**Team Name**     **GISters India     Group Code: MAPATHON3571**
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**Topic**             **Detection of change in Water Bodies / Reservoirs / Wetlands.**

## Methodology

We tried to detect change in Mumbai's shoreline. For that purpose we chose LISS III data primarily due to good resolution(23 m ). We downloaded four tiles each from oct. 2008 and feb. 2018.
For processing the data further, we observed the LISS III individual band images as well as false colour composites. We found that water bodies appear almost dark in band4 of the dataset.( We also searched and found that the reflectance of water is nearly 0 in NIR band.) . After band selection we did the following GIS steps:

1. Created a virtual raster by fusing band 4 images of all 4 tiles(2008).
2. To see the DN value for water pixels, we observed histograms of water rich tiles.( Let's call it $D_w$)
3. Using raster calculator we reduced the DN of the images to 2( black and white or 0 and 1.)( Based on Histogram observations, we created condition DN<=D_w)
4. Repeated the above steps for 2018 data.
5. Now subtracted the two rasters' DN value and obtained the change in another layer.
6. Next superimposed this layer on the 2008 map and presented the map as submitted.

The major complexity was involved in selecting the $D_w$, by trial and error, we reached some feasible number for $D_w$ . Also before hitting on the idea for creation of a binary DN layer, we were trying to subtract the band 4 rasters directly but the difference in the range of DN values between the 2008 data and 2018 data was not allowing us to extract the shoreline change properly. Also we had tried other approaches before it including trying nearest neighbour clusters, thresholding( only size feature was available.) and Topographic Index.

## Applications
Some of the potential applications of the map are:

1. It will help in choosing proper sites for coastal construction activities and other coastal area usage.
2. Though our map only captures the change in 10 years, a longer term map along with a information about topology of the city will help in prediction of the effects of sea level rise and adequately plan out countermeasures( preventive or corrective) in issuing permits or building embankments etc.
3. To plan out tourist activities, seasonal variations in shoreline( and other water bodies)  can be noted and tourism may be planned/restricted accordingly.
4. It will help in planning mangrove forestation etc. to prevent further erosion by  waves and check salination etc.
5. To illustrate the effects of climate change and impress upon people the urgency of the issue.