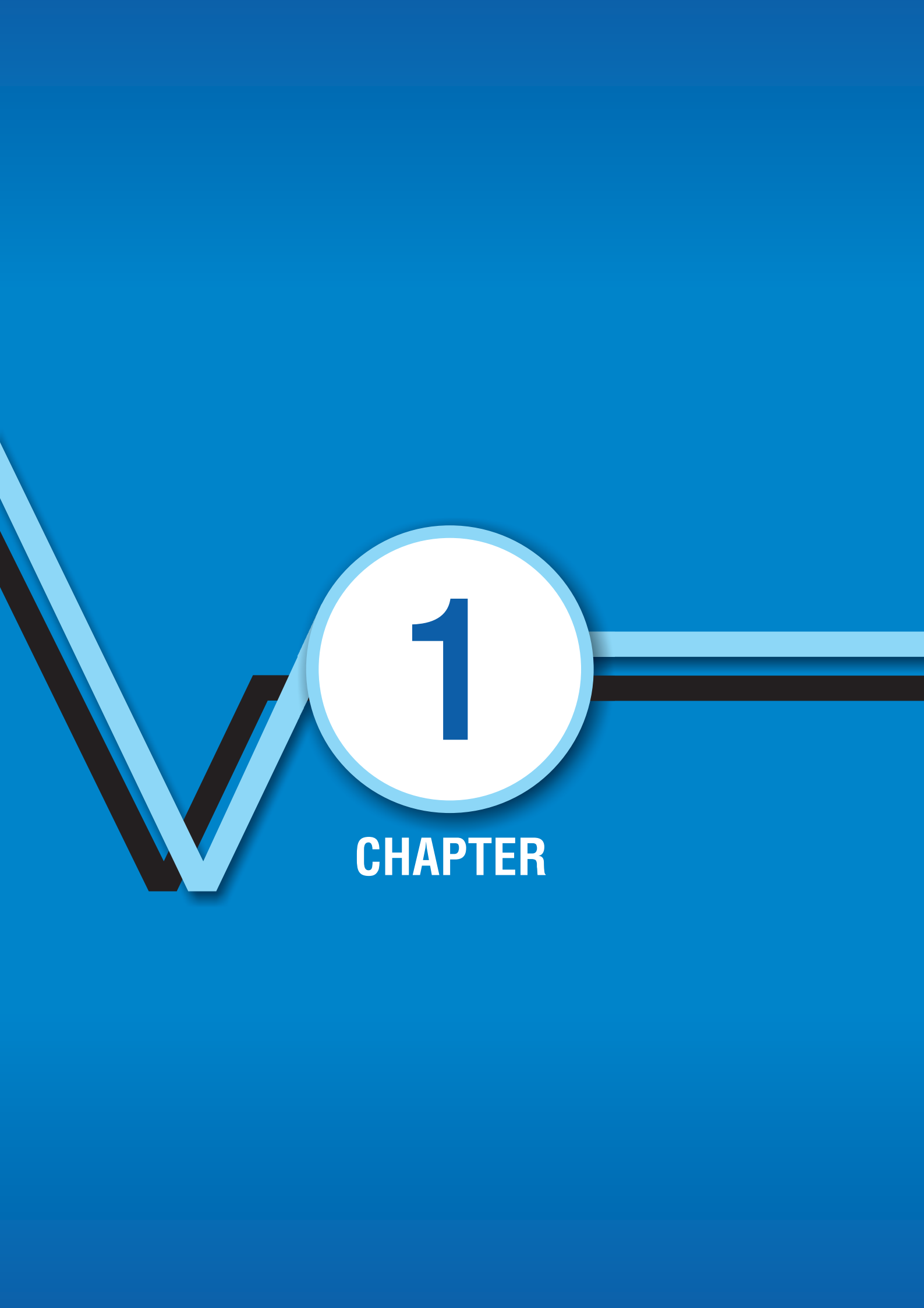
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CHAPTER

Chapter 1 Introduction

1.1 Background

Flood is one of the natural calamities that India faces almost every year in varying degree of magnitude. The frequent occurrence of flood can be attributed to various factors, including wide variation in rainfall over time and space and inadequate carrying capacity of rivers. The problems get accentuated due to silting, erosion of river banks, landslides, poor natural drainage, glacial lake outburst[1], etc. Indiscriminate development and encroachment of flood plain areas, improper planning and construction of roads, railway lines, etc. are also responsible for increase in flood damages.

As per Working Group on Flood Control Management Programme for the XI Five Year Plan (2007-2012), the total flood prone area in the country was 45.64 million hectare (m ha), which is about 14 *per cent* of the total area of the country. On an average, an area of 7.55 m ha (16 *per cent* of the total flood prone area) is affected by floods every year and the average annual damage due to floods is ₹ 1,805 crore[2].

