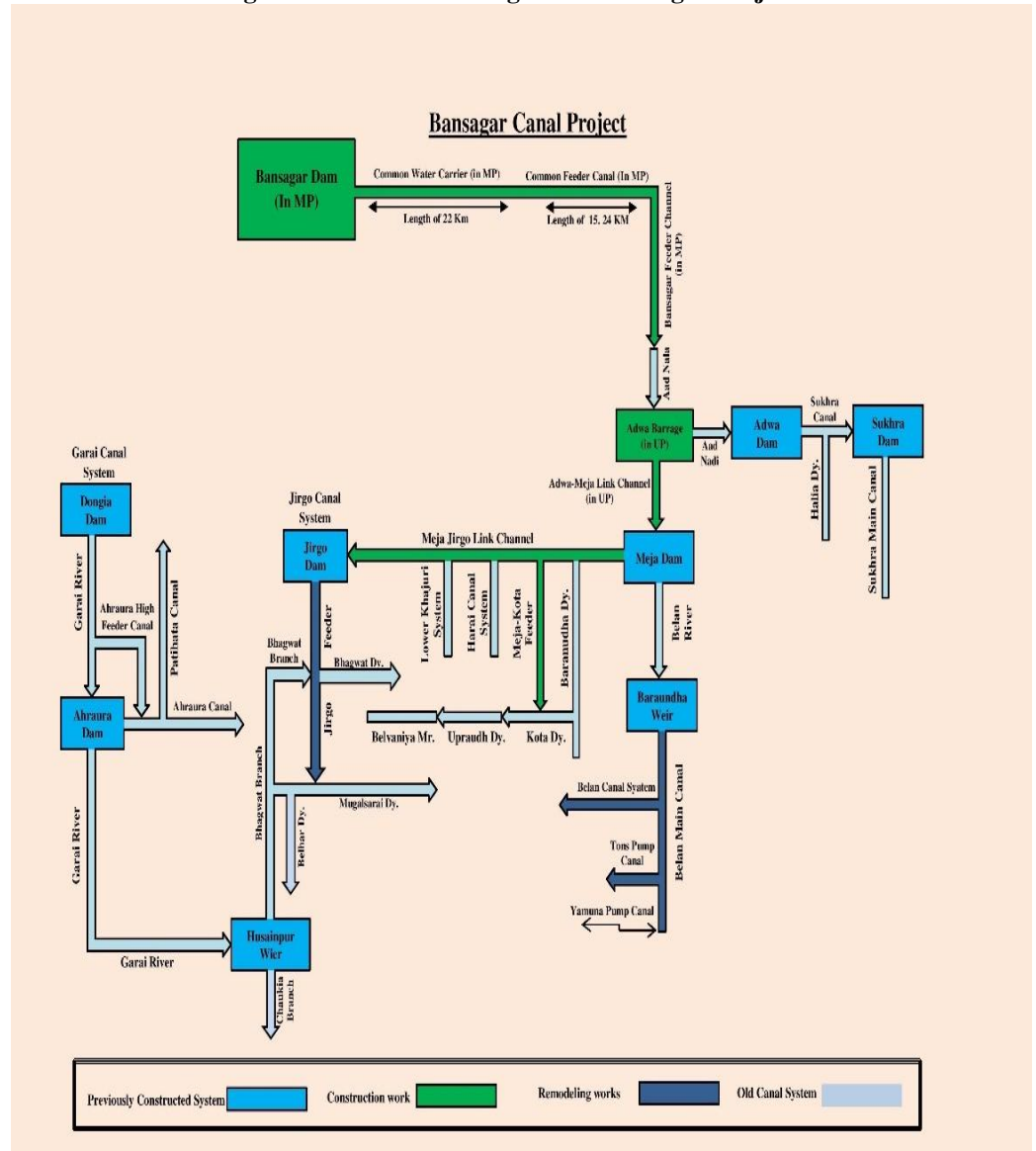
¹¹ Belan canal system, Tons pump canal system and Yamuna Pump canal system.

