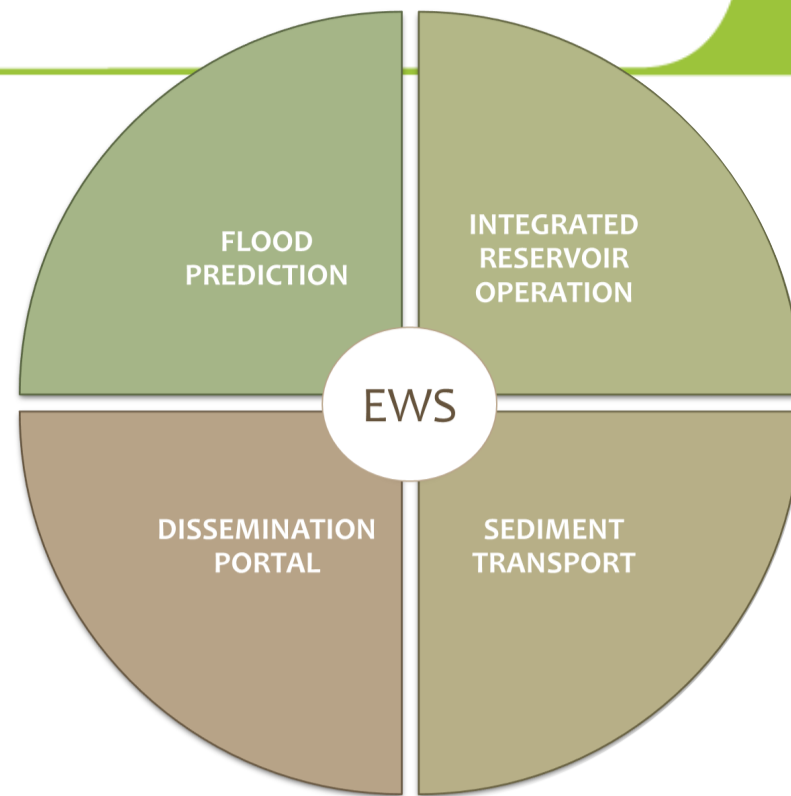


# EARLY WARNING SYSTEM FOR FLOOD PREDICTION IN RIVER BASINS OF INDIA



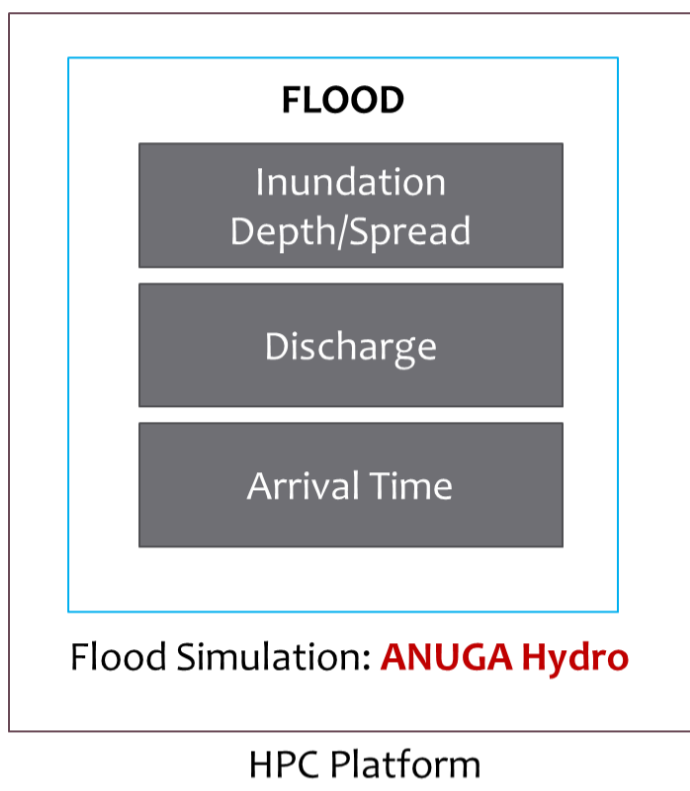
## OBJECTIVES

- Design** a user-friendly and comprehensive early warning system for flood prediction (EWS-FP) on HPC platform
- Develop** flood prediction model, sediment transport model and integrated reservoir operation tools
- Deploy** a geospatial portal for information dissemination on flood prediction

