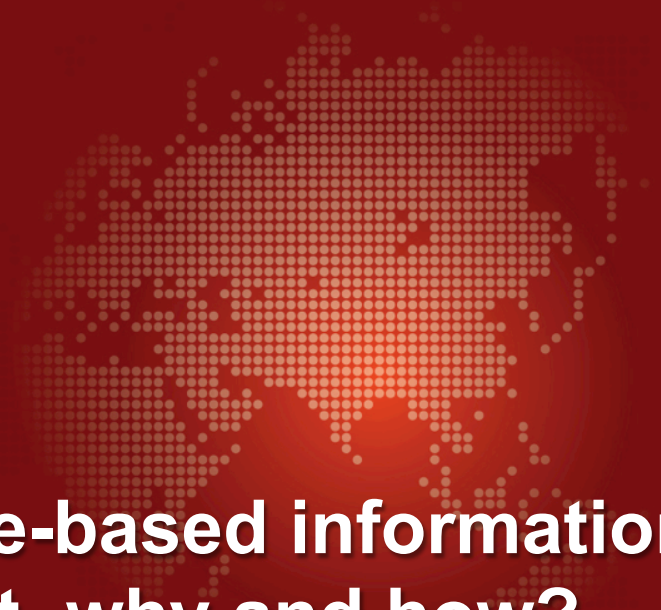

Utilizing satellite-based information for disaster risk assessment- why and how?

Peeranan Towashiraporn – ADPC

Session 1, UN International Conference on Space-based Technologies for Disaster Management
September 14, 2015 - Beijing, China

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About ADPC…

- ADPC uses science-based approaches to **identify**, **quantify** and **understand** risk

- Strengthening **effective governance** systems for managing disaster and climate risks and **institutionalizing** disaster risk management

- Incorporating disaster risk reduction into **development processes**

HFA Priority 2

Identify, assess and monitor disaster risks and enhance early warning

- Risk assessments and maps, multi-risk; elaboration and dissemination

Sendai Framework Priority 1

Understanding disaster risk

Policies and practices for DRM should be based on an understanding of disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment….

Why Disaster Risk Assessment?

DRR/DRM decision makers need an evidence-based solution to help them make informed decisions.

How can Risk Assessment help?