¹² Bansagar dam: 1/4 of cost of dam; Common water carrier: 1/3 of the cost of common water carrier; and Common feeder canal: 2/3 of cost of common water feeder.

Government of Uttar Pradesh executed construction work of Bansagar Feeder Canal, Adwa Barrage, Adwa Meja Link channel and Meja Jirgo link channel and remodeling of existing canals under (BCP). Construction of BCP was taken up in 1997 and finally commissioned in July 2018 with time overrun of 14 years after incurring expenditure of ₹ 3,419.37 crore (including ₹ 517.56 crore paid to Government of Madhya Pradesh).

A schematic diagram of Bansagar Project is given in **Figure 1.1** below:

Figure 1.1: Schematic diagram of Bansagar Project



(Source: CE, BCP)

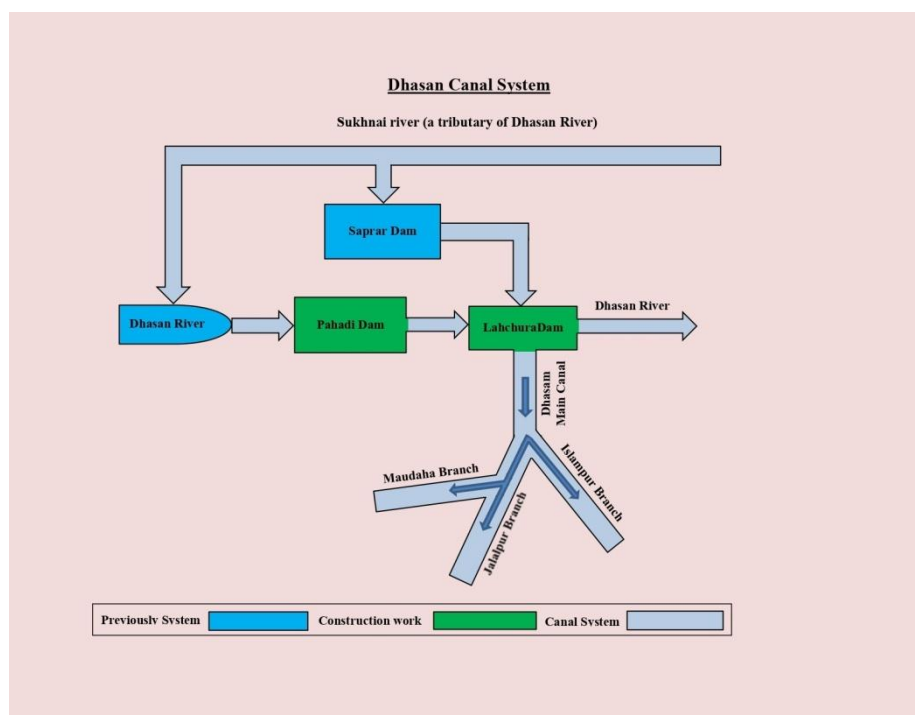
1.6.2 Lahchura Dam Project

Dhasan Canal System (DCS), constructed way back during 1906-10 covered a CCA of 97,169 hectare area in Mahoba and Hamirpur districts. DCS offtakes from Lahchura Dam constructed across Dhasan river¹³. Lahchura Dam apart

¹³ Originated from Madhya Pradesh.

from its own storage, receives water from two other Dams, viz., Pahari Dam and Saprar Dam. Pahari Dam is situated at river Dhasan, six miles upstream of the Lahchura Dam whereas Saprar Dam is situated across river *Sukhnai*, a tributary of Dhasan river. A schematic diagram is given below:

Figure 1.2: Schematic diagram of Dhasan Canal System



(Source: CE, Betwa Pariyojana)