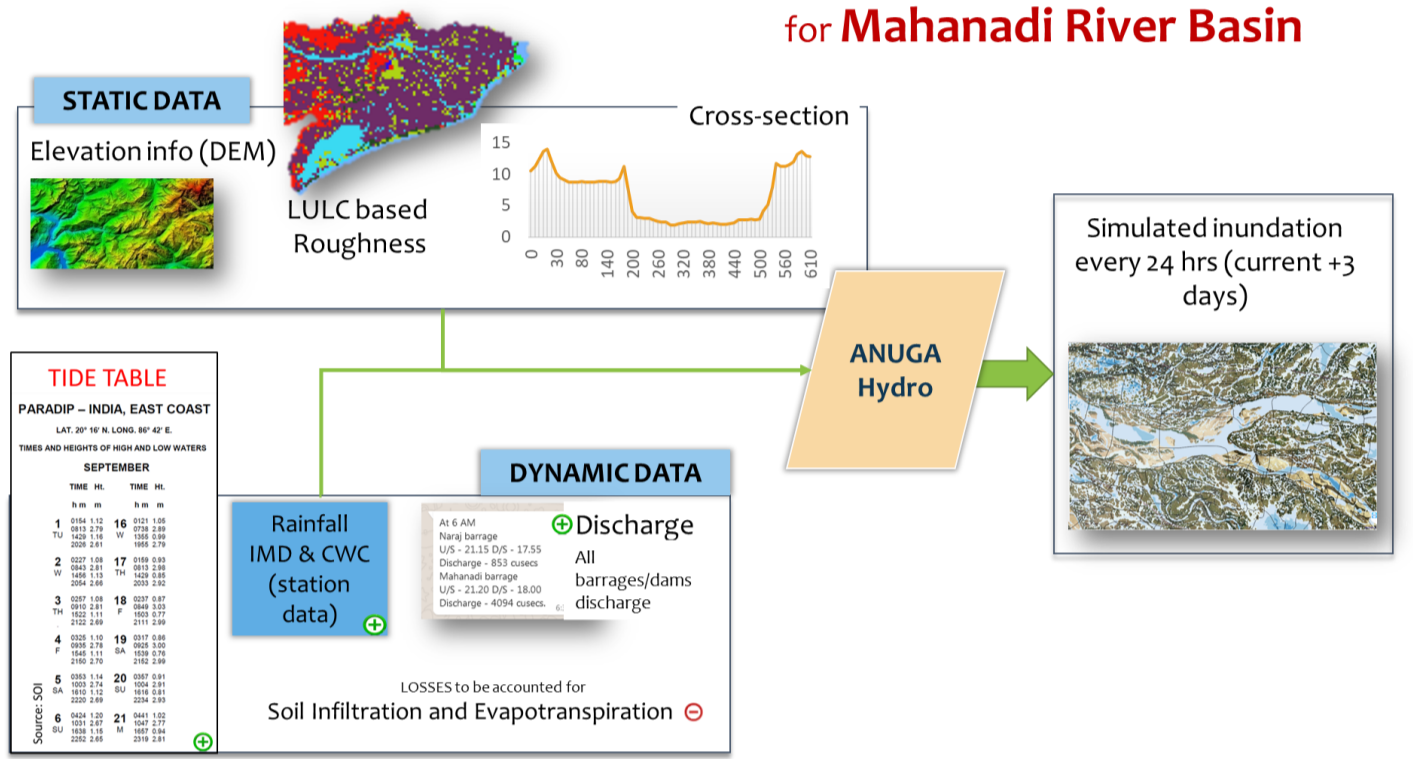


**COLLABORATORS**  
CENTRAL WATER COMMISSION  
PEC CHANDIGARH  
IISc BANGALORE

WHAT ARE WE MODELLING AND HOW?



## DAILY SIMULATION PROCESS FLOWCHART for Mahanadi River Basin



## DELIVERABLES & SOCIETAL IMPACT

3-days advance flood information (Inundation extent and Water Level) will help disaster managers to plan flood mitigation measures well in advance for informed decision making. Model setup has been designed in such a way that it gives flexibility to the user to include or exclude hydrological parameters. This will help in replicating the model in other river basins of India

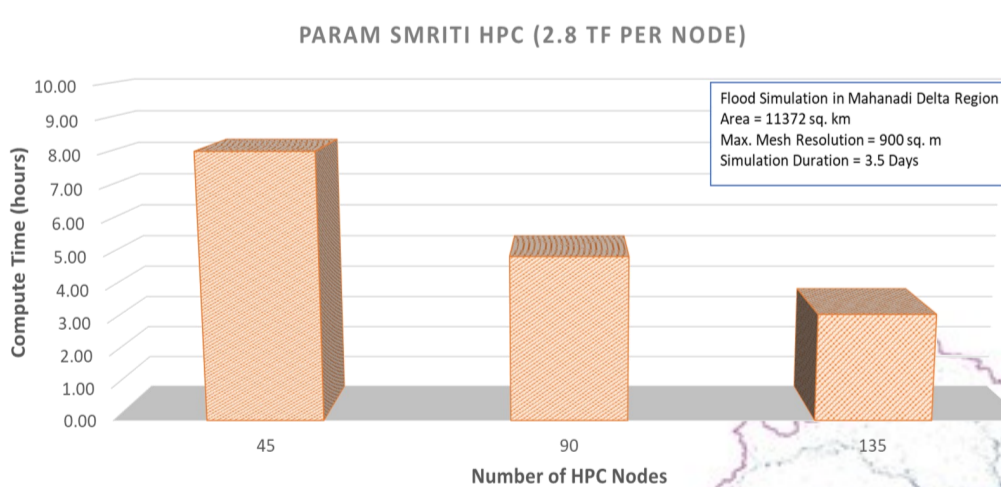
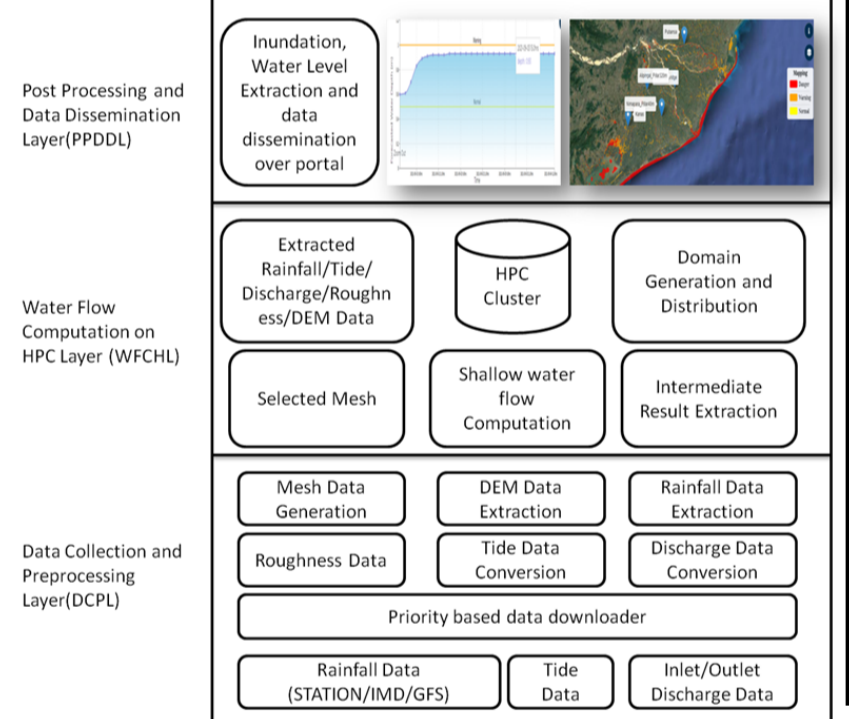
## SIMULATED FLOOD INUNDATION

