

**Report of the
Comptroller and Auditor General of India
on
Schemes for Flood Control and
Flood Forecasting**



**Union Government
Ministry of Water Resources, River Development
& Ganga Rejuvenation
Report No. 10 of 2017
(Performance Audit)**

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Preface

India is highly vulnerable to floods. Out of the total geographical area of 329 million hectares, about 45.64 million hectares is flood prone. Floods are a recurrent phenomenon, which cause huge loss of lives and damage to livelihood systems, property, infrastructure and public utilities. As per the report of the Working Group on Flood Control Management Programme (December 2006) for the XI Five Year Plan (2007-2012), on an average, every year, 7.55 million 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.

The Performance Audit on “Schemes for Flood Control and Flood Forecasting” examined whether schemes for flood control and flood forecasting were efficient and effective; and whether the review and oversight mechanisms were effective.

The Performance Audit showed that there were long delays in approval of Detailed Project Reports leading to technical designs becoming irrelevant at the time of actual funding. Flood management works were not taken up in an integrated manner covering entire river/tributary or a major segment of rivers/tributaries. There were delays in completion of the projects under Flood Management Programme. A large number of the telemetry stations installed during the XI plan remained non-functional, as such real time data for most of the period was not available. There were also huge delays in completion of all the projects under River Management Activities and Works related to Border Areas. Emergency Action Plans had been prepared for only a few large dams. Key recommendations of Rashtriya Barh Ayog such as scientific assessment of flood prone areas and enactment of Flood Plain Zoning Act have not materialised. Performance and concurrent evaluation was not done as per scheme guidelines.

We hope that the report prepared for submission to the President of India under Article 151 of the Constitution of India, for being laid before the Parliament, will help in planning and proper implementation of projects under Flood Management Programme, Flood Forecasting, projects under River Management Activities and Works related to Border Areas and taking action for preparation of Emergency Action Plan for Dams.

Executive Summary

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. As per Working Group on Flood Control Management Programme for the XI Five Year Plan (2007-2012), the total flood prone area worked out to 45.64 million hectare (m ha).

Government of India has set up various Committees for management of flood like Rashtriya Barh Ayog (राष्ट्रीय बाढ़ आयोग), Task Force 2004 and Working Group on Water Resources for XI Plan. Government has also framed National Water Policy 2002 and 2012 to govern the planning and development of water resources and their optimum utilization. The reports of the above committees/policies gave certain recommendations for management of flood in time bound manner. To achieve the above recommendations, schemes for flood control viz. Flood Management Programme, Flood Forecasting, River Management Activities and Works related to Border Areas and Emergency Action Plan for Dam were implemented.

The Performance Audit on “Schemes for Flood Control and Flood Forecasting” examined whether schemes for flood control and flood forecasting were efficient and effective; and whether the review and oversight mechanisms were effective.

We sampled 206 Flood Management Programme projects, 38 flood forecasting stations, 49 River Management Activities and works related to Border Area projects and 68 large Dams, in 17 selected States/UT during 2007-08 to 2015-16.

Financial Management of Flood Management Programme (FMP)

There were inordinate delays in 48 projects of four States ranging between two to 21 months in releasing first instalment of Central assistance to State Governments after approval of Empowered Committee.

(Paragraph 2.4)

An amount of ₹ 600.92 crore along with interest of ₹ 18.30 crore recoverable as loan from the State Governments for not releasing the Central assistance within 15 days to the executing agencies, was not recovered by the Central Government.

(Paragraph 2.5)

Funds amounting to ₹ 171.28 crore in six projects of five States were not utilised and remained parked for the period ranging between 15 months to more than 60 months. Funds amounting to ₹ 36.57 crore in three States were diverted by the implementing agencies for works not approved in the Detailed Project Reports.

(Paragraphs 2.7 and 2.8)

An expenditure amounting to ₹ 18.12 crore incurred in the previous financial year before its approval by Empowered Committee was included in the cost of project in contravention of clause 4.10.3 of Flood Management Programme guidelines. Further, an amount of ₹ 19.99 crore was released in excess in two projects in Bihar and Uttarakhand.

(Paragraph 2.9)

State Governments did not ensure submission of audited statements of expenditure and Utilisation Certificates within stipulated time before releasing Central assistance.

(Paragraph 2.11 and 2.12)

Execution of Flood Management Programme

In eight out of 17 States/UT the flood management works were not taken up in an integrated manner covering entire river/tributary or a major segment of rivers/tributaries and the Preliminary Project Reports/Detailed Project Reports (DPRs) were not prepared in accordance with the scheme guidelines. There were huge delays in completion of FMP works which ranged from 10 months to 13 years due to delay in approval of DPRs by Empowered Committee/Inter-Ministerial Committee, leading to technical designs becoming irrelevant at the time of actual funding.

(Paragraph 3.2)

There were delays in completion of FMP projects due to non-release/timely release of funds (Central share/State share) and due to non-acquisition of required land.

(Paragraph 3.3)

Deficiencies were noticed in contract management viz. execution of work without call of tender, award of contract to large number of contractors, splitting of works, etc.

(Paragraph 3.4)

In four projects at Arunachal Pradesh and Uttar Pradesh, the actual quantity of work executed was below the approved scope of work. In four projects expenditure of ₹ 9.78 crore was incurred without the approval of the Competent Authority. GI wires valuing ₹ 25.40 crore remained unutilised in one project of Himachal Pradesh. Irregular grant of mobilization advance amounting to ₹ 80.36 crore in three States resulted in loss of interest of ₹ 15.84 crore. An expenditure of ₹ 34.51 crore was incurred on jeep track/inspection roads with Water Bound Macadam (WBM)/Bitumen (BT) surface over the flood embankment which was ineligible under FMP.

(Paragraph 3.5)

No programme for upkeep and maintenance of the completed projects, with separate budget provision as envisaged in the FMP guidelines was framed.

(Paragraph 3.6)

Central Water Commission (CWC) did not identify any drainage system, which needed immediate rehabilitation and adopt measures for its repair and restoration.

(Paragraph 3.7)

Flood Forecasting

Against a target for the XII Plan for installation of 219 telemetry stations, 310 base stations and 100 flood forecasting stations, only 56 telemetry stations had been installed as of August 2016.

(Paragraph 4.2)

Out of 375 telemetry stations, 222 number of telemetry stations were non-functional after installation and thus real time data was not available for the corresponding periods.

Flood forecasting data was used in formulation of flood forecast only after comparing the telemetry data with manually observed data; and in the case of mismatch between the two sets of data, manual data was adopted. Thus, CWC did not depend on telemetry data and relied on manual data even after investing in modernisation of telemetry station network for nearly 20 years. This defeated the purpose of establishment of telemetry equipment for meeting the requirement of real time data collection, its transmission and flood forecast formulation.

(Paragraph 4.4)

No flood forecasting stations have been established in Tamil Nadu. In XII Plan, action plan for installation of 41 telemetry stations in Tamil Nadu was prepared (July 2016) but tenders remained to be finalised.

(Paragraph 4.5)

In Odisha, non-maintenance of water level in Hirakud dam as per the rule curve and simultaneous opening later on of 50 flood gates caused heavy discharge of water resulting in flooding in downstream areas. In Uttarakhand, the flood forecasting could not be issued in time due to incorrect fixation of warning and danger levels.

(Paragraphs 4.8 and 4.9)

Other Schemes for Flood Control

There were huge delays in completion of River Management Activities and Works related to Border Areas projects which were long term solutions for the flood problems of Assam, North Bihar and Eastern Uttar Pradesh. There were discrepancies in execution of works like irregular award of work, splitting of tenders, payment at higher rates.

(Paragraph 5.2)

Out of 4,862 Large Dams, Emergency Action Plans/Disaster Management Plans of only 349 (seven *per cent*) large dams had been prepared (March 2016). Further, only 231 (five *per cent*) large dams evolved operating procedure/manuals. Out of 17 States/UT only two States

had fully carried out the pre and post monsoon inspection of the dams, three States had carried out the inspections partially and remaining 12 States had not carried out these inspections. Dam Safety Legislation initiated in 2010 has not been enacted till August 2016. Programme for maintenance of dams were not prepared and adequate funds were not provided to carry out structural/repair works.

(Paragraph 5.3)

Implementation of the recommendations of Review and oversight Committee for Flood Control Measures

The recommendations of Rashtriya Barh Ayog with regard to identification of area affected by flood in country remained unfulfilled. Scientific assessment of flood prone areas had not been completed in any of the 17 States/UT.

(Paragraphs 6.2 and 6.5)

Only Bihar and Odisha out of 17 States/UT had prepared Frequency Based Flood Inundation maps for the flood affected areas.

(Paragraph 6.6)

Morphological studies, with a view to achieve better results in building, renovating and maintaining revetments, spurs and embankments to control and mitigate disasters caused by floods, were not completed by any of the 17 States/UT.

(Paragraph 6.7)

Ten States had not prepared Comprehensive Master Plan for flood management and prepared their flood management projects on selective basis.

(Paragraph 6.8)

Three States had enacted Flood Plain Zoning Act, but demarcation of flood zones was yet to be done.

(Paragraph 6.9)

Monitoring and Evaluation

No performance evaluation was conducted for the projects in five States (Bihar, Haryana, Himachal Pradesh, Jharkhand and Odisha). Three State Governments (Manipur, Sikkim and West Bengal) did not take any action for rectification of the deficiencies pointed out during the performance evaluation of 26 completed projects under Flood Management Programme. Concurrent evaluation of projects under Flood Management Programme was not conducted in accordance with schemes guidelines in nine projects under Flood Management Programme in three States (Assam, Himachal Pradesh and West Bengal).

Remote Sensing was not used in the monitoring of projects under Flood Management Programme.

(Paragraphs 7.3, 7.4 and 7.5)

During site visits carried out in the 17 States/UT, various deficiencies were noticed in the structures created under 14 projects under Flood Management Programme in 11 States. In 23 dams of six States deficiencies relating to spillway gates, check Dams, weed growth and encroachment in downstream and low lying areas of Dams, seepages, etc. were also noticed.

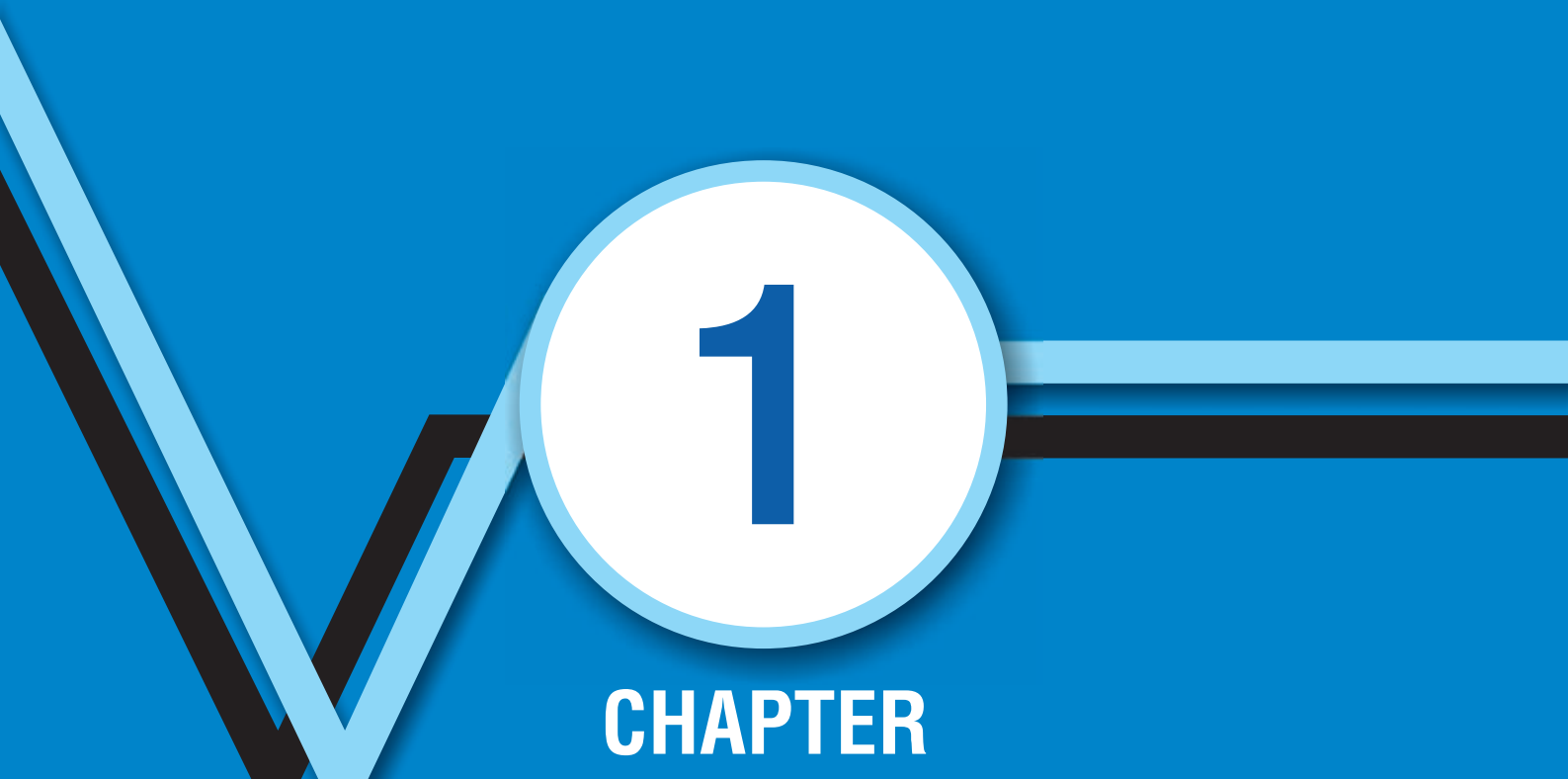
(Paragraph 7.7)

Recommendations

Based on the audit findings, following recommendations are made:

- i. *Ministry of Water Resources, River Development and Ganga Rejuvenation (MoWR,RD&GR) may release adequate funds/reimburse funds in timely manner as per FMP guidelines and may impress upon State Governments to release funds to executing agencies in time bound manner.*
- ii. *MoWR,RD&GR may keep strict vigilance on utilisation of funds by State Government and executing agencies so as to avoid parking and diversion of funds.*
- iii. *MoWR,RD&GR may release/reimburse the funds to the State Governments only after ensuring receipt of audited statements of expenditure, Utilization Certificates and other requisite documents.*
- iv. *MoWR,RD&GR may approve the projects under FMP after ensuring that the projects are formulated in an integrated manner covering entire river/tributary or a major segment of rivers/tributaries.*
- v. *MoWR,RD&GR may approve the projects under FMP after ensuring that the Benefit Cost Ratio is worked out correctly as per guidelines in this regard.*
- vi. *MoWR,RD&GR may advise the State Governments to make efforts for early completion of delayed projects and completion of new projects in stipulated time.*
- vii. *MoWR,RD&GR may take adequate steps to release the funds after ensuring acquisition of required land.*
- viii. *Central Water Commission (CWC) may devise a time bound action plan to speed up the formulation of flood forecast on real time data communication network by making all the telemetry stations operational and take suitable steps to install all the targeted telemetry stations.*
- ix. *CWC may ensure that the warning and danger levels have been fixed at appropriate level so that flood forecasting could be made correctly and timely.*
- x. *MoWR,RD&GR may prepare a time bound action plan to accelerate the completion of all the long term River Management Activities and Works related to Border Areas (RMABA) projects to facilitate the long term solution to the flood problem of Assam, North Bihar and Eastern Uttar Pradesh from annual floods.*
- xi. *MoWR,RD&GR may, in consultation with State Governments, devise a time bound action plan for preparation and implementation of Emergency Action Plans including preparation of inundation maps and hydrological studies for all the large dams in the country.*

- xii. *MoWR, RD&GR may advise the State Governments to prepare Standard Operating Procedures for dams and carry out the prescribed pre and post monsoon inspection of the dams.*
- xiii. *MoWR, RD&GR may persuade the State Governments to prepare a time bound action plan to comply with the recommendations made by Rashtriya Barh Ayog, Task Force 2004, Parliamentary Standing Committee on Water Resources and National Water Policy 2002 and 2012, and factor these recommendations in the release of funds in the various schemes of Central Government.*
- xiv. *MoWR, RD&GR may take up with the States to enact the Flood Plain Zoning Bill and implement it in a time bound manner.*
- xv. *MoWR, RD&GR may conduct performance evaluation and concurrent evaluation of all FMP projects as per FMP guidelines.*
- xvi. *MoWR, RD&GR may consider increasing the use of Remote Sensing Technology in the monitoring of FMP.*
- xvii. *CWC/Ganga Flood Control Commission may ensure quality tests on the quality of construction materials and works during field visits.*
- xviii. *MoWR, RD&GR may persuade the State Governments to immediately review the issues relating to damages/washing out of already constructed structures and take appropriate action for construction works not taken up.*



1

CHAPTER

1

Chapter

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 outburst¹, 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 crore².

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 zoning³, disaster preparedness and response are also practiced.

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.

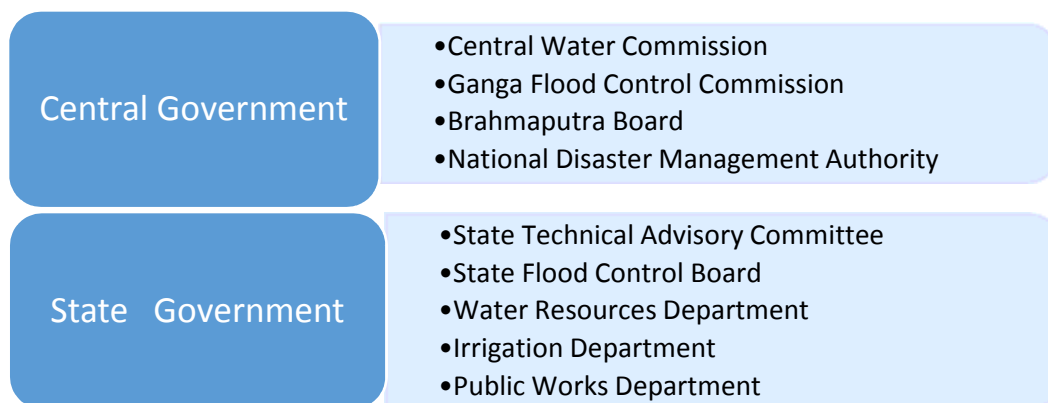
1.2 Institutional frame work for Flood Management

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), Gol 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

Gol 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 Committee⁵/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 Stations⁶ and 50 *per cent* (maximum of two) of Inflow Flood Forecasting Stations⁷ 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.

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.



2

CHAPTER

Financial Management of Flood Management Programme

2.1 Introduction

Flood Management Programme (FMP) guidelines contain provisions relating to financial parameters viz. release of funds in stipulated time, eligibility for FMP funds, reimbursement of expenditure, phasing of expenditure, submission of Utilisation Certificates (UC) and audited statement of expenditure, etc.

According to FMP guidelines, for projects approved up to July 2013, the proportion of Central and State Share of funds was to be 75 *per cent* and 25 *per cent* respectively. In the case of Special category States⁸ the proportion of Central and State Share of funds was to be 90 *per cent* and 10 *per cent* respectively. For the projects sanctioned after July 2013, the proportion of Central and State Share of funds was to be 50 *per cent* each and 70 *per cent* and 30 *per cent* respectively in the case of Special category States.

FMP guidelines stipulated that first instalment of Central assistance shall be released immediately on approval of the scheme by the Empowered Committee (EC) limiting to the corresponding provision made by the State in its budget in respect of both the Central share as well as the matching State share. Further, the grant-in-aid along with State share should be released by the State Government to the concerned project authorities executing the works within 15 days of receipt of central assistance from the GoI failing which the full central grant-in-aid released for the work should be converted into loan and be recovered as per usual terms of recovery of central loan.

2.2 Physical and Financial targets and achievements of projects

During the XI and XII FYP, 517 projects amounting to ₹ 12,243 crore were approved for 25 States/UTs under FMP. The number of works approved, completed and funds released vis a vis estimated cost to the State Governments, under FMP during XI and XII Plans (upto March 2016) is given in Table 2.1.

⁸ North Eastern States, Sikkim, Himachal Pradesh, Jammu & Kashmir and Uttarakhand.

Table 2.1: Works approved and Funds released during XI and XII Plan

(₹ in crore)

State/UT	Works approved (Number and Estimated Cost)						Works Completed	Funds Released		Total Funds Released (XI+XII Plan)
	XI Plan		XII Plan		XI+XII Plan			XI Plan	XII Plan	
	Nos.	Estimated cost	Nos.	Estimated cost	Nos.	Estimated cost		Total XI Plan	Total XII Plan	
1. Arunachal Pradesh	21	107.33	0	0	21	107.33	11	81.69	64.22	145.91
2. Assam	100	996.14	41	1,386.97	141	2,383.11	94	748.86	64.89	813.75
3. Bihar	43	1,370.42	4	447.63	47	1,818.05	41	723.18	184.64	907.82
4. Chhattisgarh	3	31.13	0	0	3	31.13	0	15.57	3.75	19.32
5. Goa	2	22.73	0	0	2	22.73	2	9.98	2.00	11.98
6. Gujarat	2	19.79	0	0	2	19.79	1	2.00	0.00	2
7. Haryana	1	173.75	0	0	1	173.75	0	46.91	0.00	46.91
8. Himachal Pradesh	3	225.32	4	1,139.62	7	1,364.94	1	165.98	171.87	337.85
9. Jammu & Kashmir	28	408.22	14	163.18	42	571.40	8	252.57	129.39	381.96
10. Jharkhand	3	39.30	0	0	3	39.30	2	18.44	4.27	22.71
11. Karnataka	3	59.46	0	0	3	59.46	0	23.80	0.00	23.8
12. Kerala	4	279.74	0	0	4	279.74	0	63.68	55.22	118.9
13. Manipur	22	109.34	0	0	22	109.34	19	66.34	24.36	90.7
14. Meghalaya	0	0.00	0	0	0	0	0	3.81	0.00	3.81
15. Mizoram	2	9.13	0	0	2	9.13	0	14.48	1.93	16.41
16. Nagaland	11	49.35	3	37.38	14	86.73	9	28.96	31.04	60
17. Odisha	67	169.00	1	62.32	68	231.32	60	101.12	0.00	101.12
18. Puducherry	1	139.67	0	0	1	139.67	0	7.50	0.00	7.5
19. Punjab	5	153.40	0	0	5	153.40	0	40.43	0.00	40.43
20. Sikkim	28	104.92	17	261.40	45	366.32	21	83.69	8.15	91.84
21. Tamil Nadu	5	635.54	0	0	5	635.54	0	59.82	0.00	59.82
22. Tripura	11	26.57	0	0	11	26.57	8	23.62	0.00	23.62
23. Uttar Pradesh	26	667.57	3	382.27	29	1,049.84	6	290.69	111.22	401.91
24. Uttaranchal	12	119.82	9	183.45	21	303.27	8	49.63	153.98	203.61
25. West Bengal	17	1,822.08	1	438.94	18	2,261.02	6	643.26	146.14	789.4
Total	420	7,739.72	97	4,503.16	517	12,242.88	297	3,566.01	1,157.07	4,723.08

Source: MoWR, RD&GR

It can be seen from the table that against the total estimated cost of ₹ 12,242.88 crore approved during XI and XII plans, only ₹ 4,723.08 crore (39 per cent) was released by MoWR, RD&GR. As against 517 works approved during the period, only 297 (57 per cent) works were completed. Project-wise detail of expenditure, though called for, were not furnished by the Ministry.

Ministry stated (February 2017) that Central share is being released as and when proposals are received as per norms and guidelines subject to funds availability.

The fact remained that only 57 per cent of approved works were completed in nine years of the XI and XII Plan periods.

Audit findings dealing with release of funds to 136 sampled projects in MoWR, RD&GR and implementation of 206 projects in 17 selected States/UT are discussed in succeeding paragraphs.

2.3 Shortfall in release of Central/State assistance

As per clause 5.6 of FMP guidelines 2013, the State Governments shall ensure inclusion of the scheme in the State Plan and make requisite budget provision towards Central as well as State share on annual basis.

As per the financial phasing and construction programme of the FMP projects, the projects were to be completed within the stipulated period of two to three financial years. The requirement of funds in each year, for both Central and State shares, was to be provided in the annual budget by the State Government.

In 17 selected States/UT, we found cases of inadequate budget provision and short release of Central and State share of funds, which are summarised in Table 2.2 below.

Table 2.2: Shortfall in release of Central/State assistance

(₹ in crore)

State	Years	Projects	Central Share	Funds released by Centre	Shortfall in release of Central Share	% of shortfall
1. Arunachal Pradesh	2010-11 to 2015-16	10	367.34	81.95	285.39	78
10 FMP projects ⁹ were approved during 2010-11 to be completed within two to three financial years. There was a shortfall in release of Central assistance by 78 per cent. This led to delay in the commencement and the projects remained to be completed.						
2. Assam	2007-08 to 2015-16	141	2,043.19	812.22	1,230.97	60
There was a shortfall in release of Central assistance by 60 per cent. Further, the State Government also did not release 84 per cent of the allocated budget provision. Insufficient flow of fund adversely affected the implementation of schemes.						
3. Jharkhand	2007-08 to 2015-16	3	29.48	21.35	8.13	28
There was a shortfall in release of Central assistance by 28 per cent. Further, the State was deprived of Central assistance of ₹ 8.13 crore out of approved amount of ₹ 29.48 crore from the Gol due to delay in completion of two projects (JHK-01 ¹⁰ & JHK-03), non-submission of Utilisation Certificates (UCs), etc. during March 2008 to March 2012.						
4. Manipur	2007-08 to 2015-16	22	96.81	89.31	7.42	8

⁹ Project code numbers ArP 12 to ArP 21.

¹⁰ Project code numbers were allotted to each FMP project of the State serially after the approval of the project by the EC/IMC.

