

National Database for Emergency Management - ISRO DMSP

National Remote Sensing Centre
Indian Space Research Organization
Department of Space, Government of India
Hyderabad, Telangana, India

The Vision: To provide space based information addressing all natural disasters in preparedness, response, mitigation, and reconstruction phases for Disaster Risk Management in the country



- NRT activities and damage assessment
- State level flood hazard zonation atlases
- Spatial flood early warning systems



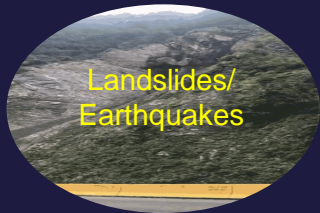
- National level geo-portal for DRR
- DSS, IDRN and PDNA tools
- DR site for ICR-ER, MHA



- Automatic forest fire alert system
- Rapid assessment of fire affected area



- International Charter
- Sentinel Asia
- Capacity Building



- Landslide/earthquake damage assess.
- National landslide inventory
- Landslide susceptibility mapping



- BRTMS
- Strategic applications

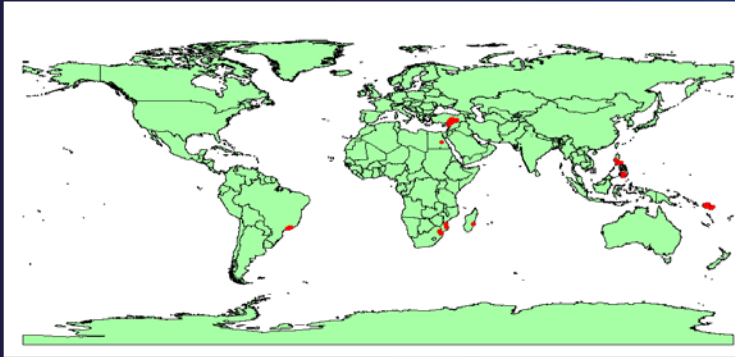
End user: MHA, NDMA, SDMAs, NDRF, MEA, FSI, GSI, etc..

These are used by the State and central authorities in relief & rescue operations, damage assessment and in DRR activities

International Cooperation and Capacity Building

International Charter

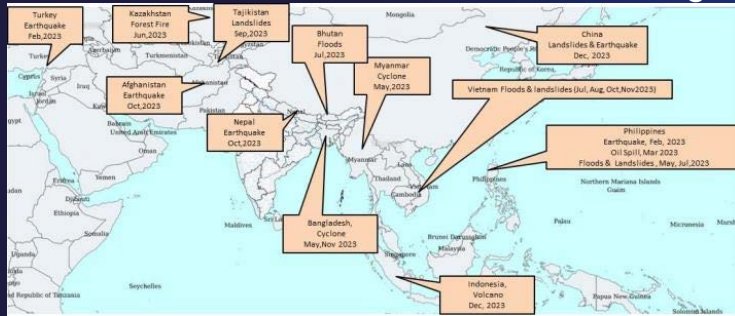
29 disaster events, 170 IRS Satellite images
ISRO Will Lead International Charter in 2025



- Annual DMS training programmes (5days)
- NDEM training programmes for NDRF and DMS officials
- Sentinel Asia & IORA Workshops
- Workshops in association with NDMA, and NIDM
- Regional workshops on DMS applications

Sentinel Asia

20 disaster events, 53 IRS Satellite images





National Database for EMERGENCY MANAGEMENT

NATIONAL REMOTE SENSING CENTRE

NDEM Objectives



Multi-scale geospatial database for the country.

Development of Decision Support System tools for addressing disaster/ emergency management.

Computer infrastructure to facilitate data dissemination and services hosting and DR site at MHA, New Delhi.

Stake Holders



Monitoring Dept

MHA, NDMA, PMO,
NIDM, IDS



State Disaster Dept

All States/ UTs DM Dept. Officials



Forecasting Dept

IMD, CWC, INCOIS, SASE



District Disaster Dept

760+ Districts from all
States/ UTs



Disaster Forces

NDRF, SDRF

NDEM Milestones

NDEM v1

Geospatial Viewer
VPN Access
GIS Tools

NDEM v2

Mobile Apps
MoU With NDRF
Regional Training Programs

NDEM v3

Disaster Dashboard
MoUs With States
3 SKOCH Awards
Customized NDEM-NDRF Portal

NDEM v5

Enhanced Pan India Disaster Scenario
Overlay multiple services on one map
Enhanced Geospatial Tools
More Disaster Services
State specific bi-lingual base map

2013

2015

2017

2018

2021

2023

2024

NDEM v3

Customized Portals for States
Regional Training Programs

NDEM v4

Regional Languages Support
More DSS Tools & PDNA Tools
Regional Training Programs
Public Access to Disaster Layers

NDEM v4.1

Enhanced Disaster Dashboard
Forest Fire / Lightning Alerts
SMS alerts to stake holders
Terrain / 3D Visualization
Award in Excellence Geospatial Applications

