STUDY OF PROBABLE
GLOBAL WARMING & TSUNAMI IMPACT
ALONG
ANDHRA PRADESH COASTLINE

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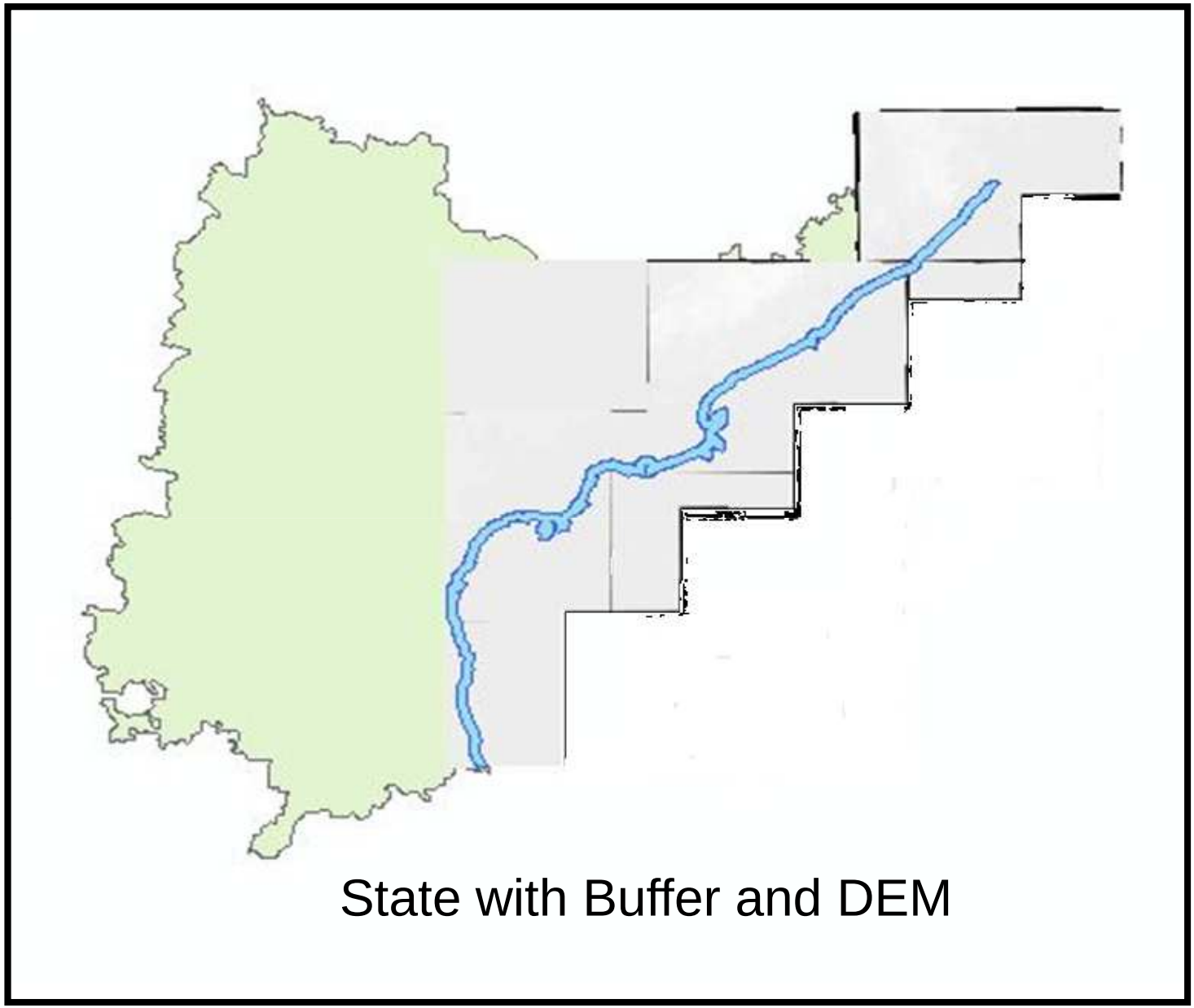
INTRODUCTION

- Coastal resources are vulnerable to natural hazards
  - Global warming
  - Tsunami
- It has become imperative to simulate and study the effects of the phenomena.
- The study is aimed at
  - identifying the data requirements for simulation
  - preparing the quick and simple reports for end-use.