There was a shortfall in release of Central assistance by eight *per cent*. Further, during 2008-16, the State Governments made year-wise budget provisions for FMP as a whole¹¹. However, no project/scheme-wise budget provision was provided in the State budget document. Out of the Central share of ₹ 96.81 crore (based on cost of actual execution of work), the GoI released a fund of ₹ 89.31 crore thereby leaving a balance of ₹ 7.42 crore (eight *per cent*).

5. Sikkim	2007-08 to 2015-16	45	94.44	85.29	9.15	8
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There was a shortfall in release of Central assistance by eight *per cent*. Further, as per the approved outlay, MoWR, RD&GR was required to release ₹ 94.44 crore as central share. However, MoWR, RD&GR released ₹ 85.29 crore resulting in short release of ₹ 9.15 crore.

6. Uttar Pradesh	2007-08 to 2013-14	29	694.83	401.68	293.15	42
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There was a shortfall in release of Central assistance by 42 *per cent*. Further, in 21 out of 29 FMP projects, the State Government did not provide matching budget provision in accordance with the phasing of expenditure during 2007-08 to 2013-14.

We further observed that:

In Bihar, against the overall estimate of ₹ 754.83 crore for five projects approved between March 2008 and December 2013, the Central share was ₹ 566.12 crore and the State share was ₹ 188.71 crore. We observed that the Centre released only ₹ 321.23 crore (March 2016). We further observed that the total expenditure incurred on the five projects was ₹ 830.79 crore exceeding the approved estimate by ₹ 75.96 crore.

In Uttarakhand, in four projects (project code UK 1, UK 5, UK 9 and UK 12), the Uttarakhand Government did not provide budget or release funds during 2007-08 and 2012-13 in UK-1, 2012-13 and 2014-15 in UK 5, and 2014-15 in UK 9 and UK 12. The State Government stated (December 2016) that funds could not be released due to non-receipt of Central share from GoI. This reduced the availability of funds in the hands of executing agencies thereby affecting the progress of works.

Ministry stated (February 2017) that shortfall in release of funds were either due to lesser budgetary allocation or non-submission/non-eligible proposals under Flood Management Programme (FMP).

The fact remained that shortfall in release of funds affected the implementation of projects.

2.4 Delayed release of Central assistance to State Governments

Para 4.10.1 of FMP guidelines stipulates that first instalment of Central assistance shall be released immediately on approval of the scheme by the Empowered

¹¹ Under the Major Head 4711-Capital Outlay on Flood Control Schemes, Sub Head -Critical Flood Control and Anti Erosion Scheme.

Committee (EC)¹² limiting to the corresponding provision made by the State in its budget in respect of both the Central share as well as the matching State share.

We observed that in 48 projects there were inordinate delays ranging from two to 21 months in releasing Central assistance to State Governments after approval of EC, as shown in Table 2.3.

Table 2.3: Delay in release of first instalment of Central assistance

State	Number of projects	Period of approval	Amount of first instalment (₹ crore)	Period of delay (Months)
1. Bihar	20	XI & XII Plan	200.65	2-6
2. Haryana	1	XI Plan	46.91	5
3. Uttar Pradesh	25	XI & XII Plan	238.59	2-16
4. Uttarakhand	2	XI Plan	8.05	21
Total	48			

Ministry stated (February 2017) that release of first instalment of central assistance for some of the schemes gets delayed due to late submission of proposals with requisite documents by the State Government.

The delay in release of Central assistance to State Governments from the date of approval of EC resulted in delay in commencement and completion of works.

2.5 Non-recovery of Central assistance including interest from State Government

As per FMP guidelines, the Central assistance along with State share should be released by the State Government to the concerned project authorities executing the works within 15 days of receipt of Central assistance from the GoI failing which the entire Central assistance released should be converted into loan and recovered as per usual terms of recovery of Central loan along with interest.

We observed that in 66 cases of eight States, the Central assistance of ₹ 600.92 crore was not released by the State Governments to the executing agencies within 15 days of the receipt of Central assistance. However, GoI did not recover this amount as Central loan from the State Governments along with the interest for the delayed period. This resulted in non-recovery of ₹ 600.92 crore (including interest of ₹ 18.30 crore at the rate of nine *per cent* per annum). The State wise figures are given in Table 2.4.

¹² Empowered Committee is the competent authority for approval of FMP projects and is chaired by Secretary (Expenditure) and includes Secretary, MoWR, RD&GR and Chairman, CWC.

Table 2.4: Non-recovery of Central assistance including interest from State Government

(₹ in crore)			
State	No of projects	Amount of central assistance	Amount of interest
1. Assam	23	183.04	9.43
2. Haryana	1	46.48	3.25
3. Jharkhand	2	13.35	0.61
4. Kerala	4	63.67	0.68
5. Punjab	5	40.43	1.22
6. Uttar Pradesh	21	218.45	2.79
7. Uttarakhand	10	35.50	0.32
Total	66	600.92	18.30

The Ministry stated (December 2016) that regarding release of funds by State Government to Executing agencies, it could be sorted out by persuading State Governments for timely release of funds.

2.6 Release of funds/rush of expenditure at the fag end of the year

As per Rule 56 of GFR, rush of expenditure, particularly in the closing months of the financial year, shall be regarded as a breach of financial propriety and shall be avoided.

We found cases of release of funds and rush of expenditure at the fag end of the financial year which are detailed in Table 2.5.

Table 2.5: State-wise details of release of funds/rush of expenditure at fag end of the year

State	Observations
Release of funds by Gol to State Governments	
1. Arunachal Pradesh	During 2009-10, an amount of ₹ 12.93 crore was released at the fag end of the year i.e. February 2010 for nine projects (ArP 1-9) and March 2010 against two projects (ArP 10-11). Similarly, during 2010-11, funds of ₹ 31.70 crore were released at the end of the financial year in March 2011 in a single instalment in respect of 11 projects.
2. Tamil Nadu	Gol sanctioned Central assistance of ₹ 59.82 crore to the State Government during the last quarter of the financial years 2009-10 (₹ 1.11 crore in February 2010) and 2010-11 (₹ 58.71 crore in January 2011) for FMP projects.
3. Uttar Pradesh	In 19 out of 29 FMP projects, Gol issued 16 sanctions of ₹ 67.74 crore (17 per cent of the total funds released) to State Government for execution of the projects at the fag end of the financial years 2008-09 to 2013-14 i.e. between 25 and 31 March.

Release of funds by State Government to Implementing Agencies	
4. Uttar Pradesh	In six out of 29 FMP projects, the State Government issued four sanctions of ₹ 57.32 crore (16 <i>per cent</i> of the total released by State Government) to the executing Divisions at the fag end of the financial year i.e. between 25 to 31 March.
5. Uttarakhand	In six of ten test-checked projects it was observed that the State Government/HOD released the entire sanction of ₹ 41.00 crore to the executing agencies in the last quarter of the respective financial years i.e. 2008-09 to 2013-14. As a result, ₹ 21.92 crore (53.46 <i>per cent</i>) was surrendered by the executing agencies to the State at the end of the concerned financial years due to inability to utilize the amount.
Incurring of expenditure by Implementing agencies	
6. Assam	Water Resource Department spent 50.75 <i>per cent</i> of total expenditure (₹ 280.28 crore) in the month of March alone against the 30 selected projects during 2008-16. During 2013-15, almost entire (99.77 <i>per cent</i>) expenditure amounting to ₹ 60.88 crore was incurred in the month of March.
7. Jammu & Kashmir	Expenditure incurred during the last quarter of the years 2008-09 to 2012-13 in six projects in which funds were received regularly, ranged between 51 to 87 <i>per cent</i> . Expenditure in March each year ranged between 48 to 87 <i>per cent</i> .
8. Odisha	Out of the total expenditure of ₹ 15.19 crore on six projects (OR-19, OR-23, OR-61, OR-64, OR-65 and OR-68), ₹ 6.72 crore (44.23 <i>per cent</i>) was incurred in the last quarter of each financial year i.e. 2008-09 to 2011-12. Further, ₹ 4.96 crore (32.65 <i>per cent</i>) was incurred during the month of March.

Ministry stated (February 2017) that release of Central assistance for some of the schemes gets delayed due to late submission of proposals with requisite documents by the State Government.

The fact remained that funds were released and expenditure incurred in contravention of the GFRs.

2.7 Parking of funds

Central Government Account (Receipt and Payment) Rules, 1983 stipulate that no money should be drawn from the Government Treasury unless it is required for immediate disbursement.

Funds amounting to ₹ 171.28 crore in six projects in five States (Bihar, Himachal Pradesh, Jharkhand, Uttar Pradesh and West Bengal) were not utilised and remained parked with the executing agencies for periods ranging between 15 months to more than 60 months.

Ministry stated (February 2017) that State Government will be impressed upon to adhere and comply.

2.8 Diversion of funds

The terms and conditions governing grant of funds during XII Plan under the scheme stipulated that funds should be utilised for the purpose for which they were released and no part of it was to be diverted.

We noticed that funds amounting to ₹ 36.57 crore in six projects¹³ in three States (Assam, Himachal Pradesh and Tamil Nadu) were diverted by the implementing agencies for works not approved in the DPR, as detailed in Table 2.6.

Table 2.6: Diversion of funds by implementing agencies

State	Observations
1. Assam	In the project AS-85 on 'Emergent measures for protection of Rohmorja area in Dibrugarh district', Water Resources Department, Dibrugarh (WRD) incurred expenditure of ₹ 1.55 crore for construction of office building. Similarly, under project AS-105 on 'Protection of Makadhuj area from the erosion of river Brahmaputra', provision of ₹ 18 lakh was kept for construction of boundary wall. Both the above works were not included in the approved scope of work, resulting in diversion of funds of ₹ 1.73 crore.
2. Himachal Pradesh	Under the project HP-4, ₹ 2.03 crore was utilised between November 2014 and June 2015 on activities like additional accommodation for office building, flood monitoring centre and deployment of outsourced employees that were not covered under the scope of DPR resulting in diversion of funds. Similarly, funds of ₹ 30.35 crore under three projects (HP-1: ₹ 99 lakh, HP-2: ₹ 18 lakh and HP-4: ₹ 29.18 crore) were diverted (between March 2010 to June 2016) for repair and maintenance of previously executed works that were not covered in the approved DPRs of the projects.
3. Tamil Nadu	As per CWC guidelines ¹⁴ permanent building constructed for maintenance of the project should be discussed in DPR. However, in the project TN-03, ₹ 81 lakh was diverted towards construction works ¹⁵ that were not mentioned in the DPR. Further, in the same project, an amount of ₹ 1.65 crore was diverted from project savings and sanctioned for the work of desilting the river, which was not originally provided in the estimate. The State Government stated (November 2016) that necessary provision of funds was made in the DPR duly approved by CWC. However, the duly approved DPR could not be furnished.

We also observed that no follow up action was taken by MoWR, RD&GR towards diversion of funds. The diversion of funds led to lesser expenditure on the

¹³ AS-85, AS-105, HP-1, HP-2, HP-4 and TN-3.

¹⁴ For preparation, submission, appraisal and clearance of FMP (2002).

¹⁵ Construction of centralised flood control centre (Cuddalore), construction of five staff quarters for Irrigation Assistants (Kallakurichi) and construction of Flood Management Centre (Kallakurichi).

approved projects and irregular expenditure on works not included in the scope of the approved projects.

Ministry stated (February 2017) that State Government will be impressed upon to adhere and comply.

2.9 Inadmissible expenditure/Excess release of Central share

As per clause 4.10.3 of FMP guidelines, Central assistance towards the expenditure incurred by the State Government on a project in the previous financial year(s) before its approval by the Empowered Committee (EC) would not be entertained. We observed instances where expenditure incurred prior to approval of EC was also included in the cost of the projects. These cases are discussed below.

a. Inadmissible Central share

Scrutiny of records at MoWR, RD&GR revealed that in four projects of three States, expenditure amounting to ₹ 18.12 crore incurred in the previous financial year before its approval by EC was included in the cost of the project. The details of the four projects are given in Table 2.7.

Table 2.7: Project wise details of inadmissible Central share

(₹ in crore)				
Project Code no.	Date of approval by EC	Year of expenditure	Amount of expenditure in previous year	Inadmissible Central share
AS-49	Jul 2008	Feb 2005 to Nov 2007	1.25	0.94
AS-143	Mar 2014	Sep 2012	3.45	2.59
BR-46	Aug 2011	2010-11	1.17	0.88
HP-1	Sep 2009	Prior to 2008-09	12.25	11.02
Total			18.12	15.43

The above table shows that an amount of ₹ 15.43 crore of Central share was included in the cost of four projects of three States, which was inadmissible as expenditure was incurred by the State Government prior to the year of approval of the project by EC.

b. Excess release of Central share

According to FMP guidelines, for projects approved up to July 2013, the proportion of Central and State Share of funds was to be 75 per cent and 25 per cent respectively. In the case of Special category States¹⁶ the proportion of Central and State Share of funds was to be 90 per cent and 10 per cent

¹⁶ North Eastern States, Sikkim, Himachal Pradesh, Jammu & Kashmir and Uttarakhand.

respectively. For the projects sanctioned after July 2013, the proportion of Central and State Share of funds was to be 50 *per cent* each and 70 *per cent* and 30 *per cent* respectively in the case of Special category States.

However, in contravention of the above guidelines, we observed instances of excess release of Central share of funds in Bihar and Uttarakhand, as discussed below:

- (i) **Bihar:** The project BR-48- Bagamati Flood Management Scheme, Phase-II was approved by EC (August 2011) for a total cost of ₹ 576.41 crore. Of this, expenditure of ₹ 116.54 crore was incurred in 2010-11 i.e. the year before the year of approval by EC. However, the cost approved by EC under FMP was ₹ 120.94 crore. The proportionate expenditure for the year 2010-11 was ₹ 24.45 crore¹⁷ of which, 75 *per cent* amounting to ₹ 18.34 crore was not admissible as Central share. However, the entire Central share of ₹ 90.70 crore was released, resulting in excess release of ₹ 18.34 crore.
- (ii) **Uttarakhand:** Similarly, under the project, UK 1 - Construction of Right Marginal bund on river Ganga from Bhogpur to Balawali approved by EC in March 2008, of the total cost of ₹ 20.69 crore, ₹ 4.98 crore was incurred upto 2006-07. The Central share was ₹ 15.52 crore of which ₹ 13.44 crore was released. However, the amount of ₹ 3.73 crore being 75 *per cent* of ₹ 4.98 crore, was not admissible as Central share. As such, ₹ 1.65 crore (₹ 3.73 crore - ₹ 2.08 crore¹⁸) was released in excess.

2.10 Delayed reimbursement of expenditure

As per clause 4.10.3 of FMP guidelines, actual expenditure incurred by the State Government from their own resources in the financial year (in which the project was approved by the EC under FMP) would be reimbursed in the same financial year, or, if the Central assistance was not released in that financial year, in the next financial year, in which case requirement of budget provision may not be necessary.

Scrutiny of records at MoWR, RD&GR revealed that in five projects in Bihar, Jharkhand and Uttar Pradesh expenditure amounting to ₹ 68.32 crore was not reimbursed in the same financial year but was reimbursed in the subsequent years. The project wise findings are given in Table 2.8.

¹⁷ (₹ 116.54 crore/₹ 576.41 crore) X ₹ 120.94 crore.

¹⁸ Amount of Central share due for release (₹ 15.52 crore - ₹ 13.44 crore).

Table 2.8: Project-wise details

Project Code no.	Date of approval by EC	Amount/Date of 1 st , 2 nd and 3 rd instalment	Amount/Date of last instalment	Amount not reimbursed in the same financial year
BR-09	Aug 2008	₹ 2.72 crore/Jan 2009 ₹ 2.62 crore/Feb 2010 ₹ 3.18 crore/Mar 2011	₹ 2.69 crore/Feb 2013	₹ 2.21 crore (75% of ₹ 2.94 crore) incurred during 2011-12.
BR-45	Aug 2011	₹ 7.43 crore/Oct 2011	₹ 6.44 crore/Feb 2013	₹ 6.12 crore (75% of ₹ 8.16 crore) incurred during 2011-12.
BR-48	Aug 2011	₹ 45.35 crore/Oct 2011	₹ 45.35 crore/during XII Plan	₹ 45.35 crore incurred during 2011-12.
JHK-1	Aug 2008	₹ 6.00 crore/Oct 2008 ₹ 4.53 crore/Mar 2010	₹ 2.82 crore/Oct 2011	₹ 1.08 crore (75% of ₹ 1.45 crore) incurred during 2010-11.
UP-13	Sep 2009	₹ 11.68 crore/Mar 2010	₹ 15.47 crore/Dec 2011	₹ 13.56 crore (75% of ₹ 18.08 crore) incurred during 2010-11
Total				₹ 68.32 crore

Thus, the amount of ₹ 68.32 crore in five projects was released to the State Government in contravention of FMP guidelines, which shows poor fund management.

Ministry stated (February 2017) that the delay in reimbursement of expenditure was on account of non-receipt of eligible proposals, monitoring visit reports, audited statement of expenditure timely and also on account of budgetary constraints, etc.

The fact remained that funds were released to the State Government in contravention of FMP guidelines.

2.11 Non-submission of audited statements of expenditure

As per clause 4.14 of FMP guidelines, States were required to submit audited statements of expenditure incurred on works under the scheme within nine months of the completion of the financial years. In case of non-submission of audited statement of expenditure within the stipulated time period, release of Central assistance would not be considered.

We observed that although six States (Assam, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Uttar Pradesh and Uttarakhand) did not furnish audited statements of expenditure in any of the years during the period between 2007-08 to 2015-16 (March 2016), the Ministry had released an amount of ₹ 2161.79 crore as detailed in Table 2.9.

Table 2.9: Amounts released without receipt of audited statement of expenditure

(₹ in crore)

State	Amount
1. Assam	813.75
2. Himachal Pradesh	337.85
3. Jammu & Kashmir	381.96
4. Jharkhand	22.71
5. Uttar Pradesh	401.91
6. Uttarakhand	203.61
Total	2,161.79

In Tamil Nadu, there was a delay ranging from 13 to 25 months in submission of audited statement of expenditure due to which the balance financial assistance of ₹ 361.43 crore was not released under five projects as of August 2016.

The Department stated (November 2016) the delay in submission of audited statement of expenditure was due to eviction of encroachment (project TN-1) and intervening of Cyclone Thane (project TN-2 to TN-4) and some clarifications sought by the CWC. The fact remained that delay in submission of audited certificates of expenditure resulted in non-receipt of balance funds under the projects.

Ministry stated (February 2017) that the release of Central assistance to States were done either on submission of audited statement of expenditure by Accountants General office or the certificate submitted duly signed by Account officer/Executive Engineer of the project of that very State.

However, the fact remains that Central assistance to States were released in contravention of FMP guidelines.

2.12 Submission of Utilization Certificates

It was, therefore, necessary to furnish UCs in respect of each project so that the quantum of progress achieved in each project could be ascertained from the UCs and release of funds regulated commensurate with the achievements.

We found that five States (Assam, Bihar Odisha, Uttarakhand and West Bengal) did not submit UCs for funds amounting to ₹ 182.82 crore¹⁹. No relevant record regarding submission of UCs was found in Jammu & Kashmir.

There was delay of eight to 20 months in submission of UCs by Tamil Nadu, due to which the subsequent instalment of ₹ 361.43 crore was not released. The State

¹⁹ Assam: ₹ 35.57 crore; Bihar: ₹ 7.46 crore; Odisha: ₹ 4.06 crore; Uttarakhand: ₹ 68.47 crore and West Bengal: ₹ 67.26 crore.

Department stated (November 2016) that UCs were originally submitted in October 2011 but were not accepted and returned by CWC as the same were not countersigned by the Secretary to Government/Public Works Department (PWD).

Thus, due to non-receipt of utilization certificate, MoWR, RD&GR could not ascertain proper utilization of funds and release further funds, which affected timely completion of FMP projects.

Ministry stated (February 2017) that timely submission of UCs is being impressed upon the States.

2.13 Conclusion

During the nine years of the XI and XII Plan periods, only 57 *per cent* of approved works were completed. There were shortfalls in releases of Central assistance, deviations from FMP guidelines in phasing of expenditure and delays in completion of the projects. There were also inordinate delays in releasing first instalment of Central assistance to State Governments after approval of EC. The amounts along with the interest accrued thereon were not recovered from the State Governments for the delayed release of funds to the executing agencies. There were instances of funds remaining parked with the executing agencies without utilisation or being diverted by the implementing agencies for works not approved in the DPRs. Expenditure incurred in the previous financial year before its approval by EC was taken into account for working out the FMP cost in contravention of FMP guidelines. MoWR, RD&GR and State Governments did not ensure submission of audited statements of expenditure and UCs within stipulated time before releasing of Central assistance.

2.14 Recommendations

We recommend that

- i) MoWR, RD&GR may release adequate funds/reimburse funds in timely manner as per FMP guidelines and may impress upon State Governments to release funds to executing agencies in time bound manner.
- ii) MoWR, RD&GR may keep strict vigilance on utilisation of funds by State Government and executing agencies so as to avoid parking and diversion of funds.
- iii) MoWR, RD&GR may release/reimburse the funds to the State Governments only after ensuring receipt of audited statements of expenditure, Utilization Certificates and other requisite documents.

A decorative graphic on a blue background. It features a large 'V' shape on the left, formed by two parallel lines: a light blue one on top and a black one on the bottom. To the right of the 'V' is a white circle with a light blue border, containing the number '3'. Two horizontal lines, one light blue and one black, extend from the right side of the circle across the page.

3

CHAPTER

3

Chapter

Execution of Flood Management Programme

3.1 Introduction

Critical flood control and river management works in the entire country are covered under the Flood Management Programme (FMP). These works include river management, flood control, anti-erosion, drainage development, anti-sea erosion, flood proofing works besides flood prone area development programme in critical regions. It also includes restoration of damaged flood control/management works.

FMP was sanctioned in November 2007 during the XI Plan. However, spill over works of on-going Central plan schemes of X Plan were also to be supported under this scheme during XI Plan and spill over works of XI Plan would be supported during XII Plan. During XII Plan Central assistance for projects of catchment area treatment was also to be provided. 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.

The concerned State Governments submit preliminary reports covering surveys and investigations, International/Inter-State aspect, hydrology, etc. to CWC, which conveys 'in-principle' consent to State Governments for preparation of Detailed Project Report (DPR). Project report after having secured all mandatory clearances from the specified Committees including State Technical Advisory Committee, State Flood Control Board, Forest Clearance, techno-economic viability acceptance of CWC/GFCC/Advisory Committee of MoWR, RD&GR (as applicable), erstwhile Planning Commission, etc. were to be considered and finalized for Central assistance under this scheme by an Empowered Committee (EC) headed by Secretary (Expenditure), Ministry of Finance (MoF) during XI FYP and by an Inter-Ministerial Committee (IMC) headed by the Secretary, MoWR, RD&GR during XII FYP.

Out of the sampled 206 projects in 17 State/UTs, 81 projects were completed as of March 2016. Audit findings relating to these projects are discussed in succeeding paragraphs.

3.2 Deficiencies in formulation of Project Proposal/Detailed Project Report

According to Section 4.1 of FMP Guidelines 2009, flood management works were to be taken up in an integrated manner covering entire river/tributary or a major segment of rivers/tributaries. Section 5.2 also states that the CWC/GFCC/BB would play an active role in the formulation stage of the proposals for flood management works by the State Governments.

As per the scheme guidelines, Preliminary Project Report (PPR) were to be prepared including general data of survey/investigation, geological investigation, anticipated benefits/expected outcomes of the project, actual time taken in preparation of PPR reports, date of submission of PPR to CWC and date on which PPR was accepted by CWC. Further, the scheme guidelines also provided that DPRs must contain meteorological and other data like soil survey, socio-economic bench mark survey, salinity and drainage and engineering surveys, land effected cases such as the area under submergence, total forest land effected, total private land effected, revenue land effected, etc. As per guidelines for Preparation of DPR of Irrigation and Multipurpose Projects 2010, the preliminary project proposal should contain general data of the hydrological and meteorological investigations, etc. collected by way of preliminary studies and survey made in advance.

Also the National Water Policy, 2012 underlined the need for factoring the input of climate change into all projects. The policy also envisages that planning and management of water resources structures such as dams, flood embankments, tidal embankments, etc. should incorporate coping strategies for possible climate change.

We found deficiencies in formulation of Project Proposal/DPR, as detailed State-wise in Table 3.1.

Table 3.1: Deficiencies in Project Proposals/DPR

State	Observations
1. Arunachal Pradesh	There was no integrated approach in identification of flood management works and selection of FMP projects based on different rivers/basins. Brahmaputra Board was also not involved during the formulation stage. The Water Resource Department stated that projects are shortlisted based on problem areas as identified by Divisional/district level offices.

