Utilizing space and GIS for effective disaster risk management
-ESCAP's practices in Asia and the Pacific

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Vienna, Austria

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Contents

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I. Overview of ESCAP: Building resilience for disaster risk reduction

- **In 2014, Asia and the Pacific continued to be the region most affected by natural disasters**
  - Over half of the world's 226 natural disasters occurred in Asia and the Pacific; 6,050 lives lost; 80 million people affected; cost $60 billion

- **In 2015, large scale natural disasters brought devastation**
  - Cyclone Pam wrecked havoc in Vanuatu and affected the Pacific; the recent earthquakes devastated Nepal

- **Sendai Framework for DRR 2015-2030 calls for regional solutions**
  - For sharing policy lessons and good practices; monitoring and early warning systems; sharing scientific knowledge and technology

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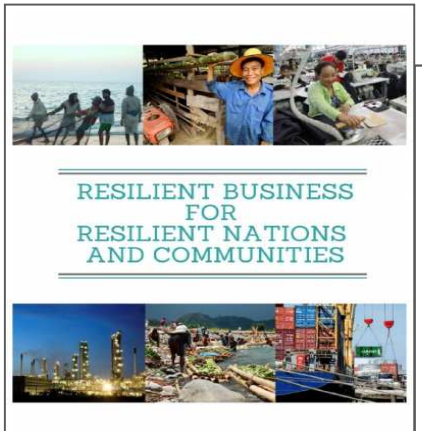
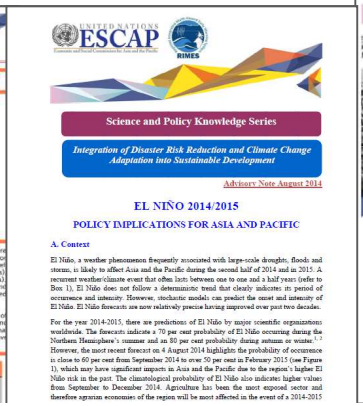
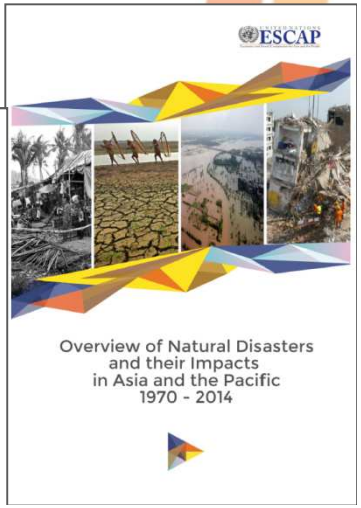
Taking forward the Sendai Framework for DRR

- **Evidence-based policy for mainstreaming DRR into development strategy**
  - Analysis: ***O****verview of natural disasters and their impacts in Asia and the Pacific 1970-2014;* ***R****esilient business for resilient nations and communities; and more …*
  - Multi-sectoral capacity building on mainstreaming DRR; China, India and Indonesia as Regional Training Centres
  - Development of a basic range of disaster related statistics
- **Regional advisory services** to 10 high-risk, low-capacity countries since last Commission
  - Disaster management policy, post disaster needs assessment; Sub-regional framework of cooperation in Central Asia; Asia Pacific Centre for Disaster Information Management
- **Trust Fund for Tsunami, Disaster and Climate Preparedness--**strengthened the capacities of 19 countries in multi-hazard early warning and coastal resilience
  - 9 ongoing projects
    Fresh contributions from Japan and GIZ; new commitment from India







II. Enables timely access to and use of space-derived products and GIS for effective disaster risk reduction

- Just in 2015, 130 Near real-time satellite imagery and 25 damage maps have been provided to Vanuatu, Tuvalu and Nepal for effective disaster response and relief;
- Guidelines on rapid assessment of damage and losses (with SAARC);
- SOPs for utilizing space based data during disasters (with ASEAN);
- ESCAP will enhance the collaboration with ASEAN, SAARC and Pacific countries on effective utilizing space-based information for disaster management.