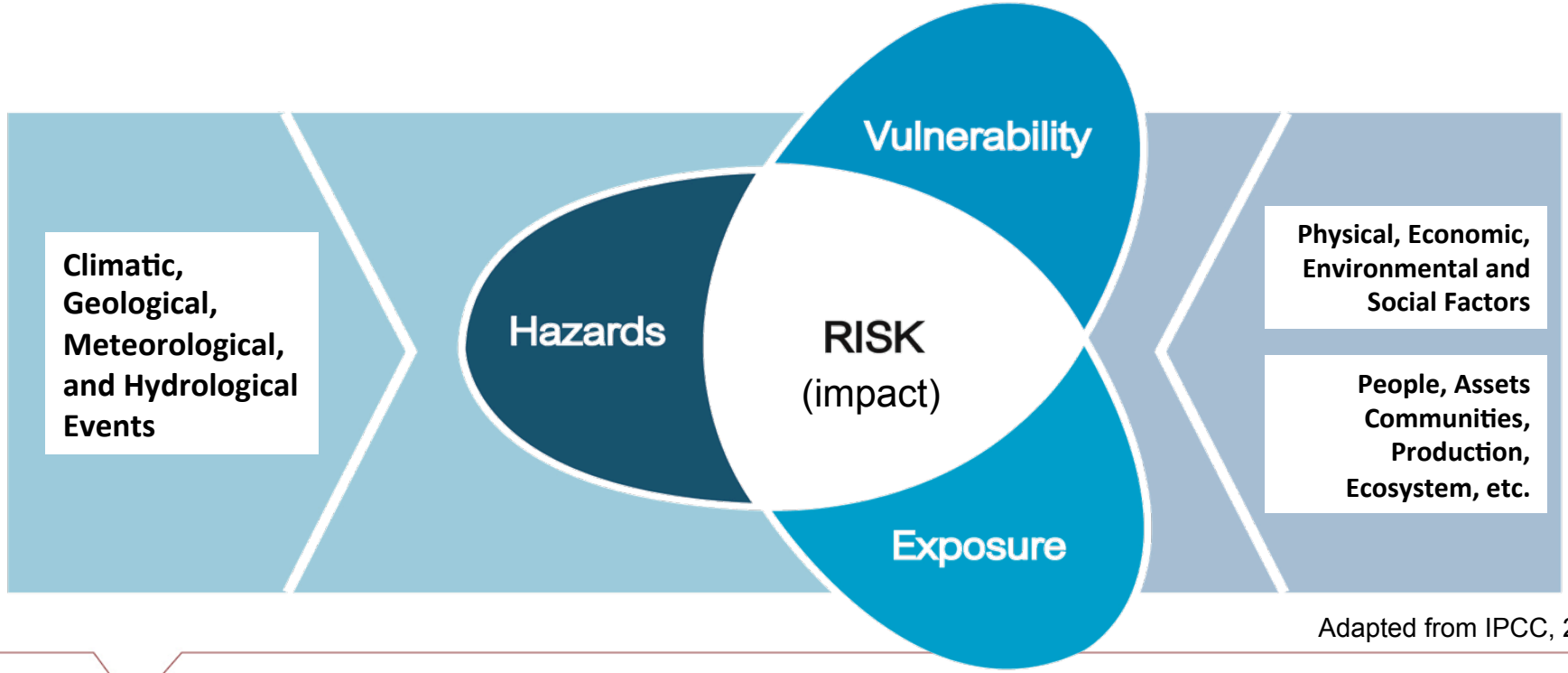
The science-based approach provides spatial information on the risk (where and how much), which guides priority setting, resource allocation, and policy development.

What is Disaster Risk Assessment?

Disaster risk assessment is simply a quantification or estimation of possible impact (damage) from disasters before they happen.

Disaster Risk Assessment

interplay between Hazard, Exposure, and Vulnerability



Adapted from IPCC, 2012

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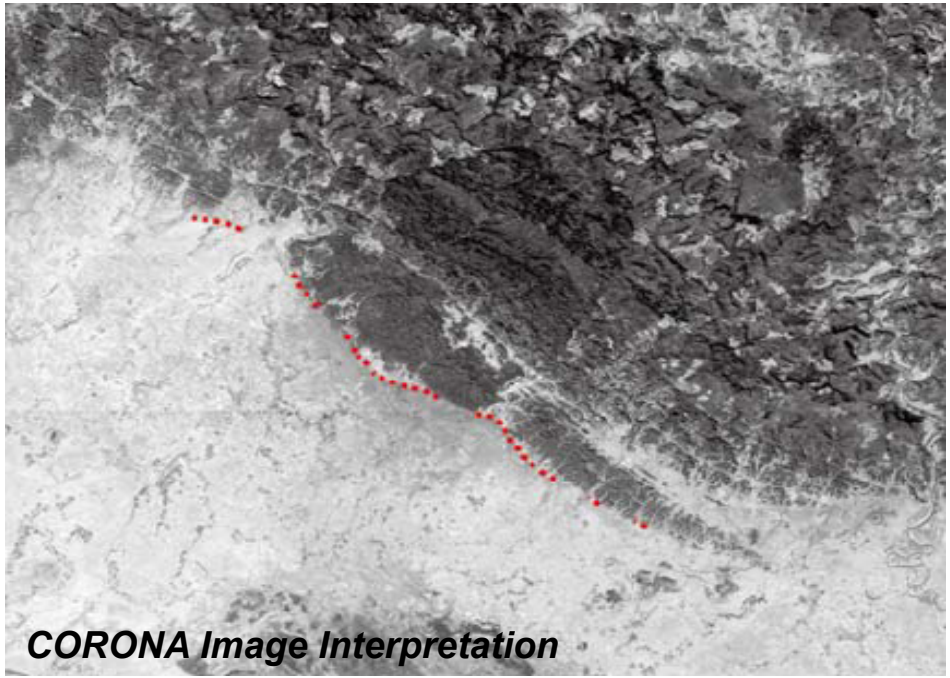
Hazard Assessment