2. Assam	<p>Though the scope of works was proposed at Divisional level, DPRs of each of the projects executed under FMP were not prepared. During discussion with Audit, the Divisional Officers stated (May-July 2016) that the detailed estimates were considered as DPR. The reply is not acceptable as DPRs containing records of Morphology study, Survey and Investigation, authority/technical Committee who selected the site, etc. were to be prepared.</p> <p>Further, one project (AS-105) out of the above works with an estimated cost of ₹ 14.94 crore was recommended for review (November 2009) by the 47th State TAC. However, the project was implemented without obtaining the final approval of TAC.</p>
3. Himachal Pradesh	<p>Of five selected projects, DPRs in respect of only two projects (HP-2 and HP-4) were based on mathematical model study including morphological studies. The remaining three projects (HP-1, HP-3 and HP-7) were taken up without any such study. Central Monitoring Agencies viz. CWC/GFCC also did not insist on preparation of DPRs on the basis of mathematical model studies/morphological studies.</p>
4. Jammu & Kashmir	<p>PPRs were not prepared in the test checked Divisions. Further, the DPRs did not contain information as required under scheme guidelines. Dates of preparation of DPRs were also not recorded. As a result, time taken in preparation of DPR and its submission to SE/CE/TAC and actual time taken in finalization /approval of project could not be verified.</p>
5. Jharkhand	<p>Approval of the State Flood Control Board as stipulated under FMP guidelines was not obtained in respect of proposals for the projects (JHK-01, JHK-02 and JHK-03).</p>
6. Kerala	<p>No PPRs were prepared for the FMP projects, KEL-1, KEL-2, KEL-3 and KEL-4. This was justified on the ground that the DPRs were prepared in 2009 and 2010 based on the recommendations in the study report of M.S Swaminathan Research Foundation (MSSRF) for another project approved (July 2008) in principle by GoI. It was further stated that DPRs were prepared based on Hydrological survey, Meteorological data collection and engineering surveys including total station surveys and scientific study reports furnished by joint team of IIT, Chennai and Centre for Water Resources and Development Management (CWRDM), Kozhikode. The Water Resource Department also stated (June 2016) that the soil investigation of project KEL-2 was conducted by Kerala Engineering Research Institute, Peechi.</p> <p>We, however, found that the above said study was conducted for another project for which final reports were submitted to Government of Kerala in December 2011, after the DPRs for the projects KEL-1, KEL-2, KEL-3 and KEL-4 had already been prepared (2009/2010). Further, the study report on soil investigation was also submitted only in December 2012 after preparation of DPRs.</p> <p>As such, the methodology for preparation of DPRs could not be verified.</p>
7. Uttar Pradesh	<p>In 14 test checked projects, scientific assessment, morphological study and Digital Elevation Model (DEM) required for formulation of project proposals/DPR were not made. Documents pertaining to soil surveys, socio-economic benchmark survey, water logging, engineering surveys were not enclosed in DPR.</p>

8. West Bengal	<p>(a) In four selected Projects (WB-3, WB-6, WB-11 and WB - 14), FMP works were not taken up in an integrated manner, covering entire stretch of the affected portion of the river. Rather, these four projects were taken up in a fragmented manner at different locations or stretches of the rivers. For instance, the project WB-6 was executed on two rivers in five different locations²⁰ and clubbed into one FMP scheme. Similarly, in Project WB-3, two different work sites were clubbed together in one FMP scheme.</p> <p>(b) Out of nine selected FMP works, DPRs of only three projects²¹ were prepared by Irrigation and Water Department (IW&D). In other six projects only project booklets containing cost estimate of each item, analysis of rate, quantity calculation, etc. were prepared. The project booklets of these six projects did not contain any meteorological data, survey of soil, socio economic benchmark survey, water logging, salinity and drainage and engineering survey. It also did not contain population that would be benefitted by implementing these projects.</p> <p>(c) Task Force constituted (June 2009) by GoI to assess the damage caused by cyclone Aila and to suggest remedial measures to prevent further breaches in embankments and consequent flooding of areas recommended for short term and long term measures to be implemented by Irrigation & Waterways Department. DPR for the long term measures was to be prepared by February 2010. However, the Department did not prepare (March 2016) DPR of long term measure due to poor progress of short term measures (re-construction of embankments).</p>
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Thus, it can be observed that in the above eight States, there was no integrated approach in identification of flood management works and PPRs/DPRs were not prepared in accordance with the Scheme guidelines.

The Ministry stated (December 2016) that the integrated basin management approach is always emphasized. However, due to lack of resources with the States/UT and to take up the emergent works in critical areas, proposals are submitted by States/UT which are considered by MoWR, RD&GR.

The fact remained that there was no integrated approach in identification of flood management works and PPRs/DPRs were not prepared in accordance with the Scheme guidelines.

3.2.1 Delay in approval of DPRs for Anti-Erosion/Flood Protection work

As per CWC guidelines 2010 for appraisal of Irrigation and Multipurpose projects, the time prescribed for approval of DPRs by CWC/GFCC/BB is nine months after receipt of the project proposal.

Audit observed that there was considerable delay in approval of 39 projects by EC/IMC in eight out of the 17 selected States/UT. The State wise position is given in Table 3.2.

²⁰ Apalchand, Sidhabari-Chjangmari, Barnesh Domohani and Bakali over river Teesta and Basusuba over river Dharala.

²¹ Aila Project, KKB drainage basin scheme and Kandi Master Plan.

Table 3.2: Delay of projects by EC/IMC after approval of STAC

State	Projects scrutinised	Projects delayed	Delay by EC/IMC after approval of STAC
1. Arunachal Pradesh	21	11	4 - 8 years
2. Assam	30	1	More than 7 years
3. Bihar	24	10	10 - 75 months
4. Himachal Pradesh	5	1	More than 4 years
5. Jammu & Kashmir	18	5	2 - 4 years
6. Puducherry	1	1	3 years
7. Punjab	5	1	13 years
8. Uttar Pradesh	29	9	17 - 47 months
Total	133	39	

It can be seen from the table that the delays occurred ranging between 10 months to 13 years in approval of DPRs by EC/IMC. The long delay poses a risk of change in the site situation and river morphology over the years due to which technical design as approved by various technical authorities may no longer be relevant at the time of actual funding.

Ministry stated (February 2017) that examination and recommendation of projects depends on timely compliance by the State Governments on the observations made by appraisal agencies. The fact remained that the delay in approval of DPRs affected commencement and completion of the projects.

3.2.2 Non-achievement of objectives due to inadequate planning and palliative measures

In three projects implemented in Assam (two projects²²) and West Bengal (one project²³), we noticed that after completion of flood protection works and incurring expenditure of ₹ 16.72 crore, the area was inundated with floods, due to reasons such as protective measures not taken up to prevent back flow of the river, non-establishment of embankment near the sluice gate of the river and damage of newly constructed embankment, respectively.

As a result, the protection measures undertaken by the Departments were not sufficient to prevent damage from floods.

²² AS-26 - Raising and strengthening of B/dyke from Janjimukh to Neamati including dowel along Mudoijan P.W.D. Road and anti-erosion works at Sagunpara area in district Jorhat, Assam (Expenditure: ₹ 7.35 crore) and AS-40: - Raising and strengthening of embankment on the right bank of river Longai in and around Patharkandi (Expenditure: ₹ 6.47 crore).

²³ Bank protection works along both banks of the river Bhagirathi at Sundarpur and Basantpur, Kazipara to Nabagram and Saharbarati to Uttarasan outfall in the district Murshidabad and at Sanyalchar in the district Nadia, West Bengal (Expenditure: ₹ 2.90 crore).

3.2.3 Expenditure without approval of revised DPR

The Haryana State Flood Control Board (HSFCB) approved the FMP project (Har-1) in January 2008. GoI approved (August 2009) the project for ₹ 173.75 crore, to be completed by March 2012. Before any major work under the project was executed, the floods of year 2010 changed the site conditions and HSFCB revised the proposal in December 2010 and March 2012. The scope of the work was substantially changed in revised DPR. Accordingly, the State Government submitted the revised DPR to GFCC, Patna in March 2012 approval of which was pending as of June 2016. Expenditure of ₹ 176.17 crore (including Central share of ₹ 46.91 crore) was incurred without approval of revised DPR.

3.2.4 Benefit Cost Ratio

The guidelines for preparation and appraisal of projects under FMP included the procedure for working out Benefit Cost Ratio (BCR) of the project proposed to be undertaken, which was one of the criteria employed in the appraisal of project proposals for financial viability. The BCR should be worked out on prescribed standard and annual loss supported by documents from the Revenue Department of the State. BCR is calculated as follows:

- i) Average annual damage computed on the basis of at least last 10 years' data.
- ii) Average annual damage anticipated after execution of the project.
- iii) Saving in annual damage (item (i) - item (ii)).
- iv) Annual cost of flood management component is (a) 12 *per cent* of allocated cost of dam, (b) 16 *per cent* of allocated cost of embankment, (c) 17 *per cent* of allocated cost for anti-erosion projects, (d) Total annual cost (a+b+c).
- v) $BCR = \text{Item (iii)} / \text{Item (iv)}$.

Out of 137 selected FMP projects in Assam, Haryana, Himachal Pradesh, Jammu & Kashmir, Kerala, Odisha, Pudducherry, Punjab, Sikkim, Tamil Nadu and Uttar Pradesh, appraisals of 55 FMP projects received in CWC were checked. We noticed deficiencies in the calculation of BCR, details of which are given in Table 3.3.

Table 3.3: Deficiencies in calculation of Benefit Cost Ratio

State/UT	Project	Comment
1. Assam	AS 87, AS-81, AS-104	Data of past damage was not available in the projects. The area likely to be eroded in 50 years was worked out on the basis of average annual erosion (calculated on actual erosion of four to 12 years). Thus, data on probable damage was taken into consideration instead of actual data on damage.

	AS-130	Figures of damages that occurred during last six years as per departmental records of concerned Revenue Circle were taken for calculation of BCR instead of last 10 years.
	AS-102	BCR was based on the value of the produce of the land which would be benefited on implementation of the scheme, instead of actual damage that occurred during the last 10 years.
	AS-90	BCR was based on the approximated value of crop, etc. flooded during one year, and the figures were not authenticated by Revenue authorities.
2. Himachal Pradesh	HP-3	Damages figures were not authenticated by Revenue authorities.
	HP-2	BCR was based on the value of the produce (90.6 <i>per cent</i> of total damages of ₹ 51.53 crore) expected after the completion of the project on account of Agricultural, Horticultural, Fisheries and Forestry produce per annum instead of actual damage that occurred during the last 10 years.
3. Jammu & Kashmir	JK-2, JK-24 & JK-27	Data was taken for less than 10 years period. In JK-2, BCR was calculated on probable average annual benefits occurring after completion of the scheme, instead of actual damage that occurred during the last 10 years.
4. Manipur	MAN-1,2,7,8,10,11,12,13,15,18 and 19	BCR in respect of DPRs of 11 sampled projects was prepared without accounting of pre-project average annual damage for the last 10 years.
5. Puducherry	PD-1	Damages were calculated on the basis of value of land calculated on higher rate instead of approved rates.
6. Punjab	PB-3 and PB-4	Damages worked out on data of area affected by flood for one year instead of average annual damage for the last 10 years.
7. Sikkim	SIK-27	Instead of calculating average annual damage for the last 10 years the BCR was calculated based on the one year average actual loss plus one year average expected loss resulting in double impact of damages. The expected loss also included ₹ 360 crore as cost of Airport, which was incorrect.
8. Uttar Pradesh	UP-29	99 <i>per cent</i> of total damages taken for calculation of BCR were based on probable loss due to chance of breach in the bund which was being restored in this project.
9. Uttarakhand	Not available	Data in respect of population, houses, land affected and annual losses there against was based on departmental surveys alone and not substantiated by authentication from any other agency viz. concerned district administration/Agricultural Department.

Thus, it was observed that the BCR was not calculated as prescribed in the guidelines, due to which we could not derive an assurance on the correctness of the BCR employed as a basis for appraisal and subsequent approval of the projects.

The Ministry agreed (December 2016) to examine the cases mentioned in the report.

3.3 Delay in completion of projects

As per clause 4.9 of FMP Guidelines 2009, flood management works of critical nature are expected to be completed in a time bound manner, say in a maximum of two to three financial years. We found cases of delays in completion of projects in five States/UT. The State-wise details are given in Table 3.4.

Table 3.4: State wise details of delay in completion of projects

State	Projects test checked	Projects completed with delay	Period of delay
Arunachal Pradesh	21	10	1-3 years
Assam	30	22	3-33 months
Jammu & Kashmir	20	11	1-4 years
Odisha	30	26	1-32 months
West Bengal	9	5	7 months- 5 years

Non-execution of the above FMP works in time affected the issues of preventing soil erosion of the river bank, stabilizing the slope, river training work that poses threat to the lives, properties and siltation in the river.

The Ministry stated (December 2016) that due to lesser budgetary allocation under FMP, States are not getting the required funds, which is leading to delays in completion.

The fact remained that there were huge delays in completion of FMP works which were expected to be completed in a time bound period of two to three years.

Project and State specific delays are highlighted in the subsequent paragraphs.

3.3.1 Delay due to non-acquisition of land

Paragraph 4.6 of FMP guidelines 2009 envisages that at the time of submitting a new proposal, the State Governments should ensure acquisition of land required for the projects and should submit a certificate to this effect, failing which no funds would be released to the State Governments. Further, the land required for the projects were to be funded by the State Governments from its own resources.

EC in its 7th meeting (August 2011) reiterated the same and further stated that if any State Government was subsequently found to have provided a wrong

certificate regarding acquisition of land, the relevant project would be dropped and any release made adjusted appropriately.

We found that in seven States (Assam, Himachal Pradesh, Punjab, Tamil Nadu, Uttar Pradesh, Uttarakhand and West Bengal), land was not acquired before the start of work with the result that the projects were stalled, resulting in unfruitful expenditure of ₹ 59.88 crore in 13 projects in these States. A few interesting cases are discussed in Box 3.1.

Box 3.1: Non-acquisition of land

Assam
Construction of three embankments for a total length of 30.235 km were approved under three projects (AS-88, AS-90 and AS-130) between August 2011 and December 2013 at a total estimated cost of ₹ 135.40 crore. The works were left midway with physical progress of 40 <i>per cent</i> to 80 <i>per cent</i> and total financial progress of ₹ 15.36 crore due to non-availability of required land. The embankments were only partially constructed and there were number of gaps in the embankments. As a result, the entire length was exposed to the threat of inundation. This was significant, as the areas where the projects were sanctioned had suffered from floods every year during 2012-16.
Himachal Pradesh
Under the project HP-1 (Paonta Sahib Division), the work of construction of three embankments (3.200 km) was awarded (November 2010) to a contractor at a cost of ₹ 2.79 crore, stipulated to be completed by June 2011. However, as of June 2016, the contractor completed the embankment of 1.930 km only with expenditure of ₹ 1.95 crore. The delay in execution of the work was attributed to land disputes. This indicated that the Division awarded the embankment work without ensuring encumbrance free land. The Department did not take action to settle the land dispute and the work remained incomplete for more than six years since sanction.
Punjab
The project PB-1 was approved by CWC in March 2006. In order to avoid devastation to the farming community and their life and property and use of Nallah from army point of view, canalization of Sakki/Kiran Nallah ²⁴ , was proposed under the above project. Land acquisition was the major component of the project as land measuring 1,434.85 acre was required for straightening the alignment of the Nallah. Central assistance of ₹ 21.51 crore (October 2008) and State share of ₹ 7.17 crore (February 2009) were released for the project which was to be completed by March 2011. The Department started (October 2008) the project, however, the army stopped the work in June 2009. After obtaining NOC from the army, the work was resumed in January 2010. Thereafter, the project was delayed due to delay in release of funds by Finance Department and non-passing of bills by treasury. As a result, no land was acquired for the project even after lapse of more than seven years after approval of the project. Only 16 out of 36 proposed

²⁴ Having total length of 155.5 km (88 km in Gurdaspur district and 67.5 km in Amritsar district). It originates from Swalipur Kohlian near Dinanagar and outfalls in river Ravi near village Lodhi Gujjar in Amritsar district.

Village Reach (VR) bridges were completed and one bridge which was to provide connectivity to the people of villages Hardochhani and Balgan was lying in abandoned condition after incurring an expenditure of ₹ one crore. Some earth work in two bridges could not be executed due to non-acquisition of land. As a result, smooth passage of water beneath these two bridges constructed at a cost of ₹ 2.33 crore could not be ensured. The Executive Engineer, Drainage Division, Hoshiarpur, stated that (May 2016) the work was held up due to non-receipt of funds from the Government. The reply is not acceptable as the State Government should have ensured the acquisition of land required for the projects from their own resources.

Tamil Nadu

Creation of flood protection wall/embankment in the Adyar river near Nandambakkam bridge proposed (July 2008) to GoI under Centrally Sponsored, FMP was withdrawn by Chief Engineer, Water Resource Department (WRD) (March 2012), due to inability of WRD to acquire 0.69 hectare of land for the project, resulting in non-initiation of flood protection works and non-availing of GoI grant of ₹ 7.60 crore. This could have been one of the contributing factors for heavy inundation in Nandambakkam area of Chennai during 2015 floods.

Uttar Pradesh

Seven²⁵ out of 29 projects were approved by GoI at cost of ₹ 422.79 crore. The projects involved acquisition of land measuring 666.86 ha. Against this requirement, the Department could only acquire 361.50 ha (54 per cent) land with an expenditure of ₹ 44.62 crore. The Department was unable to acquire land ranging between 12 per cent to 86 per cent in these seven projects.

Further, in three projects (UP-1, UP-2 and UP-4), involving construction of 59.60 km earthen embankment on Ami (Gorakhpur) and Kunra (Siddharthnagar) rivers, only 23.20 km embankment was completed after incurring expenditure of ₹ 29.44 crore. As a result, there were gaps ranging from 60 to 1,000 m in these embankments, which were prone to damage due to rainfall and floods. Thus, construction of embankments without acquiring the requisite land resulted in unfruitful expenditure of ₹ 29.44 crore.

Uttarakhand

Construction of marginal bund on right bank of River Ganga from Bhogpur to Balawali in district Haridwar in a length of 20.500 Km (Project UK-1) was under the consideration of the State Irrigation Department since March 1988. The project was submitted (April 1989) to GFCC Patna for approval, but the same was revised on several occasions subsequently under the directions of GFCC. The project was approved (October 2005) by the erstwhile Planning Commission at an estimated cost of ₹ 11.92 crore with the remark that work be completed by the end of March 2007. Though the work was started in March 2006, the same could not be completed in time due to non-availability of land. The State Government approached GFCC (May 2009) to revise the cost of project on the ground of delay in inclusion of the project in X Five Year Plan (2002-2007). The project cost was revised by GoI at a cost of ₹ 20.69 crore and the work was completed by April 2014 after incurring expenditure of ₹ 20.69 crore.

²⁵ UP-01, UP-02, UP-03, UP-12, UP-25, UP-27 & UP-28

Thus, the project took 17 years before getting the approval of the concerned authorities. The State Government stated (December 2016) that it had to depend on GoI for funds and for various approvals. Fact remained that the project took more than 26 years to complete.

West Bengal

As per DPR of WB-17, Baghai river, one of the main tributary of Kaliaghai was to be desilted from 0 km to 24 km by excavation of the river bed. We noticed that excavation from 11.5 km to 22.50 km of the river stretch was completed (May 2016) at a cost of ₹ 18.85 crore. However, work in the stretch 0 km to 11.5 km and 22.5 km to 24 km was not taken up due to delay in land acquisition. Due to gaps in the excavation of the river stretch, drainage of accumulated water in the entire stretch may be affected.

The Ministry agreed (December 2016) to examine the cases mentioned in the report.

3.3.2 Non recovery of compensation due to delay in completion of projects

As per clause 2 of the Conditions of Contract, the contractor who fails to complete the work within the stipulated date shall be liable to pay an amount of compensation equal to one *per cent* or such smaller amount as the Superintending Engineer may decide on the said estimated cost of the whole work for every day that the quantity of work remains incomplete. The entire amount of compensation to be paid shall not, however, exceed 10 *per cent* on the estimated cost of the work.

In 89 works of eight projects²⁶ in Manipur, the contractors failed to complete execution of the works within the stipulated period. Three works remained incomplete even after lapse of more than four years from the stipulated date of completion. As such, the defaulting contractors were liable for payment of compensation of ₹ 1.88 crore of which ₹ 1.55 crore was not recovered.

3.3.3 Incomplete projects

We noticed cases of projects remaining incomplete as detailed below:

Himachal Pradesh: The execution of FMP HP-4 having estimated cost of ₹ 922.48 crore was held up due to non-release of funds (Central share/State share) since November 2014 after incurring expenditure of ₹ 359.48 crore up to June 2016.

Jharkhand: The work under project JHK-3 was not found completed within the stipulated period of completion (March 2012). The contractor applied for extension of time up to March 2013 on the ground of public hindrances, land problem and delay of payments though these were not mentioned in Standard Bidding Document (SBD) for seeking extension of time. The application was forwarded (November 2013) to Water Resources Department (WRD) after expiry of 14 months from the receipt of application from the contractor in contravention

²⁶ MAN-1,2,7,8, 10, 11,12,13, 15,18,19

of prescribed period of 14 days. The Ganga Pump Nehar Division, Sahebganj finally granted (December 2013) extension of time after expiry of 38 days in contravention of prescribed period of 21 days. The work remained incomplete as of March 2016.

Manipur: Three works executed under the project (MAN-7) remained abandoned since April 2013 after incurring an expenditure of ₹ 2.54 crore.

Sikkim: Out of 28 projects sanctioned during 2007-12, four projects (14 per cent) were incomplete as of March 2016. During 2012-16, 17 projects were sanctioned but Gol had not released any funds as of March 2016. Water Resources and River Development Department (WRRDD) stated (November 2016) that these 17 projects could not be executed for want of State share due to revision of cost sharing ratio from 90:10 to 70:30.

The project (Sik-16) was awarded (September 2008) to the contractor for ₹ 5.31 crore with the completion date as April 2010. The contractor was paid (September 2009 to March 2016) ₹ 2.60 crore. The scheduled date of completion of work was subsequently extended upto February 2011 as per the request made by the contractor. However, till August 2013 the contractor had executed only half of the contract value of the work. The Department finally rescinded the work in September 2014 and decided (November 2014) to execute the residual work valuing ₹ 2.70 crore departmentally. Further, as per the report of spot inspection of work site by the site engineer and the public of the area, the quality of the works was also not found satisfactory due to which the Guide Wall and Drop Wall were washed off in the last four monsoon rains and required total reconstruction. The work remained incomplete as of November 2016 and expenditure of ₹ 2.60 crore was rendered infructuous. We observed that the Department did not take any action on the contractor for the loss sustained to the Government. WRRDD stated (November 2016) that the reason for abandonment of work by the contractor could not be ascertained.

Uttar Pradesh: Gol sanctioned ₹ 48.85 crore for projects UP-1 to UP-4 (2007-2008) in Uttar Pradesh on the basis of Schedule of Rates (SoR) of 2003-04. Due to formulation of projects on old rates, only 53.62 km against the required length of 127 km embankment was constructed after incurring expenditure of ₹ 41.95 crore. Consequently, project costs of UP-01, UP-02 and UP-03 were revised to ₹ 30.12 crore, ₹ 39.82 crore and ₹ 25.61 crore respectively (2009-10) and UP-04 revised to ₹ 42.12 crore (2010-11), due to increase in cost of material and labour. All the four revised projects were approved by TAC and Steering Committee of State Flood Control Board (SFCB), however, the approval of GFCC/MoWR, RD&GR was accorded only for UP-03 and UP-04 (March, 2012) for ₹ 25.61 crore and ₹ 27.76 crore respectively, whereas approval for UP-01 and 02 was pending as of March 2016. The progress of work of all four projects was stopped (March 2011)

for want of funds with the physical progress between 30 to 54 *per cent*. Thus, work executed after incurring expenditure of ₹ 41.95 crore was stalled and remained to be completed.

Further, in UP-4 project, with a view to protect 1,696 hectares of land, the project (UP-4) for construction of 15 km long earthen embankment on right bank of river Kunra in Siddharth Nagar, Uttar Pradesh was approved by GFCC in 2006-07 with sanctioned cost of ₹ 10.33 crore including Central assistance of ₹ 7.75 crore. The construction work included earthen embankment and 10 regulators. During scrutiny of records and joint physical verification (May 2016) it was found that only 8.119 km of earthen embankment was constructed. Further, regulators were not constructed. Instead several gaps of 50-60 m were left between earthen embankments for these regulators. No plantation work was carried out on the embankment though provisioned in the approved estimates. Due to incomplete construction of earthen embankment and non-construction of regulators, the objective of protection of 1,696 ha of land from flooding was not achieved rendering the expenditure of ₹ 10.33 crore incurred on the project as unfruitful.

3.4 Deficiencies in contract management

The project implementing authorities were required to follow the provisions of General Financial Rules, applicable State Financial Rules and CPWD Manual, etc. in the award and management of contracts for execution of works under the sanctioned projects. To observe transparency and maintain economy in contract management and award of work, Central Vigilance Commission also circulated various circulars and guidelines to the States. However, test check of records of FMP Projects revealed various irregularities in the contract management as discussed in succeeding paragraphs.

3.4.1 Execution of work without call of tender

Test check of records relating to 18 projects in four States revealed that works amounting to ₹ 109.01 crore were awarded without call of tender. Details of execution of work without call of tender are given in Table 3.5.

Table 3.5: Details of works without call of tender

(₹ in crore)

State	Projects test checked	Estimated cost	Comments
1 Arunachal Pradesh	6 (ArP-2, ArP-4, ArP-5, ArP-6, ArP-10 and ArP-14)	58.49	Projects were executed by implementing agencies through work orders without call of tender.

State	Projects test checked	Estimated cost	Comments
2 Haryana	HAR-1 (seven works)	15.97	In three Divisions works were allotted against single tender received, without re-calling for tenders.
3 Jammu & Kashmir	8 (JK-2, JK-6, JK-7, JK-9, JK-13, JK-14, JK-17 & JK-36	9.45	Works were executed without calling of tender.
4 Uttar Pradesh	2 (UP-12 and UP-15), 53 agreements	10.99	The agreements on nomination basis were signed with private contractors without competitive bidding citing urgency. However, 19 out of 50 works were completed with a delay of seven to eight months. The Irrigation and Water Resources Department stated that the agreements were executed in anticipation of the sanction as the work was urgent. Reply is not acceptable as the laying/pitching work of boulders had started only as late as March after the monsoon season.
	UP-16	14.11	12,65,500 geo-bags ²⁷ were procured at a cost of ₹ 14.11 crore through 14 supply orders (cost ranging between ₹ 40 lakh and ₹ 2.23 crore) from six firms on quotation basis instead of through competitive bidding by inviting tender.

Thus, the benefit of competitive price expected from the tendering process was lacking. Further, award of work without calling for tenders was also in violation of the General Financial Rules.