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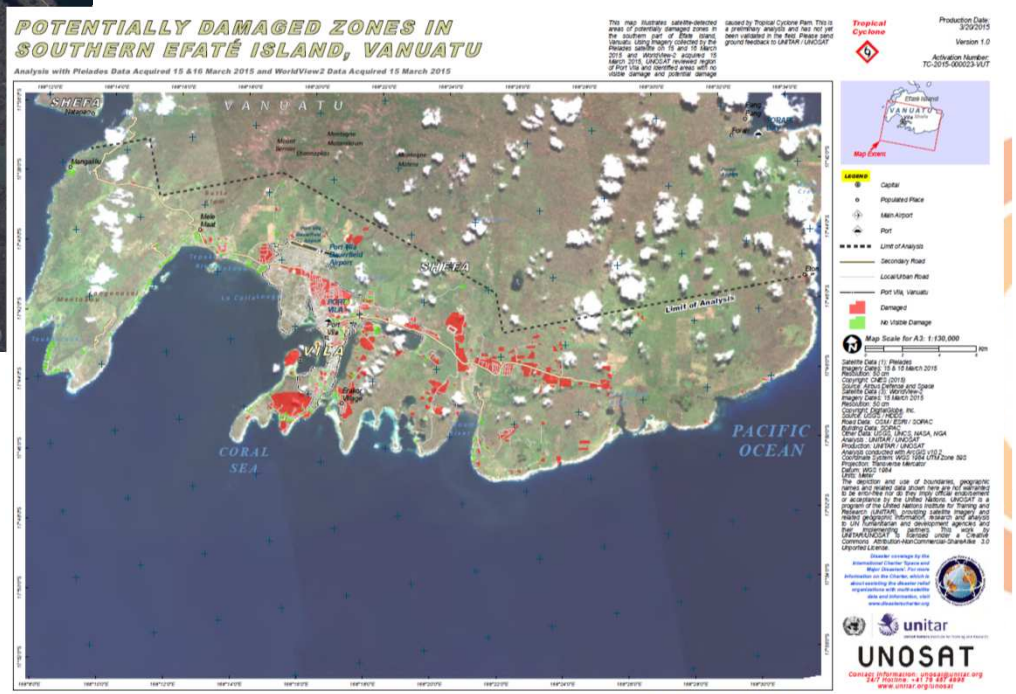
Satellite Image and damage map of Cyclone Pam Vanuatu



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Pontoon Bay, Weila Bay

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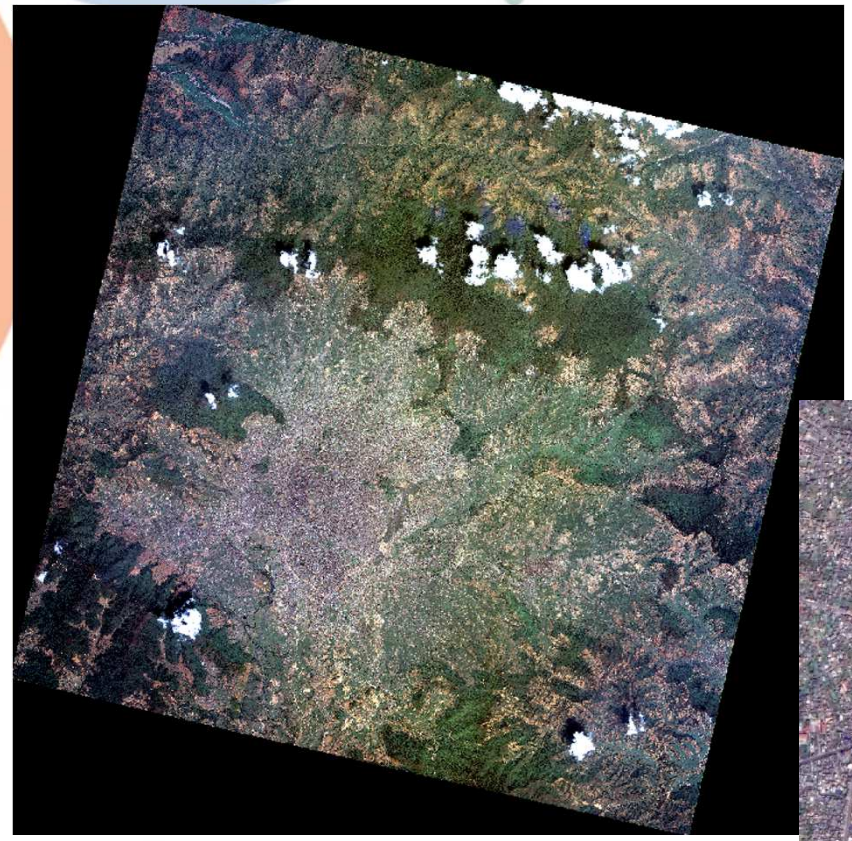
Satellite Image of Nepal



