

Chennai Flood Warning system



1.0 Introduction:

The 2015 Chennai floods which paralysed the city was due to three consecutive weather systems that brought in unprecedented rain to the city. Chennai came to a standstill, in spite of its extensive drainage connectivity, comprising three major rivers namely Kosasthalaiyar, Cooum, Adyar, the mammoth Buckingham canal, ennore creek, pallikaranai marsh and man-made drainage systems.

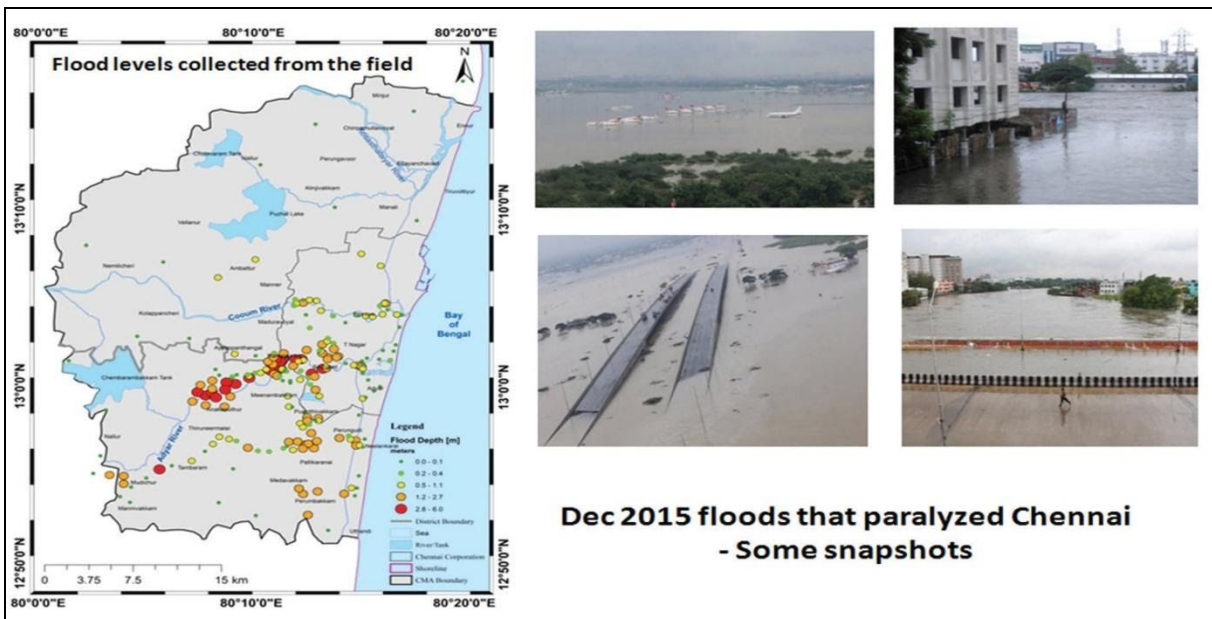


Fig 1. Chennai Flood, December 2015



Fig 2. Field data collection

2.0 Genesis and development of the CFLOWS-Chennai:

Subsequent to the deluge in Chennai, the need for an expert system for flood forecasting and warning was acutely evident and the office of the Principal Scientific Adviser (PSA) to the Govt. of India, decided to develop an expert system comprising of flood forecasting, flood inundation and possible means of its management for dealing with any such future events. The multi-disciplinary system was developed as a multi-institutional project with active involvement of Indian Institute of Technology (IIT) Bombay as the lead, IISc, Bangalore, IIT- Madras, IRS, Anna University, along with the partnership of institutes of Ministry of Earth Sciences namely India Meteorological Department (IMD), National Centre for Medium Range Weather Forecasting (NCMRWF), National Centre for Coastal Research (NCCR), Indian National Centre for Ocean Information Services (INCOIS). The system is being made operational by Ministry of Earth Sciences to aid the Government of Tamil Nadu. Recognising the complexity of the warning system and need of operation of such expert in close coordination with Tamil Nadu State Government, it was decided to entrust the task to National Centre for Coastal Research (NCCR), an attached office of Ministry of Earth Sciences so that end to end system can be developed, tested and put into operation in real time as Ministry has expertise in operation of similar

system for Early Warning of Tsunami at INCOIS. NCCR integrated all the components and developed an end to end system with active involvement of Tamil Nadu State Government for operational purposes.