PAN INDIA DISASTER SCENARIO

Layer Manager

☒ PAN India Disasters

Forest Fire

Earthquake

Flood

News

Coastal Current

Now cast Warnings

Cloud Burst

Cyclone

Avalanche

Temperature

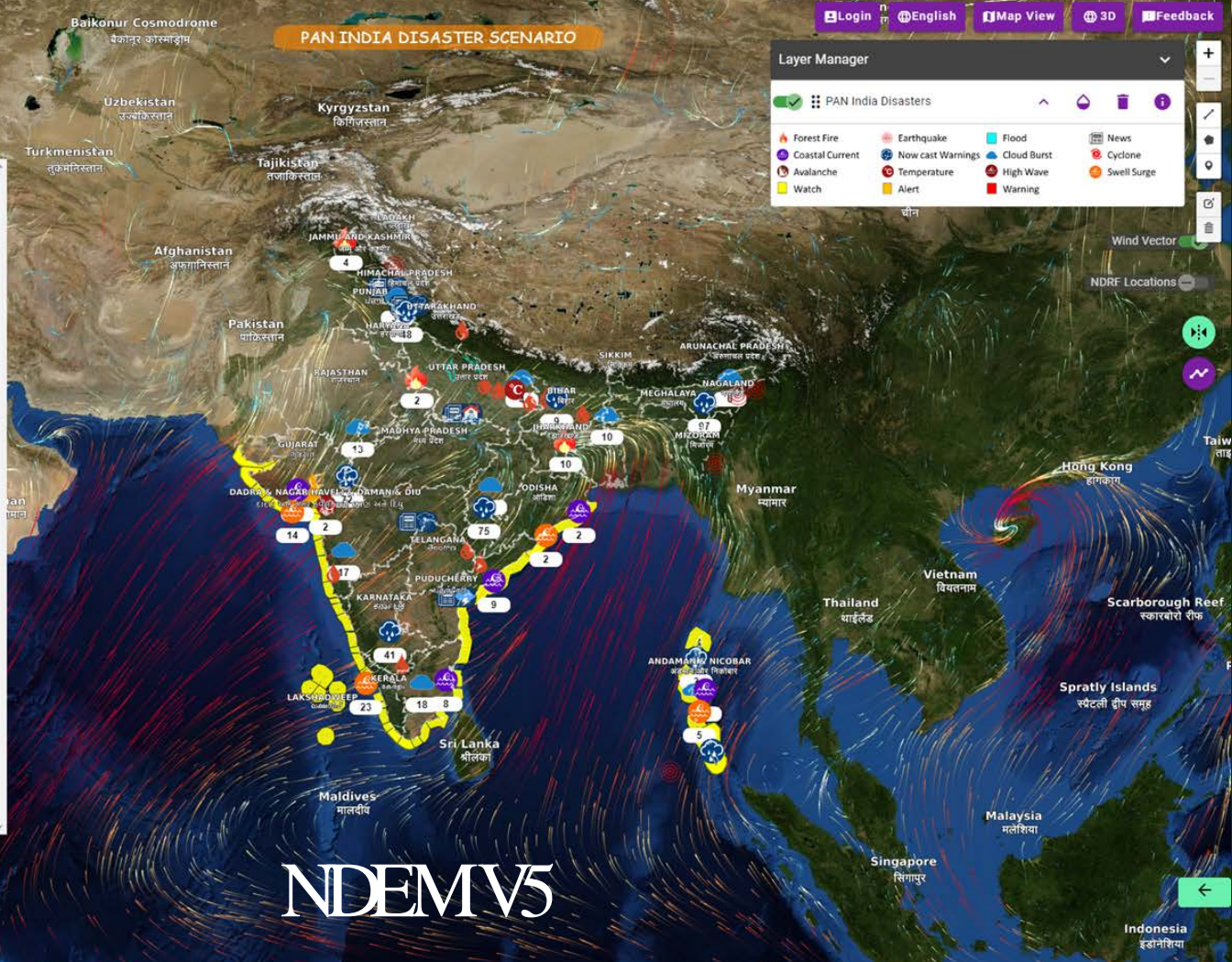
High Wave

Swell Surge

Watch

Alert

Warning



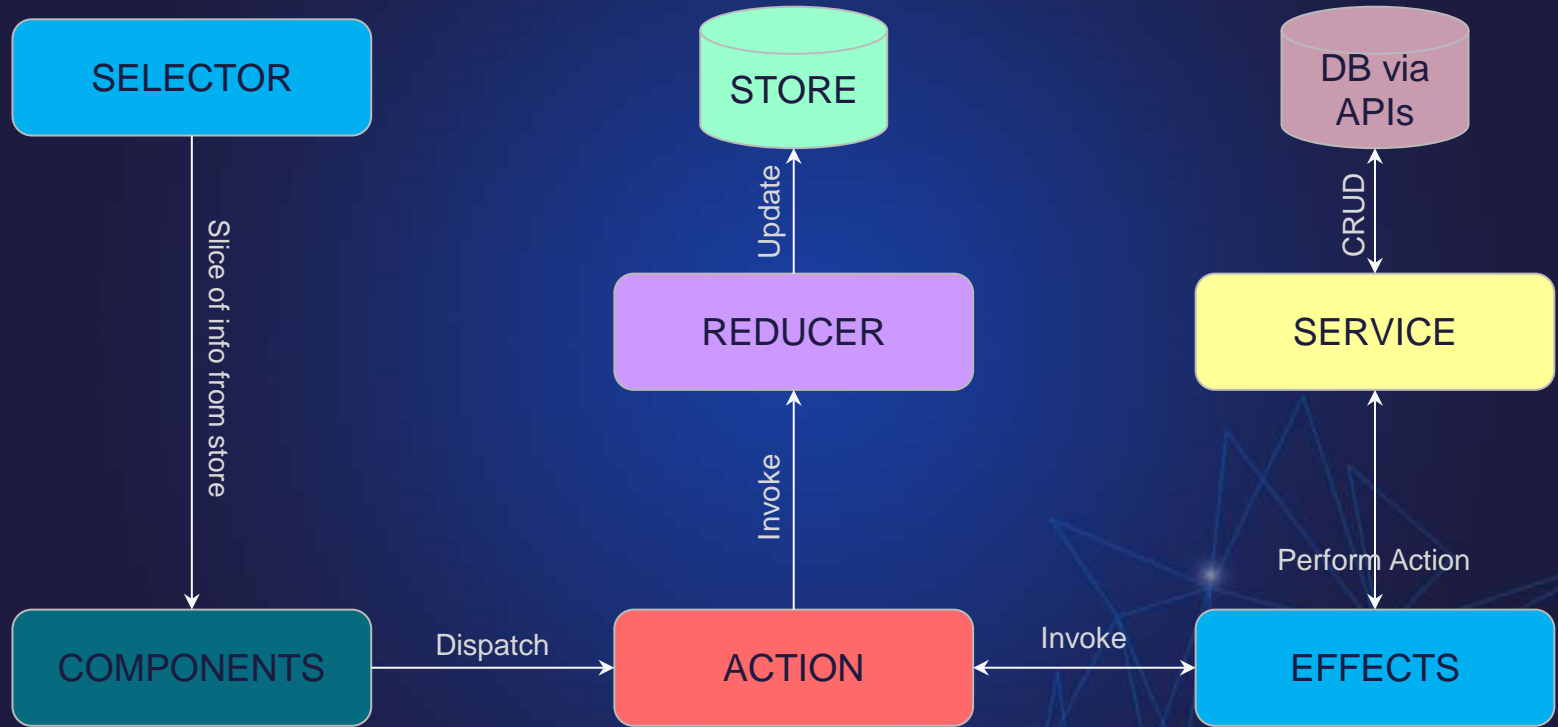
NDEM V5

NDEM 5.0 Technology Stack and Architecture

Frontend:

- TypeScript
- RXJS (Reactive Extensions for JavaScript)
- Angular v16
- Angular Material Design
- NGRX (Angular Reactive Extensions)
- Transloco
- Leaflet

Component Communication Flow



PAN India Disaster Scenario

- Geo-referenced News
- Earthquake Locations
- Forest Fire Locations
- Water Level above WL
- Cyclone Tracks
- Flood Inundation Areas
- Landslides
- Nowcast warnings
- Avalanche alerts
- Temperature
- High wave alerts
- Swell Surge
- Cloud Burst
- Cyclone



Disaster Services

- Near real time space based disaster data; alerts and warnings from various organizations are enriched with addition of geospatial database services
- Access all kinds of disaster services on a single platform
- Utilize wealth of historical data

All the disaster services are categorized

Current Scenario (Response)

Near Real Time Flood

Near Real Time Forest Fires

Earthquake Events

Lightning

CWC Water Levels

Districtwise Nowcast

Current Weather

Cloud Movement

MOSDAC Services

Cloud Burst Locations

Historical (Mitigation)

Flood Hazard Atlas

Flood Historical Data

Glacial Lakes

Flash Flood Vulnerability Index

Flood Risk Vulnerability

Forest Fire Vulnerability Districts

Landslide Hazard

Landslide Inventory

GSI Geo-Hazard Data

Disaster Services

Current Scenario (Response) ▾

Early Warnings (Preparedness) ▾

Historical (Mitigation) ▾

Early Warnings (Preparedness)

Spatial Flood Early Warning (Goda...