### MAHANADI DELTA REGION

#### Input parameters

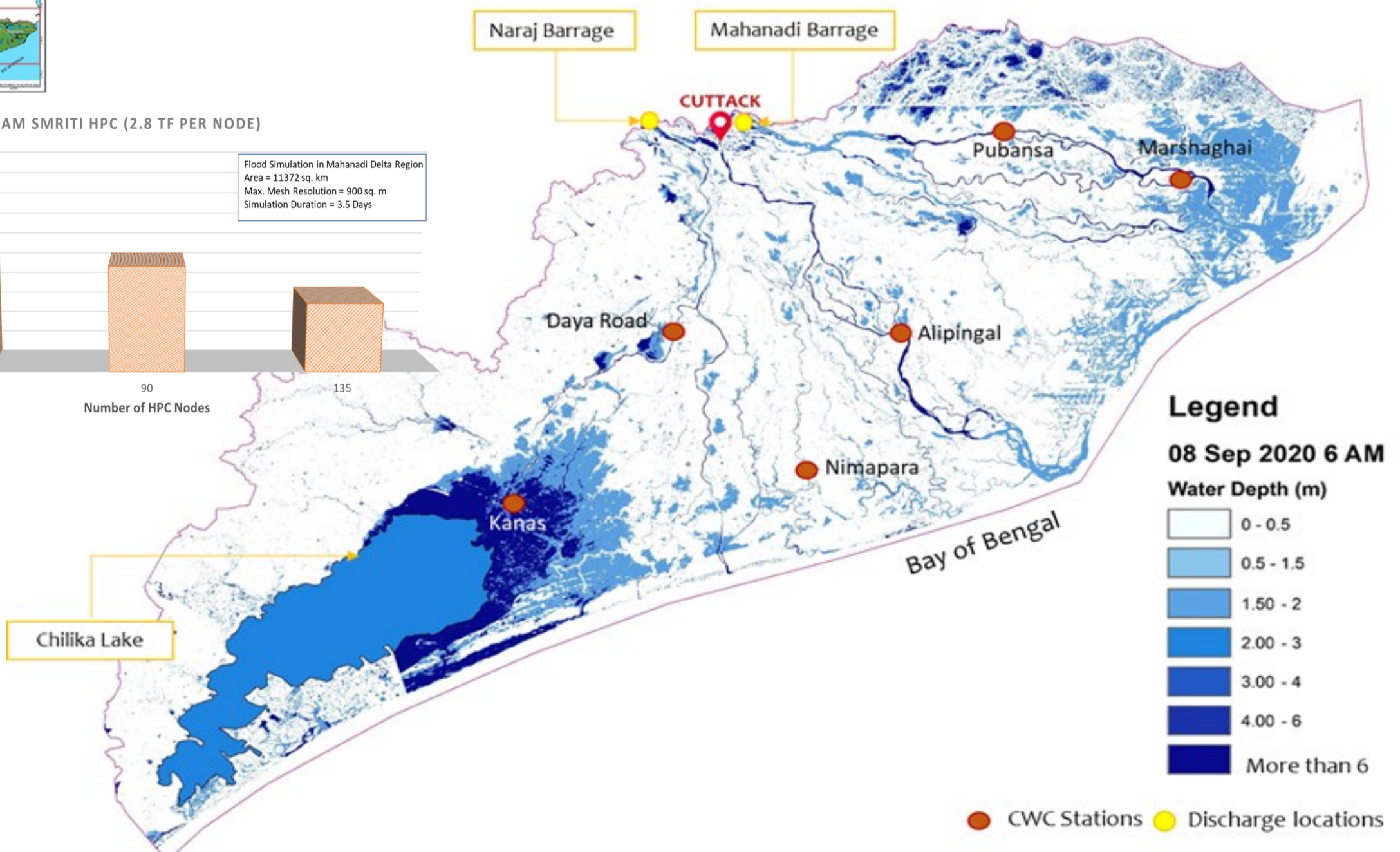
- Barrage Discharge:** Naraj, Jobra (CWC)
- Tide:** Paradip Port (SOI)
- Rainfall:** WRF, GFS (IMD), GPM, GFS (NASA)
- Surface Roughness:** Based on LULC
- DEM:** LIDAR 1 m and ALOS 30 m

High-level design of model setup



PARAM SMRITI HPC (2.8 TF PER NODE)

Flood Simulation in Mahanadi Delta Region  
Area = 11372 sq. km  
Max. Mesh Resolution = 900 sq. m  
Simulation Duration = 3.5 Days

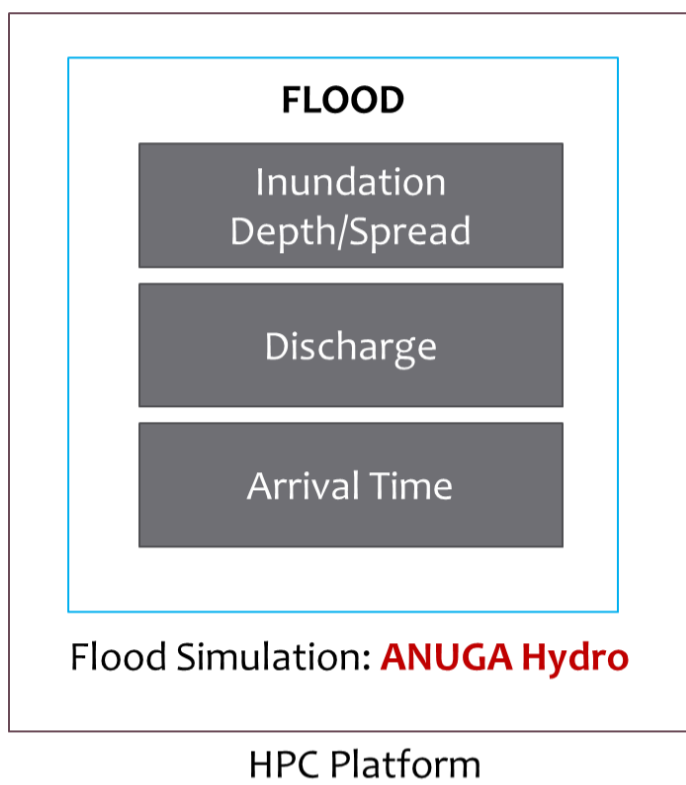


USER AGENCY: CENTRAL WATER COMMISSION, ODISHA STATE WATER RESOURCES DEPARTMENT, ODISHA STATE DISASTER MANAGEMENT AUTHORITY

