Thermal heat Island effect and associated land cover changes of Indian Bengal Delta (IBD)

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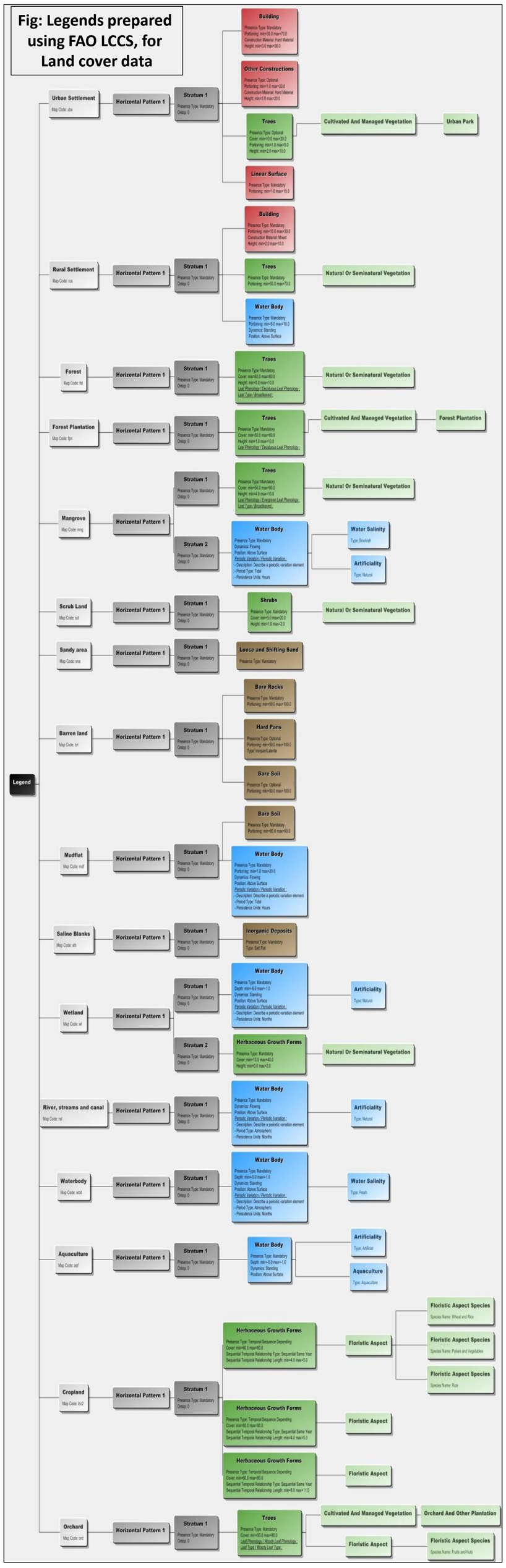
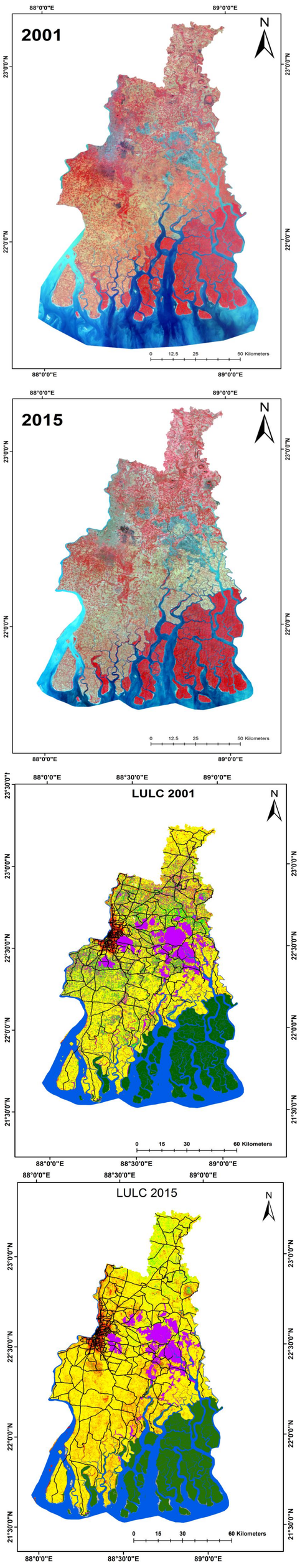
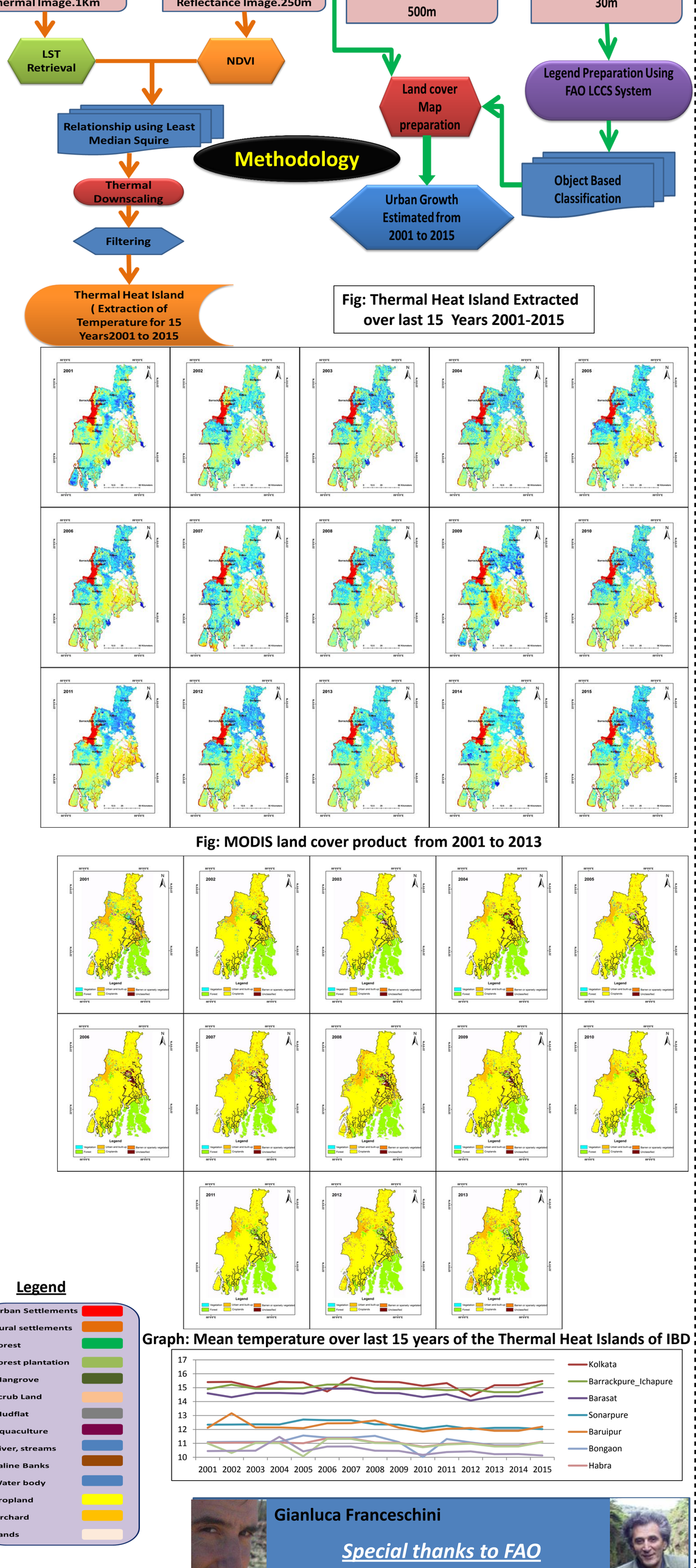
Abstract: Urban heat island (UHI) refers to an urban area with a significant higher temperature in comparison to surrounding rural areas due to specific land cover and anthropogenic activities. Thermal heat island effect is a slow onset hazard which is very much important in the current scenarios of climate change. In the present study to identify UHI, thermal imageries of MODIS 1 KM spatial resolution have been down scaled to 250metre using NDVI product of the same date ,subsequently the temperature of the UHI have been extracted year wise for the same day. Land cover changes were also analysed from MODIS and LANDSAT imageries according to Land Cover Classification System (LCCS) of Food and Agricultural organization (FAO). The result shows a very minor but steady increase of UHI effect along with the significant land conversion from Forest, agriculture, water bodies to built-up areas especially surrounding the urban areas of IBD.