Elevation Models

for flood hazard mapping or landslide susceptibility

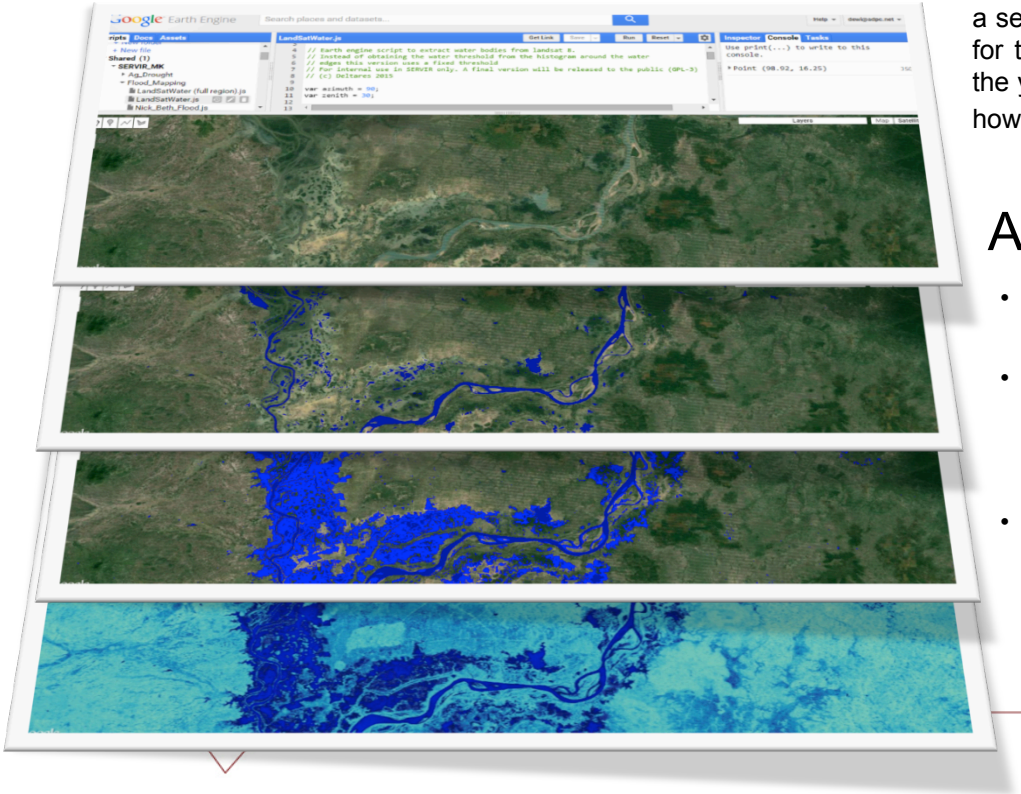
Interpretation of images for earthquake fault studies



CORONA Image Interpretation

CORONA Satellite images were used to interpret the 3-dimensional view of fault displacement terrains in Bangladesh.

Flood Extent Mapping



Historical Floods

a series of historic flood extent maps of the Lower Mekong Basin for the most extensive flooding during the monsoon for each of the years 2000 to 2015, showing the annual inundated areas and how they changed with time.