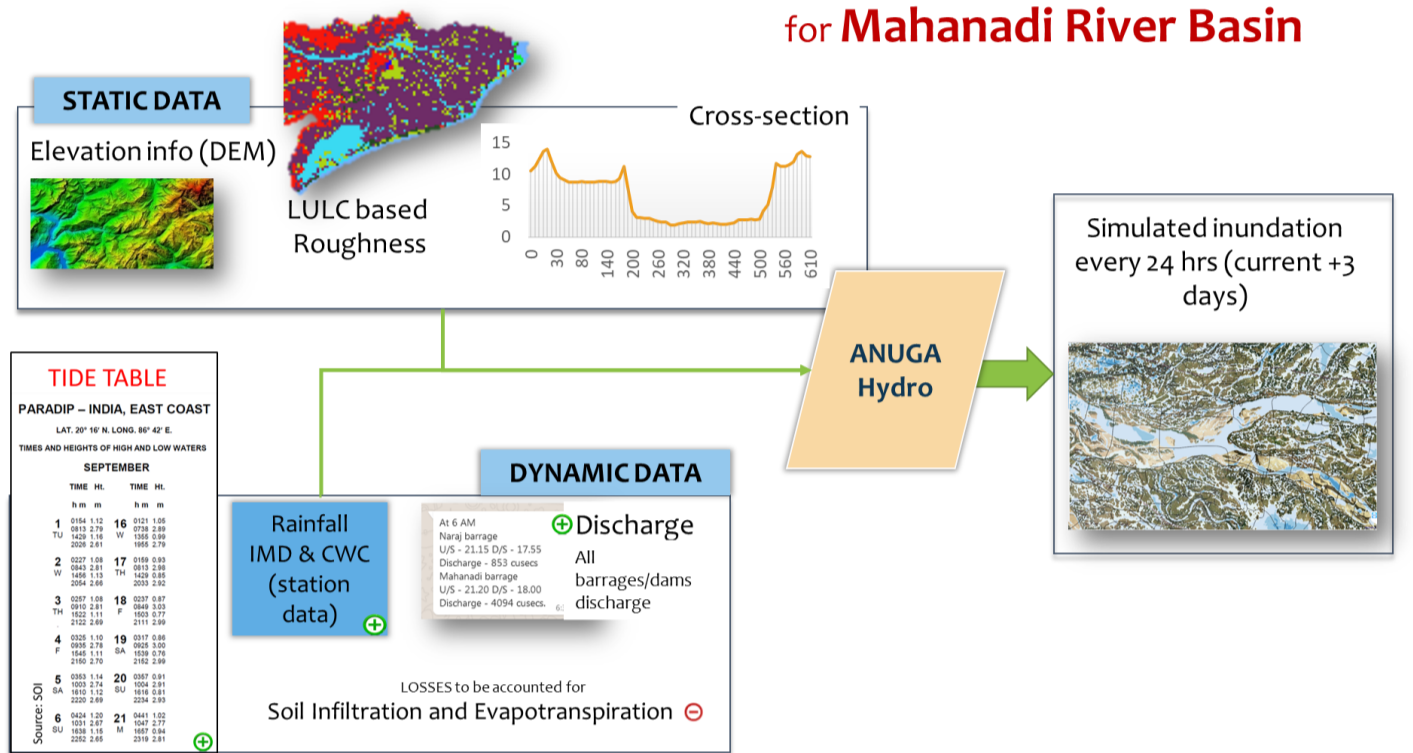
# EARLY WARNING SYSTEM FOR FLOOD PREDICTION IN RIVER BASINS OF INDIA

COLLABORATORS  
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PEC CHANDIGARH  
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WHAT ARE WE MODELLING AND HOW?



## DAILY SIMULATION PROCESS FLOWCHART for Mahanadi River Basin



### DELIVERABLES & SOCIETAL IMPACT

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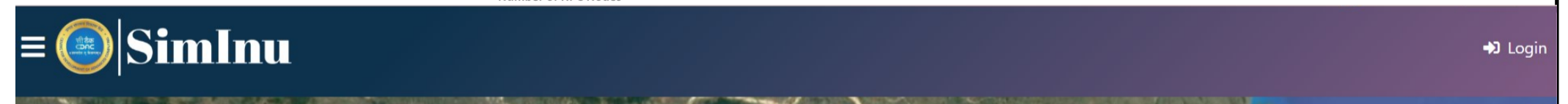
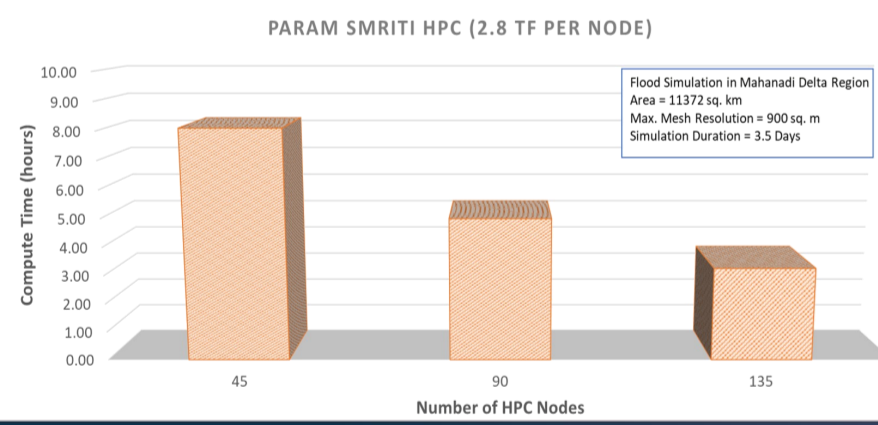
## SIMULATED FLOOD INUNDATION



### MAHANADI DELTA REGION

#### Input parameters

- Barrage Discharge: Naraj, Jobra (CWC)
- Tide: Paradip Port (SOI);
- Rainfall: IMD (WRF, GFS), NASA (GPM, GFS)
- Surface Roughness: Based on LULC;
- DEM: LIDAR 1 m and ALOS 30 m