Satellite: China's GF-1
Location: Kathmandu, Nepal
Date: 11Apr., 2015

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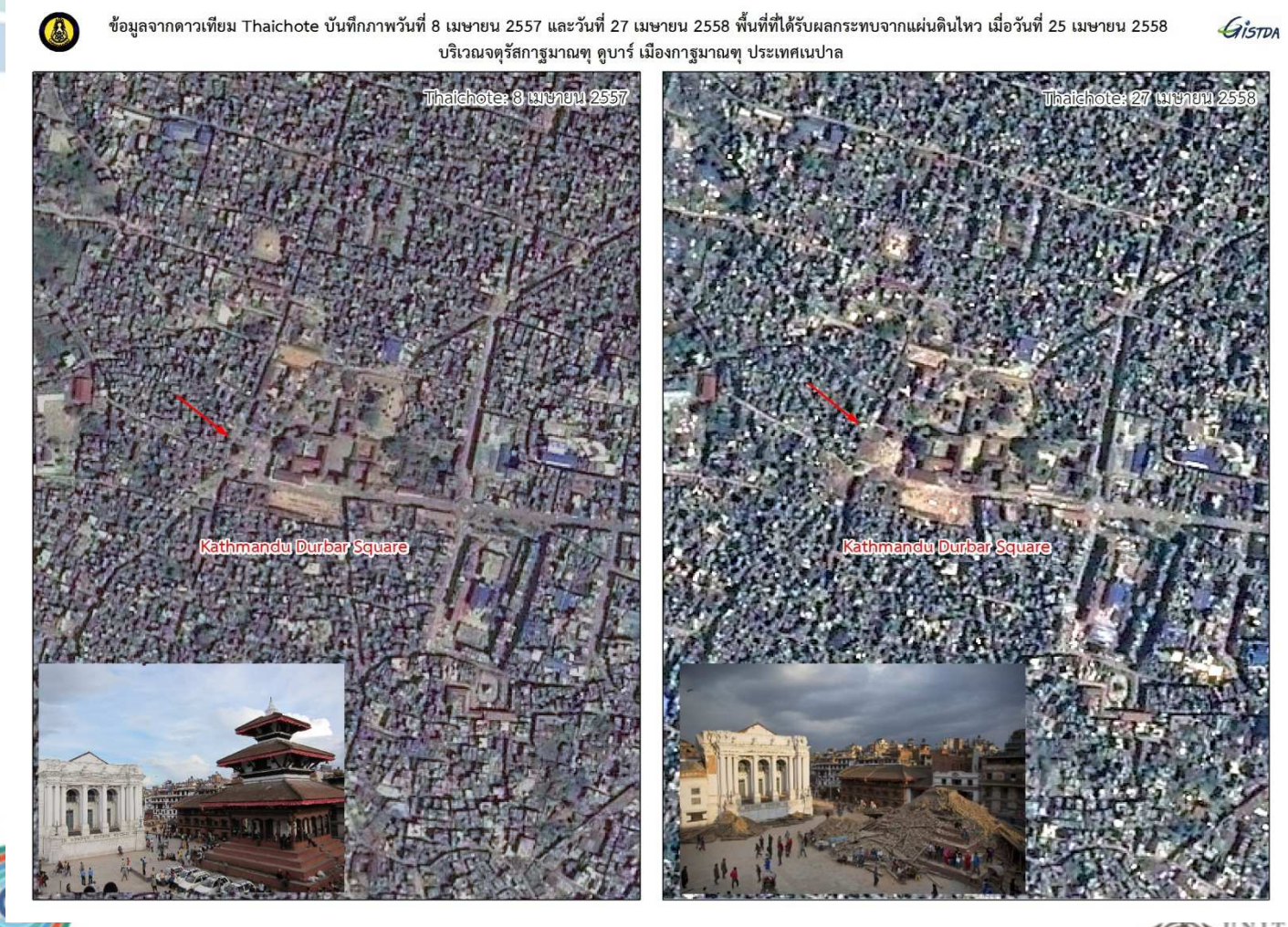
Damage assessment （ThaiChote Satellite）



