CHAPTER I
INTRODUCTION

1 INTRODUCTION

The National Centre for Earth Science Studies (NCESS) estimates[1] that 14.52 *per cent* of the total area of Kerala is prone to floods. Floods are the most common of natural hazards that affect people, infrastructure and natural environment in Kerala. Incidence of floods in the State is becoming more frequent and severe. While high intensity rainfall causes flooding during monsoons in the State, increase in flood plain occupancy and reclamation of water bodies and wetlands over the years have contributed to increasing flood damages. Hence, flood management needs to be accorded high priority in the disaster management profile of the State. The mitigation of damages caused by floods is dependent upon a combination of pre-flood preparedness, operational flood management and post flood review.

Government of Kerala (GoK), in line with the Disaster Management Act, 2005 enacted the Kerala State Disaster Management Rules, 2007 and promulgated the Kerala State Disaster Management Policy, 2010 for holistic disaster management in the State. The Kerala State Disaster Management Authority (KSDMA) under the Revenue and Disaster Management Department was constituted (2007) to lay down guidelines to be followed by the various departments of GoK in the formulation of their development plans and projects such that integrated measures could be taken for prevention of disasters and provide necessary technical assistance for disaster management.

A Performance Audit on 'Preparedness and response to floods in Kerala' covering the period 2014-19 was conducted to assess whether planning and implementation of flood management measures were effective with focus on the floods in 2018.

1.1. Organisational set-up for flood control

The Kerala State Disaster Management Authority (KSDMA)[2] is assisted in the execution of its functions by the State Executive Committee (SEC) which was constituted (2007) by the GoK with the Chief Secretary to the Government as the Chairperson. The Head of the Department of Revenue and Disaster Management, who is the Convenor of SEC and Head of the Department of KSDMA, acts as the State Relief Commissioner.

District Disaster Management Authorities (DDMA) have been constituted in all 14 districts to act as the planning, coordinating and implementing bodies for disaster management and to mobilise resources of all relevant departments at their level. As per Kerala State Disaster Management Plan approved in 2016, the Water Resources Department is the nodal department for

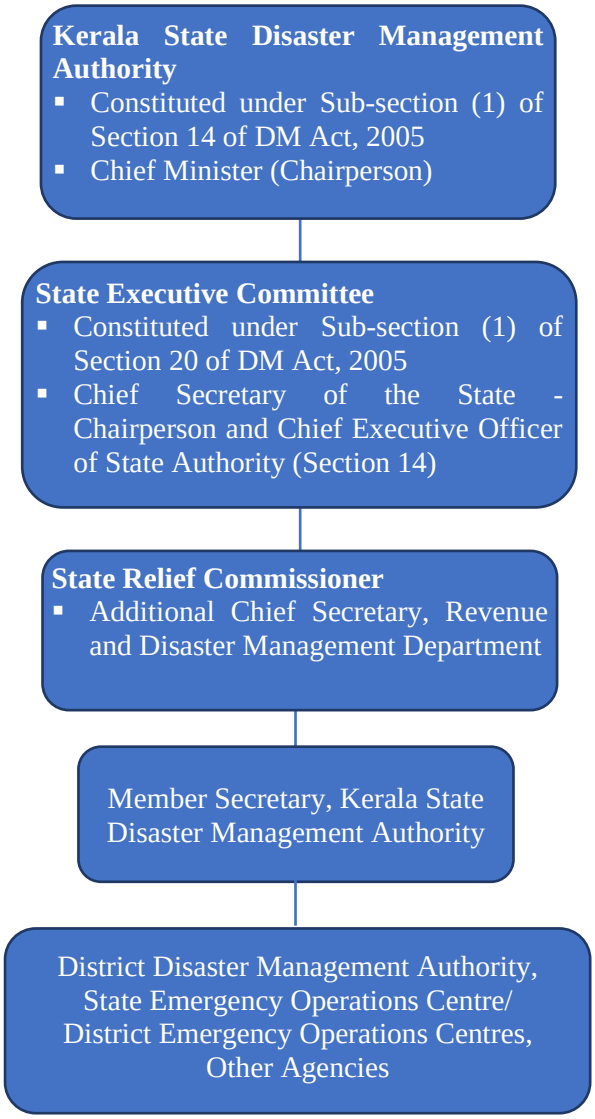
[1] Estimated in 2010 on the basis of multi hazard zonation maps prepared by NCESS

[2] with the Chief Minister of the State as the ex-officio Chairperson and nine members including the Minister of Home and Vigilance, Minister for Agriculture and Principal Secretary, Revenue and Disaster Management Department forming part of the Authority