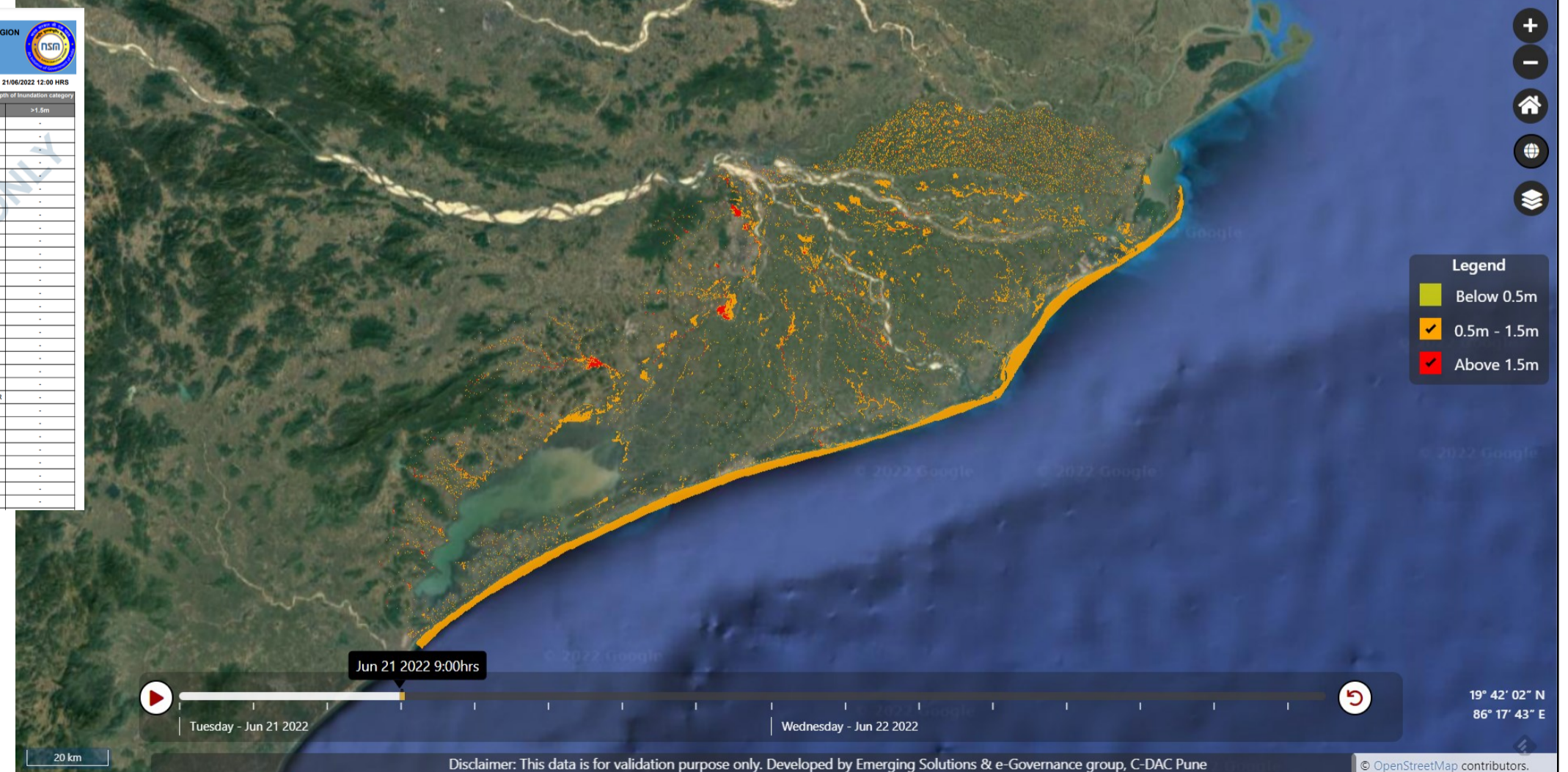


FLOOD INUNDATION FORECAST FOR MAHANADI DELTA REGION

FORECAST DATE: 21/06/2022

Simulation starting at time 00:00 hrs of every 24 hrs (current time)

Sl.No	District	Block	<0.5m	0.5 to 1.5 m	>1.5m
1	CUTTACK	OUTTACK	ARAWATA	-	-
2	CUTTACK	OUTTACK	BAGHAPUR	-	-
3	CUTTACK	OUTTACK	BAGHANKHATI	-	-
4	CUTTACK	OUTTACK	TEHUR	-	-
5	CUTTACK	OUTTACK	MAHANGA	-	-
6	CUTTACK	OUTTACK	KANDEL	-	-
7	CUTTACK	OUTTACK	KESAMPUR	-	-
8	CUTTACK	OUTTACK	ARIMA	-	-
9	CUTTACK	OUTTACK	NETRANGI	-	-
10	CUTTACK	OUTTACK	KHANOLO	-	-
11	CUTTACK	OUTTACK	RHANGASALI	-	-
12	CUTTACK	OUTTACK	BSO	-	-
13	CUTTACK	OUTTACK	TABSA	-	-
14	CUTTACK	OUTTACK	JANLO	-	-
15	CUTTACK	OUTTACK	HARANTA	-	-
16	CUTTACK	OUTTACK	NALANGASAN	-	-
17	CUTTACK	OUTTACK	SELI	-	-
18	CUTTACK	OUTTACK	BAGHAPUR	-	-
19	CUTTACK	OUTTACK	BASTAPADA	-	-
20	CUTTACK	OUTTACK	CHANDAPUR	-	-
21	CUTTACK	OUTTACK	SEBAPUR	-	-
22	CUTTACK	OUTTACK	KRISHNAPUR	-	-
23	CUTTACK	OUTTACK	DHAPUR	-	-
24	CUTTACK	OUTTACK	KANAPUR	-	-
25	CUTTACK	OUTTACK	ADYANPUR	-	-
26	CUTTACK	OUTTACK	BANDHAPUR	-	-
27	CUTTACK	OUTTACK	HARANTA	-	-
28	CUTTACK	OUTTACK	BRHANKHANGA	-	-
29	CUTTACK	OUTTACK	MOHANPUR	-	-
30	CUTTACK	OUTTACK	MALLAPUR	-	-



USER AGENCY: CENTRAL WATER COMMISSION, ODISHA STATE WATER RESOURCES DEPARTMENT, ODISHA STATE DISASTER MANAGEMENT AUTHORITY