3.4.2 Award of contract in violation of codal provisions/instructions

As per Rule 129 (1) (vi) of the General Financial Rules, no works shall be commenced or liability incurred in connection with it until tenders are invited and processed in accordance with rules. Rules 252 and 253 of the Assam Financial Rules prescribe the following process for allotment of contract work: (1) Publishing of NIT; (2) Receipt of bid documents under sealed cover from interested contractor(s); (3) Opening of bid documents; (4) Selection of

²⁷ Geo-bag or Nonwoven Geotextile bag is a product that is made out of polyester, polypropylene or polyethylene and is used for the protection of hydraulic structures and riverbanks from severe erosion.

contractors through comparative statement of the bidders; (5) Signing tender agreement and (6) Issue of work order followed.

Further, MoWR, RD&GR suggested (August 2010) to the Government of Assam that works should not be unnecessarily split to engage a large number of contractors. Only reliable contractors should be engaged, so that quality and coordination between contractors could be achieved. It was also suggested that the practice of engaging a large number of contractors through small tenders should be done away with immediately.

We found cases of violation of codal provisions and instructions of Ministry in awards of contracts in Assam which are discussed in succeeding paragraphs.

- (i) Under the project AS-102, the Chirang WR Division issued 151 work orders to 86 contractors before entering into tender agreement with them. The Division accepted (July 2016) the fact and assured that codal provisions would be followed in future.
- (ii) Similarly, under AS-39, the Goalpara WR Division issued work orders (February-December 2009) to 219 contractors without following selection procedures. The work orders contained instructions to sign the tender agreement within three to 15 days which was in contravention of the Assam Financial Rules. Further, agreements were not executed in 67 cases even after allotment of work. The Division stated that the above system followed in the past was discontinued after introduction of e-tendering (December 2015) in the Department.
- (iii) Large numbers of contractors were involved in the projects, ranging from 27 (AS-77), 188 (AS-40) to 517 (AS-104) in a single FMP work. Involvement of such large numbers of contractors in execution of single project created hurdles in maintenance of accounts and monitoring of execution.
- (iv) The Sivasagar WR Division failed to maintain basic records like Register of Works, Contractors' Ledger, etc. The Division stated that such large numbers of contractors were involved in order to provide employment to registered contractors. The reply is not acceptable as the objective of FMP was to provide effective flood control measures and not to guarantee employment to registered contractors.

3.4.3 Splitting of Works

Rule 130 of GFR provides that for purpose of approval and sanction, a group of works which forms one project, shall be considered as one work. The necessity for obtaining approval or sanction of higher authority to a project which consists of such a group of work should not be avoided because of the fact that the cost of

each particular work in the project was within the powers of such approval of a lower authority. This provision however shall not apply in case of works of similar nature which are independent of each other.

We observed from records relating to five projects in three States that works amounting to ₹ 27.81 crore were awarded after splitting of the work to cover the bid capacity of contractors which was in violation of GFR. This resulted in undue favour to the contractor and excess payment of ₹ 1.71 crore to contractors.

- a. **Bihar:** In project BR-51 in Bihar, NIT was invited for work of ₹ 7.32 crore, however the work was split to accommodate the capacity of one bidder and a portion amounting to ₹ 3.21 crore was awarded without re-tendering. Another NIT was subsequently invited for residual work under this project. Thus, award of work to an ineligible bidder resulted in extension of undue favour to contractor.
- b. **Himachal Pradesh:** The work of FMP HP-7 implemented by Paonta Sahib Division having approved cost of ₹ 14.37 crore was split into five jobs on the ground of executing the work speedily, achieving the targets and utilising funds. The Division stated (July 2016) that the work was split up for speedy execution of the work. The reply is not acceptable as the action was in contravention of the GFRs. Moreover, it was seen in audit that the completion of the project was delayed by 13 months and the project remained incomplete as of June 2016.

A comparison of item rates awarded to different contractors of five jobs also revealed variations, which resulted in excess payment of ₹ 1.71 crore to contractors because of higher items rates under their respective contracts.

- c. **Jammu & Kashmir:** As per Financial Rules of Jammu & Kashmir, the Chief Engineer, Superintending Engineer and Executive Engineer (EE) are delegated the powers to allot works costing up to ₹ 50 lakh, up to ₹ 20 lakh and up to ₹ 10 lakh respectively²⁸. We noticed that the EE's labour works to the tune of ₹ 6.12 crore (advertised cost) were split in three projects (JK-2, JK-32 and JK-33) and work was awarded to 96 contractors valuing between ₹ 1.50 lakh and below ₹ 10 lakh each.

3.4.4 Excess expenditure due to award of work to L-2

As per para 13.18.1 (f) of Haryana PWD Code, if the lowest agency (L-1) backs out, his earnest money shall be forfeited and the second lowest agency (L-2), third lowest agency (L-3) in order of sequence, may be called upon to bring his offer to the level as the originally first lowest agency. In the event of their refusal to do so, tenders shall be recalled.

²⁸ up to ₹ 4 crore, up to ₹ 2 crore and up to ₹ 40 lakh respectively (w.e.f January 2013)

In Haryana, tenders were invited for the work 'Strengthening of river embankment of River Yamuna' for an amount of ₹ 6.40 crore in HAR-1 project. As per comparative statement the rate of L-1 was ₹ 75.51 per cu m for earth work. Accordingly, the work was allotted to the firm in March 2012 for ₹ 5.11 crore. The firm, however, backed out and did not undertake the work. Subsequently, the work was awarded to L-2. We observed that the work was allotted to (L-2) on their quoted rate ₹ 84 per cu m instead of the rate quoted by L-1, which was in contravention of rules. The work was completed for ₹ 4.89 crore which resulted in excess expenditure of ₹ 49 lakh.

3.4.5 Award of works without collecting Performance Guarantee Bond

As per CPWD Manual, a successful tenderer shall deposit five *per cent* of the tendered amount as Performance Guarantee Bond (PGB) and the letter for the commencement of the work shall be issued to the contractor only after he submits the PGB.

We noticed from records relating to 15 projects in three States that PGB was either not obtained or not renewed, details of which are given in Table 3.6.

Table 3.6: Details of contracts without Performance Guarantee Bond

State	Project Code /No. of works	Amount of performance guarantee	Remarks
1 Manipur	334 works pertaining to 11 sampled Anti-erosion Flood Control Projects	₹ 2.83 crore	PGB was not obtained
2 Jharkhand	JHK-1	₹ 38 lakh ₹ 66 lakh	PGB not renewed after July 2012 and August 2013 respectively.
3 Tamil Nadu	Three projects	-	In respect of one project completed in March 2012, PGB was not obtained from the contractor. In two projects validity period of PGB was not extended beyond March 2013.

Non-collection/renewal of PGB was in contravention of the provision of CPWD manual.

3.5 Execution of contracts

As per rule 132 of GFR the broad procedure for execution of works includes preparation of detailed design and estimates; issue of administrative approval and expenditure sanction; no work to be executed before issue of administrative approval and expenditure sanction; issue of tenders as per rules; execution of

Contract Agreement or Award of work before the commencement of work; and final payment only on satisfactory completion of the work.

3.5.1 Deviations from the approved scope of work

(i) In two projects implemented by Arunachal Pradesh and one project implemented in Uttar Pradesh we observed that work actually executed was below the approved scope of work, as discussed below:

Arunachal Pradesh: While executing the work under project ArP-4 - Flood protection works on Pachin river from Naharlagun to Nirjuli, against a total provision of ₹ 6.03 crore for 2,053.00 m, length of only 1,531.33 m of the structure was constructed at a cost of ₹ 1.64 crore. Against the required volume of crated boulder of 16,424 cu m, only 4,975.91 cu m was constructed which was only 30.30 *per cent* of the approved scope of work. Similarly, under the project: ArP-5 - Anti-erosion works of Noa Dehing river to protect both bank of river in the downstream of Border Roads Task Force (BRTF) bridge, against the requirement of 10,136.9 cu m of wire netted boulder crates and 3,732.45 cu m of Boulder pitching at a cost of ₹ 3.63 crore, only 4,332.10 cu m and 1,598.91 cu m respectively was done at a cost of ₹ 16 lakh. Further, revetment was constructed only in and around the spurs though the original provision was for 835 m in length. Thus, there was curtailment of work to the extent of 58 *per cent*, and ₹ 3.47 crore was diverted to other components of the work.

Uttar Pradesh: The project UP-27: - Construction of marginal embankment upstream of Elgin Bridge along right bank of river Ghaghra in districts Barabanki was sanctioned by GoI (December 2013) for ₹ 170.08 crore. Earthwork of 62,67,380 cu m (₹ 89.39 crore) was provisioned in DPR but in the estimate, the same was reduced to 38,48,939 cu m (₹ 77.64 crore) without any justification. Since the corresponding length of embankment was not reduced, it may have impact on the safety level of embankment.

(ii) In one project in Arunachal Pradesh ArP-6 - Anti-erosion works of Noa Dehing river to protect Diyun Circle in Lohit river, we observed that a total of 95,954.58 cu m of earthwork with extra charge for additional lift costing ₹ 1.06 crore was executed though the same not provided in the DPR. As the above work was not directly related to Anti-Erosion works, the construction of revetment, embankment and boulder crates was compromised. Justification for taking up the work was not on record.

The Ministry stated (December 2016) that the monitoring teams of CWC/GFCC/BB generally examine and advise the project authorities on these issues during the field visits. The Ministry needs to strengthen the monitoring by these agencies and impress on the State Governments to undertake projects in accordance with the scheme guidelines.

3.5.2 Expenditure incurred without approval of the Competent Authority

In four projects implemented in Assam, Himachal Pradesh and Tamil Nadu, we noticed that expenditure was incurred on projects without approval of the Competent Authority. The details are discussed below:

(i) Assam: Under the Project AS-85 - Emergent measures for protection of Rohmorja area in Dibrugarh district, the erstwhile Planning Commission accorded (February 2010) investment clearance to the work at ₹ 59.91 crore. State Finance Department restricted the rates of items of the estimate and accorded (December 2010) concurrence at ₹ 52.35 crore based on which Water Resources Department (WRD) accorded Administrative Approval (AA) (December 2010) and Technical Sanction (TS) (February 2011). However, against the sanction, actual expenditure of ₹ 59.82 crore was incurred, resulting in unauthorized expenditure of ₹ 7.46 crore.

(ii) Himachal Pradesh: In two projects (HP-1 and HP-7), the contractor executed four jobs of embankment at a cost of ₹ 3.86 crore against the contracted amount of ₹ 3.57 crore during 2011-16. Payment of ₹ 29 lakh was made to contractors over and above the value of the contract without approval of Competent Authority.

(iii) Tamil Nadu: Under the Project TN-4, expenditure of ₹ 2.03 crore was incurred for removal of sand shoal under FMP which was not in order as the same was not included in the scope of work. The Department stated (November 2016) that the desilting work was executed out of the savings in the lump sum provision. However, approval of higher authority was not furnished to Audit.

3.5.3 Cost escalation in work

Under the project BR-32, Raising, strengthening and extension of existing embankments along Bhutahi Balan river, Madhubani district, Bihar the work of raising, strengthening of 53.08 km and extension of 1.72 km of embankment with brick soling on 53.08 km on existing embankment was approved by MoWR, RD&GR with an estimated cost of ₹ 37.14 crore. The work was awarded (January 2010) to single contractor under two agreements with agreement cost of ₹ 32.02 crore and scheduled date of completion by May 2010. The work of brick soling was not included in the scope of work of the agreements. The work was closed (March 2012) without completing the scope of the agreement. Subsequently, four agreements were executed (March 2012) for residual work and brick soling on 53.08 km on existing embankment with agreement value of ₹ 9.47 crore. Total expenditure on the project was ₹ 35.86 crore. Thus, due to

price escalation and non-inclusion of brick soling work in the original agreement resulted in extra expenditure of ₹ 1.82 crore.

3.5.4 Idle inventory

Under one project (HP-4) in Himachal Pradesh, the Irrigation and Public Health Department (IPH) procured G.I. wires for issue and use by contractors without assessing actual requirement. This resulted in idle inventory of wires valuing ₹ 25.40 crore, which remained unutilised.

3.5.5 Execution of works at unidentified areas

Irrigation and Flood Control Department, Manipur executed flood protection works under projects MAN-10 and MAN-13, (December 2008 – March 2010) with an expenditure of ₹ 2.90 crore on various sites namely Jirighat, Khutchoithup and Nongbrang. We, however, observed that these sites were not identified by the Department as flood prone areas. Execution of flood protection works at unidentified sites resulted in wasting of resources.

3.5.6 Irregular expenditure

We found cases of irregular expenditure in the projects shown below:

- (i) As per the CPWD manual, provision for contingency shall be kept in the estimated cost of the project. The contingencies can be utilized in connection with the execution of the project on activities such as engagement of watch and ward staff and jobworks like surveying, material testing, estimating, structural design, drawings, models and other field requirements, etc.

The GoI released (2008-09) ₹ 11.78 crore for 11 FMP projects in Manipur. However, against this, an amount of ₹ 9.38 crore only was released by the State Government after deducting ₹ 2.40 crore at source including ₹ 35 lakh as contingency charges (at the rate of three *per cent*). As contingency charges are to be utilised by the implementing agency in connection with the execution of the concerned work, deduction at source of the contingency charges by the Finance Department of the State was in violation of the norms.

- (ii) CPWD Manual 2007 provides that mobilisation advance limited to 10 *per cent* of tendered amount at 10 *per cent* simple interest per annum can be sanctioned in not less than two instalments against a bank guarantee for the full amount of the advance. We observed that mobilisation advance was not sanctioned as per the CPWD Manual as discussed below:

Assam: Under the project AS-88, interest free mobilization advance of 30 *per cent* of the contract price amounting to ₹ 6.55 crore was granted instead of the prescribed rate of 10 *per cent* of the contract price amounting to ₹ 2.19 crore (10 *per cent*). This resulted in loss of interest of ₹ 78 lakh.

West Bengal: The Irrigation and Waterways Department allowed interest free mobilisation advance of ₹ 76 crore in execution of the Aila Project (WB-16) which resulted in loss of interest to the tune of ₹ 15.06 crore.

- (iii) Under the Project TN-3 and TN-4, executed in Tamil Nadu, expenditure of ₹ 34.51 crore was incurred towards provision of jeep track/ inspection roads with Water Bound Macadam (WBM)/ Bitumen (BT) surface over the flood embankment which was ineligible under FMP. In the Exit Conference (November 2016), the Department clarified that the site was of a clay soil necessitating the same for carrying out inspection and maintenance. However, formal sanction to the same was not received.

3.5.7 Extension of work resulting in price adjustment

In Jharkhand, the projects (JHK-2 and JHK-3), were to be completed by June 2011 but a corrigendum was issued (September 2010) extending the period of completion of work from June 2011 to March 2012. However, no change/modification in the items of work were mentioned in the Bill of Quantity (BoQ). As a result, the contractor became eligible for the price adjustment of ₹ 2.23 crore (₹ 1.07 crore for JHK-02 and ₹ 1.16 crore for JHK-03) as per Standard Bidding Document (SBD). In addition, the State could not receive Central share of ₹ 2.81 crore from the sanctioned amount of ₹ 7.43 crore for want of approval of extension of completion schedule by the erstwhile Planning Commission, Gol.

3.5.8 Additional expenditure due to delay in completion of work

The project UP-12 to be executed in Uttar Pradesh was sanctioned for protection of 312.54 ha land from flood, under which construction of 2,850 m long embankment from Harishchandra Ghat to Udaya Ghat at right side of Ghaghra river in the district Faizabad was approved at a cost of ₹ 5.46 crore (2005-06) from the State budget. The work was entrusted to Uttar Pradesh Project Corporation Limited (UPPCL) and started in February 2007. Payment of ₹ 1.76 crore was made to UPPCL upto March 2008. UPPCL completed only earthen part of embankment and left the work (March 2008) due to change in alignment of embankment (from 0-2,850 metre to 3,900 metre) and increase in cost of material and labour. Consequently, a revised estimate of ₹ 9.42 crore including balance work was prepared which was approved (October 2009) at a cost of ₹ 8.77 crore under UP-12.

Meanwhile, 460 m of constructed earthen embankment was washed away in flood during 2008. In order to protect the earthen embankment, a new project of retired embankment was proposed at a cost of ₹ 12.90 crore which was sent (February 2009) to GFCC again for inclusion under FMP. GFCC accorded approval

of ₹ 11.30 crore (March 2009) under FMP Project UP-12 on which expenditure of ₹ 9.96 crore was incurred (March 2016).

Thus, delay in completion of work resulted in cost escalation.

3.5.9 Execution of sub-standard works

Departmental inspection of nine works in Haryana (HAR-1) amounting to ₹ 41.12 crore for Tajewala complex pointed out a loss of ₹ 17.03 crore (August 2011) on account of substandard works. A committee of three members pointed out that ₹ 10.07 crore was recoverable from contractor. The Department charge-sheeted its 11 officers/officials, blacklisted five contractors for nine works and registered an FIR (May 2012) with Police for fake guarantees. The amount was not recovered as of June 2016. During the exit conference, the State Government intimated that inquiry officer had since been appointed (May 2015).

3.5.10 Non-recovery of royalty

Royalty for minerals used in FMP works from allotted quarries of Industries Department was to be recovered at applicable rates in case where 'M' forms were not submitted by the contractors. Audit noticed that in four FMPs, royalty of ₹ 5.43 crore²⁹ was not recovered from the contractors who had not submitted 'M' forms along with their bills.

The EEs of the concerned divisions stated (May-July 2016) that action would be taken on merit basis and recovery of royalty will be made accordingly. The fact, however, remains that in spite of instructions of the Industries Department; the divisions had not effected recovery of royalty from the contractor's bills.

3.5.11 Excess Payments to contractors

As per the conditions of tender/agreement in Kel-2, Regulation of flood water in Kayal Area, 4 Padasekharans and Mitigation of floods in Group 9, 5 Padasekharans in Kuttanad Region of Kerala, the tender premium³⁰ was not to be allowed on the cost of items allowed in the estimate data at market rate. The agreement schedules in all the three works under the above project were prepared (June 2010 to March 2012) after deducting the cost of market rate items before applying tender premium. But while making payments (September 2015), tender premium was allowed on the cost of market rate items also, resulting in excess payments to the tune of ₹ 24 lakh to the contractors.

The Kuttanadu Development Division, Mankombu accepted the observation and assured that the amount would be recovered from the contractors.

²⁹ HP-1: ₹ 1.64 crore, HP-2: ₹ 2.37 crore, HP-3: ₹ 0.22 crore and HP-7: ₹ 1.20 crore.

³⁰ Amount charged in excess (23.90 per cent) over estimated cost other than market rate items.

Further, in Tamil Nadu as per PWD Schedule of Rates (SoR), theoretical weight of one m³ of stone without voids is 1.59 MT. However, while arriving at the rate for stones, the department erroneously adopted 2.65 MT per m³ in projects TN-2 and TN-3. This resulted in additional avoidable expenditure of ₹ 2.38 crore. The Department (November 2016) confirmed the audit observation.

3.5.12 Delay in settlement of claims of contractor

Under the Project: Pud-1: - Flood Protection works in Yanam, Puducherry, against the total quantity of 39,614.40 sq m earth work was to be executed as per agreement. The earth work was to be followed up with providing of Water Bound Macadam grade I and II and Bituminous. The contractor carried out earth work (Bank Stabilization) of 28,181.67 sq m for a total value of ₹ 85 lakh. However, the balance work towards formation of road in the above reaches was not carried out by the contractor due to non-settlement of claims preferred by him for the work already done. In the meantime, earth work done in the above projects eroded in heavy rains and floods during the subsequent years. Consequently, expenditure of ₹ 85 lakh incurred in strengthening of road was rendered infructuous.

3.6 Maintenance and upkeep of the project

With regard to upkeep and maintenance of the existing FMP projects, the project authority was to draw programmes for maintenance of works after their completion for effective utilisation of investment on the project. For this purpose, a separate budget was to be provided. Further, as per Para 7.12 of the Report of Working Group on Flood Management and Region Specific issues for XII plan (October 2011), Gol, inventory register was required to be maintained by the Department to have a holistic view on the works already completed and further measure required for reasonable flood management.

We observed cases of deficiencies in maintenance and upkeep of the projects and inventory register as described in succeeding paragraphs.

a. Assam: No programme for upkeep and maintenance of the completed projects, with separate budget provision as envisaged in the FMP guidelines was framed.

Four Divisions of the Department did not maintain basic records to watch the assets created for the 22 FMP projects executed during 2007-16. The Department incurred expenditure of ₹ 221.40 crore (as of March 2016) on implementation of the projects. Since the records of assets were not maintained, the Department could not monitor the present state of the assets created and could not ascertain the details of the assets whose maintenance was required.

Moreover, there was no budget provision for maintenance of the FMP projects for the years from 2007-08 to 2015-16 and we noticed that the Department had not taken up maintenance work of any of the assets created under the 22 FMP projects.

b. Jammu & Kashmir: We found that no data of assets showing book value, year of completion was in existence in any of the test checked divisions. There was no provision of maintenance of assets in the projects after their completion and no separate funds were provided for maintenance of the eight projects completed since 2013-14 under FMP by the State Government.

c. Sikkim: No inventory register was maintained by the Department.

d. Tamil Nadu: Government of Tamil Nadu did not provide (since completion of the projects in March 2012 onwards) specific fund in the budget proposals for the maintenance of assets created under FMP at a total cost of ₹ 625.78 crore. Consequently, proper maintenance of such assets could not be ascertained in audit.

3.7 Rehabilitation of Natural Drainage Systems

As per clause 10.1 of the National Water Policy, 2012 greater emphasis should be placed on rehabilitation of natural drainage systems. The 21st Standing Committee on water resources reiterated this and recommended (February 2014) that the Ministry/CWC should, in consultation with all the basin States, chalk out a time-bound, implementable programme of action to identify those drainage systems viz. rivers/streams, canals, etc., which need immediate rehabilitation and adopt measures to be taken by the concerned agencies/authorities for their repair and restoration.

We observed that CWC did not take any action to identify drainage systems in consultation with the basin States. We also observed that in the 17 States selected for audit, none of the States except Tamil Nadu and Odisha prepared measures for rehabilitation for natural drainage systems.

CWC stated (April 2016) that GoI had approved FMP during XI and XII FYP, scope of which included drainage development as well as catchment area treatment and it was upto State Government to propose the scheme under FMP. Ministry further stated (February 2017) that GFCC had also carried out studies for assessment of the existing waterways under the road and rail bridges for the entire Ganga basin.

The reply is not tenable as Ministry/CWC in consultation with basin States was to chalk out a time-bound implementable programme to identify those drainage systems which need immediate rehabilitation.

3.8 Shortfall in convening of Technical Advisory Committee Meeting

In Tamil Nadu, based on CWC instructions, the State Government revived (January 1985) the Technical Advisory Committee (TAC) whose functions inter-alia included identification of flood prone areas and formulation of schemes to contain the flood and recommending to Government, devising measures to evict encroachment in vulnerable areas and safe guarding the flow ways and flood places, evolving a methodology for the flood warning system in the State. The Committee was to meet as and when necessary, but not less than once in six months.

However, the Committee met only on two occasions³¹ during 2011-16. Despite availability of ₹ 315 crore under XII Plan (2012-17), the Committee neither identified flood prone areas nor formulated any schemes to contain floods. Further, the TAC failed to devise measures to evict encroachment in vulnerable areas and safe guarding the flow ways and flood places and for the flood warning system in the State.

3.9 Conclusion

Some of the flood management works were not taken up in an integrated manner covering entire river/tributary or a major segment of rivers/tributaries and the Preliminary Project Reports/Detailed Project Reports were not prepared in accordance with the scheme guidelines. There were huge delays in completion of FMP works due to delay in approval of DPRs by Empowered Committee/Inter-Ministerial Committee, leading to technical designs becoming irrelevant at the time of actual funding. Instances of incorrect calculation of Benefit Cost Ratios were noticed. There were delays in completion of FMP projects due to non-release/timely release of funds (Central share/State share) and due to non-acquisition of required land. Deficiencies in contract management viz. execution of work without call of tender, award of contract to large number of contractors, splitting of works etc. were noticed. Cases of irregular grant of mobilization advance, award of work without collecting Performance Guarantee Bond etc. were also noticed. There were cases of deviations from the approved scope of work, reduction in physical parameters, execution of work without authorisation of Competent Authority, execution of sub-standard work, delays due to non-settlement of claims. Central Water Commission did not identify any drainage system which needed immediate rehabilitation and adopt measures for its repair and restoration.

³¹ 08 March 2013 and 30 October 2015.

3.10 Recommendations

We recommend that

- i)** MoWR, RD&GR may approve the projects under FMP after ensuring that the projects are formulated in an integrated manner covering entire river/tributary or a major segment of rivers/tributaries.
- ii)** MoWR, RD&GR may approve the projects under FMP after ensuring that the Benefit Cost Ratio is worked out correctly as per guidelines in this regard.
- iii)** MoWR, RD&GR may advise the State Governments to make efforts for early completion of delayed projects and completion of new projects in stipulated time.
- iv)** MoWR, RD&GR may take adequate steps to release the funds after ensuring acquisition of required land.



4

CHAPTER

4

Chapter

Flood Forecasting

4.1 Introduction

Flood Forecasting is a non-structural measure³² 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. Flood Forecasting comprises of Level Forecasting and Inflow Forecasting. The Level Forecasts help the user agencies in deciding mitigating measures like evacuation of people and shifting people and their movable property to safer locations. 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.

Flood forecasting and flood warning in India commenced in a small way in the year 1958 with the establishment of a unit in CWC, New Delhi, for flood forecasting for the river Yamuna at Delhi. Since then, CWC established 175 Flood Forecasting Stations (FFS) comprising of 147 level flood forecasting and 28 inflow forecasting stations upto 2006-07, and the number remained stagnant till 2014-15. Presently (2016-17), CWC's flood forecasting network covers 184 FFS in 19 States, UT of Dadra and Nagar Haveli and NCT Delhi. CWC has not established any FFS in 15 States/UTs i.e. Andaman and Nicobar Islands, Chandigarh, Daman and Diu, Goa, Himachal Pradesh, Kerala, Lakshadweep, Manipur, Meghalaya, Mizoram, Nagaland, Puducherry, Punjab, Rajasthan and Sikkim.