During the last five decades of the Plan period, different methods of flood protection/mitigation have been adopted by different States depending upon the nature of problem and local conditions. Reservoirs, embankments, channelisation of rivers, drainage improvement, channel improvement, watershed management and diversion of flood waters are some of the structural measures for flood mitigation. In addition to structural measures, other non-structural measures like flood forecasting, flood warning in case of threatened inundation, Flood-plain zoning[3], disaster preparedness and response are also practiced.

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1 Glacial lakes are formed when glacial ice impounds water. Failure of these ice dams lead to sudden release of large quantities of water, known as Glacial Lake Outburst Flood.

2 Based on data compiled in 1980, which continues to be the base line even as on date.

3 Flood-plain zoning measures aim at demarcating zones or areas likely to be affected by floods of different magnitudes or frequencies and probability levels, and specify the types of permissible developments in these zones, so that whenever floods actually occur, the damage can be minimised, if not avoided.

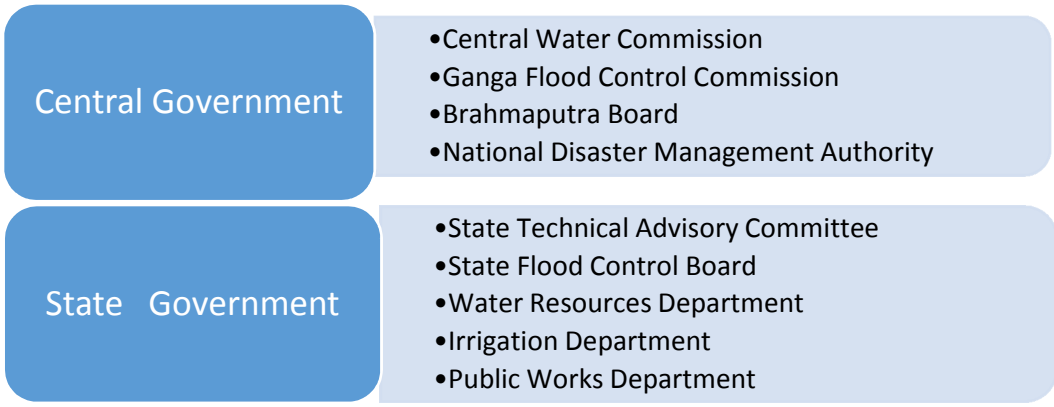
1.2 Institutional frame work for Flood Management

The subject of flood control is not included in any of the three legislative lists under the Constitution of India. However, Drainage and Embankments are two of the measures specifically mentioned in the State List. As such, Flood control and management schemes are planned, investigated and implemented by the State Governments with their own resources, according to the priority within the States.

The Union Government renders assistance to States, which is technical, advisory, catalytic and promotional in nature. The Ministry of Water Resources, River Development and Ganga Rejuvenation (MoWR, RD&GR) is responsible for laying down policy guidelines and programmes for the development and regulation of the country's water resources. The Ministry provides technical guidance and conducts scrutiny, clearance and monitoring of the irrigation, flood control and multi-purpose projects (major/medium). The Ministry is also responsible for operation of the central network for flood forecasting and warning on inter-state rivers, the provision of central assistance for some State Schemes in special cases and preparation of flood control master plans for the Ganga and the Brahmaputra.

There is a two tier institutional framework for flood management as illustrated in Chart 1.1.

Chart 1.1: Two tier institutional framework for flood management



The role, function and jurisdiction of institutions are described in subsequent paragraphs.

1.2.1 Central Government

The Union Government has the following organisations to enable the State Governments in addressing flood problems in a comprehensive manner:

1.2.1.1 Central Water Commission

Central Water Commission (CWC), an attached office under MoWR, RD&GR, is the apex organization for achieving the goal of furthering and promoting measures of flood control, conservation and utilization of water resources throughout the country in the areas of beneficial uses, irrigation and hydropower generation, flood management and river conservation.

The CWC plays a direct role in real time collection of flood data, flood forecasting and dissemination of flood forecasts to the local administration for planning suitable administrative measures including evacuation of people from flood affected areas to safer locations.

1.2.1.2 Ganga Flood Control Commission

The Ganga Flood Control Commission (GFCC) was set up by the Government of India (GoI) in 1972 for preparation of comprehensive plan for flood management of the river systems in the Ganga basin including implementation, monitoring and performance evaluation of various flood management schemes and technical guidance to the basin States such as Bihar, Chhattisgarh, Delhi, Haryana, Himachal Pradesh, Jharkhand, Madhya Pradesh, Rajasthan, Uttar Pradesh, Uttarakhand and West Bengal.