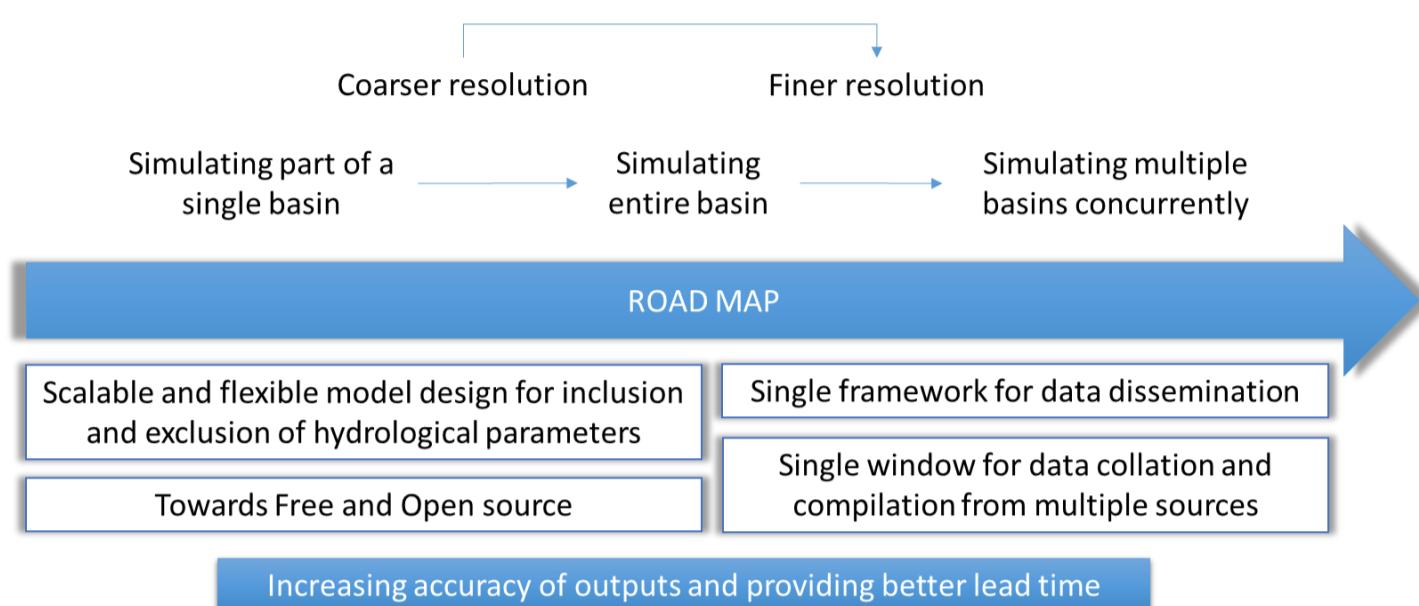
# EARLY WARNING SYSTEM FOR FLOOD PREDICTION IN RIVER BASINS OF INDIA

3-days advance flood information (Inundation extent and Water Level) provided will help disaster managers to plan flood mitigation measures well in advance for informed decision making.

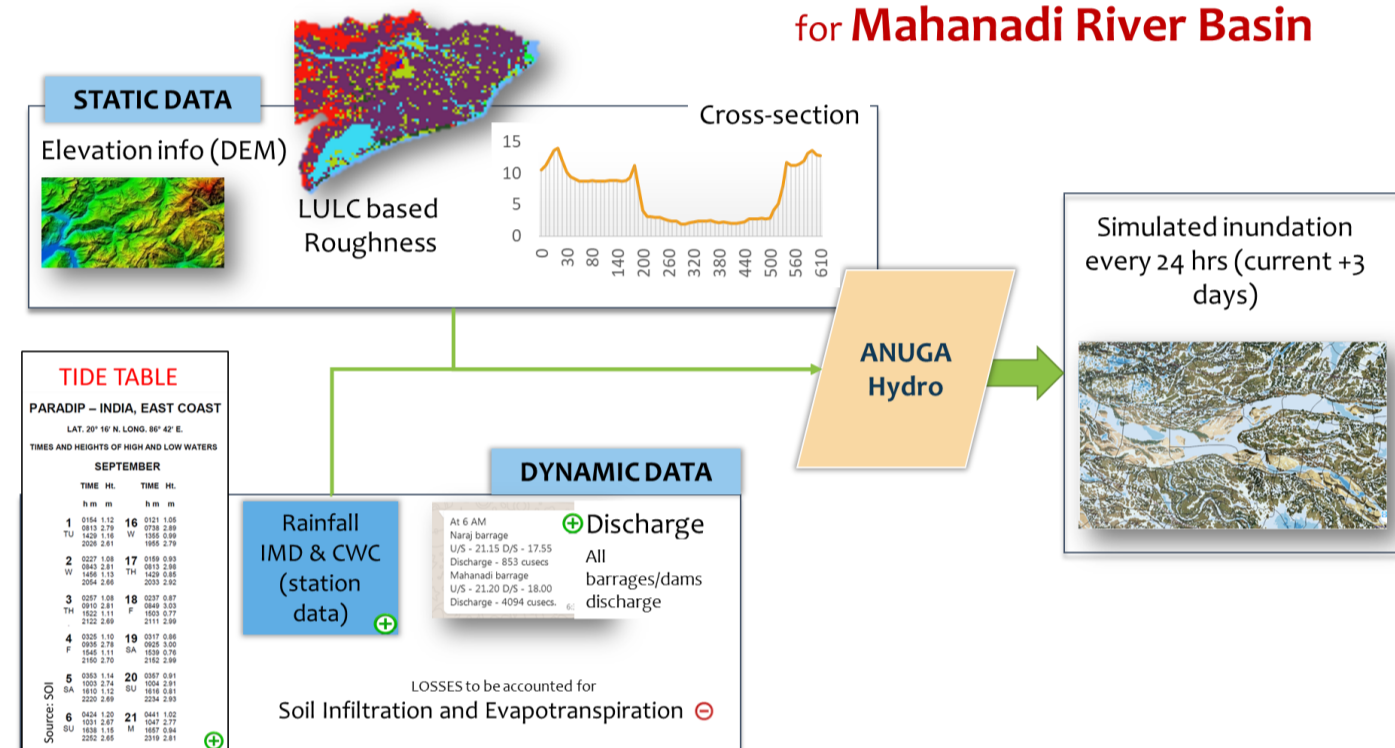
Model setup has been designed in such a way that it gives flexibility to the user to include or exclude hydrological parameters to replicate the model in other river basins of India.