4.2 Modernization of Flood Forecasting Stations

CWC undertook the work of modernization of flood forecasting network during the IX Plan on pilot basis. The modernization works envisaged establishment of telemetry equipment in the FFS to enable collection and transmission of automatic real time data, automatic formulation of flood forecast and expeditious

³² Different structural as well as non-structural methods of flood protection have been adopted in different States. Structural measures include storage reservoirs, flood embankments, drainage channels, anti-erosion works, channel improvement works, detention basins, etc. and non-structural measures include flood forecasting, flood plain zoning, flood proofing, disaster preparedness, etc.

dissemination thereof in order to increase the lead time for enabling concerned agencies to undertake mitigation measures for reducing the risk of disasters from flood. The basin-wise establishment of telemetry stations in the country since IX plan is given in Table 4.1.

Table 4.1: Details of Plan-wise and basin-wise installation of Telemetry stations

Five Year Plan	Name of Basins	No. of telemetry stations installed
IX	Chambal (20 nos.), Mahanadi (35 nos.)	55
X	Godavari (63 nos.), Krishna (41 nos.), Brahmaputra (21 Nos.) Damodar (20 nos.), Yamuna (15 nos.), Mahanadi (8 nos.)	168
XI	Narmada & Tapi (76 nos.), Indus (4 nos.), Ganga (63 nos.), Yamuna (25 nos.), Mahanadi (36 nos), Brahmaputra (14 nos.) and Godavari (4 nos.).	222
XII	56 telemetry stations installed upto July 2016. Basin wise details are not available	56

During XI Plan, a Central Sector Scheme, namely, Flood Forecasting was prepared by amalgamating two ongoing schemes of X Plan namely;

- Establishment and Modernisation of Flood Forecasting Network in India including inflow forecast, and
- Strengthening and Modernisation of Flood Forecasting and Hydrological Observation Network in the Brahmaputra and Barak Basin.

The flood forecasting scheme for XII Plan was approved in December 2015 with a provision of ₹ 281 crore.

The physical and financial targets and achievements of Flood Forecasting Scheme during XI and XII Plan are given in Table 4.2.

Table 4.2: Plan-wise physical and financial targets and achievements

Period	Physical		Financial (₹ in crore)	
	Target	Achievement	Target	Achievement
XI FYP	Installation of 222 telemetry stations.	Installed after delay of 26 months	130	103
	Modernisation of 219 stations with telemetry stations.	56 stations modernised (August 2016).	281	114.09 (March 2016)
	Creation of 36 level forecasting stations, 64 inflow forecasting stations and 310 base stations.	Work in progress (August 2016).		

XII FYP	Work of inundation modelling using available DEMs (about 30 M ha flood prone area whose high resolution DEMs were available with NRSC ³³)	Work in progress (August 2016).		
	Preparation of new Probable Maximum Precipitation (PMP) Atlas and updation of old Atlas.	Work in progress (August 2016).		
	Setting-up of six additional modelling stations.	Work in progress (August 2016).		

As would be seen from the table above, the work of modernisation of only 56 telemetry stations had been completed as of August 2016.

4.3 Delay in installation of telemetry stations during XI plan

The work of supply, installation, testing, commissioning and maintenance of 222 telemetry stations, one Earth Receiving Station (ERS) and 10 Modelling stations including hardware, software and peripheral for eight years of real time data acquisition was awarded (March 2010) to Essel Shyam Technologies Limited, Noida (contractor) for ₹ 30.07 crore. The work was to be completed by April 2011.

However, the work of installation of all 222 telemetry stations was completed by June 2013 after delay of 26 months. We observed that in only seven telemetry stations the delay was attributed on part of the contractor and a penalty of ₹ 8,998 was levied. Delay in installation of the remaining stations was due to non-availability of sites/approved design and drawings and delay in handing over of sites to the contractor, indicating deficient planning and preparation.

Ministry stated (February 2017) that the delay in execution was primarily due to high water level in river causing delay in civil works on the site for installation of Bubbler Termination Point as well as the high water level in dams which were beyond the control of CWC as well as vendor. Land acquisition was another reason for delay in installation of sites.

The fact remained that MoWR, RD&GR could not achieve the commissioning of telemetry stations targeted during the XI Plan, which spilled into the XII plan period.

³³ National Remote Sensing Centre, Hyderabad, a unit of the Department of Space.

4.4 Non-functional telemetry stations

Scrutiny of records at MoWR, RD&GR revealed that out of 375 telemetry stations for which information was made available by the Ministry, 222 telemetry stations were non-operational. As a result, the real time data was not available for the corresponding period as indicated in **Annexure IV**.

The telemetry stations were non-functional due to reasons such as theft of telemetry equipment, dismantling due to inadequate security arrangements and non-installation of Radar Sensors/Bubbler. We also found cases in which telemetry stations were washed away, parts of stations were stolen, parts not working, parts damaged, receipt of erratic/non reliable data, solar panel and battery stolen and non-functional modelling centres, etc.

We observed that flood forecasting data was used in formulation of flood forecast only after comparing the telemetry data with manually observed data; and in the case of mismatch between the two sets of data, manual data was adopted. Thus, CWC did not depend on telemetry data even after investing in modernisation of telemetry station network for nearly 20 years. This defeated the purpose of establishment of telemetry equipment for meeting the requirement of real time data collection, its transmission and flood forecast formulation.

The work of 'Supply, Installation, Testing, Commissioning and Maintenance of the Telemetry Stations' was entrusted to an agency (Essel Shyam Technological Limited, Noida) by the Upper Yamuna Division of CWC. We noticed that the concerned divisions repeatedly requested (January 2014/May 2016) the agency to undertake proper maintenance of the non-working stations, however, no action was taken.

Ministry stated (February 2017) that all efforts were being made to make other telemetry stations functional at the earliest.

4.5 Non-implementation of Flood Forecasting Scheme/operations

We observed that flood forecasting was not done in some States due to lack of sanction for the scheme, absence of request from State Government, etc. as discussed below.

- i) No flood forecasting scheme was sanctioned in the State of Tamil Nadu during XI Plan under Central Sector scheme. In XII Plan, action plan for installation of 41 telemetry stations in Tamil Nadu was prepared (July 2016) but tenders remained to be finalised (July 2016). Modernised flood forecasting infrastructure using real time data acquisition system and forecasting models for all river basins were not developed in Tamil Nadu. Floods forecasting were based on the meteorological forecast and special warning issued by IMD.

Ministry stated (February 2017) that under XII Plan, 13 forecast stations (four Level and nine Inflow) have been planned in the State of Tamil Nadu, of which five have been operationalised during 2016.

- ii) Flood forecasting operations were not conducted in Himachal Pradesh. The Regional Committee for scientific assessment of flood prone area asked (September 2014) CWC Shimla to take up the matter with Government of Himachal Pradesh to collect/share related information and real time data available with project authorities to develop a robust flood forecasting system. We observed that no further progress was made since.
- iii) There were 32 FFS in Bihar under CWC. However, Inflow forecast of reservoirs or barrage was not done as the request in this regard from State authorities was not made.
- iv) The Karimganj FFS at River Kushaira, Assam was modernised under XII FYP so as to get real time data through telemetry system. Though a telemetry machine was installed (January 2015), data regarding water level and rainfall was not collected from the telemetry machine, as the FFS had not received any instructions in this regard. Non-utilisation of the telemetry machine for flood forecasting defeated the purpose for which it was installed.
- v) CWC proposed to install 14 and 15 telemetry stations in Damodar and Lower Brahmaputra Divisions respectively during 2012-17. However, as of June 2016, no progress was made in this regard.

4.6 Insufficient number of Flood Forecasting Stations

In Jammu & Kashmir and West Bengal, we noticed that the number of FFS/Rain Gauge Stations was not adequate to meet the requirements of the States. The observations are as follows:

- (i) There are four rivers in Jammu & Kashmir i.e. Indus, Tawi, Chenab and Jhelum, which are prone to flood every year. However, only one FFS was established (2015) at Rammunshi Bagh for flood forecasting on river Jhelum, following the devastating floods during September 2014 in Kashmir Valley.

Working Group on Flood Management strongly recommended (2014-15) undertaking a comprehensive study of the entire flood related scenario in the area within six months and directed the CWC to initiate urgent steps to set up a centralized forecasting station in the State. CWC proposed installation of 19 additional modernised stations comprising five new level

forecasting-stations and 14 base stations on river Jhelum, Chenab and Indus during XII five year-plan.

However, even after nearly two years, only seven sites were established (level forecast station). No automatic telemetry equipment was installed, due to which data was being collected manually.

Ministry stated (February 2017) that the process of installing of telemetry system was taken up during 2016 as the Standing Finance Committee (SFC) memo was approved only in December 2015. The fact remained that sufficient number of FFS could not be installed in the flood prone State of Jammu & Kashmir.

- (ii) There are 27 Rain Gauge Stations in Lower Brahmaputra Division in West Bengal. Scrutiny of records revealed that since construction of these stations, a number of flood protection works like barrages, embankments, spurs, culverts, etc. were constructed. These hydrological structures disturb the flow of the river causing time lag between base stations and forecast stations. Besides, most of the small tributaries of the major rivers remained un-gauged. In view of the difficulties in assessment of river flow during heavy downpours, the Division felt (since 2008) the deficiency of Rain Gauge Stations and requirement for more Rain Gauge Stations. However, CWC was yet to approve any new forecasting stations. Thus, flood forecasting was not effectively carried out in this division.

4.7 Wrong alignment of manual water level gauge and telemetry bubbler

At Naharkatia FFS, Assam we observed that the main channel of the river was flowing about 100 m away from the position at which the manual water level gauge and telemetry bubbler were installed. As a result, the actual water level and discharge of water as recorded in FFS and then transmitted was not accurate. The Department stated (June 2016) that the river course had changed a long time back and shifting of gauges at the main river course was not possible due to limitations of the telemetry system.

Ministry stated (February 2017) that concerned officers were instructed to maintain the proper approach to the Gauges.

The fact remained that the water level gauge and telemetry bubbler no longer served their purpose and remained idle.

4.8 Lack of flood forecasting due to non-maintenance of water level

Orissa State Water Policy, 2007 states that in highly flood prone areas, flood control would be given overriding consideration in the reservoir regulation policy even at the cost of sacrificing some irrigation or power benefits. The Flood

Management Manual states that Officer in charge of Dam has to maintain the reservoir level according to the Rule Curve³⁴ which is determined on the basis of prior experience. To maintain the water at safe level, adequate number of sluice gates should be opened to discharge the water.

India Meteorological Department (IMD) made repeated forecasts of heavy rains in the State of Chhattisgarh and a part of Odisha located in the upstream of Mahanadi river for Hirakud Dam and also in downstream areas of Hirakud dam during the period from 24 August 2011 to 09 September 2011. For the above period, CWC also informed about heavy quantum of inflow of water to the Hirakud reservoir.

Despite above warnings, Dam Authorities maintained the water level above the lower limit of Rule Curve i.e. 590 feet (ft) for the above period. It was noticed that adequate number of sluice gates were also not opened during the period prior to the forecast.

There are a total of 98 sluice gates in this Dam. On 01 September 2011 the level was 624.50 ft and seven sluice gates and three crest gates were opened. On 04 September 2011 the level was 624.97 ft and 13 sluice gates and five crest gates were opened, on 09 September 2011 the level was 628.50 ft and 55 sluice gates and four crest gates were opened. This caused flood in the downstream areas of Hirakud dam. The loss of life and property assessed during three days in September 2011 in 13 districts was assessed to the extent of over ₹ 2,000 crore.

Similarly, the Dam authorities did not maintain the Rule Curve level of 590 ft in the Hirakud Reservoir during August 2014 and raised the reservoir level up to 628 ft Due to heavy rain in both upstream and downstream area of Mahanadi during first week of August 2014, 50 gates of the dam were opened which caused heavy discharge of water resulting in flooding in the lower basin of Mahanadi.

Dam authorities, Burla stated (June 2016) that keeping in view the rainfall and runoff pattern of the year 2011, it was decided to keep the reservoir level at 600 ft to meet the water requirement for irrigation and power. The Dam Division further stated that the Rule Curve was a guideline to follow as a filling schedule during normal operation but it did not restrict the operator to use the reservoir space for flood moderation.

Ministry stated (February 2017) that CWC issues inflow forecasts to project authorities on daily basis and the project authorities take their considered

³⁴ Rule curve is the target level planned to be achieved in a reservoir, under different conditions of probabilities of inflows and/or demands, during various time period in a year.

decisions on releases from reservoir based on the rule curve and situation downstream; CWC's inflow forecast plays only an advisory role.

The reply may be viewed in the light of the fact that the provisions of the State Water Policy, Flood Management Manual as well as forecasts of IMD and CWC were not heeded to by the Hirakud Dam authorities adherence to which would have helped in mitigating the severity of the flooding in the lower basin of Mahanadi.

4.9 Lack of flood forecasting due to incorrect fixation of warning and danger levels

No flood forecast was issued by the Himalayan Ganga Division, CWC, Dehradun (HGD), Uttarakhand for the river Alaknanda at Srinagar during June 2013 despite heavy losses to public property due to floods. The justification given was that warning and danger levels were at 539 metres (m) and 540 m respectively and the maximum water level touched 537.90 m only during the time, thus not reaching the warning level. The State Government revised (October 2013) the warning and danger levels at 535 m and 536 m respectively after the flood was over.

Ministry stated (February 2017) that the Government of Uttarakhand reviewed the Warning and Danger Level in consultation with the CWC and they were revised and flood forecasts were being issued from 2014 flood season onwards with newly fixed levels.

4.10 Conclusion

Against a target for the XII Plan for installation of 219 telemetry stations, 310 base stations and 100 flood forecasting stations, only 56 telemetry stations had been installed as of August 2016. Most of the telemetry stations installed during XI plan were non-functional due to which real time data was not available at these stations. Therefore, CWC did not depend on telemetry data even after investing in modernisation of telemetry station network for nearly 20 years which defeated the purpose of establishment of telemetry stations. There were insufficient number of flood forecasting stations in some of the States. There were deficiencies in installation and maintenance of flood forecasting stations. In Odisha, non-maintenance of water level in Hirakud dam as per the rule curve, and simultaneous opening later on of 50 flood gates caused heavy discharge of water resulting in flooding in downstream areas. In Uttarakhand, the flood forecasting could not be issued in time due to incorrect fixation of warning and danger level.

4.11 Recommendations

We recommend that

- i) CWC may devise a time bound action plan to speed up the formulation of flood forecast on real time data communication network by making all the telemetry stations operational and take suitable steps to install all the targeted telemetry stations.
- ii) CWC may ensure that the warning and danger levels have been fixed at appropriate level so that flood forecasting could be made correctly and timely.



5

CHAPTER

Other Schemes for Flood Control

5.1 Introduction

Apart from the two main schemes on Flood Management and Flood Forecasting, GoI implemented other smaller schemes towards flood control viz. River Management Activities and Works related to Border Areas (RMABA) and Dam Safety Studies and Planning (DSSP). This chapter contains observations on the extent of work achieved under RMABA and Dam Safety.

5.2 River Management Activities and Works related to Border Areas

RMABA was an on-going Central sector scheme of MoWR, RD&GR which was restructured in XI Five Year Plan on the advice of the erstwhile Planning Commission by integrating smaller schemes operated by the Ministry during X Plan and some new works related to border areas with the neighbouring countries namely, Nepal, Bhutan, Bangladesh, China and Pakistan. The scheme was continued in the XII FYP.

During XII Plan, the component of grant-in-aid to Union Territories (UTs) which was funded under FMP during XI Plan, was also brought into the present scheme in view of requirement of 100 *per cent* funding of flood management/anti-sea erosion works in the UTs. The main activities under RMABA during XI and XII Plan periods were:

- a. Field surveys, investigations and preparation of joint DPR in respect of Pancheshwar, Kosi, Saptakosi, Kamla and Naumure project (with/ in Nepal) and construction of high dams on these rivers at an early date.
- b. Regular maintenance of flood protection works of Kosi and Gandak Projects (in Nepal), Flood Protection/anti-erosion works in the border areas with Bangladesh and Pakistan by the States.
- c. Flood forecasting on rivers common to India and Nepal and flood forecasting in Bhutan, Bangladesh, China and adjoining Indian sites.

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

5.2.1 Delay in completion of RMABA projects

The RMABA package was approved for XI Plan (December 2008) and for XII Plan (December 2014) for projects like Pancheshwar, Saptakosi, Naumure and Kamla.

Also, as per Task Force constituted in 2004³⁵, long term solution to the problems of Assam, North Bihar and Eastern Uttar Pradesh from annual floods lay in creating storage reservoirs of adequate capacity with the requisite allocated flood cushions on the rivers Brahmaputra, Barak and Ganga and their tributaries in India or in Nepal. The major recommendations of the Task Force were:

- (i) Investigation and preparation of DPR of Sapta Kosi High Dam Multi-purpose and Sun Kosi Storage cum Diversion Scheme; provision of adequate flood storage allocation for management of floods; and negotiation for implementation of the project so that construction could start soon after preparation of DPR.
- (ii) Finalisation of DPR of Pancheshwar Multi-Purpose Project and its implementation in a time bound manner.
- (iii) Feasibility study of Kamla Multi-Purpose project and preliminary study for Bagmati Multi-Purpose Projects.

We observed that there was huge delay in completion of all the long term RMABA projects as detailed below:

A. Pancheshwar Multipurpose project: India and Nepal signed the Mahakali Treaty in 1996 for integrated development of river Mahakali (Sharda in India) including Pancheshwar project.

For finalisation of DPR, provisions of ₹ 15.00 crore and ₹ 14.90 crore were allocated during X and XI Plans respectively, against which expenditure of ₹ 11.22 crore and ₹ 12.65 crore was incurred.

As per the treaty, pre-construction activities would be started side by side while making final tie-up for project funding by the two Governments. For pre-construction activities, a token provision of ₹ 20 crore was initially provided during XI Plan which was revised to ₹ one crore at the time of revision of funds for XI Plan. However, no expenditure was incurred. In the XII Plan amounts of ₹ 50.13 crore and ₹ 100 crore were provided for investigation and pre- construction works of Pancheshwar multipurpose project respectively. Expenditure incurred along with latest status of the project was, however, not furnished by MoWR, RD&GR.

³⁵ A Task Force was set up by MoWR, RD&GR to look into the problems of recurring floods in Assam, Bihar, West Bengal and Eastern Uttar Pradesh for suggesting short term and long term measure for management of flood and erosion control.

Ministry stated (February 2017) that Pancheswar Development Authority (PDA) was set up at Kathmandu in September 2014 after the approval of the Cabinet and the draft final DPR was submitted by PDA to both the countries in November 2016.

The fact remained that work under the project was yet to be initiated.

- B. Kosi High Dam Multipurpose Project:** During December 1991 an understanding was reached between India and Nepal to take up joint studies/investigations of Saptakosi High Dam project and to prepare a DPR. For this joint project-Sapta Kosi Sun Kosi Investigation (JPO-SKSKI) was set up in August 2004, which was to complete the works by February 2007. Due to law and order problem in the project area, the investigation work could not be completed. During the X Plan period, expenditure of ₹ 12.44 crore was incurred against the outlay of ₹ 30 crore. The work was spilled over to XI Plan period for completion by September 2008 with a revised cost of ₹ 70.55 crore in view of increase in scope of work. For survey and investigation of Kosi High Dam ₹ 58.11 crore was initially provided during XI Plan which was later revised to ₹ 33.64 crore, against which an expenditure of ₹ 27.37 crore was incurred. However, due to local agitation against the project, work could not be completed. The cost of the work was further revised to ₹ 74.86 crore (February 2009) and to ₹ 87.63 crore (February 2011) for completion by February 2013. In the XII Plan, a provision of ₹ 40.61 crore was made under the project for carrying out Survey and Investigation activities.

The status of the project along with related records was not furnished by MoWR, RD&GR. Ministry stated (February 2017) that the Joint studies/ investigation and preparation of DPR of Saptakosi High Dam project and Sun Kosi storage cum diversion scheme was under progress through Indo-Nepal joint project office, located at Biratnagar, Nepal. The progress was slow due to resistance by local people.

The fact remained that work under the project was yet to be initiated.

- C. Naumure Hydro-electric project:** The Naumure project is envisaged on the river Rapti, upstream of the Sikta Irrigation Project which is under construction unilaterally by Nepal. For investigation and pre- construction works of Naumure Hydro-electric project (Nepal) ₹ 21.40 crore was initially provided during XI Plan which was revised to ₹ one crore. No expenditure was incurred for this activity. For investigation of Naumure Hydro-electric project ₹ 25.00 crore was provided during XII Plan.

Ministry stated (February 2017) that pre-feasibility study was completed by CWC in March 2010. During 7th meeting of Joint Committee on Water Resources (January 2013), Nepalese side expressed that pre-feasibility report prepared by CWC was not acceptable in its present form as it did not cater to their demand of irrigation for Kapilvastu region by way of inter basin transfer. No further development was reported thereafter.

The fact remained that work under the project was yet to be initiated.

D. Kamla Project: No provision was allocated for this project under XI and XII Plan.

5.2.2 Discrepancies/shortcomings in execution of RMABA works

We observed the following discrepancies/shortcomings in execution of works in Uttar Pradesh and West Bengal:

a. Irregular award of work on short term tender notices

As per the Government order (December 2000), works below ₹ two lakh only could be awarded on short term tender notices by giving 15 days' time. For works of more than ₹ two lakh, tenders were to be invited by giving 30 days' notice. We noticed the following discrepancies in eight test checked projects in Uttar Pradesh:

- i) In five projects, six contracts valuing ₹ 23 crore were awarded on the basis of tenders invited on very short term notice up to seven days.
- ii) Four agreements valuing ₹ 20.40 crore were executed on the basis of single tender.
- iii) Two agreements of ₹ 2.60 crore were executed after three months of opening tender though the tender notice was issued for short term tender.
- iv) In one work of ₹ 1.35 crore, three out of six bids received were rejected without recording any reason thereof.

b. Splitting of tenders

In West Bengal, administrative approval for Scheme-3 'Bank protection work on the Right bank of River Punarbhaba' was granted to Malda Irrigation Division at ₹ 13.30 crore in January 2011. Scrutiny revealed that Malda Irrigation Division split the above work into eight small reaches (ranging each from 100 m to 250 m) and the works were awarded to 10 contractors to expedite the works. Splitting up of the work into smaller works resulted in variations of the contracted rates from 0.03 to 25.77 *per cent*. The work was completed after 14 months of the scheduled date of completion.

The Department stated (December 2016) that this methodology was very commonly adopted with the objective of expedition in execution for economy

and efficiency. The reply is not tenable as there was delay in completion of the work as well as variations in contracted rates though all the tendered items of the work were identical.

c. Allowance of higher rate on disposal of excavated earth

With a view to better drainage and flood management, the work (Scheme-4) of Desilting of River Ichchamati along the common border portion³⁶ in West Bengal was awarded (March 2010) at a tender cost of ₹ 35.64 crore for completion by January 2011. The work was completed in August 2011 and the agency was paid (December 2012) ₹ 37.31 crore. The scope of work *inter alia* included an item of disposal of excavated earth/materials outside the Government land by truck or by any other conveyance beyond 500 m at the rate of ₹ 116 per cubic metre (cu m).

Records revealed that 10.90 lakh cu m of silt was disposed at the rate of ₹ 116 per cu m and the contractor was paid ₹ 12.64 crore. We observed that the analysed rate (land for disposal to be arranged by the contractor) was ₹ 116 per cu m based on the Schedule of Rates (SoR) of Public Works (Roads) Department (2008-09). However, as per the SoR of the Greater Calcutta Drainage Circle (GCDC) during that period the rate of the item was ₹ 49.50 per cu m considering sale proceeds of the excavated earth. Hence, there was an avoidable expenditure of ₹ 7.46³⁷ crore due to allowance of higher rate.

The Department stated (December 2016) that sale of excavated earth in border areas was a difficult proposition and rate was analysed/adopted for disposal of earth at a land to be arranged by the agency.

The reply is not acceptable as we observed that in two desiltation works on the downstream and upstream of the same river executed by the same division in the year 2004-05 and 2013-14, the SoR of the applicable GCDC was followed in determining the rate of disposal of excavated earth/material beyond 500 m on land to be arranged by the contractor.

d. Non-maintenance of history sheet of RMABA works

Kosi High Level Committee (KHLC) recommended that proper history sheet of the protection works implemented at different sites were to be maintained. The history sheet was to indicate all spurs/protection works particularly works requiring repeated repairs of the restoration work indicating, inter-alia, the

³⁶ From Barnaberia, P.S.Gaighata at 120 km (Kulkhali, P.S-Sarsa, Distt. Jessore, Bangladesh) to BSF bridge at Kalanchi, P.S.Gaighata at 140.415 km (Chanduria, P.S.Sarsa, Distt. Jessore, Bangladesh) approximate length -20.415 km.

³⁷ Higher rate ₹ (116-49.50) per cum x 10.90 lakh cum = ₹ 7.25 crore plus 2.90 per cent (₹ 0.21 crore) of contractual rate of ₹ 7.25 crore.

work done in the previous years along with the expenditure incurred on repairs from time to time for proper assessment of their performance and for suggesting remedial measures. This was also reiterated by Gandak High Level Committee during its visit in November 2012.

We noticed that history sheets of 119 Anti Erosion (AE) activities carried out in Bihar during 2008-2015 were not maintained and no performance evaluation was done for these works.

5.3 Dam Safety

Building a dam not only ensures a large number of potential benefits but it also creates a structure with potential hazards, which may result from its failure. When a dam fails, due to unprecedented rainfall, earthquake, landslide, poor maintenance and/or sabotage; the huge volume of water stored transforms into a flood wave, which may cause severe damage to the lives and properties situated downstream. The effect of such a disaster can be mitigated to a great extent if the resultant magnitude of flood peak and its time of arrival at different locations downstream of the dam can be estimated, thereby facilitating the planning of emergency action measures.