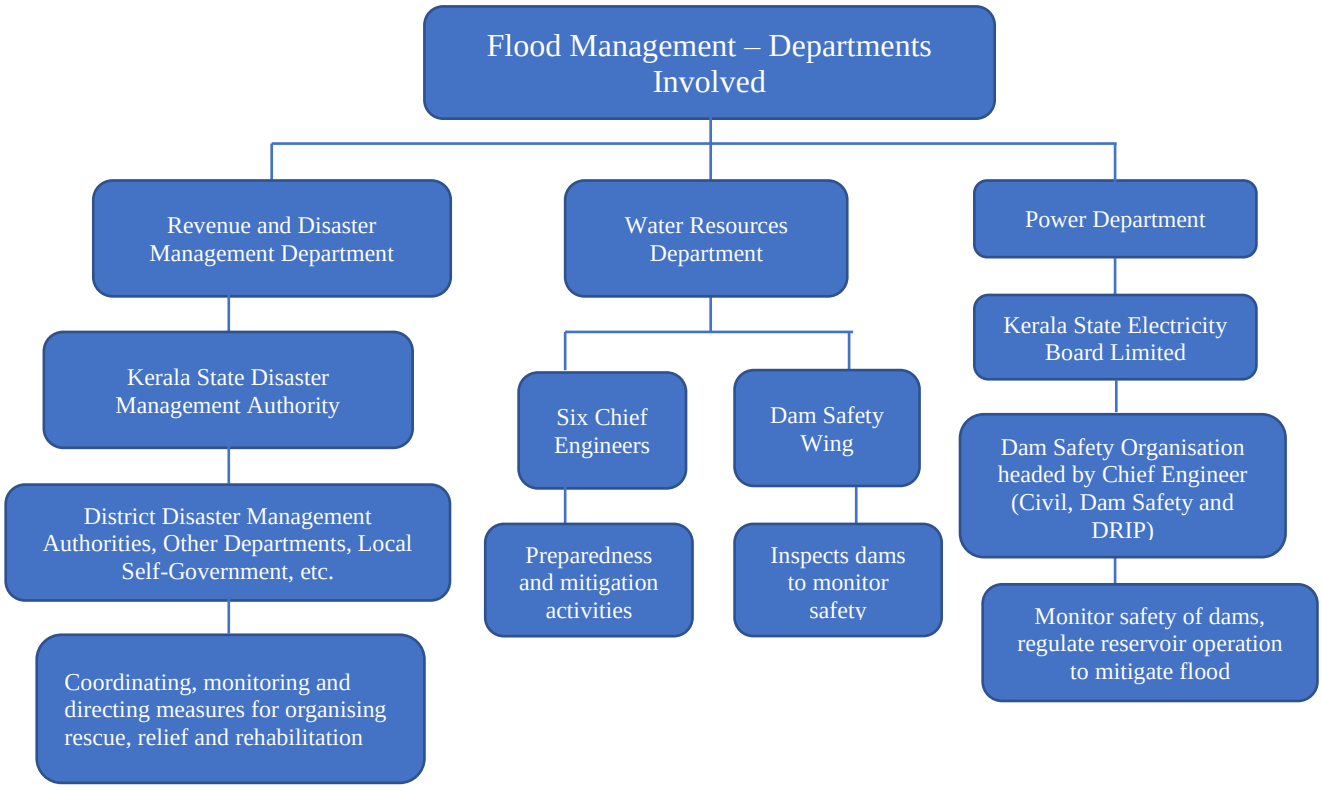
preparedness, and the Revenue and Disaster Management Department, for response and recovery in times of flood.

Emergency Operations Centres at the State (SEOC) and district level (DEOC) function under KSDMA and DDMAs respectively, for prompt assessment and relay of information to facilitate quick response and effective decision making. The Departments of Water Resources and Power, through their subordinate wings/ officers, implement structural and non-structural measures for disaster risk reduction to effectively manage flood scenarios in the State. The organograms presented below depict the organisational set up of disaster management in the State.

Institutional set up for disaster management



Institutional set up for disaster management (contd.)



1.2. Audit Objectives

The Performance Audit was conducted with a view to assess whether

- planning for flood management was comprehensive and effective;
- implementation of measures for management and control of floods was effective;
- preparedness and response to the floods in 2018 was adequate and timely.

1.3. Audit Criteria

Audit observations were benchmarked against the criteria derived from the following documents:

- The Disaster Management Act 2005
- NDMA Guidelines on Management of Floods 2008
- Kerala State Disaster Management Rules 2007
- State Disaster Management Policy 2010
- National Disaster Management Plan 2016

- State Disaster Management Plan 2016
- National Water Policy 2002, 2012
- Central/ State Government Orders, Circulars, Codes, Manuals and Guidelines of KSDMA, other implementing agencies etc.