Data Inputs

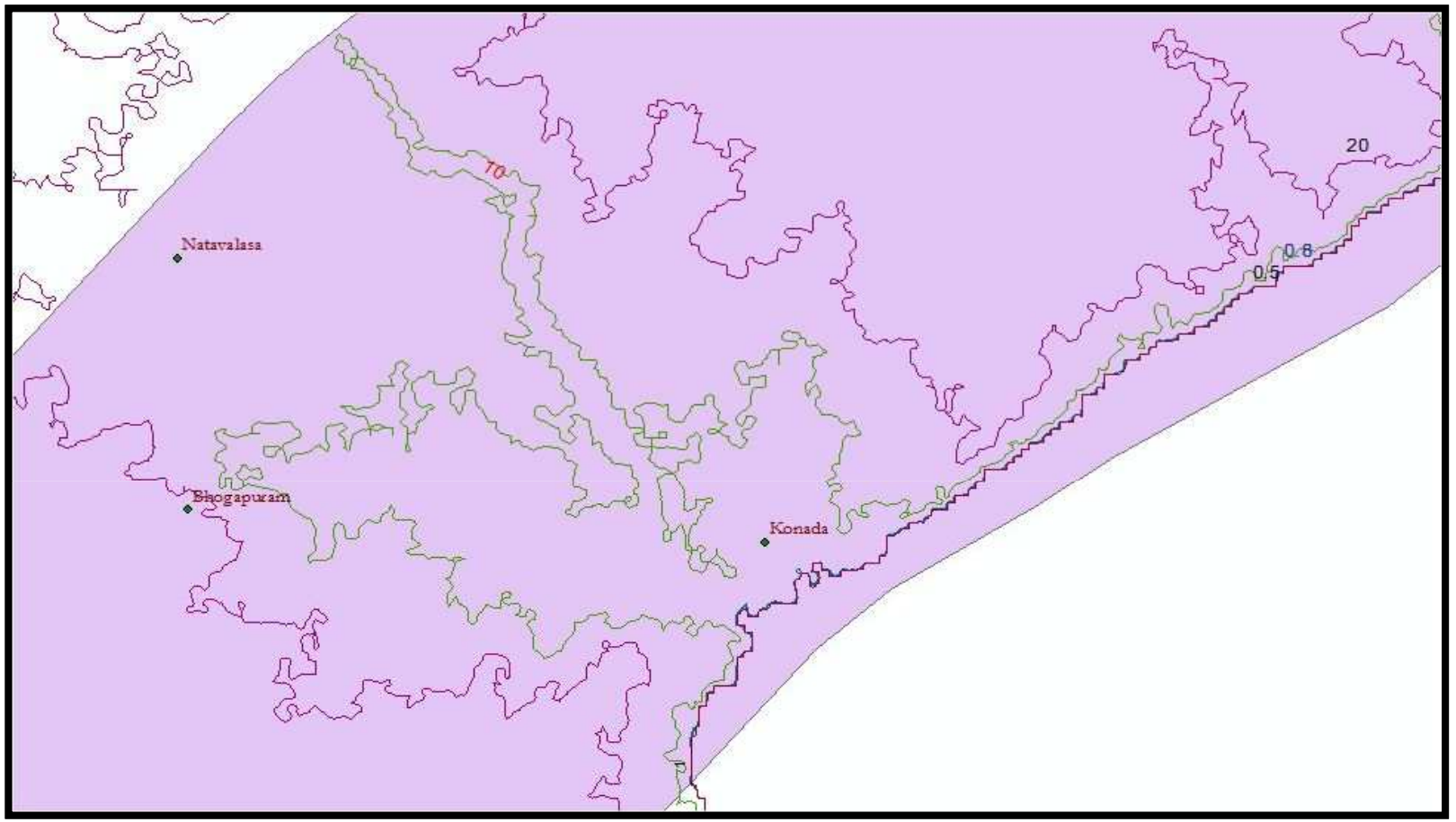
- Elevation data: SRTM data for the entire AP coast (External Data)
- Vulnerable area: 10 km buffer along the entire coast
- Shape files of following features:
  - State Outline (Polygon)
  - Place Names (Point Data)
- The official population data according to Census-2011 for all the coastal districts (External Data)