(a) Before earthquake

(b) After earthqual

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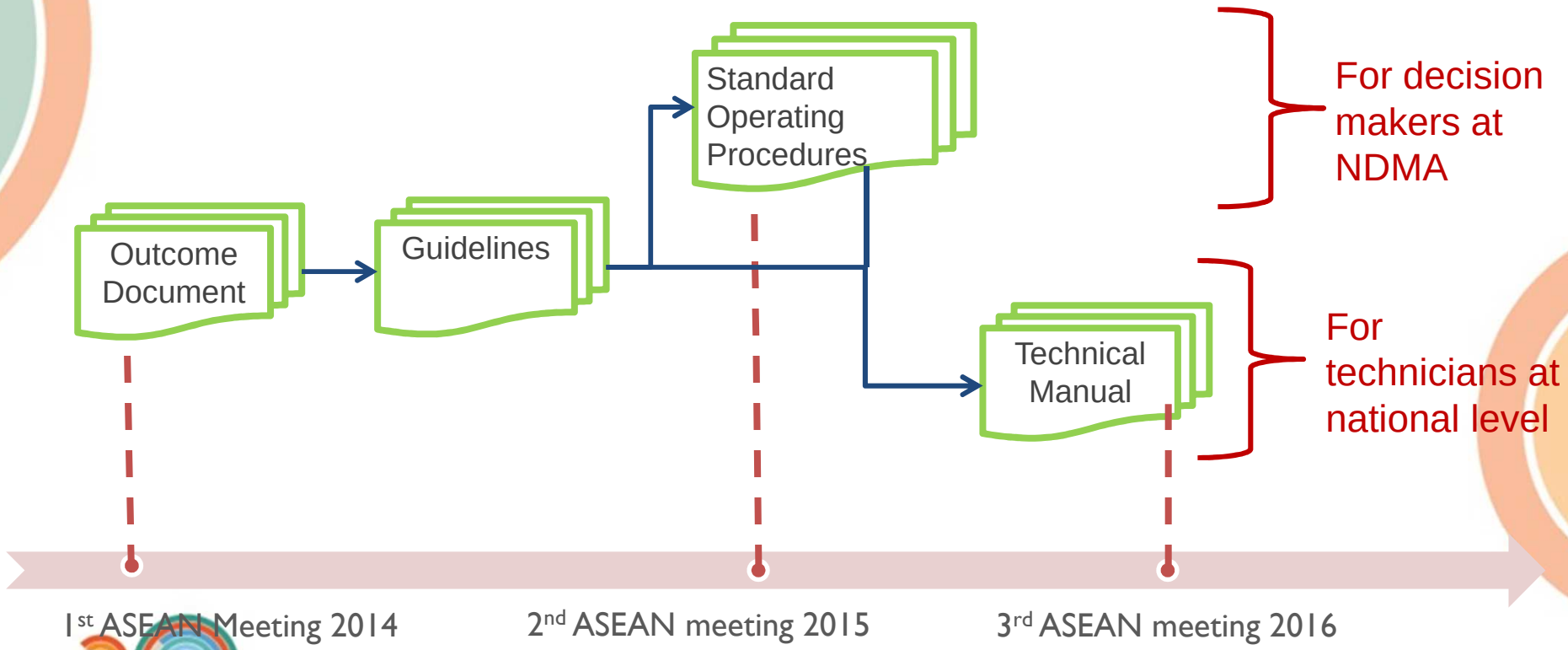
UN-ASEAN workshops on SOPs and guidelines

ESCAP, UN-SPIDER and UNOSAT proposed 2 products going forward:



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Current status:

Standard Operating Procedures

Outcome Document ✓ Done

Guidelines ✓ Done

Standard Operating Procedures - In progress

Technical Manual … waiting to initiate

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- Decide if you need support?
- Choose a satellite-derived product
- Do you have the capacity to produce this yourself?
- Make your request
- Share with relevant authorities
- Utilise the products
- Was this useful? provide feedback

Integrating geospatial products and services
In Damage and Loss Assessment (DaLA)/PDNA

A step-by-step guide on conducting rapid damage assessments for some specific sectors -Housing, Infrastructure, Agriculture and future Disaster Risk.

Contribute towards the development of South Asia Recovery Framework by the SAARC.

Targeted to managers or practitioners from government agencies who often participates and supports rapid disaster needs assessment and responsible for post-disaster relief, response, recovery and reconstruct programmes.

It will be used for capacity building training.