Landslide Early Warning

SILAAS

Avalanche Alerts

PAN-India Run Off

Seven Day Flood Forecast (CWC)

Cyclone Track (IMD)

Sea State Forecast

City Weather Forecast

Lightning Forecast

Swell Surge Alerts

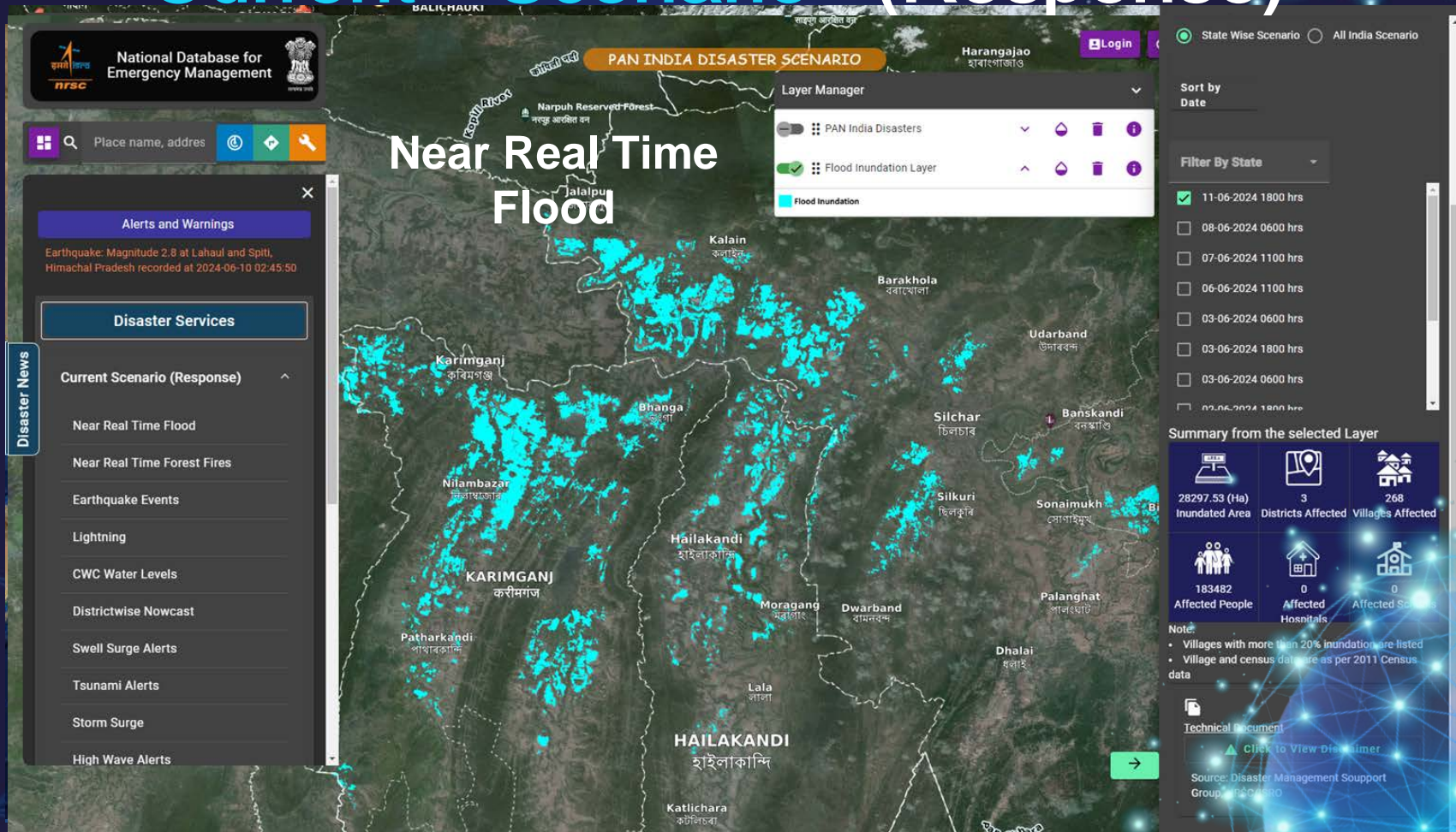