**COLLABORATORS**  
CENTRAL WATER COMMISSION  
PEC CHANDIGARH  
IISc BANGALORE

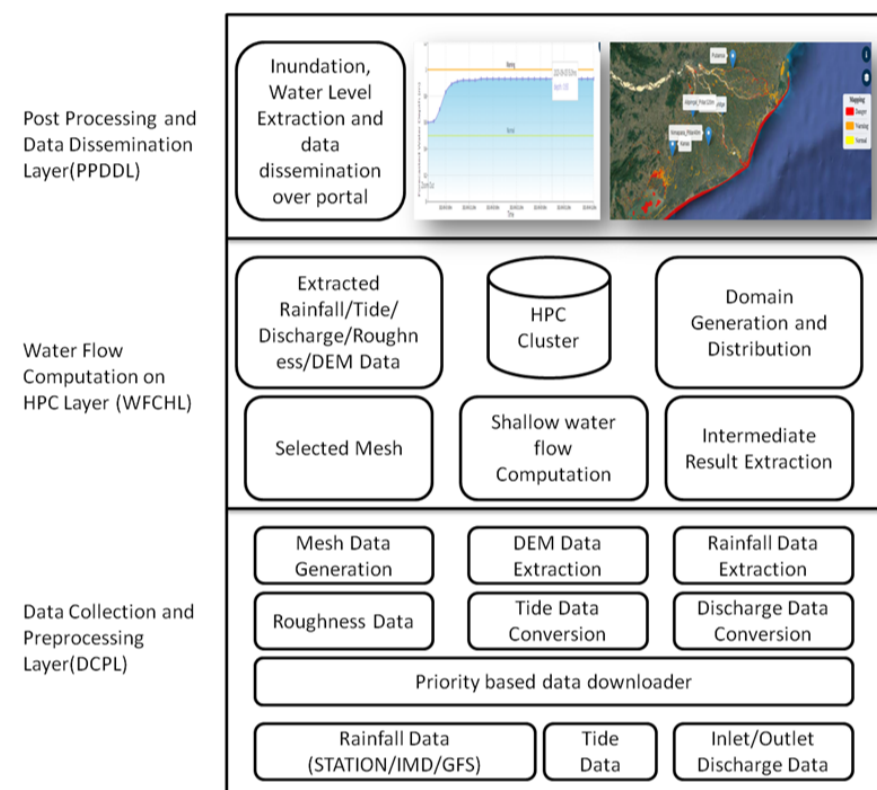
## PROJECT ROAD MAP



## DAILY SIMULATION PROCESS FLOWCHART for Mahanadi River Basin



### High-level design of model setup



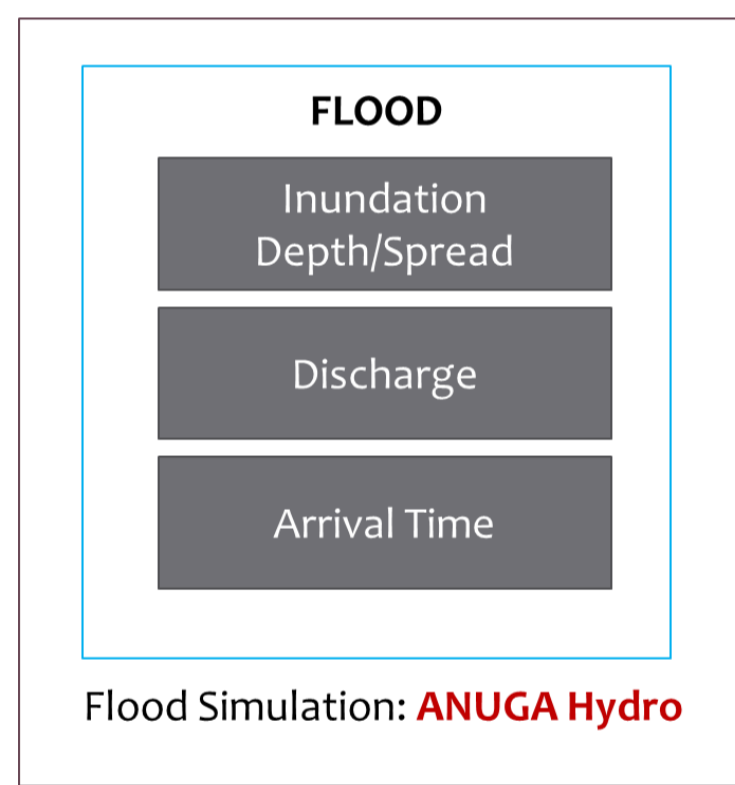
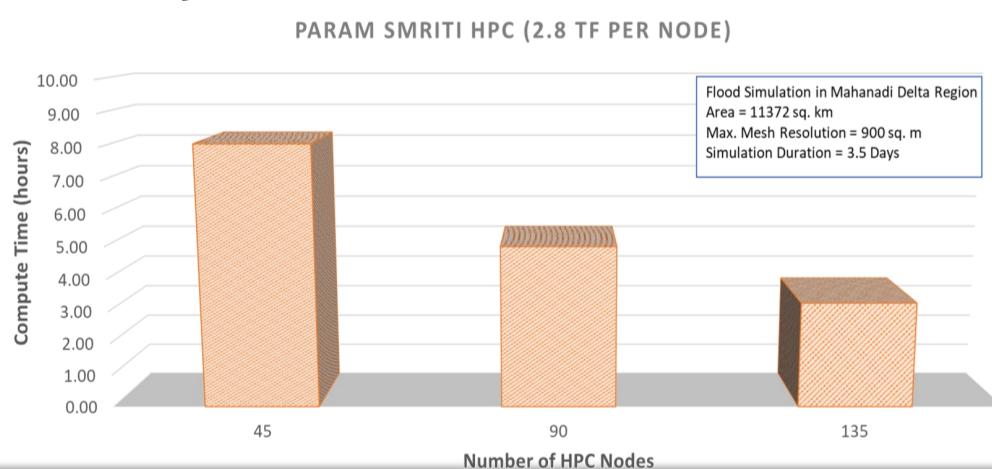
## SIMULATED FLOOD INUNDATION