1.2.1.3 Brahmaputra Board

The Brahmaputra Board (BB) is a statutory body constituted in 1980 by an Act of Parliament with the objective of planning and integrated implementation measures for control of flood and bank erosion in Brahmaputra. The jurisdiction of the Board includes the States of Arunachal Pradesh, Assam, Meghalaya, Manipur, Mizoram, Nagaland, Sikkim, Tripura and part of West Bengal falling within the Brahmaputra Basin.

1.2.1.4 National Disaster Management Authority

Government of India (GoI) set up National Disaster Management Authority (NDMA) in 2005 to implement a holistic and integrated approach to Disaster Management in India. NDMA is mandated to lay down the policies, plans and guidelines for Disaster Management to ensure timely and effective response to disasters.

1.2.2 State Government

The State Level Mechanism includes the Water Resources Departments, State Technical Advisory Committees (STAC) and Flood Control Boards, Irrigation Departments and Public Works Departments. The States are required to investigate, plan, construct, maintain and operate all flood works.

1.3 Flood Control and Management Schemes

During XI (2007-2012) and XII (2012-2017) Five Year Plans (FYPs), GoI implemented two major schemes viz. Flood Management Programme and Flood Forecasting Scheme towards Flood Control and Management.

1.3.1 Flood Management Programme

Due to unprecedented floods of 2004 in Assam, Bihar and West Bengal that resulted in heavy loss of life and property, a Task Force on Flood Management was constituted by MoWR, RD&GR. Based on the recommendations of the Task Force (December 2004), Flood Management Programme (FMP) was prepared.

The scheme was sanctioned by the Cabinet in November 2007 with Central Assistance of ₹ 8,000 crore in XI FYP (2007-2012). Further, a central assistance of ₹ 10,000 crore was approved in October 2013 for XII FYP (2012-2017) for undertaking works related to (i) river management, (ii) flood control, (iii) anti – erosion, (iv) drainage development, etc. The guidelines for the scheme were formulated in December 2007 and revised subsequently in August 2009 for XI plan and in October 2013 for XII plan. During the XI and XII plans ₹ 4,723.08 crore was released by MoWR, RD&GR upto March 2016.

1.3.2 Flood Forecasting

Flood Forecasting is a non-structural measure and has been recognised as an effective tool for flood management by providing advance warning to the flood prone areas. The formulation of a forecast requires effective means of real time data communication network between the forecasting station and the base station.

As of June 2008, CWC was operating 878 Hydrological and Hydro-meteorological sites across the country covering 20 river basins for gauge, discharge, sediment and water quality observations. Besides, CWC also operated 175 Flood Forecasting Stations in the country. An outlay of ₹ 130 crore in respect of Flood Forecasting Scheme for XI FYP was approved, of which expenditure of ₹ 103 crore was incurred upto March 2012. The outlay for XII Plan was ₹ 281 crore, of which expenditure of ₹ 114.09 crore was incurred up to March 2016.

1.4 Other schemes for flood control

GoI implemented other smaller schemes towards flood control viz. Dam Safety Studies and Planning; and River Management Activities and Works related to Border Areas (RMABA).

1.4.1 Dam Safety

A Central sector scheme namely 'Dam Safety Studies and Planning' was introduced during XI Plan with total provision of ₹ 10 crore, which was

subsequently revised to ₹ six crore. Expenditure of ₹ 4.22 crore was incurred during the XI Plan. The scheme on Dam Safety Studies and Planning was subsumed in the Dam Rehabilitation and Improvement Project (DRIP)[4] during XII Plan.

As per Crisis Management Plan (CMP) for Dam failures (March 2011), MoWR, RD&GR through National Committee on Dam Safety (NCDS) impressed upon each State to come out with Emergency Action Plan (EAP) for each of its large dams. Accordingly, CWC prepared the guidelines for "Development and Implementation of EAP for Dams" in May 2006 and circulated it to all the States for its implementation.

1.4.2 River Management Activities and works related to Border Areas

River Management Activities and works related to Border Areas (RMABA) is an on-going central sector scheme of MoWR, RD&GR during XII FYP which was restructured in XI FYP on the advice of the erstwhile Planning Commission by integrating smaller schemes operated by the Ministry of Water Resources during X FYP with some new works related to border areas with the neighbouring countries, namely, Nepal, Bhutan, Bangladesh, China and Pakistan. During XII Plan, the component of grant-in-aid to Union Territories (UTs) funded under FMP during XI FYP was also brought into the present scheme.

The scheme was approved for ₹ 820 crore during XI FYP and ₹ 740 crore during XII FYP. The expenditure was ₹ 721.14 crore and ₹ 339.89 crore during XI and XII FYP (up to March 2016) respectively.

Besides the above schemes, State Governments implemented their own programmes/schemes for Flood control and Management which were funded by them.