Tsunami Alerts

Storm Surge

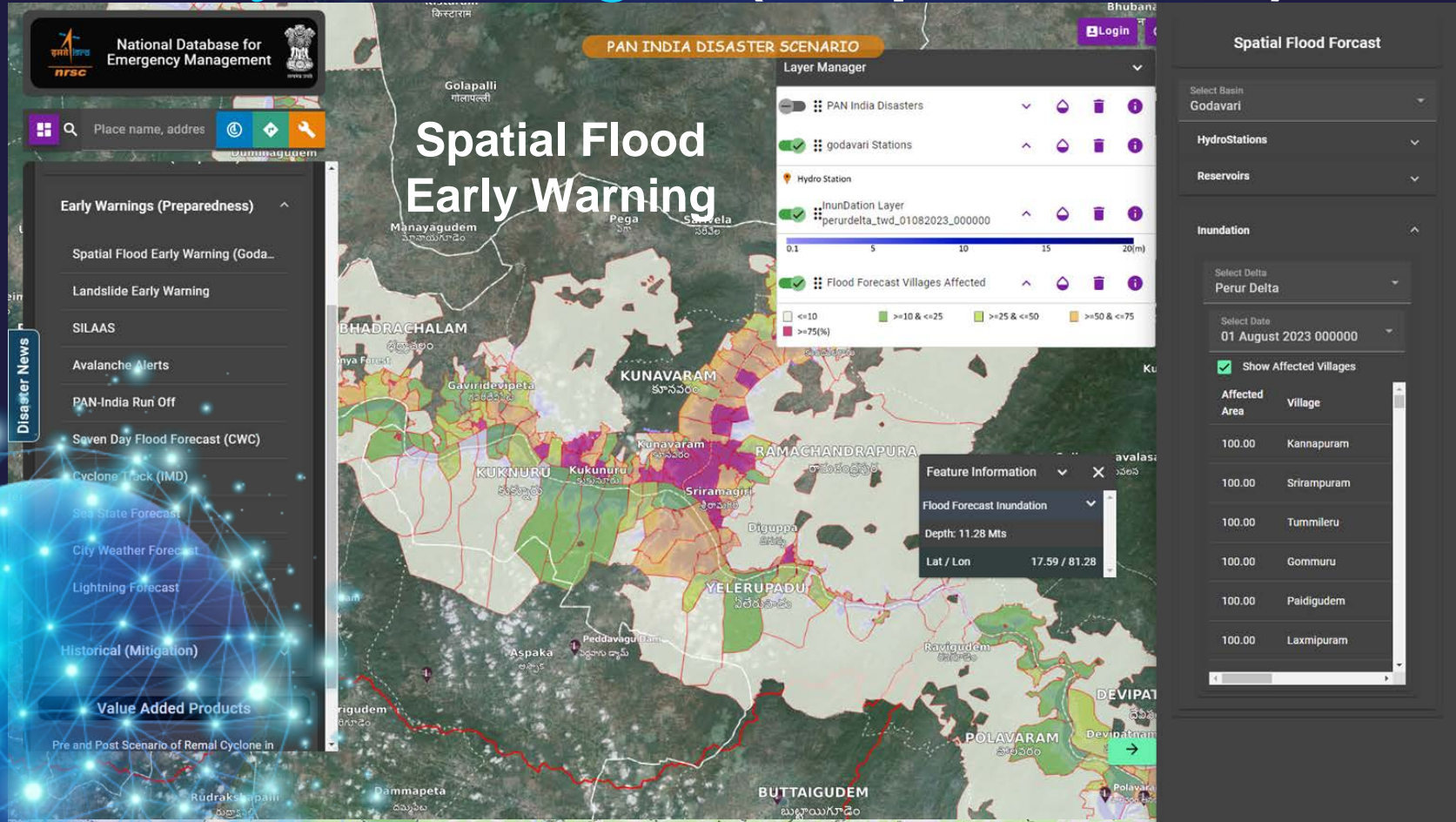
High Wave Alerts

Coastal Current Alerts

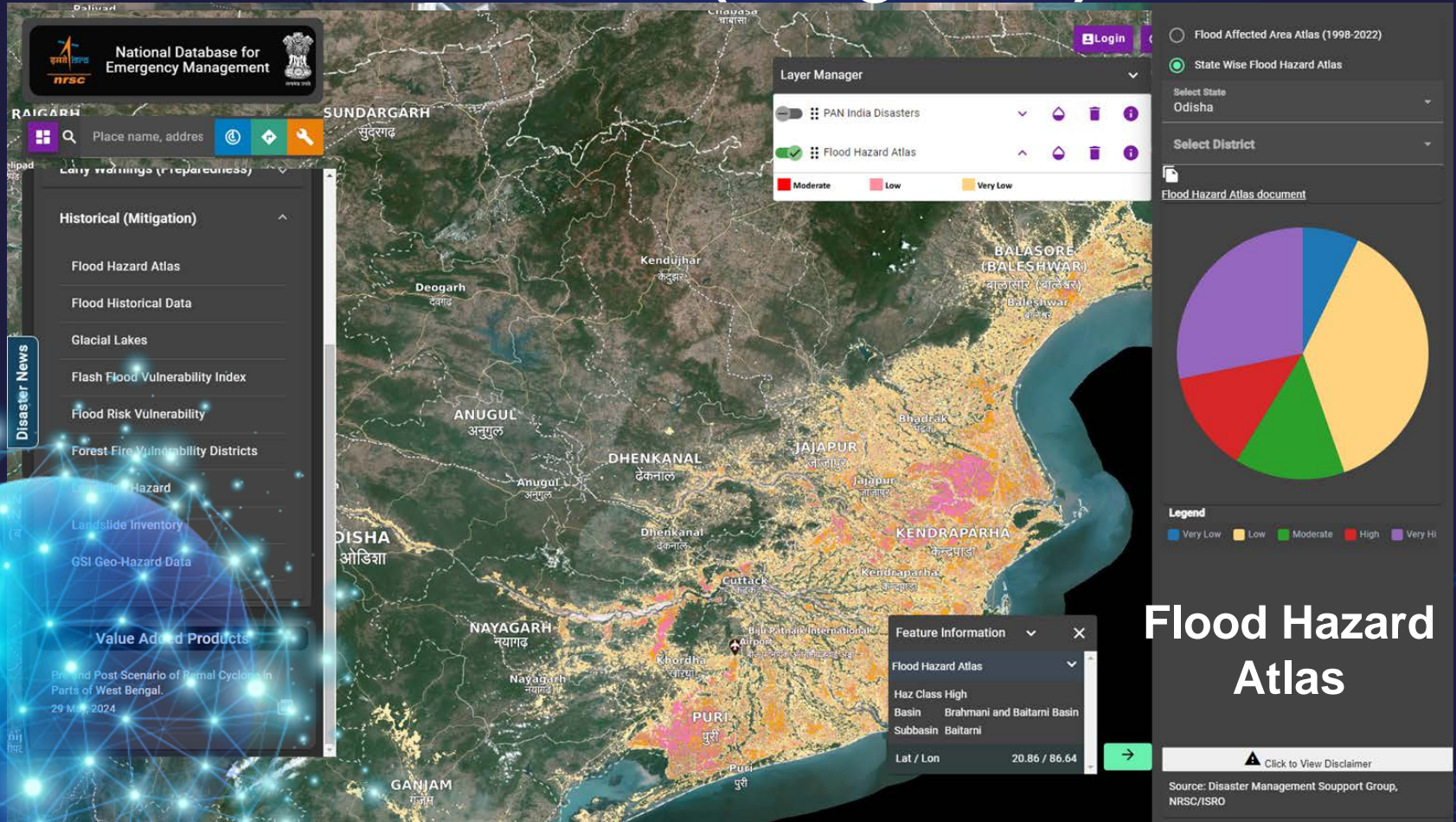
Current Scenario (Response)



Early Warnings (Preparedness)



Historical (Mitigation)