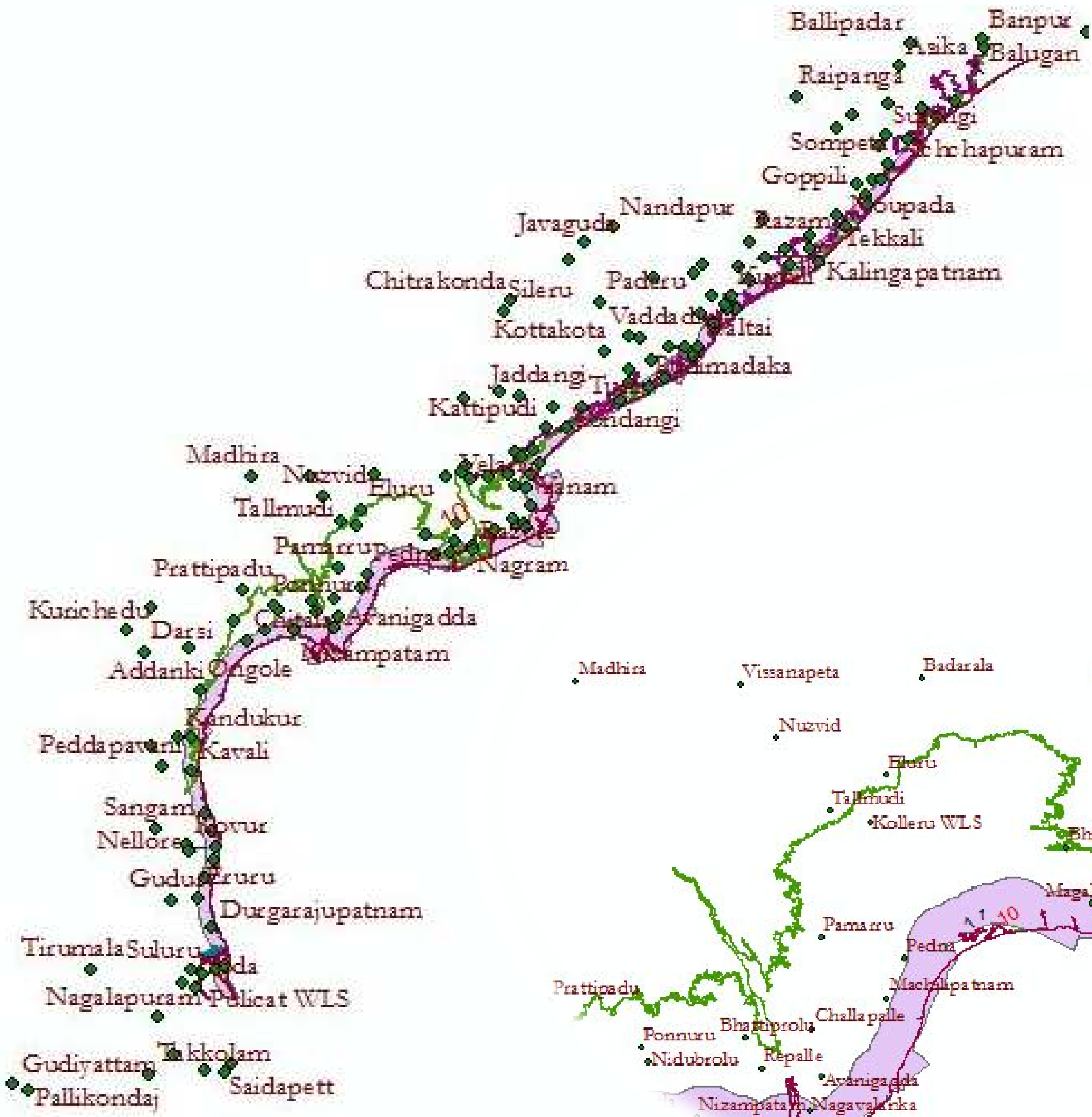
State with Buffer and DEM

Processing

- The contours of 0.5, 0.8 & 1 m (for global warming) are generated.
- The same process is repeated for 10 & 30m contours (for tsunami) .
- The proximity analysis is done to locate the contours near to the coast for the probable submergence areas.