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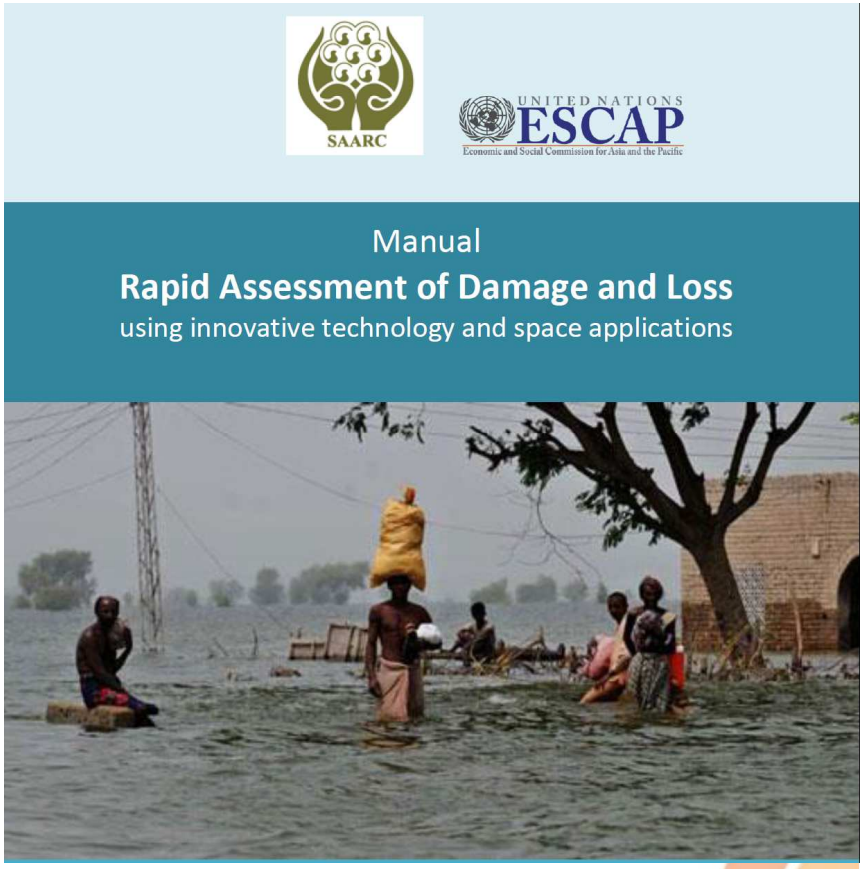

It introduces how to capitalize upon the innovative technologies – space applications, geo-spatial databases and crowdsourcing for making disaster assessment faster, evidence-based and monitorable?