Key Words: Urban heat island, Thermal Down scaling, Land Conversion, Indian Bengal Delta

Fig: Legends prepared using FAO LCCS, for Land cover data







Methodology

Fig: Thermal Heat Island Extracted over last 15 Years 2001-2015

Fig: MODIS land cover product from 2001 to 2013

Legend

- Urban Settlements
- Rural settlements
- Forest
- Forest plantation
- Mangrove
- Scrub Land
- Mudflat
- Aquaculture
- River, streams
- Saline Banks
- Water body
- Cropland
- Orchard
- Sands

Graph: Mean temperature over last 15 years of the Thermal Heat Islands of IBD

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Conclusion: **The mean temperature of the heat islands extracted over 15 years i.e. from 2001 to 2015. The results revealed two interesting facts.**

1.The mean temperature of these heat islands showing positive trend over last 15 years. A very small but steady increase of mean temperature is noticed (0.00532 Degree per year)

2.There is a distinct temperature difference between Metro city like Kolkata and nearby city and other satellite cities. Alarmingly the temperature difference is increasing and from MODIS land cover product and classified (based on FAO LCCS) LANDSAT image the growth of urban area is evident over last 15 years, these indicates that the metro cities may become more vulnerable due to climate change if the present trend continues.

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* All results are primary observations, Validation process going on.