1.5 Why we chose the topic

India is highly vulnerable to floods. Out of the total geographical area of 329 m ha, more than 40 m ha is flood prone. Floods are a recurrent phenomenon, which cause huge loss of lives and damage to livelihood systems, property, infrastructure and public utilities. At average, every year, 7.55 m ha hectares of land is affected, 1,560 lives are lost and the damage caused to crops, houses and public utilities due to floods is estimated at ₹ 1,805 crore. Thus, proper

[4] A State sector scheme with a central component being implemented in CWC. DRIP envisaged rehabilitation of 223 existing dams and dam safety institutional strengthening in the States of Kerala, Madhya Pradesh, Odisha and Tamil Nadu. The overall responsibility for project oversight and coordination of DRIP was with the Dam Safety Rehabilitation Directorate of Dam Safety Organisation (DSO) of CWC.

management of floods constitutes an important element in national development activities. Keeping in view the huge outlay in Flood Control and Management schemes, spate of floods in the recent past and topicality of the issue, we decided to undertake the Performance Audit on Schemes for Flood Control and Flood Forecasting.

1.6 Audit objectives

The audit objectives of the performance audit on Schemes for Flood Control and Flood Forecasting in India were to examine whether:

i) Management, execution, monitoring and evaluation of Flood Management Programme was efficient and effective in controlling floods;

ii) Establishment of Flood Forecasting network for dissemination of real time data was adequate;

iii) Management and planning for execution of other schemes namely 'River Management Activities and works related to Border Areas' and 'Dam Safety Studies and Planning' was efficient and effective; and

iv) Review and Oversight mechanisms for flood control measures were effective in management of flood.

1.7 Audit scope and methodology

We reviewed the projects sanctioned by MoWR, RD&GR during the XI and XII FYP period i.e. from 2007 to March 2016 in order to have an overview of the flood management in India. There was spillover of projects from one Plan period to another; hence it was necessary to cover both the FYP periods.

We covered schemes viz. FMP; Flood Forecasting; River Management Activities and works related to Border Areas; and Dam Safety Studies and Planning. The DRIP project which was initiated during the XII Plan encompasses several dam safety aspects, however, in this Audit, only the aspect of preparation of Emergency Action Plan for dams was covered.

An entry conference was held on 17 March 2016 in which audit objectives, scope and methodology were explained to MoWR, RD&GR. Audit was conducted by scrutiny of records at MoWR, RD&GR, CWC, GFCC, BB and implementing agencies of State Governments during April-August 2016. The audit findings were discussed with the Ministry and concerned agencies on 19 December 2016. The response of the Ministry during the discussions have been incorporated in the report in the relevant chapters. The comments furnished by the Ministry on the recommendations along with further Audit comments have been given as **Annexure I**.

1.8 Audit sampling

During the XI and XII FYP, 517 projects were approved and funds were released to 25 States under FMP. We selected 17 States/UT for audit having 480 approved projects, in which total projects of more than ₹ 50 crore were approved by Empowered Committee[5]/Inter-Ministerial Committee (EC/IMC).

The sampling methodology used in respect of various flood control schemes was as under:

a. We examined 50 *per cent* of the projects approved by the EC/IMC under FMP upto 31 March 2016 subject to maximum of 30 projects. In the States having five or less sanctioned projects, all the projects were selected for audit scrutiny. We selected 47 projects for joint site visits.

b. We selected 25 *per cent* of Level Flood Forecasting Stations[6] and 50 *per cent* (maximum of two) of Inflow Flood Forecasting Stations[7] under the selected Divisions for file examination. We selected 17 Flood Forecasting Stations for joint site visits.

c. The sample size for examination of files of Emergency Action Plan (EAP) of Large Dams in the States during 2007-08 to 2015-16 was 10 *per cent* and 54 Dams for joint site visits.

Details of State wise samples are given in **Annexure II.**

The Ministry did not have complete details of the projects. Out of 206 selected FMP projects the Ministry provided records for 136 projects only. These 136 files also did not contain complete details of the projects. The list of files not provided for audit is given in **Annexure III**.

1.9 Acknowledgement

We acknowledge the cooperation extended by Ministry of Water Resources, River Development & Ganga Rejuvenation, Central Water Commission and the State Government Departments at each stage of the performance audit.

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[5] Empowered Committee is the competent authority for approval of FMP projects during XI Plan and is chaired by Secretary (Expenditure) and includes Secretary, MoWR, RD&GR and Chairman CWC.
Inter-Ministerial committee is the competent authority for approval of FMP projects during XII Plan and is chaired by Secretary MoWR, RD&GR and includes Member (RM) CWC, Chairman GFCC, Chairman BB and Advisor, Planning Commission.

[6] The Level Forecasts help the user agencies in deciding mitigating measure like evacuation of people and shifting people and their movable property to safer locations.

[7] The Inflow Forecasting is used by various dam authorities in optimum operation of reservoirs for safe passage of flood downstream as well as to ensure adequate storage in the reservoirs for meeting demand during non-monsoon period.