Contours of Global Warming
(0.5, 0.8 & 1m)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Paderu
Kottakota
Jaddangi
Kattipudi
Madhira
Eluru
Tallmudi
Nagram
Prattipadu
Kurichedu
Darsi
Addanki
Kandukur
Kavali
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Durgarajupatnam
Tirumala
Suluru
Nagalapuram
Pulicat WLS
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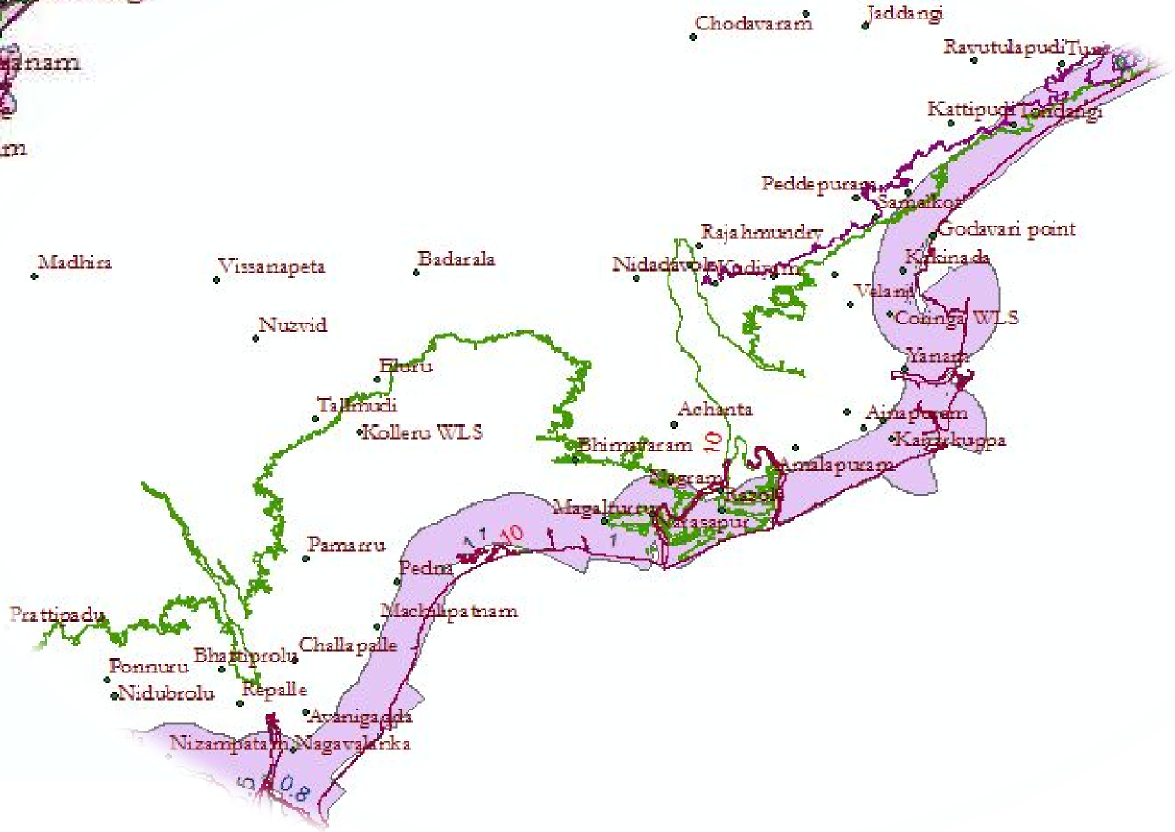
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Kattipudi
Tondangi
Peddapuram
Godavari point
Rajahmundry
Kakinada
Nidadavole
Madhira
Vissanapeta
Badarala
Coringa WLS
Nuzvid
Eluru
Yanam
Tallmudi
Achanta
Kolleru WLS
Bhimavaram
Amalapuram
Pamarru
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Nidubrolu
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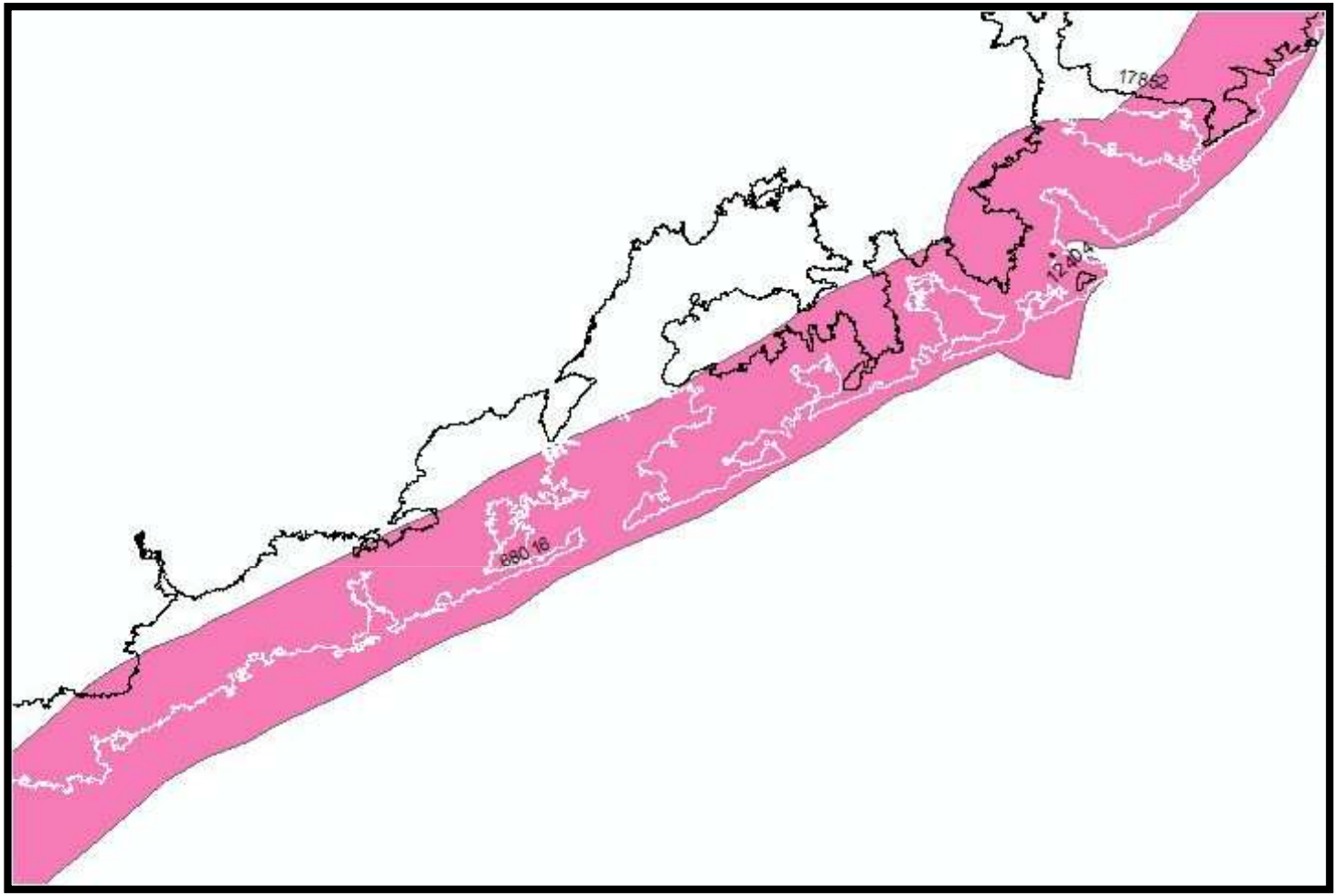