The various activities for mitigating the effect of Dam failure as per Emergency Action Plan (EAP) were:

- a. Determination of the potential inundated area by Dam Break analysis;
- b. Preparation of inundation maps;
- c. Notification of emergency;
- d. Communication, flood management; and
- e. Evacuation.

In order to assist State Governments to identify the causes of potential distress and to recommend suitable remedial measures, GoI established the Dam Safety Organization (DSO) in CWC in June 1979. The Standing Committee constituted by Ministry of Irrigation in 1982 recommended (1986) to evolve unified procedure of dam safety for all dams. The National Committee on Dam Safety (NCDS) was constituted by MoWR, RD&GR in October 1987 to oversee Dam Safety Activities in various States and suggest improvements to bring dams safety practices in line with the latest state-of-art consistently with Indian conditions. NCDS, in its 27th meeting (September 2005) finalized the Guidelines for Development and Implementation of EAP for Dams.

In view of above, a Central sector scheme namely 'Dam Safety Studies and Planning' was evolved during XI Plan in CWC having components as preparation and digitization of generalized Probable Maximum Precipitation (PMP) atlases for Indus, Krishna, Ganga and Brahmaputra Basins; upgradation of atlases prepared under Dam Safety Assurance & Rehabilitation Project (DSARP) completed in

September 1999; Environment and Social Assessment Studies; Risk Analysis Studies; and other special studies for identified projects and Training and Development of Special purposes packages on Dam Safety Activities.

The total provision for the scheme during XI Plan was ₹ 10 crore, which was revised to ₹ six crore. Expenditure of ₹ 4.22 crore was incurred by CWC during the XI Plan. However, the activity of preparation and digitization of PMP atlases could not be completed and pursued. The scheme on Dam Safety Studies and Planning was subsumed in the Dam Rehabilitation and Improvement Project (DRIP)³⁸ during XII Plan.

Also, as per clause 10.7 of National Water Policy 2012, to increase preparedness for sudden and unexpected flood related disasters, dam/embankment break studies, preparation and periodic updating of Emergency Action Plans (EAPs)³⁹/Disaster Management Plans (DMPs) should be evolved after involving affected communities. Clause 10.5 also states that operating procedures for reservoirs should be evolved and implemented in such a manner to have flood cushion and to reduce trapping of sediment during flood season.

According to National Register of Large Dams 2002, there were about 4,050 completed large dams in India and another 475 were under construction. The number of completed large dams increased to 4,862 as of March 2016. The National Register, however, brought out that EAPs were not available for most of the completed large dams.

5.3.1 Status of Emergency Action Plans/Disaster Management Plans

Out of 4,862 large dams, EAP/DMPs⁴⁰ of only 349 large dams (seven *per cent*) were prepared (March 2016). Preparation of action plans to implement EAPs in respect of these 349 dams was under process. Mock drill in respect of only one dam⁴¹ was conducted as of March 2016. Status of preparation of EAPs/DMPs and Operation and Maintenance (O&M) Manual is given in Table 5.1.

³⁸ 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, Orissa 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.

³⁹ An Emergency Action Plan (EAP) is a formal document that identifies potential emergency conditions at a dam and specifies pre-planned actions to be followed to minimize property damage and loss of life.

⁴⁰ Disaster Management Plans.

⁴¹ Ranjit Sagar Dam (Punjab) on 15 May 2014.

Table 5.1: Status of EAPs/DMPs and preparation of O&M manual

States/UTs	Completed Dams	Dams for which O&M manual was prepared	EAPs/DMPs prepared
1. Andaman & Nicobar Island	2	0	0
2. Andhra Pradesh	127	0	3 (EAP for 6 Dams under preparation)
3. Arunachal Pradesh	1	0	0
4. Assam	3	0	0
5. Bihar	24	20	20 (All EAPs need to be updated)
6. Chhattisgarh	248	5	57
7. Goa	5	0	0
8. Gujarat	619	1	1
9. Haryana	1	0	0
10. Himachal Pradesh	19	11	19
11. Jammu & Kashmir	14	0	7
12. Jharkhand	50	1	0
13. Karnataka	230	0	37 (5 prepared as per CWC guidelines and 32 EAPs to be updated as per CWC guidelines)
14. Kerala	61	0	0
15. Madhya Pradesh	898	20	2
16. Maharashtra	1693	110	181
17. Manipur	3	0	1
18. Meghalaya	8	0	0
19. Mizoram	0	0	0
20. Nagaland	1	0	0
21. Odisha	199	7	0
22. Punjab	14	12	12 (update required for all 12 EAPs)
23. Rajasthan	201	0	0
24. Sikkim	2	0	2
25. Tamil Nadu	116	44	0 (Preparation of EAPs for 106 Dams stated to be in progress under DRIP ⁴²)
26. Telangana (from 02 June, 2014)	162	0	0
27. Tripura	1	0	0
28. Uttar Pradesh	115	0	2
29. Uttarakhand	16	0	4
30. West Bengal	29	0	1
Total	4,862	231	349

Source: as provided by CWC

The Table shows that Operating Manuals were prepared in respect of only 231 large dams (five *per cent*) and EAPs/DMPs were prepared for only 349 dams (seven *per cent*). Thus, preparedness for sudden and unexpected flood related disasters through preparation and periodic updating of EAPs / DMPs was inadequate.

⁴² World Bank funded 'Dam Rehabilitation and Improvement Project'.

The Ministry stated (December 2016) that this would be forwarded to CWC/ Dam Rehabilitation and Improvement Project for remedial action.

In Tamil Nadu, the Water Resource Department did not prepare EAP for the reservoirs in Chennai and its suburbs (December 2016). The EAP could have helped better management of flood discharge from all reservoirs, including Chembarambakkam tank, Chennai during 2015 floods.

5.3.2 Hydrology Studies and Inundation Map

An inundation map delineates the areas that would be flooded as a result of a dam failure or unusually large spillway releases. An inundation map is sometimes supplemented by a narrative description of areas that would be flooded.

Conducting hydrology studies and preparing inundation maps for various flood levels for a Dam is a part of EAP. We noticed that the same was still under preparation at State level even in respect of those Dams for which EAPs were prepared. We also observed that despite several discussions in NCDS meetings, State Governments had not specified any time frame for conducting hydrology studies and preparing inundation maps.

Out of 17 States/UT covered under audit, only two States furnished information on status of hydrology studies and preparation of inundation maps.

- a. **Himachal Pradesh:** Out of 19 large dams in the State, inundation maps were prepared only for two dams.
- b. **Kerala:** No dam-break analysis was conducted in respect of any of the 61 dams in the State.

CWC did not provide any further information in this regard.

5.3.3 Enactment of Dam Safety Legislation

National Water Policy 2002 envisaged enactment of Dam Safety Legislation in order to ensure proper inspection, maintenance and surveillance of existing dams.

Gol sought to enact Dam Safety Legislation seeking all India applicability by exercising power conferred under Article 246⁴³ of the Constitution. Accordingly, Gol introduced (August 2010) the Dams Safety Bill, 2010 before the Parliament. The Bill was subsequently referred to the Parliamentary Standing Committee (PSC) on Water Resources for examination. Owing to significant changes/modifications entailed in the Bill while complying with the observation and recommendation of the PSC, MoWR, RD&GR decided to withdraw the Bill and

⁴³ The Article empowers the Parliament to make laws with respect to any of the matters enumerated in the Concurrent List.

introduce the modified Bill as a new Bill in the Parliament. By this time, the term of the 15th Lok Sabha came to an end and the Dam Safety Bill, 2010 lapsed. In the mean-time, the State of Andhra Pradesh was bifurcated into the States of Telangana and Andhra Pradesh. Accordingly, MoWR, RD&GR requested both the States for fresh approval of the said resolution earlier passed by the House of erstwhile State of Andhra Pradesh. A fresh resolution was, however, still awaited as of August 2016.

Therefore, Central Dam Safety Legislation to ensure proper inspection, maintenance and surveillance of existing dams was pending enactment by the Parliament. Among the States, Bihar was the only State which had enacted the Dam Safety Legislation (May 2006).

5.3.4 Pre and Post monsoon inspection of Dams

As per minutes of 33rd meeting of NCDS, pre and post monsoon inspection of each large dam was required to be carried out by Dam Safety Organization (DSO) of the concerned State. Annual consolidated reports of pre and post monsoon inspection of previous years was to be submitted to DSO (CWC) in April every year for record and further action at their level.

Out of 17 States/UT selected for audit, only Himachal Pradesh and Tamil Nadu had carried out the pre and post monsoon inspection of the dams, three States had carried out the inspections partially. DSO, CWC also did not ensure that these inspections were carried out at regular intervals in order to ensure safety of the dams.

The Ministry stated (December 2016) that this would be forwarded to CWC/ Dam Rehabilitation and Improvement Project for remedial action.

5.3.5 Maintenance of Dams

As per para 24 of National Water Policy 2002, there should be proper organisational arrangements at the National and State levels for ensuring the safety of storage dams and other water-related structures consisting of specialists in investigation, design, construction, hydrology, geology, etc. The policy also stated that guidelines on the subject should be periodically updated and reformulated and there should be a system of continuous surveillance and regular visits by experts. We examined the activities with regard to maintenance of existing dams in the selected States.

We found that in five large dams (two in Bihar, two in Uttar Pradesh and one in West Bengal) certain defects and deficiencies were pointed out during the Safety review by Expert Committee but no remedial measures were taken due to non-availability of funds. The details are given in Table 5.2.

Table 5.2: Issues relating to maintenance of Dams

State	Observations
1. Bihar	An Expert Committee conducted (December 2015) a safety review of two Dams ⁴⁴ for suggesting remedial measures. Defects and deficiencies observed in the dams during inspection were, however, not rectified as Department had not provided any funds for the same. Due to siltation, water storage capacity of the Badua Dam was found to be reduced.
2. Uttar Pradesh	During scrutiny of 12 test checked dams, it was noticed that neither any programme/norms for maintenance of dams were prepared nor any specific funds for maintenance of these dams were made available. Further, defects and remedial measures ⁴⁵ pointed out by external agencies on inspection of Rihand Dam (1985) and Maudaha Dam (May 2015) were not rectified due to non-sanction of funds for the purpose.
3. West Bengal	Kangsabati Kumari Dam, constructed in the year 1965, required maintenance and repair of boulder on slope for a slope length of 3,270 m at a cost of ₹ 99 lakh. However, only 1,680 m was taken up in 2015-16 at a cost of ₹ 22 lakh. The Department accepted the fact and stated (June 2016) that the complete work of repair could not be taken up due to paucity of funds.

Thus, although maintenance of dams was an important issue, there were short comings such as non-preparation of programme for maintenance of dams and non-provision of adequate funds to carry out maintenance of dams. Inadequate maintenance of dams in spite of serious defects pointed out by expert committees placed the safety of the dams and the surrounding population at risk.

5.5 Conclusion

There were huge delays in completion of RMABA projects which were long term solutions for the flood problems of Assam, North Bihar and Eastern Uttar Pradesh. There were discrepancies in execution of works like irregular award of work, splitting of tenders and payment at higher rates. Out of 4,862 completed dams in the country, Emergency Action Plans/Disaster Management Plans of only 349 dams were prepared. A time bound initiative for preparation and implementation of Emergency Action Plans including preparation of inundation maps and

⁴⁴ Chandan Dam under Irrigation Division, Baunsi and Badua Dam at Irrigation Division, Bijukhorwa.

⁴⁵ Rihand Dam - cracking of concrete on the upstream and downstream faces of the dam and power block intake structure, separation of the secondary concrete of power house intake gate grooves from primary concrete and dislodging of the gate guides; and cracking of RCC columns in pen stock gallery of power house and consequent exertion of pressure on turbine mass concrete. Maudaha Dam - seepage in drainage gallery, immediate repair of flood gate and construction of emergency exit upto DSL level, etc.

hydrological studies for all the large dams, was not observed. Dam Safety Legislation initiated in 2010 has not been enacted till August 2016. Pre and post monsoon inspection were not carried out in most of the States/UT. Programme for maintenance of dams were not prepared and adequate funds were not provided to carry out structural/repair works.

5.6 Recommendations

We recommend that

- i)** MoWR, RD&GR may prepare a time bound action plan to accelerate the completion of all the long term RMABA projects to facilitate the long term solution to the flood problem of Assam, North Bihar and Eastern Uttar Pradesh from annual floods.
- ii)** MoWR, RD&GR may, in consultation with State Governments, devise a time bound action plan for preparation and implementation of Emergency Action Plans including preparation of inundation maps and hydrological studies for all the large dams in the country.
- iii)** MoWR, RD&GR may advise the State Governments to prepare Standard Operating Procedures for dams and carry out the prescribed pre and post monsoon inspection of the dams.



6

CHAPTER

6

Chapter

Implementation of the recommendations of Review and Oversight Committees for Flood Control measures

6.1 Introduction

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. Therefore, the related schemes are formulated and implemented by concerned State Governments. The role of Union Government is advisory in nature.

Government of India (GoI) has set up various committees for management of flood, such as Rashtriya Barh Ayog, Task Force 2004, Working Group on Water Resources for XI and XII Plan, etc. GoI has also framed National Water Policy (2012) to govern the planning and development of water resources and their optimum utilization. The reports of the above committees/policies contain certain recommendations for management of flood in time bound manner.

Rashtriya Barh Aayogh (RBA) was constituted (1976) to identify flood prone areas to reduce annual damage occurring due to floods. RBA submitted its report in March 1980. The recommendations were forwarded (September 1981) to all States/UTs/Ministries in the form of guidelines and instructions for implementation.

As per Report of Working Group on Flood Management for XII Plan (October 2011), an integrated basin management approach is needed that encourages the use of the resources of a river basin as a whole instead of traditional, fragmented and localized approach. It also emphasized that for making use of new technologies, it is desirable that a scientific assessment of the flood prone areas detailing at micro level and considering frequency of flooding, duration and depth of inundation, etc. should be done.

In this chapter, the status of compliance of some of important recommendations made by these Committees and important clauses specified in the National Water Policy 2012 have been discussed.

6.2 Assessment of areas liable to floods

Identification of flood affected areas was an important input for taking up flood management schemes for flood alleviation. As per recommendation No. 1 of RBA, the following activities were to be undertaken:

- i. State Governments were asked to verify the RBA assessed figures of area liable to floods and furnish data along with connected maps to Central Water Commission (CWC)/ Ganga Flood Control Commission (GFCC) before March 1982.
- ii. Flooded area at any time during the period for which records have been maintained should be transferred by the States on a detailed map of the river basin.
- iii. CWC/GFCC should carry out test checks in the field of the areas marked in the Map. The area may be updated every five years.
- iv. CWC should undertake a study and lay down criteria for defining “flooded area”.

As per GFCC guidelines, review of flood affected area in a State was to be undertaken in every Five Year Plan. The Working Group on Flood Management and Region Specific Issues, (October 2010) suggested for review of the flood affected areas of the respective States.

State/UT-wise status of assessment of areas liable to flood in respect of the sampled States (as of July 2016) is given in Table 6.1.

Table 6.1: State/UT-wise status of assessment of areas liable to flood

State/UT	Geographical Area (in lakh ha)	Flood prone area as identified by RBA (in lakh ha)	Flood prone area as identified by the State/UT (in lakh ha)	Whether verification of flood prone area done
1. Arunachal Pradesh	93.00	-	1.19	Not verified
2. Assam	78.40	31.50	38.20	Verified
3. Bihar	93.81	42.60 (jointly for Bihar & Jharkhand)	68.80	Not verified
4. Haryana	44.20	23.50	23.50	Not verified
5. Himachal Pradesh	55.70	2.31	4.76	Not verified
6. Jammu & Kashmir	222.20	0.80	5.14	Not verified
7. Jharkhand	83.10	-	Figures not available	Not verified
8. Kerala	38.90	8.70	14.70	Not verified
9. Manipur	22.30	0.80	0.80	Not verified
10. Odisha	155.70	14.00	33.40	Not verified
11. Puducherry	0.50	0.10	0.50	Not verified

State/UT	Geographical Area (in lakh ha)	Flood prone area as identified by RBA (in lakh ha)	Flood prone area as identified by the State/UT (in lakh ha)	Whether verification of flood prone area done
12. Punjab	50.40	37.00	40.50	Not verified
13. Sikkim	7.10	0.00	0.20	Not verified
14. Tamil Nadu	130.10	4.50	4.50	Not verified
15. Uttar Pradesh	240.93	73.36	73.40	Verified
16. Uttarakhand	53.47		Figures not available	Not verified
17. West Bengal	88.80	26.50	37.66	Not verified

Source: Report of the Experts Committee (March 2003) to Review the Implementation of Recommendations of RBA (National Flood Commission)

Of the selected 17 States/UT, only Assam and Uttar Pradesh had verified the RBA assessed figures of area liable to floods. As such, only these two States had furnished the data along with connected maps to CWC/ GFCC. CWC did not have any information on the activities at (ii), (iii) and (iv) of Recommendation No. 1 of RBA.

Thus, the recommendations of RBA with regard to identification of area affected by flood in country remained non-implemented. No records in regard to flooded area were transferred on a detailed map of the river basin by the States. As such, CWC/GFCC could not carry out test check in the field area marked in the map in the absence of such identification of area.

The Ministry stated (August 2016) that an expert committee for the scientific assessment of the flood prone area in India had been constituted in CWC (July 2012) and three meeting have been held so far. Ministry further stated (December 2016) that necessary follow-up actions on the recommendations of Rashtriya Barh Aayog had been taken up.

However, the recommendations of RBA have not been implemented as pointed out above.

6.3 Assessment of area that can be given protection against flood damage/protectable area

As per recommendation No. 3 of RBA, the following activities were to be undertaken:

- i. The State Government should carry out field surveys and indicate the area that can be given protection against flood damage.
- ii. The assessment of protectable area should be reviewed every five years to account for change in the circumstances and needs for flood protection.

CWC had requested States (after September 1981) to undertake field survey and assess the area that can be given protection against flood damage/protectable

area taking into account the changed circumstances and review them every five years.

In the 17 States/UT covered in audit, we found that five States viz. Bihar, Himachal Pradesh, Odisha, Tamil Nadu and Uttar Pradesh had furnished details of the area which was provided with reasonable protection. Apart from these, Punjab and Uttar Pradesh had furnished the details of area which was proposed for protection. The remaining States did not carry out the field surveys and indicate the area that could be given protection against flood damage. Also, none of the selected States carried out review of assessment of protectable area every five years to account for change in the circumstances and need for flood protection.

6.4 Figures of flood damages

As per recommendation No. 2, 28 and 29 of RBA, detailed figures of flood damages should, as far as feasible be collected under the following heads by State Government, CWC, GFCC and Department of Agriculture.

- (a) Floods
 - i. Unprotected areas flooded
 - ii. Protected areas flooded due to failure of protection works
 - iii. Areas between the embankment and river which are left unprotected
- (b) Drainage congestion
 - i. In unprotected areas
 - ii. Behind embankments
- (c) The extent of area affected by drainage congestion should be compiled separately for protected area and unprotected area.

However, as per data available with CWC (2003) flood damages statistics were compiled State wise i.e. administrative units-tehsil, sub-division and district and not category wise/basin-wise/sub basin-wise as recommended by RBA. The CWC has not compiled data related to flood damages after 2003 in the manner as recommended by RBA.

6.5 Scientific Assessment of Flood Prone Areas in India

In its report (1980), RBA assessed 40 m ha of area as flood prone in India. As there was no standard scientific definition of Flood Prone Area (FPA) in India, RBA recommended that FPA should be worked out in a better way by making use of topographic maps and detailed hydrological data.

MoWR, RD&GR constituted (July 2012) an Expert Committee for scientific assessment of FPA in India. As of August 2016, three meetings of the Expert Committee had taken place (August 2012, June 2013 and September 2015). In its second meeting, the Committee recommended that Regional Committees be constituted for each State. These committees would identify, demarcate and

classify the FPAs based on the prescribed methodology, classification and criteria. The 10 activities mentioned in Table 6.2 below had to be carried out by the Regional Committees.

Table 6.2: Activities identified for Regional Committees

Activities	Timeframe
1. Identification of rivers/tributaries, basins sub-basins and sites/locations in the State/UT, preferably on a Geographical Information System (GIS) platform for which FPA assessment is needed.	By 31 October 2015
2. Collection of hydro-meteorological data.	
3. Flood frequency analysis to determine Highest Flood Level corresponding to three year, seven year and 10 year return period flood.	
4. Delineation and Assessment of area under inundation on the available topo-sheets ⁴⁶ corresponding to the HFLs determined as per flood prone area definitions, or by any methodology like based on historical satellite data, by using SRTM ⁴⁷ /ASTER ⁴⁸ /CARTODEM ⁴⁹ , etc. (Refinement of assessment using digital topo-sheets on finer scale (1:15,000) with finer contour intervals (5 m or less and 0.5-1.0 m in case of plain and deltaic region) can be done on the availability of same.	By 31 December 2015
5. Compilation of flood damage data and related parameters.	By 31 December 2015
6. Validation of FPA by historical data, ground verifications, by using remote sensing technique with help from NRSC, NIH ⁵⁰ , any consultant, etc.	By 31 January 2016
7. Submission of preliminary/interim report (1 st Version) by Regional Committee.	By 28 February 2016
8. Submission of preliminary/interim report (1 st Version) by Expert Committee.	By 31 March 2016
9. Submission of Final report by Regional Committees after refinement of assessment/data and its validation.	By 31 May 2016
10. Submission of Final report by Expert Committee after refinement of assessment/data and its validation using GIS platform.	By 31 July 2016

Source: Third meeting of Expert Committee for scientific assessment of FPA in India

Regional Committees for all 36 States/UTs had been constituted. However, we noticed that till July 2016, of the 17 States/UT covered in audit, scientific assessment of FPAs by the Regional Committees was taken up only in Bihar, Haryana, Kerala, Odisha, Punjab and West Bengal. In the remaining 11 States, the scientific assessment of FPA was yet to be started. Further, in Arunachal Pradesh,

⁴⁶ A toposheet is a shortened name for 'Topographic sheet'. It contains information about an area like roads, railways, settlements, canals.

⁴⁷ Shuttle Radar Topography Mission.

⁴⁸ Advanced Spaceborne Thermal Emission and Reflection Radiometer.

⁴⁹ Cartosat-1 derived Digital Elevations Models.

⁵⁰ National Institute of Hydrology, Roorkee, a unit under MoWR, RD&GR.

Madhya Pradesh and Uttar Pradesh no meetings of the Regional Committee were held as of February 2016.

6.6 Preparation of Digital Elevation Models and Frequency Based Flood Inundation Maps for flood affected areas

Clause 10.6 of National Water Policy (2012) stipulated that Frequency Based Flood Inundation Maps should be prepared to evolve strategies for coping with floods and droughts, as protecting all areas prone to floods was not practicable. Further, as per recommendation 28 of 21st Parliamentary Standing Committee on Water Resources for 2013-14, Digital Elevation Models⁵¹(DEMs) were to be prepared to demarcate flood affected areas in the States that were facing perennial flood ravages, especially the Ganga basin States.

From the 17 States/UT covered in audit, we found that only Bihar and Odisha prepared Frequency Based Flood Inundation Maps. CWC was involved in development of mathematical models for flood forecasting which were to be further utilised in preparation of the maps. But as of March 2016, the models were not developed by CWC due to which Frequency Based Flood Inundation Maps were not prepared by CWC.

Preparation of DEMs including Bathymetric survey⁵² of two lakh square meter (sq m) of the most flood affected areas in Bihar, Uttar Pradesh and West Bengal at a cost of ₹ 400 crore was initially included in the Expenditure Finance Committee (EFC) proposal for the plan scheme “Flood Forecasting” in XII FYP. Later on this component was withdrawn and included in proposal of National Mission for Clean Ganga for preparation of DEMs in 2.5 lakh sq. m. area in Ganga Basin through a separate EFC. The Ministry did not furnish the latest position in this regard.

We found that none of the States sampled in audit had prepared DEMs. In the case of West Bengal, Irrigation and Waterways Department stated (August 2016) that preparation of DEMs for FPA was costly and time consuming.

During the exit meeting (December 2016), the Ministry stated that on the directions of the Expert Committee constituted for the purpose by it, Regional Committees were constituted in States/UTs, with Principal Secretaries of the State as Chairman and senior CWC field officer as Member-Secretary, for scientific assessment of Flood Prone Area. The huge money charged by National Remote Sensing Centre (NRSC) for high resolution DEMs is a deterrent in preparation of the inundation maps. State Governments too do not have required funds for this. The work on scientific assessment of flood prone area is under way in CWC.

⁵¹ The Digital Elevation Model (DEM) prepared by using satellite data, is one of the key inputs for hydrological/hydraulic model development, and flood hazard mapping.

⁵² Bathymetry is the study of underwater depth of lake or ocean floors.

However, the fact remains that non-preparation of DEMs resulted in non-demarcation of various flood zones in the Country digitally and absence of scientific images of the food affected areas. The non-preparation of Frequency Based Flood Inundation Maps also defeated the purpose of development of strategies for coping with floods.

6.7 Morphological Studies

Paragraph 10.3 of National Water Policy 2012 envisaged that Morphological studies should be undertaken, based on which planning, execution and maintenance of revetments, spurs, embankments, etc. could be carried out, so as to prevent loss of land eroded by rivers. This will become increasingly more important, since climate changes were likely to increase the rainfall intensity, and hence, soil erosion. Twenty first Parliamentary Standing Committee on Water Resources, 2014 recommended that the Ministry/CWC/GFCC should immediately conduct detailed morphological studies of all the rivers in 11 Ganga Basin States⁵³ and complete this exercise within a definite time frame with a view to achieve better results in building, renovating and maintaining revetments, spurs and embankments in the area to control and mitigate the disaster caused by the flood.

There are around 301 rivers falling under 11 Ganga basin States. CWC awarded works relating to morphological studies of only 15 rivers⁵⁴ during 2015-16, to be completed in two years. Out of these 15 rivers, morphological studies of only eight rivers (three *per cent*) was taken up.