Approach

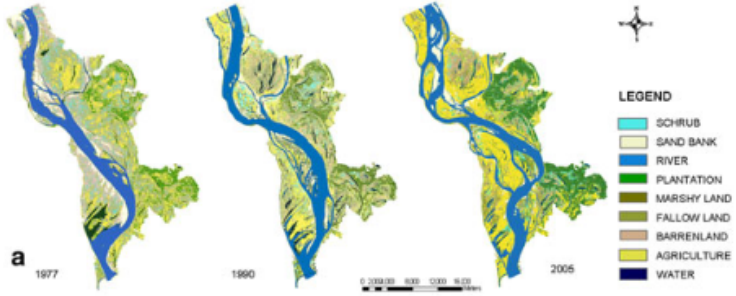
- Data inputs : Landsat 7 and Landsat 8 (and Sentinel-1 when the data become publicly available)
- Digital extraction of water feature layer will be done using Modification of Normalized Difference Water Index / MNDWI (to enhance open water feature) in combination with image processing techniques and DEM based filtering
- The digital extraction of water feature (image analysis) will be performed using Google Earth Engine (GEE) javascript or python ; and expose the application/tool through a user friendly site/Google's appspot which can freely be accessed by users

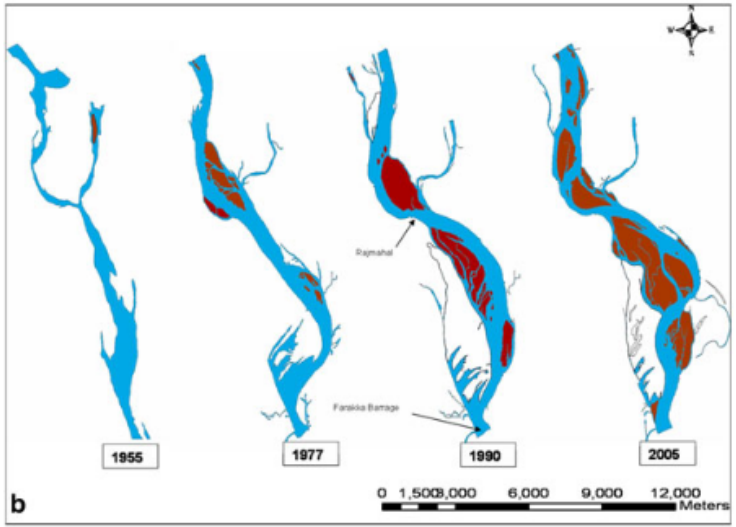
Global Precipitation Measurement (GPM) for Disaster Risk Management

- Data on a 3-hourly basis, which would be suitable even for nowcasting (i.e., less than 6 hours) system, which are especially relevant for flash flood and small river warnings.
- GPM precipitation datasets are freely available through the NASA website (http://pmm.nasa.gov/data-access/downloads/gpm)

Source : NASA

River bank erosion hazard study of river Ganga, upstream of Farakka barrage

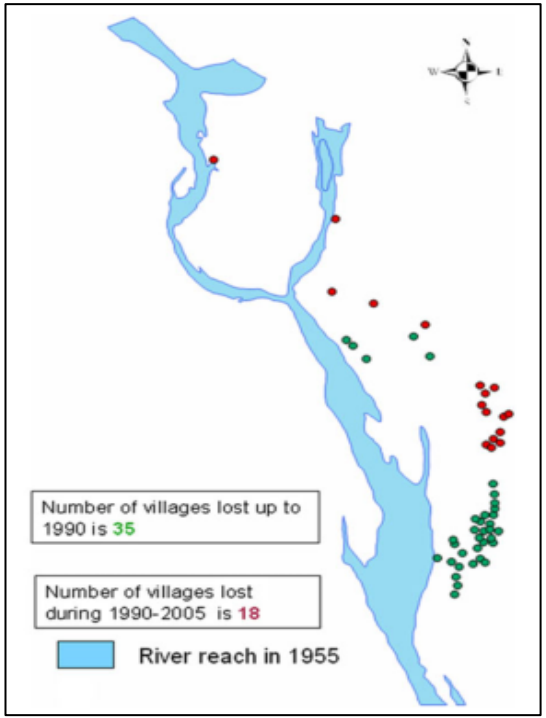




Satellite Data Used:
Landsat-MSS 10.02.1977
Landsat-TM 21.11.1990
Landsat-ETM+ 20.10.2001
IRS-1D LISSIII Feb.2003
IRS-P6 LISSIII 15.11.2005

Methodology: Visual Interpretation was used for river course extraction.