The structures of both Lahchura and Pahari Dams had become old and outdated due to which the existing falling shutters arrangement for controlling the flow of water¹⁴ was creating operational problem during monsoon season¹⁵. Therefore, to ensure optimum utilisation and assured supplies to DCS, the State Government approved (1979) a project of Modernisation of Chaudhary Charan Singh Lahchura Dam at an estimated cost of ₹ 7.04 crore. The modernisation work was completed in March 2015 at an expenditure of ₹ 328.30 crore. A project of Modernisation of Pahari Dam (Pahari Dam Project), which was constructed in the up-stream of Lahchura Dam was also approved separately by the State Government in January 2009 to replace the old structures. The project of Pahari Dam was completed in March 2018 at an expenditure of ₹ 354.20 crore. In both the projects, storage capacity of the Dams was not enhanced and only old structures of the Dams were replaced.

1.7 Outcomes indicators

Chief Engineer (BCP) informed (September 2022) that benefits of the irrigation projects are evaluated on the basis of data of irrigated area and cropping pattern. In the Performance Audit of Outcomes in Surface Irrigation of Bansagar Canal Project and Modernisation of Chaudhary Charan Singh

¹⁴ Water was to be released from Pahari dam to Lahchura dam. Besides, water stored at Lahchura dam was to be released to DCS.

¹⁵ The water in dams were stored mainly during monsoon season.

Lahchura Dam Project, the following broad outcomes were assessed vis-à-vis deliverable envisaged in DPRs of the sampled irrigation projects:

Outcomes indicators assessed in Audit	Related deliverable envisaged in the DPR of the sampled projects
Assured and adequate availability of water till the tail-end	<ul style="list-style-type: none"> ● BCP envisaged augmentation of 22,495 million cubic feet (mcft) additional water in the existing nine canal systems which would create additional irrigation intensity in 1.50 lakh ha area comprising 0.89 lakh ha in Rabi and 0.61 lakh ha in kharif. ● Lachchura Dam project envisaged optimum utilisation and assured supply of water to DCS so as to create additional irrigation intensity in 14,575 hectare area in kharif.
Change in cropping pattern	<ul style="list-style-type: none"> ● In BCP, crop area was to be enhanced to 83 <i>per cent</i> in Rabi and 67 <i>per cent</i> in Kharif against the existing crop area of 44 <i>per cent</i> and 41 <i>per cent</i> respectively. Besides, an additional cropping of vegetable in 17,150 hectare area along with change in cultivation area of oilseed and peas after completion of BCP. ● Lachchura Dam project envisaged cultivation of paddy in 0.15 lakh hectare which was not sown earlier.
Increase in crop yield as a result of irrigation project	<ul style="list-style-type: none"> ● Improvement in productivity and additional production of grain in different crops of Rabi and Kharif were also targeted after commissioning of these irrigation projects

In audit, we have examined the records to assess the extent upto which above mentioned deliverables were achieved after commissioning of the projects. However, since all the above indicators/deliverables other than the first one depend upon multiple factors such as seeds, inputs, soil health and credit, Audit had focused more on assured supply of adequate water in canals while taking into consideration the other factors in order to draw conclusions, as detailed in **Chapter-IV**.

1.8 Structure of Report

This report has been structured in following four Chapters:

Chapter-I: Introduction: Brief of the projects, audit scope and approach and outcome indicators.

Chapter-II: Project Planning deals with assessment of need and shortcomings in detailed project reports.

Chapter-III: Project Implementation deals with availability of funds and contract management.

Chapter-IV: Project Outcomes deals with completion and commissioning of the selected projects and outcomes achieved against the benefits contemplated in the Detailed Project Reports of these projects.

1.9 Acknowledgement

We acknowledge the co-operation extended by Irrigation and Water Resources Department and its field offices, Agriculture Department and Revenue Department in conducting the Performance Audit of Outcomes in Surface Irrigation of Bansagar Canal Project and Modernisation of Chaudhary Charan Singh Lahchura Dam Project.