Contours - Tsunami Impact Analysis
(10 & 30m)

Analysis & Outputs

- The area falling under the identified contours are calculated.
- The area under each contour is aggregated to arrive at the probable number of people to be displaced/submerged.
- The probable affected population is approximately 3% of the entire coastal population.
- Use of open source tools.

S.No.	Contour Height (m)	Area (sq. km.)	Polygons	Study Area Population Density
1	0.50	205	309	166800
2	0.80	221	453	154541
3	1.00	220	487	155117
4	10.00	436	1658	78407
5	30.00	1083	598	476458
			Total Affected Population	**1,031,323**

FUTURE SCOPE

- Producing Commensurate Data
  - DEM (1/3rd arc-second posting)
  - Sub-meter HIRES data for detail mapping
    - The complete road network mapping
- Emergency facilities
  - Well within a possible range of buffer
- Integrating all the collateral data.
- Simulation methodologies.

SIMULATION MODELING

- Flood fill is also called seed fill.
- The flood fill algorithm takes three parameters: a start node, a target color, and a replacement color.
- Depending on whether we consider nodes touching at the corners connected or not, we have Eight-way and Four-way, respectively.

MOST MODEL

- The **MOST** (Method of Splitting Tsunami) model, developed by Titov of PMEL and Synolakis of University of Southern California.
- MOST model has three phases- Deformation, Propagation and Inundation
  - Deformation- The initial conditions for a tsunami are considered by simulating ocean floor changes due to a seismic event.
  - Propagation – this phase propagates the generated tsunami across deep ocean using Nonlinear Shallow Wave (NSW) equations.
  - An Inundation Phase simulates the shallow ocean behavior of a tsunami by extending the NSW calculations using a multi-grid “run-up” algorithm to predict coastal flooding and inundation
- Three DEM grids used by the Inundation Phase.

MOST MODEL(contd.)

- Problems of DEM data for particularly Deformation Phase and Propagation Phase simulation modeling open-ocean tsunami propagation
- Correction- MOST tool **bath_corr** to smooth the DEM grids.
- DEM grids must be analyzed for consistency prior to using the model.

FORECAST MODEL

- Main objective -Wave arrival time, wave height and inundation area immediately after a tsunami event.
- Models are run in real time while a tsunami is propagating in the open ocean, consequently they are designed to perform under very stringent time limitations.
- Set of Databases-When a tsunami event occurs, an initial source is selected from the pre-computed database.

BIBLIOGRAPHY

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Thank you!