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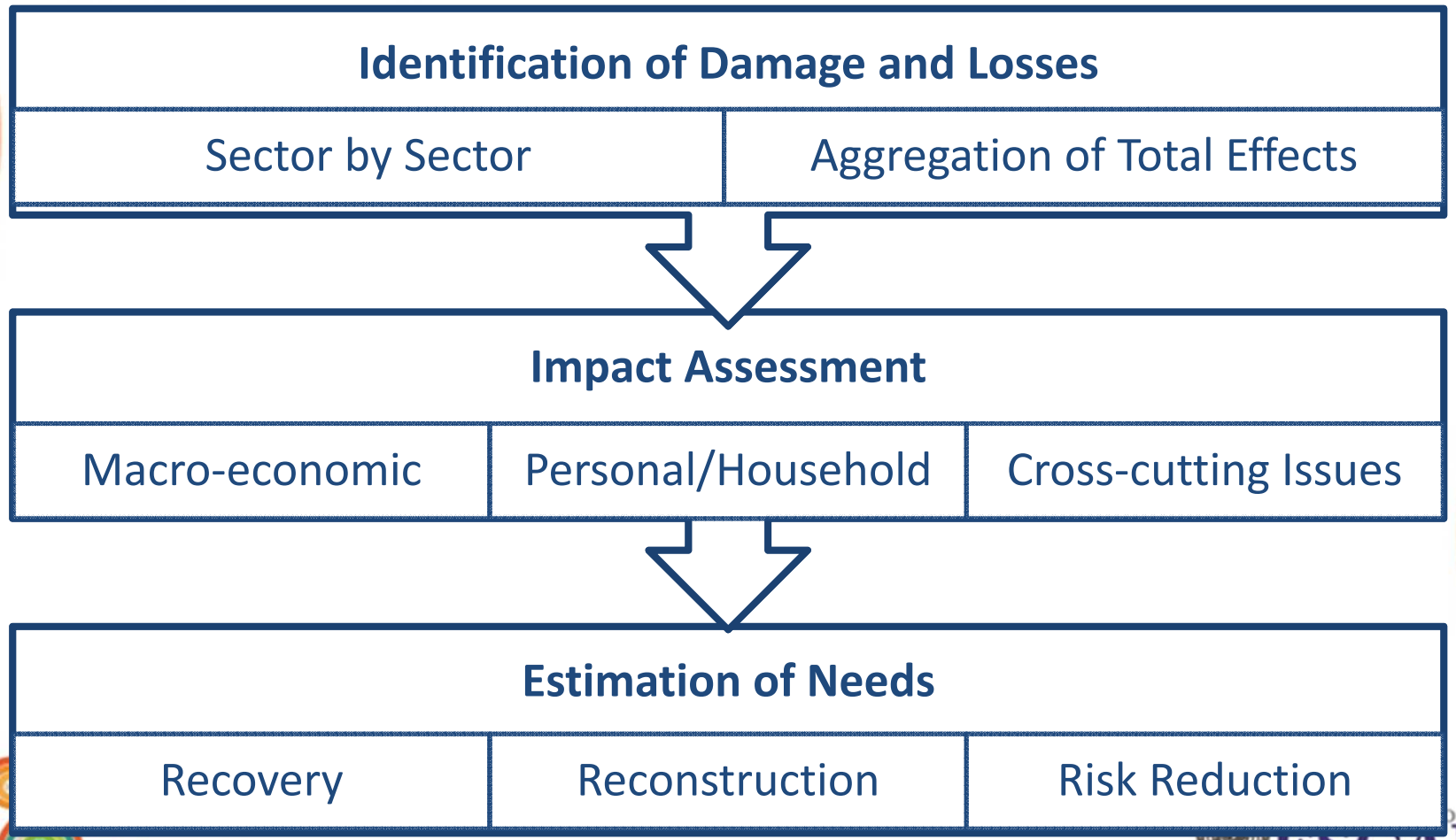
Rapid Assessment : Quantify damages across the sectors

The Assessment Process

Collateral data/info

Satellite data/products



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Rapid Assessment:

Satellite images/Geo-spatial tools: Key Findings

Sectors	Demonstrated application
Housing	Limitations in case of Earthquake but may be use for stratification and to complement with other tools
Agriculture	Yes – Quantifiable Damage
Infrastructure	Roads, critical infrastructure – Damage quantifiable – more precisely in floods, cyclones & some limitations in earthquake context
Cross-sectoral	Disaster Risks

III. Effective monitoring and early preparedness for drought helps save lives and livelihoods

- The Regional Drought Mechanism Covers the most drought prone countries in Asia-Pacific region;
- Provides space based data, strengthens capacity/coordination for effective drought monitoring and early warning;
- Helps drought-affected developing countries establish operational monitoring system, through integration of space-derived information and in-season ground data.
- Initially operationalized in pilot countries, with the technical support of two regional service nodes in China and India.
- The Mechanism brings regional resources in space applications, contributed by China, India, Japan, Thailand and others.

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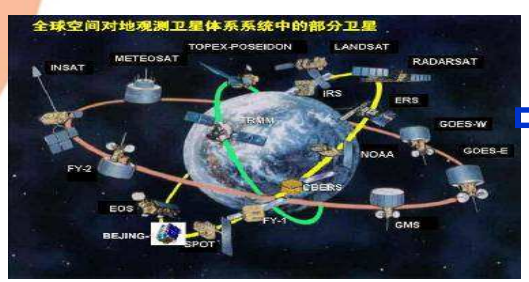
Approach and Methodology

Need assessment → Specialized training → Country Profile

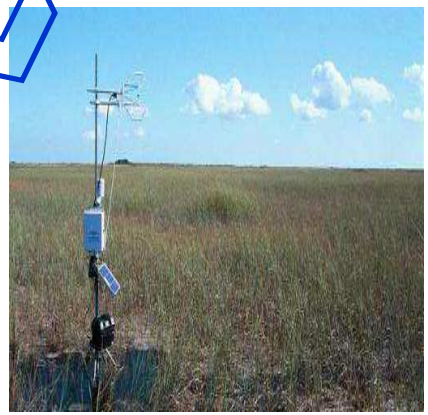
Regional Service Nodes → Country Profile