Result:
Shift in the river course is quantified using transect method to quantity the number of villages affected



Damage to the villages due to river course change

(a) Classified land use land cover map of study area in 1977, 1990, and 2005;
(b) Spatial temporal river shift of Ganga River upstream of Farakka barrage;

Ref: Praveen K. Thakur et. al, Nat Hazards (2012) 61:967–987

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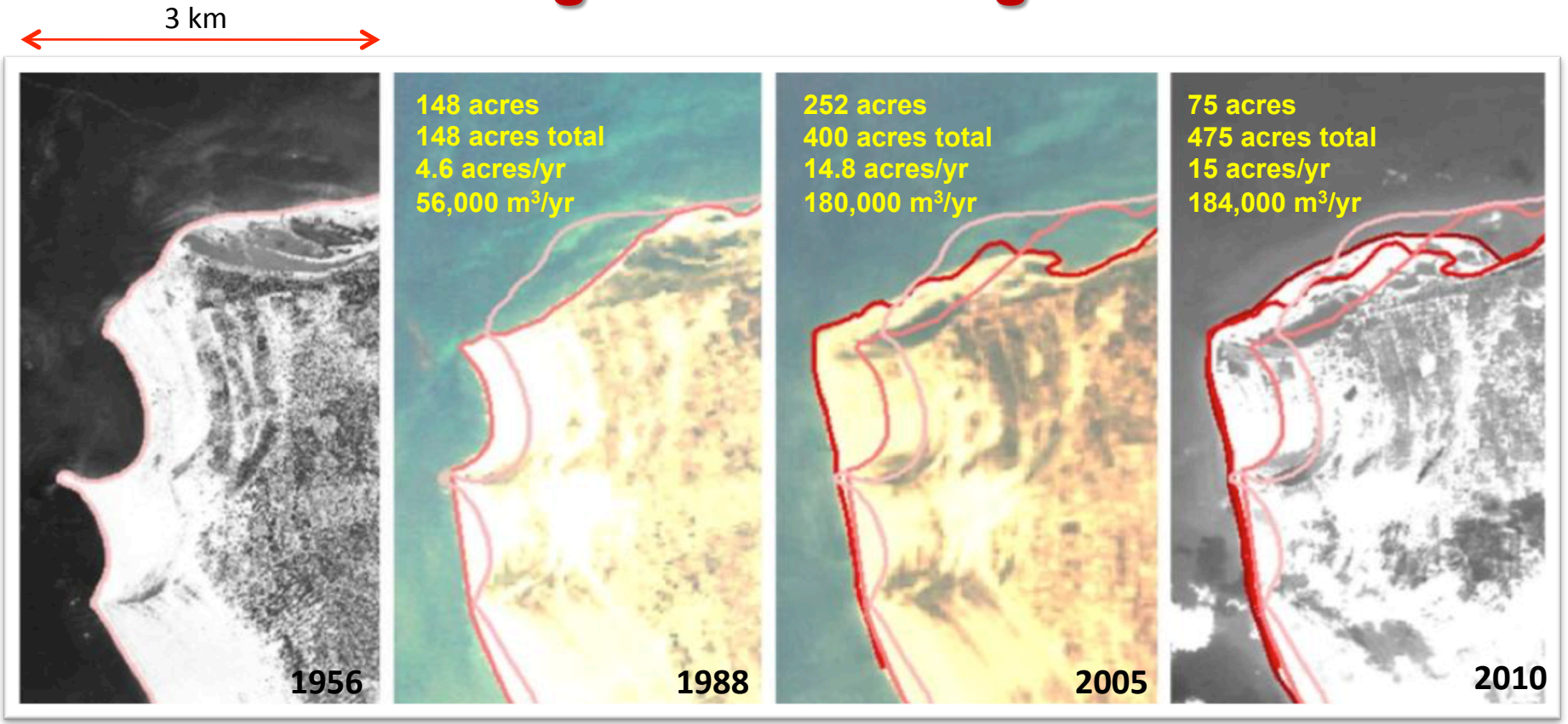
Monitoring coastal changes in Sri Lanka