Geospatial Database

NDEM database is categorized based upon the scales into different categories



INFRASTRUCTURE DATA

THEMATIC DATA

NON-SPATIAL DATA

RASTER DATA

BASE DATA

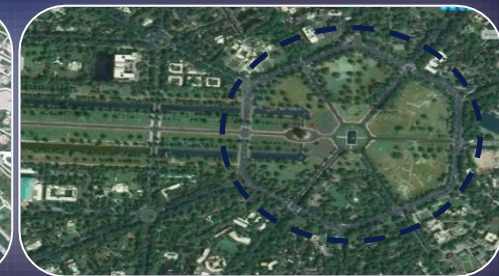
- o Carto2 DEM
- o ACE2 DEM
- o SRTMDEM
- o LISS IV MX
- o CARTOSAT – 1 PAN + MX
- o CARTOSAT – 2 PAN

- o State
- o District
- o Taluk
- o Village Boundaries
- o Road
- o Rail
- o Drainage
- o Canal
- o Coastline
- o River

- o Railway stations
- o Hospitals
- o Airports
- o Helipads
- o Ports
- o River Gauge Stations
- o Ponds & Tanks
- o Dams(Point)
- o Reservoir
- o Power plants
- o Point of Interest

- o Land use / land cover
- o Settlement-area
- o Mining Area
- o Surface water bodies
- o Forest Boundaries
- o Settlement-Point
- o Slope
- o Meteorological data

- o Socio Economic
- o Census
- o IDRN
- o Health Data



Geospatial TOOLS

DSS Tools



Incident Reporting



Interaction Tools



IDRN Data



Recovery Plan



Resource Management



DSS TOOLS

Proximity Analysis

Fetch facilities within a range with their attribute information



Evacuation Plan

Identify Top 10 best relief shelters for any disaster affected area

Route Analysis

Identify optimal route during disasters to avoid affected area



Incident Report

- Report emergency/ disaster incident
- Get approved from HQ
- Get assistance from battallion
- Followup with the situation
- Update field attributes
- Visualize historical Incidents

Disaster	Start Date	End Date	Place	Reporter Name	Reporter Number
Cyclone phailin	2013-10-12	2013-10-22	Angul	BN 3	
Cyclone phailin	2013-10-12	2013-10-22	Cuttack	BN 3	
Cyclone phailin	2013-10-12	2013-10-22	Jajpur	BN 3	
Cyclone phailin	2013-10-12	2013-10-22	Balasore	BN 3	
Cyclone phailin	2013-10-12	2013-10-22	Basore	BN 3	

Showing 6 to 10 of 45 entries

Previous 1 2 3 4 5 ... 9 Next

CLOSE

Date	2022-10-22
Disaster	Cyclone phailin
Start Date	2013-10-12
End Date	2013-10-22
Population Affected	

Historical Incidents

Incident Reporting

SELECT

*Please click on **Select** button then click on the Map to select Latitude/Longitude

OR

*Type below

Latitude, Longitude*

Incident Start Date*

Incident Start Time*

Incident Detail*

Reporter Name*

Reporter Mobile No.*

REPORT INCIDENT

Legend

- APPROVED INCIDENT(S)
- UN APPROVED INCIDENT(S) LIST
- RECEIVED INCIDENT(S)

Incident Details

Event	Flood
Call Date & Time	2017-11-20 00:00:00&11:41:11
Latitude & Longitude	26.741409301757812 : 93.05007934570314
Place	undefined
Teams Deployed	undefined
Skill Set	undefined
Population	undefined

Incident Reporting

Interaction TOOLS

- Send Emergency alerts through Group SMS and Receive SMS from field
- Broadcast messages among users
- Send Email to the users with attachments

Send SMS

Enter below details to send individual messages:

Mobile No.*

Enter Mobile No.

Message*

Enter Message

SEND SMS

CREATE GROUP

SEND GROUP SMS

VIEW GROUP

Sent SMS Report to Mobile

Show 10 entries Search:

Mobile No.	Date & Time
9158210843	24-11-2023 12:58:37 : test msg
8125976583	23-11-2023 11:40:24 : Test message
8125976583	07-11-2023 12:12:11 : test
9850757647	10-10-2023 16:48:13 : Test SMS
8888804778	10-10-2023 16:42:11 : test sms
8004931410	10-10-2023 11:55:38 : all ok
8825039981	17-08-2023 11:10:24 : test msg
9494501235	21-07-2023 02:04:00 : APSDMA
8333905026	21-07-2023 02:00:18 :
9774013462	25-06-2023 17:37:29 : test message

Showing 1 to 10 of 1,000 entries

Previous 1 2 3 4 5 ... 100 Next

Received SMS Report from Mobile

Show 10 entries Search:

Mobile No.	Date & Time
919491535876	2018-10-31 15:43:26 : test for demo
917989329892	2018-10-22 10:39:35 : mobile to portal sms test
917989329892	2018-10-17 17:09:55 : sms test from mobile
917989329892	2018-10-15 11:38:35 : portal test on 15 Oct
917989329892	2018-10-12 10:06:50 : PORTAL Testing on 12 Oct
917989329892	2018-10-10 14:14:29 : mobile to portal Amit
917989329892	2018-10-08 11:38:08 : portal test on 8 Oct
917989329892	2018-10-04 09:40:16 : portal test on 4 October
918010600156	2018-09-28 15:23:01 : portal test
918010600156	2018-09-28 15:23:01 : portal test

Showing 1 to 10 of 130 entries

Previous 1 2 3 4 5 ... 13 Next

SMS

Select Moderator

Enter Message for Broadcast

Choose File No file chosen

Max file size allowed is 5 MB (. doc, .docx, . pdf, .ppt, .pptx, .xls, .xlsx, .jpg, .jpeg, .png)

☒ Send SMS

BROADCAST

Published Message

Pending Message

Sender: battalion14

Message: fgdsdf

Attachment: documents/Public_Notice/battalion14/2023-07-10-180755/1646869246.php%