In the absence of morphological studies, proper planning, building, renovating and maintaining revetments, spurs and embankments to prevent loss of land due to erosion, could not be ensured.

The Ministry stated (December 2016) that the policies laid out in National Water Policy were being followed.

The reply cannot be accepted as Morphological studies as envisaged in the policy were not completed in any of the States.

6.8 Comprehensive Master Plan and formation of Implementation Committee

The 21st Parliamentary Standing Committee on Water Resources noted (February 2014) that the main function of GFCC is to prepare Comprehensive Master Plan

⁵³ Bihar, Chhattisgarh, Delhi, Haryana, Himachal Pradesh, Jharkhand, Madhya Pradesh, Rajasthan, Uttar Pradesh, Uttarakhand and West Bengal.

⁵⁴ Ganga, Rapti, Sharda, Kosi, Bagmati, Yamuna, Brahmaputra, Subansiri, Pagladia, Krishna, Tungbhadra, Mahananda, Mahanadi, Hoogly and Tapi.

(CMP) for flood protection and flood management in the Ganga basin States. Similarly, Brahmaputra Board was to carry out survey and investigations in Brahmaputra Valley and prepare a Master Plan for the control of floods, bank erosion and improvement of drainage in the Brahmaputra Valley and activities connected therewith. Guidelines of the GoI on the FMP envisage that Central assistance to the States would be provided for taking up flood management works in an integrated manner covering entire river/ tributary or a major segment.

The GFCC prepared CMPs for all the 23 rivers which are tributaries of the Ganga. GFCC being an Advisory Commission, execution of all works suggested under the CMPs has to be carried out by the respective State Governments. However, information regarding preparation of Action Plans for implementation of recommendations contained in CMPs was not forthcoming from State Governments. Our observations relating to preparation of CMP are as follows:

- a. Out of 17 sampled States/UT, 10 States (Bihar, Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Manipur, Odisha, Punjab, Tamil Nadu and Uttarakhand) did not prepare CMP for flood management. Instead, these States prepared flood management projects on selective basis.
- b. In Uttar Pradesh, CMP was prepared by the GFCC, however its recommendations were not implemented despite being one of the severely flood-affected States.
- c. While formulating the FMP schemes in West Bengal, major recommendations of GFCC were either not incorporated in the Detailed Project Report (DPR) or were not implemented. Seven FMP schemes falling in the Ganga Basin revealed that important recommendations such as creation of natural detention basins, partial diversion of the flood water to the spill channels, water shed management, morphological studies, etc, were not taken up.
- d. In Arunachal Pradesh, though Brahmaputra Board (BB) had prepared the basin wise CMP, no action plan on the basis of the CMP was prepared by the State (June 2016).
- e. Assam implemented only the short term schemes recommended in the CMP, but did not implement the long term measures recommended in the master plan.

Further, the Ministry requested (February 2014) six severely flood-affected Ganga basin States, namely Bihar, Himachal Pradesh, Jharkhand, Uttarakhand, Uttar Pradesh and West Bengal to constitute Implementation Committees to ensure time-bound implementation of the recommendations of the CMPs.

We found that only Uttar Pradesh formed Implementation Committee, but no records relating to its meetings and progress achieved towards implementation of

comprehensive plans were made available to audit. Thus, due to non-formation of Implementation Committees, time bound implementation of the recommendations of the CMPs for management of floods could not be ensured.

In Tamil Nadu, it was observed that Master Plan for Chennai and its suburbs, for its three rivers viz., Kosasthalayar, Cooum and Adyar, was not prepared (August 2016) to manage floods and for augmentation of water resources. The Engineer in Chief, Water Resource Department, stated (August 2016) that comprehensive master plan for Chennai and its suburbs could be evolved only in co-ordination with District Administration and local bodies. The absence of co-ordination between the WRD, Revenue Department and local bodies contributed to non-preparation of basin wise CMP, denying the planned execution of macro and micro drainage networks.

6.9 Flood Plain Zoning

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 specifying the types of permissible developments in these zones, so that whenever flood actually occurs, the damage can be mitigated.

CWC circulated a Model Bill on Flood Plain Zoning to all the States in 1975 for guidance of States for enactment of legislation in this regard. The Model Bill provided model clauses about flood zoning authorities, surveys and delineation of flood plain area, notification of limits of flood plains, prohibition or restriction of the use of the flood plains, compensation, and power to remove obstruction after prohibition.

The 21st Parliamentary Standing Committee on Water Resources recommended (2013-14) that MoWR, RD&GR take vigorous steps for persuading the States to enact the necessary legislation in this regard without delay.

We observed that only three States Manipur, Rajasthan and Uttarakhand had enacted Flood Plain Zoning Acts. As such, due to non-enactment of legislation for Flood Plain Zoning, enforcement of the measures to minimize/avoid damages due to floods could not be ensured.

The Ministry accepted (December 2016) that only States of Manipur, Rajasthan and Uttarakhand had enacted legislations for the Bill and stated that initial actions had been taken up. The Ministry further stated that it was up to the States to enact the Flood Plain Zoning Bill.

In Uttarakhand, Disaster Mitigation & Management Centre (DMMC) in 2012 had emphasised the need to banning construction especially in proximity of rivers and streams in line with the provisions of the Uttarakhand Flood Plain Zoning Act

2012. The Geological Investigation Report (2014) of DMMC and study report of (2014) of Wadia Institute of Himalayan Geology attributed that most of damages during the floods of June 2013 were due to construction and encroachment along the riverbeds and flood plain areas. If the recommendations of DMMC (2012) had been adopted by the Government, the impact of the floods of June 2013 would have been lesser.

In Tamil Nadu, the proposal (June 2014) to form a Committee to give recommendations for enacting the legislation for enactment of Flood Plain Zoning Bill, was under consideration of the State Government (August 2016). Lack of legislation for Flood Plain Zoning, resulted in developments abutting waterways, leading to inundation in Chennai and its suburbs during 2015 floods.

The fact remained that Bill on Flood Plain Zoning could not be enacted in most States even after more than 40 years since it was first envisaged.

6.10 Conduct of glacial lake outburst flood and landslide dam break floods studies

Clause 10.7 of National Water Policy 2012 envisages that in order to increase preparedness for sudden and unexpected flood related disasters in hilly reaches, glacial lake outburst flood and landslide dam break floods studies with periodic monitoring along with instrumentation, etc., should be carried out.

The work of monitoring of Glacial Lake and Water Bodies (GL/WB) in the Himalayan Region was taken up by CWC in 2009. The inventory of GL/WB was prepared in 2011 based on satellite imageries taken in 2009. As per inventory, there were 2,027 GL/WB with more than 10 hectares of water spread areas. Since 2011, monitoring of only 477 GL/WB having water spread area of more than 50 hectares was done every year during monsoon season (June-October).

Thus, periodic monitoring in hilly reaches was not being done for all the inventorised Glacial Lake and Water Bodies.

6.11 Conclusion

Recommendations of Rashtriya Barh Aayogh with regard to identification of area affected by flood in the country remained unfulfilled. In most of the States the scientific assessment of flood prone areas was not carried out. Non-preparation of Digital Elevation Models led to non-demarcation of various flood zones in the Country digitally and absence of scientific images of the food affected areas. Morphological studies with a view to achieve better results in building, renovating and maintaining revetments, spurs and embankments to control and mitigate disasters caused by floods were not completed by any of the 17 States/UT. None of the States/UT sampled in audit had prepared Comprehensive Master Plans (CMP) for flood management. Six severely flood affected Ganga basin States did

not constitute Implementation Committees for time bound implementation of the recommendations of the CMP for management of floods. None of the sampled States except Jammu & Kashmir, Manipur and Uttarakhand had enacted Flood Plain Zoning Acts. As such, enforcement of the measures to minimize/avoid damages due to floods could not be ensured.

6.12 Recommendations

We recommend that

- i) MoWR, RD&GR may persuade the State Governments to prepare a time bound action plan to comply with the recommendations made by Rashtriya Barh Ayog, Task Force 2004, Parliamentary Standing Committee on Water Resources and National Water Policy 2002 and 2012, and factor these recommendations in the release of funds in the various schemes of Central Government.
- ii) MoWR, RD&GR may take up with the States to enact the Flood Plain Zoning Bill and implement it in a time bound manner.



7

CHAPTER

7

Chapter

Monitoring and Evaluation

7.1 Introduction

As per the Flood Management Programme (FMP) Guidelines, the following have been prescribed under Monitoring Mechanism and Evaluation Studies:

- a. Monitoring of the scheme/projects under FMP to be carried out by the Central Water Commission (CWC), Ganga Flood Control Commission (GFCC) and Brahmaputra Board (BB) in their respective jurisdictions.
- b. For the schemes costing less than ₹ 7.50 crore, the performance was to be evaluated after the schemes were completed. The Performance evaluation of the completed works to be conducted by independent specialized/professional agencies having expertise in related fields in consultation with CWC/ GFCC/ BB as the case may be.
- c. State Governments was to commission concurrent evaluation studies for the schemes which cost more than ₹ 7.50 crore through reputed organization(s) (not under the administrative control of MoWR, RD&GR, Gol or under the Irrigation/ Water Resources Department of the State Government).
- d. Department of Space/NRSC to be associated in monitoring of physical progress of the schemes through advanced techniques such as Remote Sensing.
- e. Monitoring teams of CWC/GFCC/BB to monitor the physical and financial progress of the schemes. They were to conduct sample checks on the quality of construction materials and quality of works during their field visits. The samples taken/witnessed at site by the teams were to be tested for quality checks and results thereof were to be reflected in the monitoring reports.

We evaluated the extent of monitoring of schemes for Flood Control and Flood Forecasting on the basis of FMP Guidelines. Our observations are given in succeeding paragraphs.

7.2 Monitoring by Central Agencies (CWC/GFCC/BB)

As per para 4.13 of FMP Guidelines 2009, State Governments were required to submit quarterly reports on physical and financial progress of the projects to the monitoring agencies. Para 4.13 of FMP guidelines also stipulated that for the works costing more than ₹ 15 crore, the Monitoring Agencies (CWC/GFCC/BB) would inspect the works, at least once in every financial year.

As per para 5.1 of FMP Guidelines 2009, monitoring of the scheme/projects under the FMP for physical and financial progress of the projects was to be carried out by CWC, GFCC and BB in their respective jurisdictions.

We observed that monitoring of projects was not conducted by the concerned Central agencies in Arunachal Pradesh and Assam. We also observed that project authorities in Bihar and Jammu & Kashmir did not submit the quarterly progress reports to the Ministry. No information was furnished by the remaining 13 States/UT selected for audit.

Thus, Central and State agencies did not comply with the FMP guidelines in respect of monitoring of projects.

7.3 Performance evaluation of completed projects

As per para 5.8 of FMP Guidelines 2009, performance evaluation of the completed works was to be conducted by independent specialized/ professional agencies having expertise in related fields in consultation with CWC/GFCC/BB as the case may be.

We observed deficiencies in carrying out performance evaluation in 12 States (Arunachal Pradesh, Assam, Bihar, Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Odisha, Manipur, Sikkim, Tamil Nadu and West Bengal). In Uttarakhand, performance evaluation was carried out departmentally. In Kerala, Puducherry and Punjab, projects were not completed, hence performance evaluation was not required and in Uttar Pradesh no information was furnished. The deficiencies in performance evaluation are enumerated below.

- a. No performance evaluation was conducted for the projects in Bihar, Haryana, Himachal Pradesh, Jharkhand and Odisha.
- b. Consultation of the GFCC/BB in connection with the performance evaluation as required under the guidelines was not done for completed projects in Arunachal Pradesh, Assam, Bihar, Sikkim and Manipur.
- c. Dates of site visit/evaluation were neither mentioned in the evaluation reports, nor were they signed by the evaluating officers in projects of Arunachal Pradesh and Assam.

- d. The evaluation reports of projects implemented in Arunachal Pradesh did not mention the evaluation of actual achievements against targets in respect of area protected, village/towns to be protected and population benefited.

We further noticed that the State Governments did not take action on the deficiencies pointed out by the expert agencies after performance evaluation of the projects. These instances are discussed below:

- a. **Manipur:** Report of performance evaluation of one sampled project MAN-13 indicated that the performance of the scheme/project at two locations i.e. Jirighat and Khutchoithup were not satisfactory. At Jirighat, heavy damages had been caused to the retaining structures and at Khutchoithup, the river had completely submerged some portion of the retaining structure.

Action was not taken for rectification of the deficiencies pointed out by the performance evaluation team.

- b. **Sikkim:** The performance evolution of 24 FMP projects was conducted by NABARD Consultancy Services (NABCONS), which gave the following suggestions:

- a. Latest equipment to be acquired to deal with any emergency;
- b. Effective flood alert system should be in place to prevent calamities;
- c. State Government to provide budgetary support to carry out maintenance;
- d. Galvanised iron wire to be used in place of Barbed wire; and
- e. Assets Register to be maintained.

The State Government did not take action on any of the above suggestions/recommendations.

- c. **West Bengal:** Performance evaluation of the project WB-17 (Phase-II) was conducted (April 2014) by IIT Kharagpur. The expert agency suggested that proper maintenance work through reshaping the channel cross sections to maintain its geometry needed to be undertaken at regular intervals, preferably once in a year. We observed that no action was taken by the Irrigation and Waterways Department on the recommendation of IIT.

The Department stated (June 2016) that the embankments were being constructed as per drawing and availability of land. The fact remained that

maintenance work at regular intervals of once in a year as suggested by the expert agency, was not done.

Failure to take action to implement the suggestions and recommendations of experts on the performance evaluation of completed projects defeated the purpose of conducting the performance evaluation.

The Ministry stated (February 2017) that Proposals for Performance Evaluation Studies for some of the schemes are under process.

7.4 Concurrent evaluation of projects

Para 5.4 of FMP Guidelines 2009 stipulates that State Governments were to commission concurrent evaluation studies for the schemes which cost more than ₹ 7.50 crore through reputed organization(s) (not under the administrative control of MoWR, RD&GR, Gol or under the Irrigation/Water Resources Department of the State Government). For the schemes costing less than ₹ 7.50 crore, performance was to be evaluated after the schemes were completed. The concurrent evaluation report was to be submitted to the monitoring agencies (CWC/GFCC/BB).

We reviewed concurrent evaluation of the projects as per FMP guidelines in the 17 selected States/UT and observed the following:

- a. Concurrent evaluation was not conducted in accordance with the scheme guidelines in Assam (six projects), Himachal Pradesh (two projects) and West Bengal (one project). It was not carried out by reputed organization(s) (not under the administrative control of MoWR, RD&GR, Gol or under the Irrigation and Water Resources Department of the State Government).
- b. In Uttar Pradesh, Central share of ₹ 293.17 crore was outstanding as of March 2016 for want of evaluation report and audited statement of expenditure. Consequently, the State Government released ₹ 119.66 crore in excess of its due share. The Irrigation and Water Resources Department stated that all required documents were sent to Gol in time for release of Central share. The reply was not acceptable as the Department failed to submit required evaluation reports and audited statements of projects to the monitoring agencies.
- c. Concurrent evaluation was conducted through retired engineers of the Water Resources Departments in Bihar and Jharkhand in contravention of the guidelines. In Assam, the concurrent evaluation was carried out (March 2015) by Polytechnic/Engineering Colleges and NEDFi, without consulting IIT/BB.

- d. In Haryana, concurrent evaluation was not carried out and in Punjab, out of five projects, concurrent evaluation was carried out in only one project (PB-3). In four States i.e. Jammu & Kashmir, Kerala, Odisha and Uttar Pradesh concurrent evaluation was carried out but in Manipur, projects were less than ₹ 7.50 crore, hence no concurrent evaluation was required.

Thus, it was evident that concurrent evaluation was not as per the guidelines and MoWR, RD&GR also did not ensure that the evaluation was conducted.

The Ministry stated (December 2016) that the evaluations were normally being carried out as per FMP guidelines. The fact remained that there were many instances of non-evaluation of projects.

7.5 Application of Remote Sensing in planning of FMP projects

According to a research paper submitted by GFCC, satellite remote sensing coupled with Geographical Information System (GIS) has a powerful role in monitoring and mapping flood inundated and drainage congested areas. Remote sensing techniques using satellite imageries was most reliable and scientific method in evaluation of flood affected area and the damages. Agenda notes for first meeting of Regional Committee for Scientific Assessment of Flood Prone Area in Uttar Pradesh also pointed out (October 2015) that use of latest technologies viz., remote sensing, GIS, DEM, contour map of finer intervals will also enhance the quality of data collection. Recent advances in remote sensing techniques can effectively monitor, provide fairly reliable information and identify the extent of the total area and the cropped area affected by floods over a period of time using satellites imageries of different windows.

We found that satellite imagery from NRSC was used in Flood prone area only in the States of Odisha and Uttar Pradesh. Thus, Remote Sensing techniques were not used in the planning for FMP projects in all the States.

The Ministry stated (December 2016) that Remote Sensing Technology could be used subject to availability of adequate funds.

7.6 Quality control in execution of work

As per FMP guide lines, the monitoring agencies (CWC/GFCC/BB) were to monitor the physical and financial progress of the schemes. They would conduct sample checks on the quality of construction materials and quality of works during their field visits. The samples taken/ witnessed at site by the teams were to be tested for quality checks and results thereof would be reflected in the monitoring reports.

Audit observed that the prescribed quality checks were not conducted by the monitoring agencies (CWC/GFCC/BB) in 77 projects of seven States⁵⁵ examined in audit. The details of quality checks in respect of projects pertaining to remaining ten States were not made available to Audit.


The Ministry stated (December 2016) that the CWC/GFCC/BB do not have their own Quality control laboratories and it was the responsibility of the Project Authorities to ensure that the works were executed conforming to the prescribed standards. The Ministry added that the monitoring team, as required, carried out random sample checks in the laboratories maintained by the project authority.

The fact remained that neither CWC/GFCC/BB nor the project authorities carried out the requisite quality checks in all projects and there was failure of State Governments to take follow up action on irregularities pointed out.



7.7 Joint site visits



We conducted joint site visits of 47 projects/sites under FMP, 17 Flood Forecasting Station and 54 Dams comprising of teams from Audit and executing agencies. We noticed deficiencies in the projects, some of the major findings are discussed in the Tables 7.1, 7.2 and 7.3.



Table 7.1: Observations relating to joint site visits of projects under Flood Management Programme

States	Project	Deficiency noticed
Arunachal Pradesh	ArP-6: Anti-erosion works of Noa Dehing river to protect Diyun Circle in Lohit river.	<p>Construction of Spur: Out of two spurs, Spur no.1 was found about 200 m away from the flow of the river while Spur No. 2 was completely damaged and submerged in sand.</p> <p>Construction of bank revetment with Launching Apron: Against a total provision of 1,005 m, a length of 413 m was constructed. The revetment was damaged and washed away on most stretches of the river bank and only patches of the structure remained as on June 2016.</p> <p>Construction of Earthen Embankment: Earthen Embankment of 1,500 m was constructed, without the provision for Grass turfing and providing non-woven Geo-textile, as required. Further, the prescribed height of the embankment as per design was 2.5 m with base width of 14.50 m, but it was found to be about 1 m and 8 m respectively.</p>
		
	The Revetment damaged and washed away on most stretches of the bank of the Lohit river.	

⁵⁵ Assam – 30, Haryana - 1, Himachal Pradesh – 5, Jammu & Kashmir – 21, Kerala – 4, Manipur – 11 and Punjab -5.

Bihar	BR-38: Mahananda Flood Management Scheme in District Katihar (Phase I)	Brick soling work was found damaged at few places of Embankment (km 1.90 to 14.60). Embankment was found breached between km 25 to 26 (about 223 m). State Highway (SH) 98 was found badly damaged and large area was found covered by local sand due to this breach.
Himachal Pradesh		At different places in Swan river, there were a number of rain cuts and depressions on the top of the embankments and a number of big green trees growing on the river side embankment. Further, repair works were not carried out throughout the length of the completed works due to non-availability of funds.
	Tree and bushes growing on embankment under HP-2 at km 42.900.	Approximately 1,600 m of earth embankment and eight studs/spurs were physically verified. Earth embankment executed at Pandorian was found 20 per cent damaged and 10 per cent studs/spurs were found partially damaged at Pandorian and Jakhole. Modern geo-textile/geo-synthetic material/geo bags, etc. were not used for longevity and durability of vulnerable embankments as prescribed. No plantations were made along the earth embankments.
Jharkhand	JHK-03: Anti-Erosion work in the right bank of river Ganga from Kanhaiyasthan to Budhwaria in Sahibganj District	Works related to apron were not visible. The Ganga Pump Canal Division, Sahibganj stated that siltation had occurred on the bank of the river. Several acres of land were being used for agriculture. Apron was beneath the earth.
	Man- 11: Anti-erosion Project of Iril River from RD 0.00 km to 30.00 km	<ul style="list-style-type: none"> i) In the construction of Reinforced Cement Concrete (RCC) Bored pile along Iril river Right Bank Bund at Sawombung bridge in portion II, the bracing structure was found broken/separated and tilted towards the river. ii) Cement Concrete retaining wall of 40 m length was constructed on Right Bank Bund (R/B/B) instead of Left Bank Bund of the river from RD 18.00 km to 18.04 km. This indicated discrepancy between actual site of execution and measurement records. iii) Construction of Cement Concrete retaining wall for the chainage 14.400 to 14.470 km at R/B/B of the river was found executed by two different agencies.

	<p>During site visit, marked difference was seen in the quality of works between these two retaining wall structures; while the Retaining Wall (R/Wall) at 14.400-14.440 km was found in good condition, the other R/Wall executed over 14.440 to 14.470 km by another agency was found in poor state.</p>	
<p>MAN-11- poor execution of work in one portion of the retaining wall</p>		
<p>Odisha</p>	<p>OR-21:Bank protection work on left bank of river Subarnarekha near village Namkana from RD 00 to 200 m and village Palasahi from RD 00 to 400m</p>	<p>The work was executed after witnessing devastating floods in 2006 and 2007 which caused erosion of river bank. At Palasahi, stone protection work was damaged due to slipping of stones due to lack of periodical repairs and maintenance. The fact was accepted by the Balasore Irrigation Division.</p>
<p>Sikkim</p>	<p>Sik-14:Anti Erosion works in and around Mangan in North Sikkim.</p>	<p>WRRDD undertook the work in two phases, viz. (i) Jhora Training Work (JTW) along Rafong Khola, Mangan and (ii) JTW along Rimit Khola, Mangan which was completed in December 2010. During the joint site visit, the work relating to the JTW along Rafong Khola, Mangan valuing ₹ 2.57 crore was found totally washed out.</p>
<p>Tamil Nadu</p>	<p>TN-04: Flood protection works on Kollidam (Coleroon) River in Thanjavur, Nagapattinam and Cuddalore districts.</p>	<p>Flood embankment work (60 km – LS108.21 km to 168.21 km) to left bank of Coleroon River was completed (March 2012). During site visit (July 2016) of 10 km stretch (LS 145.51 km to 155.51 km), it was noticed that jungle clearance in the flood embankments were not carried out. Water Resources Department stated (July 2016) that the State Government did not provide budget for maintenance of FMP works for the entire 60 km.</p>
<p>Uttar Pradesh</p>	<p>UP- 01: Const. of embankment on right side of Ami river from Kauriram to Khajni Gorakhpur</p>	<p>Against the sanctioned length of 23 km. embankment only 7 km could be completed with 5 gaps ranging 150 m to 1000 m. The embankment constructed was damaged due to non-maintenance.</p>
		
<p>Big gap in embankment of project UP-1 (as on 04.05.2016).</p>		

 <p>Big gap in embankment of project UP-4 (as on 07.05.2016)</p>	<p>UP-4: Construction of Mahadeva Uska Bund in district Siddhartha Nagar</p>	<p>Against the sanctioned length of 15 km, only 8.12 km could be completed with the gap of 400 m. None of the six regulators were constructed as provisioned in the approved project resulting in six gaps of 50 m to 60 m. No plantation work was carried out on the embankment though provisioned in the approved estimates.</p>
	<p>UP-12: Construction of Marginal Embankments & FPW along left & right bank of river</p>	<p>Out of 3.900 km embankment sanctioned, filter layer with course sand, brick ballast and boulder pitching work at river side slope of Harishchandra Ghat to Udaya Ghat was not done in the length of 1.050 km. Street light were provisioned for the entire length of 3.9 km, however, only electric poles were installed in 2.390 km and no electrification was done as of April 2016. Bituminous road of 2.390 km was constructed instead of approved length of 3.900 km of the embankment.</p>
	<p>UP-13: Flood Protection Works along the right bank of river Gandak in district Kushinagar</p>	<p>Proposed boulder pitching work from 4.50 km to 5.600 km at Amwa khas embankment was not carried out. Only 670 m. long spur was constructed at 3.700 km of Amwa Khas embankment against provisioned 865 m and only 40 m (upstream) and 26 m (downstream) boulder pitching at nose of spur was done against sanctioned 90 m and 60 m, respectively. Brick soling work of 865 m at spur was not done though provisioned in the project.</p>
<p>Uttarakhand</p>  <p>Showing plantation deep inside marginal bund</p>	<p>UK-1: Construction of Right Marginal bund on river Ganga from Bhogpur to Balawali.</p>	<p>i) There was a deep vertical cut in the marginal bund at the starting point at Bhogpur, downstream close to the spur which was used as an approach road to river side by tractors/Buggies. Such a cut posed a risk for the water to spill into the nearby Bhogpur village in case of monsoon flood, if any, besides leaving the marginal bund susceptible to damage.</p> <p>ii) The construction of 120 m spur at km 6.500 and stone pitching of embankment in its vicinity was undertaken as a strengthening measure of marginal bund under project UK-1. We noticed substantial long standing plantation inside</p>


		the bund and soil erosion in downstream bank. Existence of plantation inside the bund area was likely to increase the possibility of soil erosion and consequent weakening of the bund structure. This was evident from the damages to the spurs and repeated damage control measures being taken.
West Bengal	WB-14: Bank protection works along both banks of the river Bhagirathi at Sundarpur & Basantpur, Kazipara to Nabagram & Saharwati to Uttarasan	Almost entire stretch (2,000 m) of the protection work in Sanyalchar executed under the project was engulfed into the river. After damage by flood in July 2011, the Irrigation and Waterways Department did not execute any repair or maintenance work and the entire place was in very vulnerable condition. The Department opined that before undertaking any protective measures, morphological studies need to be undertaken.
		