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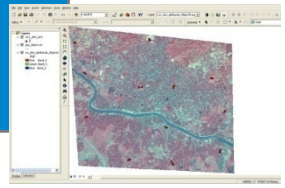
Exposure Analysis

Exposure Database – Buildings in Dhaka City, Bangladesh

Collection of QuickBird Image

Selection of TIC/GCP on the Image and Establishment of Benchmark



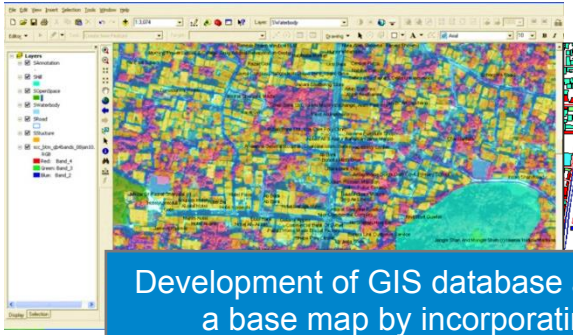
Geo-referencing the QuickBird Image by RTK GPS with the surveyed GCPs

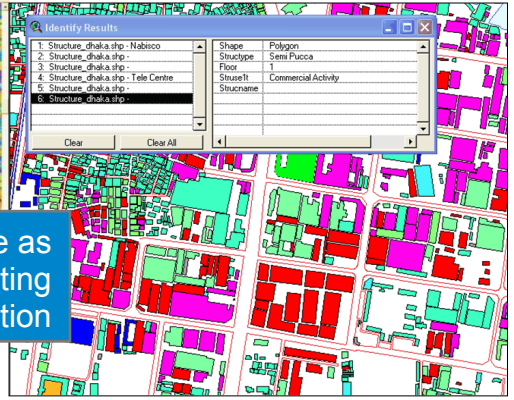
Baseline survey with total station

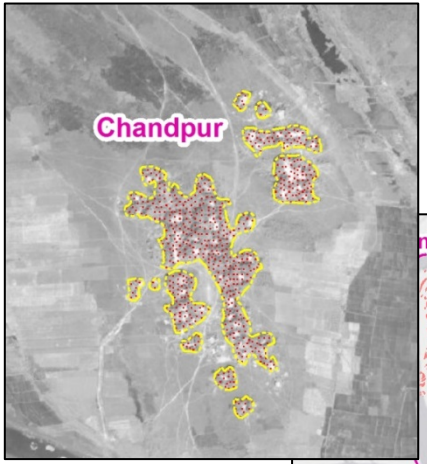
On Screen Digitization (building, road, water body, open space)

Field verification and Attribute information collection

Development of GIS database as a base map by incorporating attribute data & field information