1.4. Audit scope and methodology

Audit adopted a two-stage sampling methodology for selection of four out of 14 districts (25 *per cent*) for test check. While Idukki district was judgmentally selected due to the maximum concentration of large dams, the remaining three districts of Alappuzha, Ernakulam and Thrissur were selected through risk-based sampling. Eight[3] Taluk Offices in these four districts (two per district) which were worst hit during 2018 floods were also selected for detailed scrutiny. The detailed list of institutions covered by Audit is given in **Appendix 1.1**.

The Performance Audit covering the period 2014-19 was conducted between May 2019 and February 2020 by scrutiny of relevant records of the Revenue and Disaster Management Department and the Water Resources Department in Government Secretariat and the various agencies[4] connected with the management of floods at State/ District/ Taluk/ Village level including the Kerala State Disaster Management Authority, SEOC, Institute of Land and Disaster Management (ILDM), India Meteorological Department (IMD), Kerala State Electricity Board Limited etc. An Entry Conference was held on 18 June 2019 with the Principal Secretary, Revenue and Disaster Management Department, Secretary, Water Resources Department (who was also the Secretary, Power Department) and heads of audited institutions, including the Chairman, Kerala State Electricity Board Limited wherein the scope, objectives, criteria, and methodology of audit including selection of districts for test check were discussed.

On conclusion of audit, Exit Conferences were held with the various Departments mentioned in the Report through video conferencing on different dates as per the Government's request and in the wake of COVID pandemic, during which the audit findings and recommendations of audit were discussed in detail. Additional remarks offered by the Government with respect to the audit findings have been considered in the finalisation of the Report. Exit Conferences with Principal Secretary, Revenue and Disaster Management Department along with the Commissioner, Disaster Management and Member Secretary, KSDMA was held on 18 January 2021, with Secretary, Power Department along with Chairman, Kerala State Electricity Board Limited on

[3] Alappuzha district: Kuttanad and Chengannur; Ernakulam district: Aluva and Paravur; Thrissur district: Chalakkudy and Thalappilly; Idukki district: Idukki and Devikulam Taluk Offices

[4] Office of the Chief Engineer, Irrigation department, Dam safety offices, KSEBL/ Irrigation division offices of test-checked dams, offices of Disaster Management Authorities and Emergency Operations Centres in selected districts and Disaster Management sections in taluks.

23 January 2021 and with Additional Chief Secretary, Water Resources Department on 02 February 2021[5].

Audit methodology included scrutiny of records in selected offices, joint field visits with department officers to dam sites, river basins, flood prone areas, flood management structures etc. Audit also conducted a survey of 800 persons affected by flood in the test-checked districts. Audit engaged the Indian Institute of Science (IISc), Bangalore as Consultant to study the Kerala floods of August 2018 from a hydrological perspective. The study area was the Periyar river basin, which covers an area of 5159.71 square kilometres. The Government has communicated its concern over the fact that a simulation study by the Consultant IISc Bangalore has been relied upon for auditing a crisis management period, *viz.* the floods of August 2018. Audit's response is that the simulation studies by technical experts, though undertaken *ex post facto*, are reliable as a constructive tool, even for a crisis management situation. In this instance, the exercise has been useful in re-creating the hydrological scenario of the 2018 floods for the purpose of examining whether reservoir operations could have been handled differently with the then available set of data and thus facilitate better preparedness to handle similar challenging situations, that may arise in the future.

1.5. Acknowledgement

Audit acknowledges the cooperation extended by the Department of Revenue and Disaster Management, Department of Water Resources and Department of Power, Government of Kerala in the conduct of the Performance Audit. The co-operation extended by officials of Central Water Commission, India Meteorological Department, Kerala State Electricity Board Limited (KSEBL), Kerala State Disaster Management Authority, Irrigation Design and Research Board, Dam Safety Organisation, Kottayam, Kerala State Remote Sensing and Environment Centre and District Disaster Management Authorities in Alappuzha, Thrissur, Ernakulum and Idukki is gratefully acknowledged. Audit records its appreciation for the efforts of Prof. P. Pradeep Mujumdar and his team from IISc, Bangalore in submitting a Report on the 2018 Kerala floods. Audit has relied, *inter alia*, upon the Consultant's study for observations relating to Reservoir Operations and impact of Land Use and Land Cover change, included in this Report.

[5] Discussion was held with the Executive Director, Cochin International Airport Limited on 29 January 2021.