Vulnerable condition of Sanyalchar embankment		

Table 7.2: Observations relating to joint site visits of projects under Flood Forecasting Scheme

States	Deficiency noticed
Assam	None of the three Flood Forecasting Station sites at Naharkatia, Jiabharali and Sivasagar had wire-less system in operation and in two sites (Naharkatia, Jiabharali) Telemetry system was not functioning.
Bihar	Siltation and water quality of Koelwar and Gandhi Ghat, Patna FFS was not ascertained and laboratory instruments were lying idle due to non-availability of Research Assistant. Boats were used on hire basis due to non-availability of Boatman for the departmental boat.




<p>Uttar Pradesh</p>  <p>Solar panel and RCC block for bubbler was in damaged condition at Phaphamau, Allahabad at Ganga</p>	<p>Solar panel and RCC block for bubbler was in damaged condition and bubbler was not linked to the system. Two-gauge level measurement pillars were broken at Phaphamau, Allahabad at Ganga. The solar panel of telemetry system was missing, due to which the system not in working condition. The bubbler chamber was covered with dirt and silt at Birdghat, Gorakhpur at river Rapti. Parts of Telemetry station were dismantled and kept in office. The bubbler chamber was covered with soil due to ongoing work at Hanuman Setu, Lucknow at River Gomati.</p>
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Table 7.3: Observations relating to joint site visits of Dams

States	Deficiency noticed
<p>Haryana</p>	<p>Basic measures such as telephone connection, CCTV cameras and gates for restricted entry to public, contact numbers of higher officers, civil authorities and police authorities were not available on dam. A check dam located upstream was damaged since 2010 but was not repaired.</p>
<p>Jharkhand</p>	<p>No operation manual was prepared by the State Government for operation of Getalsud, Nalkari and Tenughat dams. At Tilaiya Dam, three cable trays were drilled to pass electricity lines to the Pump House through the drainage gallery, which not only reduced the width of the gallery but also posed a threat to the dam structure. Operating manhole chamber on top of the road for operation of gates manually at Tilaiya Dam was not safeguarded with railing and protection ladders though recommended (July 2014) by the Dam Safety Review Panel. Dam Authorities also stated that remote operation of the gates was out of order since long. Status of operation of under-sluice gates, lighting on the spillway and dam top road, alarming system, vigilance devices and alternate power were not satisfactory in the light of safety of dams.</p>
<p>Odisha</p>	<p>i) Salandi Dam: Outlet Gates No. 2 and 3 were not in operating condition</p>

States	Deficiency noticed
	<p>requiring immediate repair.</p> <p>ii) Harabhangi Dam: One seepage point was noticed at Downstream side of earth dam which remained to be arrested.</p> <p>iii) Jambira Dam: Adequate warning device (Siren) was not provided at dam site.</p> <p>iv) Muran Dam: 60 kVA DG Set needed special repair.</p> <p>v) Rengali Dam: Cracks were observed near skin plate in best wall of sluice at Block No. 43 which required rectification.</p> <p>vi) Hirakud Dam: There was leaching in 39F2 hole of Block 39-40 and deposition of lime. The deposited lime was to be cleaned by reaming on regular basis.</p> <p>vii) Gohira Dam: Gate No 5 of Spillway Gate had problems in lifting requiring immediate attention.</p> <p>viii) Jalaput Dam: Spillway protection wall was found scored near about 100 m in left flank of spill channel requiring repair to check further retrogression.</p> <p>ix) Kanjihari Dam: Gate No 7 of Spillway Gate was not operating properly and was to be repaired and made functional. There was no standby generator for alternative power system for gate operation.</p> <p>x) Salia Dam: Cracks on the surface of the body wall of the Spill way require repairing.</p>
Tamil Nadu	<p>i) Aliyar Dam and Sholayar: Weed growth was noticed in the downstream of the dam. Further, uneven settlement in the top of the earthen dam was noticed in Ailyar Dam and formation of calcium deposit in drains inside gallery was noticed in Sholayar Dam.</p> <p>ii) Bhavanisagar Dam: Encroachments in low lying area of the right bank of river were not evicted. The accumulation of silt/sedimentation reduces the active storage capacity of the reservoirs.</p>

States	Deficiency noticed
<p>Uttar Pradesh</p>  <p>Seepage in the Lower Khajuri weir</p>	<p>i) Several seepage points were noticed at Lower Khajuri weir at Mirzapur.</p> <p>ii) Flood control room was not established at Sirsi dam at Mirzapur. Tools and plants and instrument were not available at the time of site visit at Sirsi, Meja, Dhandraul, Lower Khajuri & Upper Khajuri dams. Seepage register was not being maintained at site.</p>
<p>Uttarakhand</p>	<p>Leakage of water from the flushing conduit gates at Ichari Dam was noticed.</p>  <p>Leakage of water from the flushing conduit gates at Ichari Dam.</p>

The Ministry stated (December 2016) that the issue comes under the purview of States to address.

The Ministry does impress upon the State Governments suitably whenever required. Audit is of the view that in the test checked cases included in the report, the monitoring teams of CWC/GFCC/BB did not carry out random sampled checks, as required in the FMP guidelines.

7.8 Conclusion

In five States performance evaluation of the projects was not done by the monitoring agencies. Three State Governments did not take any action for rectification of the deficiencies pointed out during the performance evaluation of 26 completed Flood Management Programme projects. In three States concurrent evaluation of Flood Management Programme projects was not conducted in accordance with schemes guidelines. Remote Sensing was not used in the monitoring of Flood Management Programme projects. Monitoring agencies (CWC/GFCC/BB) failed to conduct quality tests on the quality of construction materials and works during field visits. Site verification of Flood Management Programme projects revealed that in 11 selected States the

structures viz. embankment/earthen-embankment, revetment, launching apron, retaining wall, Gabion guide wall, stone protection work, Reinforced Cement Concrete (RCC) piles were found damaged and gaps in construction of embankments, structures washed away, less physical quantity executed, work not visible/submerged, cut in marginal bund etc. were noticed. During site visits of Dams in 11 States, Audit noticed deficiencies relating to spillway gates, check Dams, weed growth and encroachment in downstream and low lying areas of Dams, seepages etc in 23 dams in six States.

7.9 Recommendations

We recommend that

- (i). MoWR, RD&GR may conduct performance evaluation and concurrent evaluation of all FMP projects as per FMP guidelines.
- (ii). MoWR, RD&GR may consider increasing the use of Remote Sensing Technology in the monitoring of FMP.
- (iii). CWC/GFCC may ensure quality tests on the quality of construction materials and works during field visits.
- (iv). MoWR, RD&GR may persuade the State Governments to immediately review the issues relating to damages/washing out of already constructed structures and take appropriate action for construction works not taken up.

New Delhi

Dated: 27 March 2017



(MANISH KUMAR)

Principal Director of Audit
Scientific Departments

Countersigned

New Delhi

Dated: 29 March 2017



(SHASHI KANT SHARMA)

Comptroller and Auditor General of India

A decorative graphic on a blue background. It features a white circle with a light blue border containing the word 'ANNEXURES'. To the left of the circle, there are overlapping lines in light blue and dark blue that form a jagged, downward-pointing shape. To the right of the circle, there are two horizontal lines, one light blue and one dark blue, extending across the page.

ANNEXURES

Annexure I

Response of the Management/Ministry to Audit Recommendations

(Paragraph reference: 1.7)

S.No.	Recommendation	Ministry's reply
1.	MoWR, RD&GR may release adequate funds/reimburse funds in timely manner as per FMP guidelines and may impress upon State Governments to release funds to executing agencies in time bound manner.	The Flood Management Programme (FMP) during XII Plan was approved late in October, 2013. The approval to FMP projects is granted by the Empowered Committee as and when its meeting is held. The delay in release of 1 st installment can be attributed mainly to late approval of Flood Management Programme (FMP) during XII Plan, non-receipt of documents from the States/ UTs as per laid down procedures in FMP guidelines or on account of budgetary constraints. Regarding release of funds by the State Governments to Executing agencies, it would be sorted out by persuading State Governments for timely release of funds.
2.	MoWR, RD&GR may keep strict vigilance on utilisation of funds by State Government and executing agencies so as to avoid parking and diversion of funds.	Agreed to the recommendation. In the sanction order a condition would be put that the financial rules must be followed.
3.	MoWR, RD&GR may release/reimburse the funds to the State Governments only after ensuring receipt of audited statements of expenditure, Utilization Certificates and other requisite documents.	FMP guidelines are being followed. However, the cases mentioned in the report would be got examined.
4.	MoWR, RD&GR may approve the projects under FMP after ensuring that the projects are formulated in an integrated manner covering entire river/tributary or a major segment of rivers/tributaries.	The Working Group on "Flood Management and Region Specific issues" for XII Plan was constituted by the Planning Commission in October 2010. One of the recommendations of the Committee was Integrated Basin Management approach which is always emphasized by the Ministry. However, due to lack of resources with the States/ UTs and to take up the emergent works in critical areas, proposals are submitted by States/ UTs which are considered by MoWR, RD & GR.
5.	MoWR, RD&GR may approve the projects	BC ratio calculations are worked out as per

	under FMP after ensuring that the Benefit Cost Ratio is worked out correctly as per guidelines in this regard.	CWC/ MoWR, RD&GR guidelines and this aspect is further taken care of at the time of techno-economic appraisal and approval of project by Advisory Committee of MoWR, RD &GR. However, the cases mentioned in the report would be got examined.
6.	MoWR, RD&GR may advise the State Governments to make efforts for early completion of delayed projects and completion of new projects in stipulated time.	The delay in completion of projects is on account of various factors. The monitoring teams of CWC/ GFCC/ BB constantly advise the State Governments and even offer solutions for early completion of the delayed projects. State Governments have to act on the issues coming under their purview. Due to lesser budgetary allocation under FMP, the States are not getting the required funds, which also is leading to delays in completion.
7.	MoWR, RD&GR may take adequate steps to release the funds after ensuring acquisition of required land.	FMP guidelines are being followed. However, the cases mentioned in the report would be got examined.
8.	CWC may devise a time bound action plan to speed up the formulation of flood forecast on real time data communication network by making all the telemetry stations operational and take suitable steps to install all the targeted telemetry stations.	The river water level data acquisition system basically comprises of either bubbler system installed under water near the river bed or radar system installed above. While both the systems are robust, in case of bubbler system, sediment deposition on the sensors, breakage of pipes, theft of solar panels and other vital equipment parts by locals, shifting of river course, shortage of adequate manpower at sites etc. are some of the factors adversely affecting the performance of these data acquisition systems. CWC is seized of the issue and all out efforts are being made to make them functional.
9.	CWC may ensure that the warning and danger levels have been fixed at appropriate level so that flood forecasting could be made correctly and timely.	-

10.	MoWR, RD&GR may prepare a time bound action plan to accelerate the completion of all the long term RMABA projects to facilitate the long term solution to the flood problem of Assam, North Bihar and Eastern Uttar Pradesh from annual floods.	Large reservoirs are being contemplated on rivers in India/Nepal with adequate flood cushion to provide long term solution to flood problems. Master Plans have been prepared by Brahmaputra Board and GFCC. Interlinking of rivers would also help in beneficially diverting the flood waters. Inflow forecasting coupled with integrated operation of the reservoirs during monsoon/ floods can mitigate the flood damages to a very large extent. Water being a State subject, the cooperation of States is paramount in these efforts.
11.	MoWR, RD&GR may, in consultation with State Governments, devise a time bound action plan for preparation and implementation of Emergency Action Plans including preparation of inundation maps and hydrological studies for all the large dams in the country.	The observations of Audit will be forwarded to CWC/DRIP for remedial action.
12.	MoWR, RD&GR may advise the State Governments to prepare Standard Operating Procedures for dams and carry out the prescribed pre and post monsoon inspection of the dams.	The observations of Audit will be forwarded to CWC/DRIP for remedial action.
13.	MoWR, RD&GR may persuade the State Governments to prepare a time bound action plan to comply with the recommendations made by Rashtriya Barh Ayog, Task Force 2004, Parliamentary Standing Committee on Water Resources and National Water Policy 2002 and 2012, and factor these recommendations in the release of funds in the various schemes of Central Government.	Necessary follow-up actions on the recommendations of Rashtriya Barh Aayog and Parliamentary Standing Committee on Water Resources have already been taken up. The policies laid out in National Water Policy are being followed.
14.	MoWR, RD&GR may take up with the States to enact the Flood Plain Zoning Bill and implement it in a time bound manner.	A model bill for Flood Plain Zoning legislation was circulated by the Union Government in the year 1975 to all the States and Union Territories. The States of Manipur, Rajasthan and Uttarakhand have enacted legislations for the Bill and initial actions have been taken up. It is up to the States to enact the Flood Plain Zoning Bill.
15.	MoWR, RD&GR may conduct performance evaluation and concurrent evaluation of all	The para 9.1 of XII Plan FMP guidelines stipulates as under:

	FMP projects as per FMP guidelines.	The State Governments would commission concurrent evaluation studies for the projects during their execution through reputed independent organization(s) (not under the administrative control of MoWR, RD&GR or under the Irrigation/ Water Resources Department of the State Governments). This is normally carried out as per guidelines. If not, the same is insisted upon.
16.	MoWR, RD&GR may consider increasing the use of Remote Sensing Technology in the monitoring of FMP.	This is made use of for Flood Forecasting activities. For other activities, it can be considered subject to availability of adequate funds.
17.	CWC/GFCC may ensure quality tests on the quality of construction materials and works during field visits.	CWC stated that CWC/GFCC/BB do not have their own Quality control laboratories. It is the responsibility of the Project Authorities to ensure that the works are executed conforming to the prescribed standards. However, the monitoring team, as required, carries out random sample checks in the laboratories maintained by the project authority.
18.	MoWR, RD&GR may persuade the State Governments to immediately review the issues relating to damages/washing out of already constructed structures and take appropriate action for construction works not taken up.	This comes under the purview of the State Governments to address. Ministry does impress upon the State Governments suitably, wherever required.

Annexure II

State-wise Sampling

(Paragraph reference : 1.8)

A. Flood Management Programme

States	Works approved from 01.04.07 to 31.03.15	Sample projects for file scrutiny	Sample projects for site visit
1. Arunachal Pradesh	21	11	2
2. Assam	141	30	10
3. Bihar	47	24	4
4. Haryana	1	1	1
5. Himachal Pradesh	7	5	1
6. Jammu & Kashmir	42	21	4
7. Jharkhand	3	3	1
8. Kerala	4	4	1
9. Manipur	22	11	2
10. Odisha	68	30	7
11. Puducherry	1	1	1
12. Punjab	5	5	1
13. Sikkim	45	22	4
14. Tamil Nadu	5	5	1
15. Uttar Pradesh	29	14	3
16. Uttarakhand	21	10	2
17. West Bengal	18	9	2
Total	480	206	47

B. River Management and Works related to Border Areas

States	Total projects	Sample projects for file scrutiny	Sample projects for site visit
1. Assam (through BB)	13	4	1
2. Bihar	119	30	10
3. Jammu & Kashmir	3	2	1
4. Uttar Pradesh	32	8	3
5. West Bengal	17	5	2
Total		49	17

C. EAP for Dams

States	Number of Dams completed	Sample Dams for file verification	Sample Dams for site visit
1. Bihar	24	2	2
2. Himachal Pradesh	19	2	2
3. Jammu & Kashmir	14	2	2
4. Jharkhand	50	5	5
5. Kerala	61	6	6
6. Odisha	198	20	10
7. Punjab	14	2	2
8. Tamil Nadu	116	12	10
9. Uttar Pradesh	115	12	10
10. Uttarakhand	16	2	2
11. West Bengal	29	3	3
Total	656	68	54

D. Flood Forecasting (FF)**(in numbers)**

States	Number of level FF stations	Number of inflow FF stations	Sample projects for file scrutiny of level FF stations	Sample projects for site visit of level FF stations	Sample projects for file scrutiny of inflow FF stations	Sample projects for site visit of inflow FF stations
1. Assam	24	0	6	2	0	0
2. Bihar	32	0	8	3	0	0
3. Haryana	0	1	0	0	1	1
4. Jharkhand	1	4	1	1	2	1
5. Odisha	11	1	3	1	1	1
6. Uttar Pradesh	34	1	9	3	1	1
7. Uttarakhand	3	0	1	1	0	0
8. West Bengal	11	3	3	1	2	1
Total	116	10	31	12	7	5

Note – Only eight States are included for Flood Forecasting because the stations are available only in these States out of the sample of 17 States/UT.

Annexure III

**Statement showing the details of project files not furnished by the MoWR,
RD&GR**

(Paragraph reference: 1.8)

S. No.	States/UT	Total number Sampled projects	Number of Sampled projects for which record furnished	Project code number of Sampled projects for which records not furnished
1	Arunachal Pradesh	11	11	0
2	Assam	30	21	9 AS-17, 26, 88, 102, 112, 122, 130, 135, 143
3	Bihar	24	14	10 BR-3, 11, 12, 13, 14, 16, 22, 33, 38, 39
4	Haryana	1	1	0
5	Himachal Pradesh	5	3	2 HP-5 & 9
6	Jammu & Kashmir	21	18	3 JK-6, 9, 18
7	Jharkhand	3	3	0
8	Kerala	4	4	0
9	Manipur	11	11	0
10	Odisha	30	10	20 OR-3, 12, 13, 15, 16, 17, 19, 21, 23, 25, 32, 35, 36, 44,46,50,54,56, 70, 74
11	Puducherry	1	1	0
12	Punjab	5	5	0
13	Sikkim	22	4	18 SIK- 1,4,6,7,11,12,13,14,16,18, 21, 22, 24, 32,35,38,43, 45
14	Tamil Nadu	5	5	0
15	Uttar Pradesh	14	10	4 UP-1,2,9, 10
16	Uttarakhand	10	8	2 UK-4 & 19
17	West Bengal	9	7	2 WB-3, 6
	Total	206	136	70

Annexure IV

Division wise details of the problems associated with the telemetry stations

(Paragraph reference: 4.4)

Divisions	Telemetry stations installed	Non-functional Telemetry stations	Non-functional period	Reasons
1. Upper Yamuna Division	14	8	Since 2008 in respect of two stations and 2015 in respect of three stations	In six sites telemetry stations were washed away/parts stolen/ part not working and in two stations site location was to be shifted.
2. Himalayan Ganga Division	9	7	Since June 2013	In six sites, telemetry stations were washed away/parts stolen/parts were not working and in one station constant/incorrect reading was received during flood season 2013 and 2014.
3. Middle Ganga Division-II, Lucknow	15	15	Since July 2013	Telemetry Data of all the stations was not matching with observed data, hence treated as all the stations were not working properly. In three sites i.e. Bareilly, Fatehgarh and Dabri, Systems were not working hence dismantled due to safety reason.
4. Middle Ganga Division-III, Varanasi	10	10	September 2011 to June 2012	The data received did not match with manually observed data. The data (both water level and rainfall) received were erratic and reported to be non-reliable since commissioning.
5. Middle Ganga Division-IV, Patna	8	8	June 2012 to December 2012	In four sites parts were stolen/parts were not working and in four stations real time data had never been received in these sites which was repeatedly reported for needful action.

Divisions	Telemetry stations installed	Non-functional Telemetry stations	Non-functional period	Reasons
6. Middle Ganga Division-V, Patna	6	6	January 2013	In all the six stations real time data had never been received in these sites as some part of the stations had been damaged/stolen which was repeatedly reported for needful action. Modelling Centre installed in Patna was non-functional from 20 June 14 to 06 April 2015. Presently, it was in start-up mode and displaying erroneous data. Real time data was not being received for any of the telemetry stations under the jurisdiction of MGD-IV and MGD-V since long.
7. Damodar Division	24	12	June 2007 to October 2013	In nine sites telemetry stations had not been switched on due to security reason/instrument not installed/equipment stolen/parts were not working and in three stations data was not received after installation of the system.
8. Middle Brahmaputra Division, Guwahati	6	2	March 2012 and July 2015	Solar panel and battery had been stolen and in other site date logger was not working.
9. Lower Brahmaputra Division, Jalpaiguri	5	5	April 2011 to March 2016	Non-receipt of any real time data since installation of the systems till March 2016. In all the five stations constant water level data was visible at their respective modelling centre since inception.
10. Krishna & Coordination Circle, Hyderabad	41	1	2009	Submerged during 2009 floods.
11. Lower Godavari	67	2	19 September 2008 and 02	One washed away during 2008 flood and solar panel

Divisions	Telemetry stations installed	Non-functional Telemetry stations	Non-functional period	Reasons
Division/Upper Godavari Division, Hyderabad			March 2015	etc. stolen of other telemetry station.
12. CWC, Chennai	5	1	November 2015	Equipment was not giving the reading since 2015.
13. Tapi Division, Surat	38	38	09 May 2011 to 29 August 2012	Out of 38 telemetry stations only four telemetry stations have found matched water level with manually observed water level and none of the telemetry stations have matched rainfall data with manually observed rainfall data from September 2012 to 31 October 2014. Tipping Bucket Rain Gauges (TPRGs) supplied by M/s ESTL did not perform as per specifications during the monsoon seasons 2012, 2013 and 2014 and have not been tested and certified by IMD. They showed wide variation when compared with the data of Standard Rain Gauge (SRG).

Divisions	Telemetry stations installed	Non-functional Telemetry stations	Non-functional period	Reasons
14. Mahi Division, Ahmedabad	38	38	March 2011 to July 2012	<p>Out of 38 telemetry stations only seven telemetry stations have found matched water level with manually observed water level upto 26 November 2012. Nine telemetry stations remained non-functional from September 2012 to 16 February 2013. Two stations namely Somkamala Amba Dam and Paderibadi remained non-functional with effect from 02 August 2012 to 15 September 2012 and 19 September 2012 to 15 October 2012, respectively. Status after 16 February 2013 was not available.</p> <p>Tipping Bucket Rain Gauges (TPRGs) supplied by M/s ESTL have not performed as per specifications during the monsoon seasons 2012, 2013 and 2014 and have not been tested and certified by IMD. They have shown wide variation when compared with the data of Standard Rain Gauge (SRG). (Upto October 2014).</p>
15. Mahanadi-Eastern River Division, Burla, Sambalpur, Odisha		2	03 November 2012 and 18 June 2012	Stations were not reporting to modelling centre at Burla since 03 November 2012 and 18 June 2012 respectively upto 22 August 2014.
16. Eastern River Division, Bhuvneshwar	34	34	March 2012	<p>Data was not received from all the sites at Bhuvneshwar modelling centre from March 2012 to 22 November 2012.</p> <p>17 stations were not reporting from June 2013 to September 2013 (position as on 26 October 2013).</p>

Divisions	Telemetry stations installed	Non-functional Telemetry stations	Non-functional period	Reasons
17. Middle Ganga Division-I, Lucknow	11	11	August 2011 to March 2012	In all the stations telemetry data was not matching with Manual Data. Maintenance of the Telemetry stations was not satisfactory. (Upto January 2016).
18. Lower Yamuna Division	15	15	01 July 2011 to 20 December 2011	All the sites commissioned between 01 July 2011 to 20 December 2011 were non-functional/ transmitted erroneous data for 139 days between 12 January 2012 to 01 October 2012 and the contractor is liable to pay penalty of around ₹ one crore. Status after January 2013 was not available.
19. Lower Ganga Division	29	7	Not available	In two sites, battery and Solar plate had been stolen and reported to service provider which had not been provided till date. In other five sites nozzle/cable were damaged. This was reported to service provider, which had not been provided till date.
Total	375	222		

Abbreviations	
AA	Administrative Approval
BB	Brahmaputra Board
BCR	Benefit Cost Ratio
BoQ	Bill of Quantity
BT	Bitumen
CA	Central Assistance
CAT	Catchment Area Treatment
CE	Concurrent Evaluation
CE	Chief Engineer
CMP	Comprehensive Master Plan
CMP	Crisis Management Plan
CPWD	Central Public Works Department
cu m	Cubic Meter
CWC	Central Water Commission
DEM	Digital Elevation Model
DMP	Disaster Management Plan
DPR	Detailed Project Report
DSO	Dam Safety Organization
EA	Executing Agency
EAP	Emergency Action Plan
EC	Empowered Committee
EE	Executive Engineer
EFC	Expenditure Finance Committee
FF	Flood Forecasting
FFS	Flood Forecasting Station
FMP	Flood Management Programme
FPA	Flood Prone Area
FYP	Five Year Plan
GFCC	Ganga Flood Control Commission
GFR	General Financial Rules
GL/WB	Glacial Lake and Water Bodies
Gol	Government of India
ha	Hectare
IIT	Indian Institute of Technology
IMC	Inter- Ministerial Committee
IMD	India Meteorological Department
km	Kilometer
m	Meter
m ha	Million hectares
MoF	Ministry of Finance
MoWR, RD&GR	Ministry of Water Resources, River Development and Ganga Rejuvenation
NCDS	National Committee on Dam Safety
NDMA	National Disaster Management Authority
NIH	National Institute of Hydrology

NMCG	National Mission for Clean Ganga
NRSC	National Remote Sensing Centre
O&M	Operation and Maintenance
PPR	Preliminary Project Report
PSC	Parliamentary Standing Committee
PWD	Public Works Department
RBA	Rashtriya Barh Ayog
RCC	Reinforced Cement Concrete
RMABA	River Management Activities and works related to Border Areas
SBD	Standard Bidding Document
SFCB	State Flood Control Board
SOPs	Standard Operating Procedures
SoR	Schedule of Rate
STAC	State Technical Advisory Committee
UC	Utilisation Certificate
WBM	Water Bound Macadam
WRD	Water Resource Department
WRRDD	Water Resource and River Development Department



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