Date: 10-07-2023 Approved By: MHA

Sender: battalion14

Message: dsfasdfasd

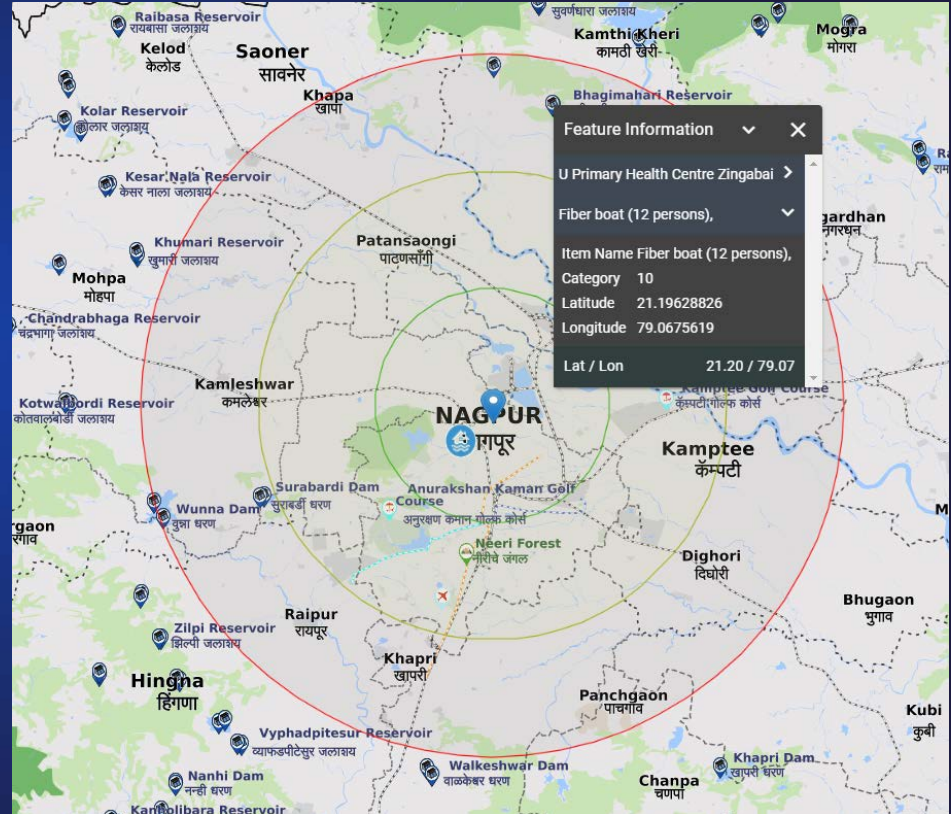
Attachment: documents/Public_Notice/battalion14/2023-06-25-170639/dr_hema_divakar.php1%

Date: 25-06-2023 Approved By: MHA

Broadcast Service

IDRN DATA

- India Disaster Resource Network (IDRN) data is used to locate nearby resources during response by field personnel
- Locate resources/ rescue equipment by Activity and category along with contact details within a buffer zone



Recovery Plan

- **Post Disaster Needs Assessment (PDNA)** - National Institute of Disaster Management, Ministry of Home Affairs, Government of India has developed the Post Disaster Needs Assessment (PDNA) Tools for India.

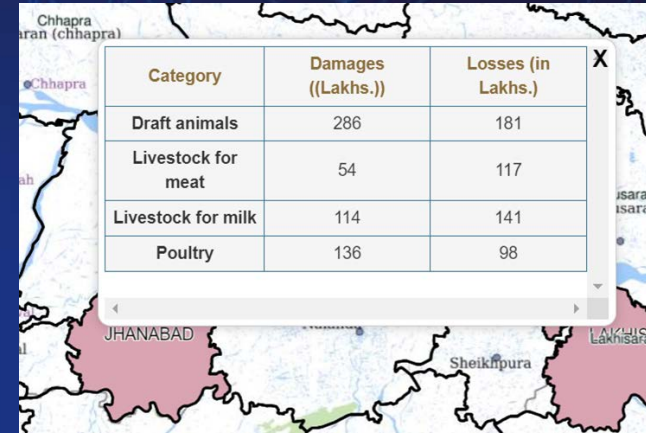
This tool will enables comprehensive and scientific assessment of recovery and reconstruction needs on the basis of a thorough analysis of disaster effects and impacts.

Base Line Data – Information of facilities before a disaster event

Damage & Loss Information – Loss incurred due to a disaster event for the current and next two years.

- **State wise Rainfall and Damage Statistics** are collected from state officials for the record and analysis

1. Agriculture, Livestock, Fisheries and Forestry Sector
2. Mining and Quarrying Sector
3. Manufacturing Sector
4. Electrical Sector
5. Water Supply and Sanitation Sector
6. Trade and Services Sector
7. Tourism Sector
8. Transport Sector
9. Communications Sector
10. Housing Sector
11. Education Sector
12. Health Sector
13. Culture and Heritage Sector
14. The Environment



PDNA– Damage Statistics

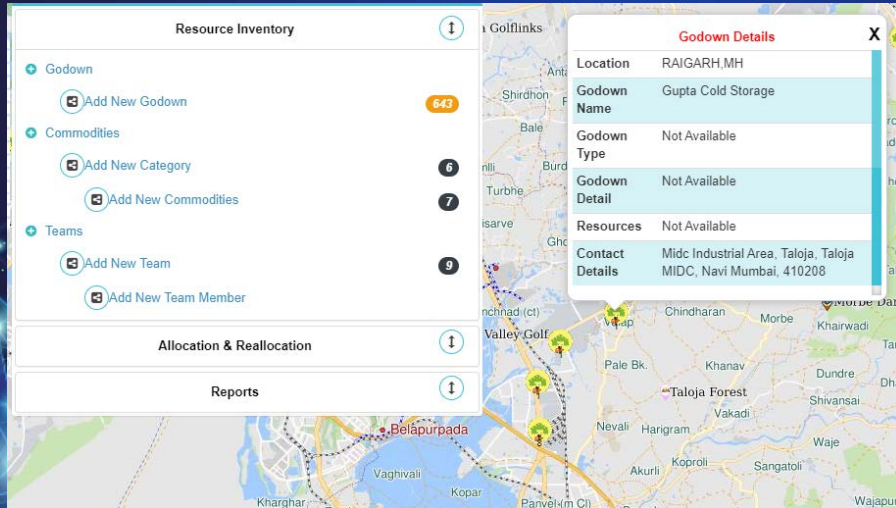
Heavy Rainfall Report for Kerala as on 2023-11-25			
Date : 2023-11-25	Till date (current monsoon)	During last 24 hours	
1. Rainfall (mm)	545.2	4.6	
2. Affected Districts	Alappuzha, Ernakulam, Idukki, Kannur, Kasargod, Kollam, Kottayam, Kozhikode, Malappuram, Palakkad, Pathanamthitta, Thiruvananthapuram, Thrissur, Wayanad	Pathanamthitta	
3. No. of Village Affected	1130	0	
4. Population Affected	20608	0	
5. Human Lives Lost District wise	Alappuzha:6, Ernakulam:0, Idukki:4, Kannur:6, Kasargod:1, Kollam:3, Kottayam:7, Kozhikode:7, Mahé, Malappuram:27, Palakkad:1, Pathanamthitta:2, Thiruvananthapuram:1, Thrissur:9, Wayanad:4	Alappuzha:1, Ernakulam:1, Idukki:1, Kannur:1, Kasargod:1, Kollam:1, Kottayam:1, Kozhikode:1, Mahé:1, Malappuram:1, Palakkad:1, Pathanamthitta:1, Thiruvananthapuram:1, Thrissur:1, Wayanad:1	
6. No. of People Missing	1	1	