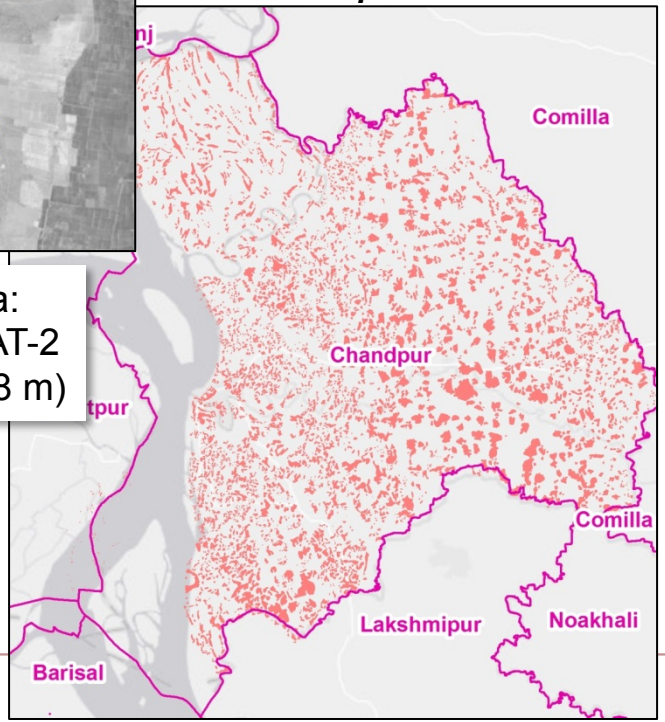




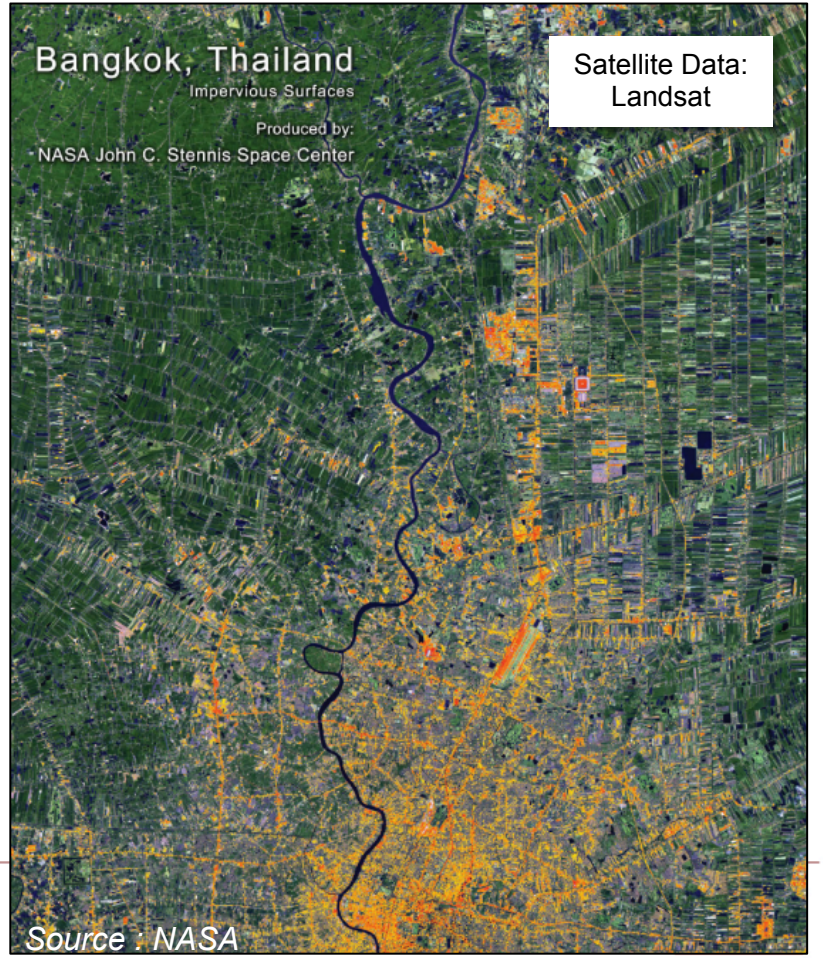


Satellite Data:
RESOURCESAT-2
LISS IV MX (5.8 m)

Settlement Areas of Chandpur District



Impervious Surface Areas of Bangkok



Challenges

While the use of satellite is common for hazard and exposure assessment, its use for vulnerability assessment is limited.

There is still misperception that satellite technology and information are only for scientists and experts.

There is still limited understanding of DRR among agencies possessing satellite technology and information.

Accessibility to high-resolution images is not always given to the general public.

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THANK YOU
FOR YOUR ATTENTION

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