The Coastal Flood Warning system for Chennai, referred to as CFWLWS-Chennai, is developed as a Web GIS based decision support system, integrating data and outputs, derived from Weather forecast models, Hydrologic models, Hydraulic models and Hydrodynamic models. The regional weather forecasting models from NCMRWF and IMD, form part of the operational CFWLWS-Chennai. The model datasets were validated, using field data, provided by IMD and the Tamil Nadu state government. Hydrologic models are used to transform rainfall into runoff and provide inflow inputs into the river systems namely Adyar, Coovum and Kosathalayar. Hydraulic models solve equations of fluid motion to replicate the movement of water to assess flooding in the study area. The hydro dynamic models are used to calculate the tide and storm surge impacts into the model domain. Based on these models a flood library, comprising of about 796 Flood inundation scenarios, were developed corresponding to different rainfall return periods, tidal conditions, water discharge conditions etc. The WebGIS based decision support system comprising of six modules was build in-house by NCCR and they are Chennai smart city, Chennai flood Vulnerability, Online data hub, 3D Visualization, Flood info - crowd sourcing and Decision support system (DSS).



Fig 3. CFWLWS-Chennai Dashboard

A Red Atlas-Action Plan Map has been developed to serve as a ready reckoner for flood mitigation operations incorporating flood maps with field datasets on the streets, locations of

relief centres, evacuation locations etc as provided by the state government. CFlOWS-Chennai will be integrated with TN-SMART, which is the disaster management portal of the Tamilnadu state Government.

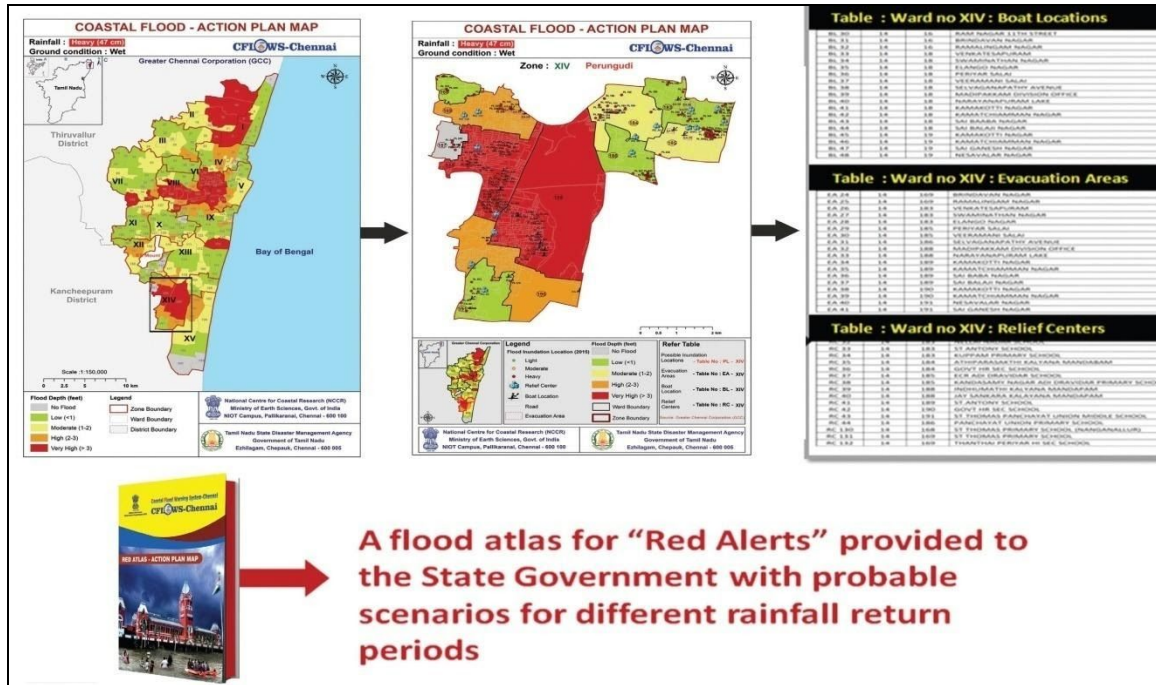


Fig 4. Flood Atlas for Red Alerts – for mitigation operations

CFlOWS-Chennai was launched by the **Shri M. Venkaiah Naidu**, Honorable Vice President of India, in the presence of **Dr. Harsh Vardhan**, Honorable Union Minister for Health and Family Welfare, Science and Technology and Earth Sciences, **Shri Banwarilal Purohit**, Honorable Governor of Tamil Nadu, **Shri O. Panneerselvam**, Honorable Deputy Chief Minister of Tamil Nadu, **Shri. R.B. Udayakumar**, Minister for Revenue & Disaster Management and Information Technology, Government of Tamil Nadu, **Shri D. Jayakumar**, Minister for Fisheries and Personnel and Administrative Reforms, Government of Tamil Nadu on November 3rd, 2019.



Fig 5. Honorable Shri M. Venkaiah Naidu, Vice President of India released a Red Atlas Action Plan Map



Fig 6. Honorable Shri M. Venkaiah Naidu, Vice President of India handed-over to Shri. R.B. Udayakumar, Minister for Revenue & Disaster Management, Government of Tamil Nadu