Rainfall Statistics

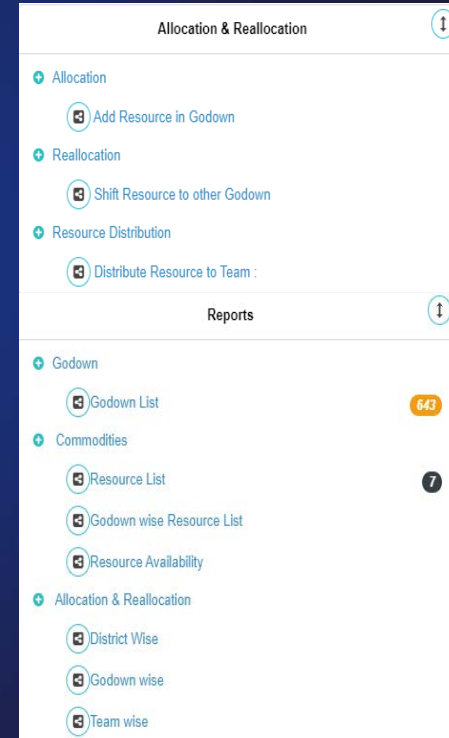
Resource Management

A well planned resource management module is developed to cover inventory, Resource allocation, organisation and tracking of essential commodities/ resources during disaster time.

- Monitor the flow of resources (Relief material)
- Allows allocation and reallocation of resources
- Create a team for the distribution of Relief Material



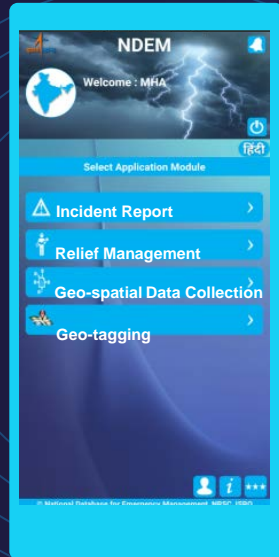
Resource Inventory



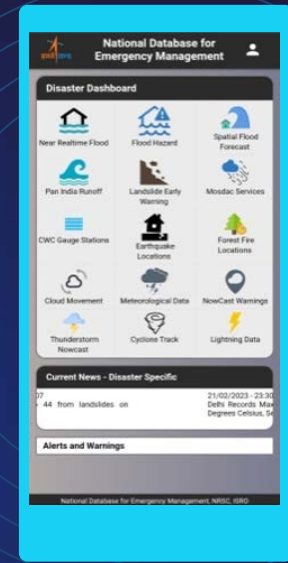
Allocation – Reallocation - Distribution

Mobile Apps

NDEM Lite mobile app is equipped with essential services and tools of NDEM portal, useful during field level operations



Relief Management App for Incident Reporting, Geospatial Data collection and Relief Management (Distress Call / Emergency Call / FIR / Summary Report)



Integrated Control Room for Emergency Response

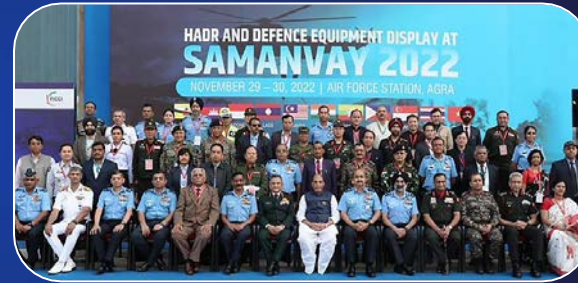
Integrated Control Room for Emergency Response (ICR-ER) is an integrated control room to tackle both Disaster Management and Internal Security of the country. It is being established by MHA at NDCC-II, New Delhi

Responsibilities of NDEM;

- ☐ To function as Disaster Recovery site for Redirection of services.
- ☐ To provide near real time disaster specific data and satellite data during disasters or emergency.

Capacity Building

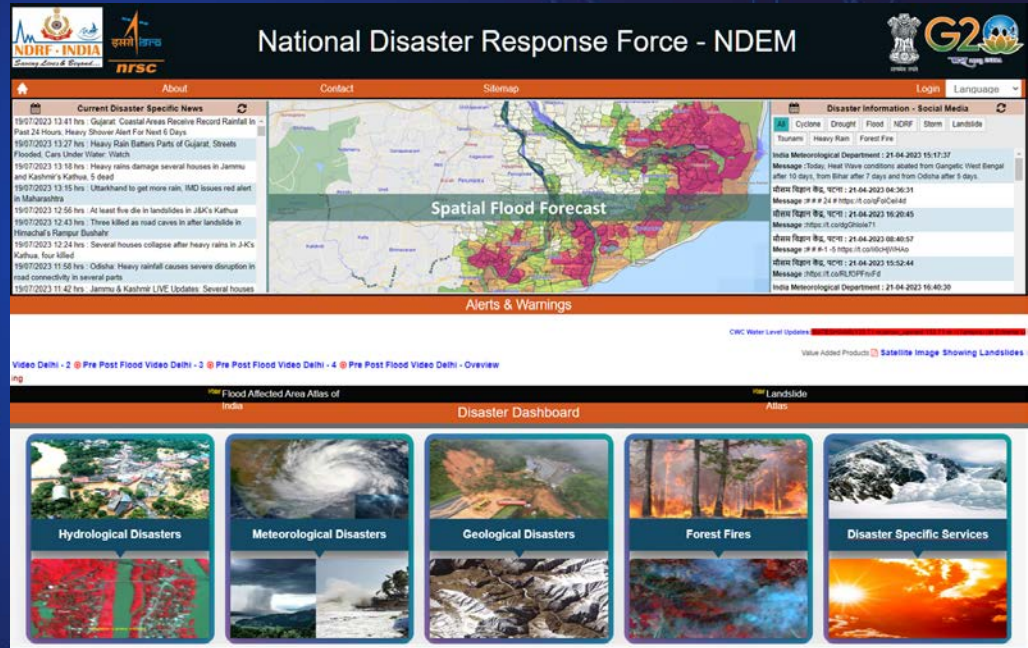
In order to increase the awareness amongst users and for better utilization of NDEM services, training programmes, workshops and mock drills are conducted to Central, State, District disaster management officials and NDRF, SDRF personnel. Capacity building programmes are also conducted in co-ordination with GDM and NIDM. Regional training programmes are conducted across the country; So far, more than 3000 officials are trained on NDEM.



Support to NDRF

NDEM services are extended to National disaster Response Force for supporting disaster response and rescue operations

- ❖ Realising the capabilities of NDEM, NDRF has entered into an MoU with NRSC.
- ❖ NDEM services are customised for Head Quarter & 16 battalions across the country.
- ❖ 10 Exclusive training programmes and Workshops were conducted for NDRF officials.
- ❖ Mock drills were conducted in each training programme for a simulated disaster event for effective utilization of portal products & services.