### MAHANADI DELTA REGION

#### Input parameters

- Barrage Discharge: Naraj, Jobra (CWC)
- Tide: Paradip Port (SOI);
- Rainfall: IMD (WRF, GFS), NASA (GPM, GFS)
- Surface Roughness: Based on LULC;
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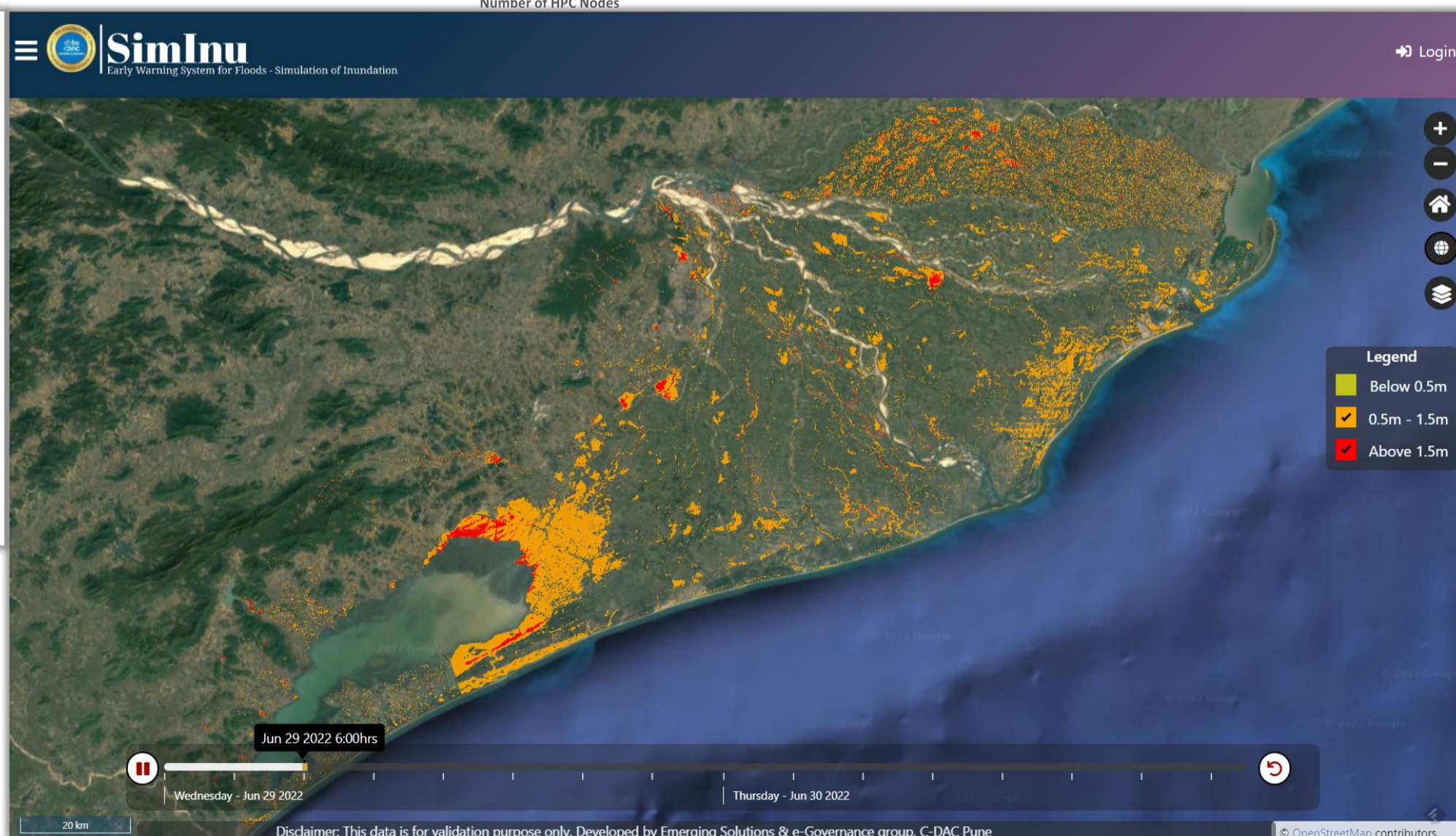


HPC Platform

FLOOD INUNDATION FORECAST FOR MAHANADI DELTA REGION

FORECAST DATE: 29/06/2022 INUNDATION AT: 01:07:2022 00:00 HRS

Sl. No.	Distric	Block	Village	Inundation at least 80% of area under depth of inundation category
1	CUTTACK	CUTTACK	BARAKATA	0.5 to 1.5 m
2	CUTTACK	CUTTACK	BACHIBANKHATI	-
3	CUTTACK	CUTTACK	MAHANGA	-
4	CUTTACK	CUTTACK	KANALO	-
5	CUTTACK	CUTTACK	KEONJHAR	-
6	CUTTACK	CUTTACK	ARMUL	-
7	CUTTACK	CUTTACK	NETAJUNGI	-
8	CUTTACK	CUTTACK	KHINDOLO	-
9	CUTTACK	CUTTACK	SBBO	-
10	CUTTACK	CUTTACK	JANALO	-
11	CUTTACK	CUTTACK	BHARLO	-
12	CUTTACK	CUTTACK	SELAPUR	-
13	CUTTACK	CUTTACK	BEILI	-
14	CUTTACK	CUTTACK	JARPANDA	-
15	CUTTACK	CUTTACK	BAKHAMPUR	-
16	CUTTACK	CUTTACK	BABATAPADA	-
17	CUTTACK	CUTTACK	CHANDAPUR	-
18	CUTTACK	CUTTACK	KRUSHNACHAPUR	-
19	CUTTACK	CUTTACK	KANAPUR	-
20	CUTTACK	CUTTACK	BANDHUPUR	-
21	CUTTACK	CUTTACK	HARAKATA	-
22	CUTTACK	CUTTACK	MOHAPUR	-
23	CUTTACK	CUTTACK	MALAKAPUR	-
24	CUTTACK	CUTTACK	BISAMPADA	-
25	CUTTACK	CUTTACK	ADALAPUR	-
26	CUTTACK	CUTTACK	NAMKANI	-
27	CUTTACK	CUTTACK	PHALSA	-
28	CUTTACK	CUTTACK	BAMARA	-
29	CUTTACK	CUTTACK	SHAKDA	-
30	CUTTACK	CUTTACK	JANAKAPUR	-
31	CUTTACK	CUTTACK	ERAKANSAMPANI	-



USER AGENCY: CENTRAL WATER COMMISSION, ODISHA STATE WATER RESOURCES DEPARTMENT, ODISHA STATE DISASTER MANAGEMENT AUTHORITY

प्रगत संगणन विकास केंद्र  
CENTRE FOR DEVELOPMENT OF ADVANCED COMPUTING



# EARLY WARNING SYSTEM FOR FLOOD PREDICTION IN RIVER BASINS OF INDIA

## SCIENCE OF RIVER FLOODING



Water is essential for life on Earth. But in large enough quantities, the very substance we drink and use to grow crops can destroy homes, businesses and cause fatalities.

### RIVER BASIN

The total area drained by a river and its tributaries. A river basin is an open system with inputs and outputs of water.



River flooding occurs when river levels rise & overflow their banks or the edges of their main channel and inundate normally dry areas.



River flooding can be caused by heavy rainfall, dam failures, rapid snowmelt and ice jams.



Any rain falling here will flow into another river basin.



Any rain falling here will flow within this basin.