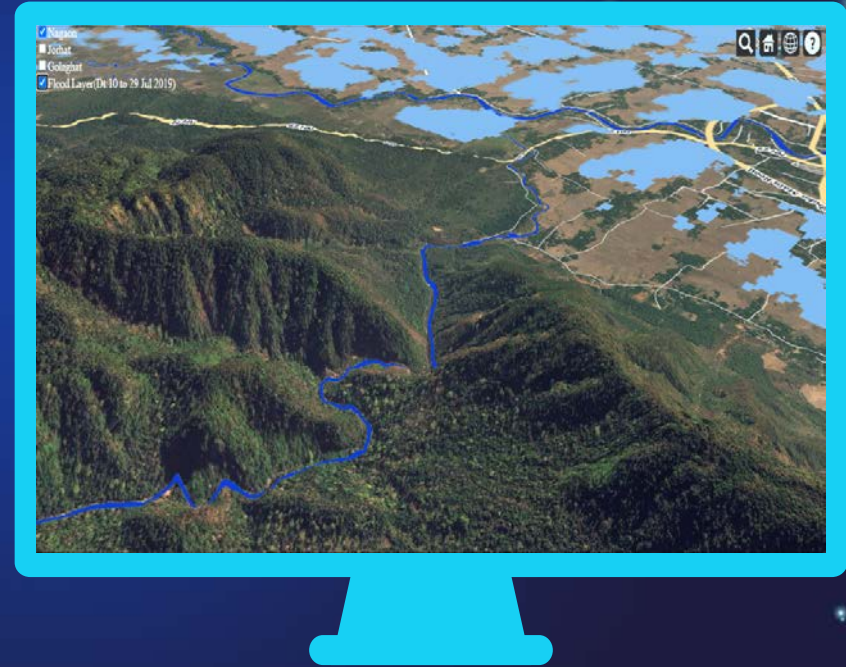


NDEM 3D

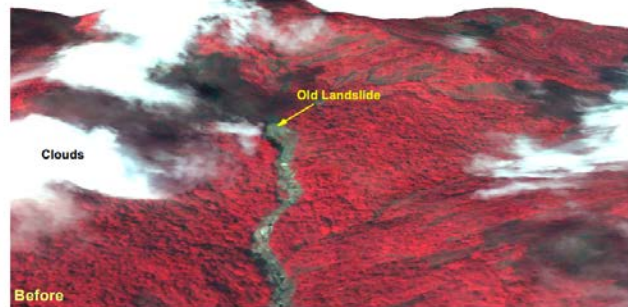
Along with Vector and Raster services, NDEM can be visualized in 3D view, it increases user experience of a disaster affected area



High Resolution Satellite Imagery



NDEM3D



Chooralmala, Wayanad, Kerala, India
Landslide Impact Map
Observed on 31/07/2024
[Location Diagrams](#)



Cartographic Information

Legend

Local Projection : WGS 1984 UTM Zone 43N Datum : WGS1984
Geographic projection : Lat / Lon (DMS), Datum:WGS 84
Scale : 1:5,000 for A3 prints

Interpretation

A major debris flow was triggered by heavy rainfall in and around the Chooramala town of Wayanad District in Kerala state of India. As per latest reports, more than 100 people are dead and many are missing. 3D rendition of the crown of the landslide illustrates that a large section of the hill slope has been affected. The areal extent of the landslide is 86,000 sq.m. The crown is located at an approximate elevation of ~1,550 m above MSL.

Data Sources

Pre Event Image : Cartosat 3 (Mx) 22 May, 2023
Post Event : VHR RISAT SAR 31 July, 2024
DEM : Cartosat DEM (2.5 m)
Images (C) NRSC/ISRO

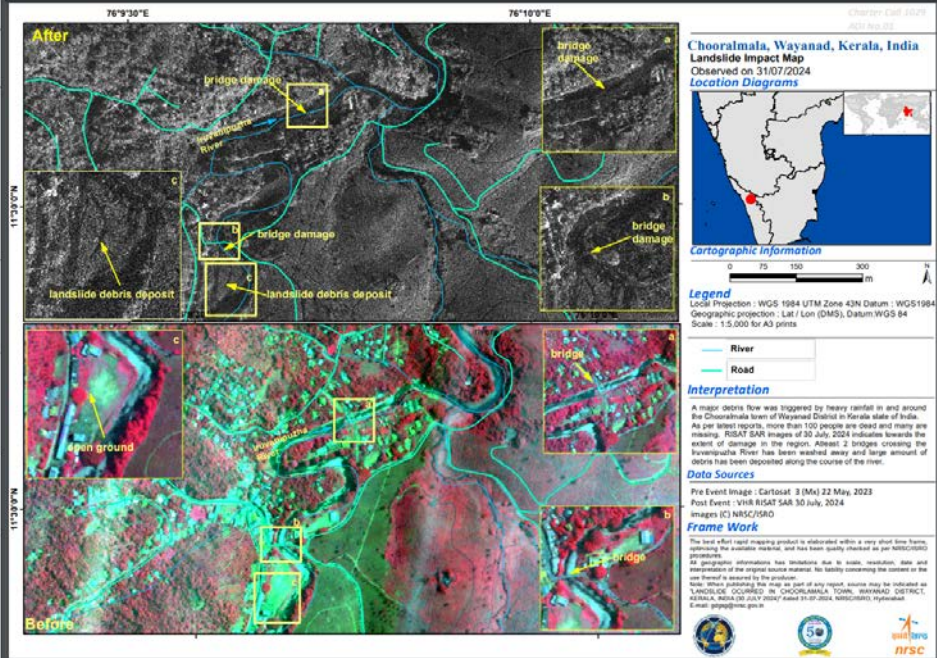
Frame Work

The best effort rapid mapping product is elaborated within a very short time frame, optimising the available material, and has been quality checked as per NRSC/ISRO procedures.

All geographic information has limitations due to scale, resolution, date and accuracy of the original source material. No liability concerning the content or the use thereof is assumed by the producer.

Note: When publishing this map as part of any report, source may be indicated as 'LANDSLIDE OCCURRED IN CHORAMALLA TOWN, WAYNAD DISTRICT, KERALA, INDIA (30 JULY 2024)' dated 21-07-2024, NRSC/ISRO, Hyderabad.

E-mail: gishp@isro.gov.in



The background is a deep blue gradient. In the bottom-left corner, there is a glowing sphere composed of a network of white lines and bright blue nodes, resembling a molecular or digital structure. In the top-right corner, there is a cluster of small, bright white stars or distant galaxies. The text "Thank You" is centered in the middle of the image in a large, white, sans-serif font.

Thank You