Regional Service Nodes

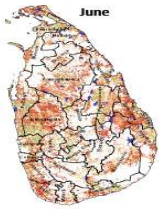
Field observation



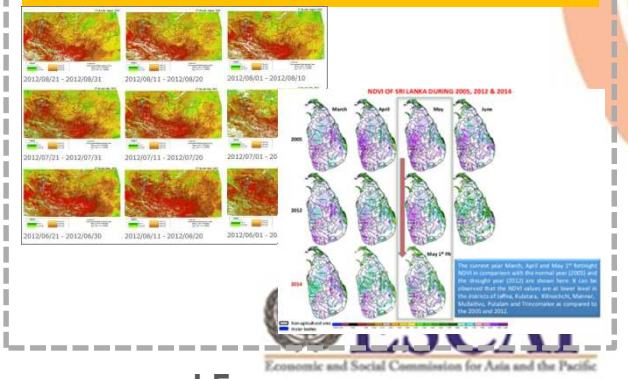
Meteorological data

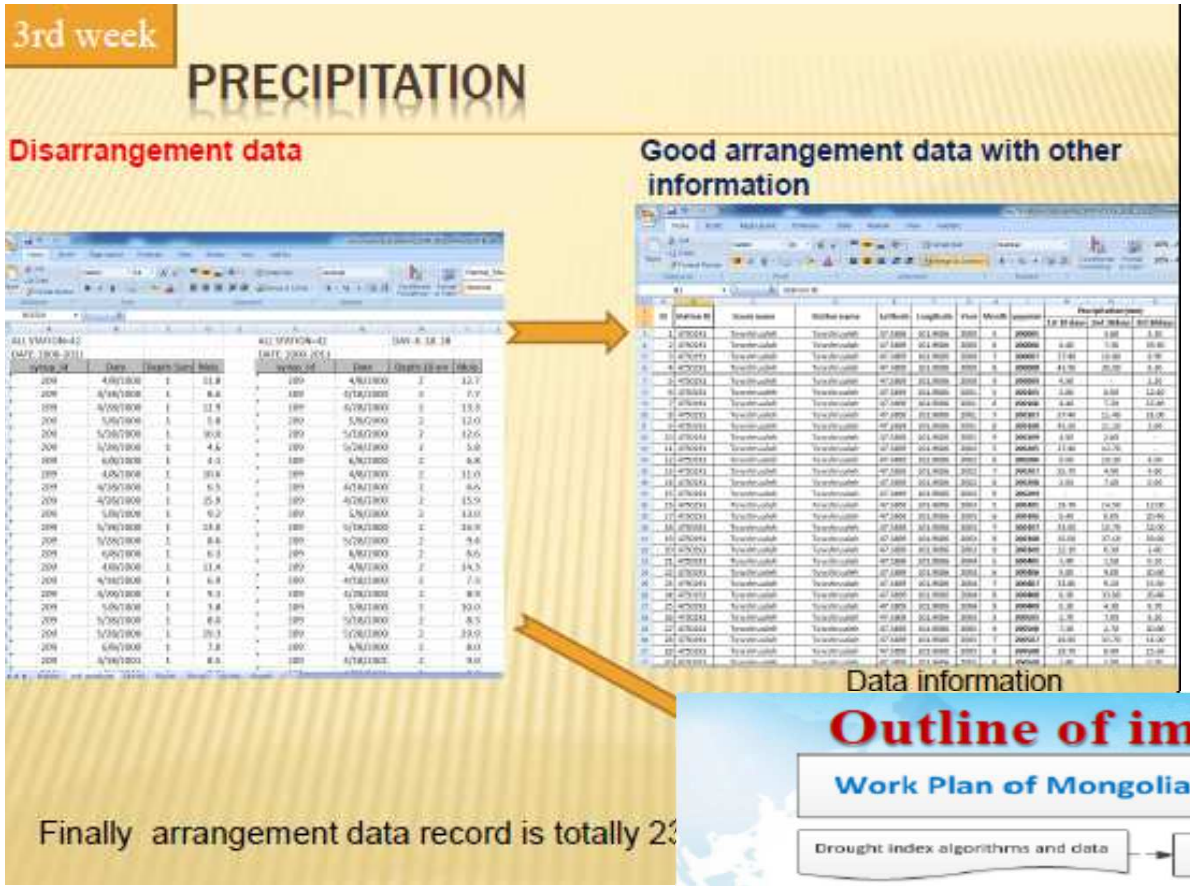


Data processing
Drought Index calculating

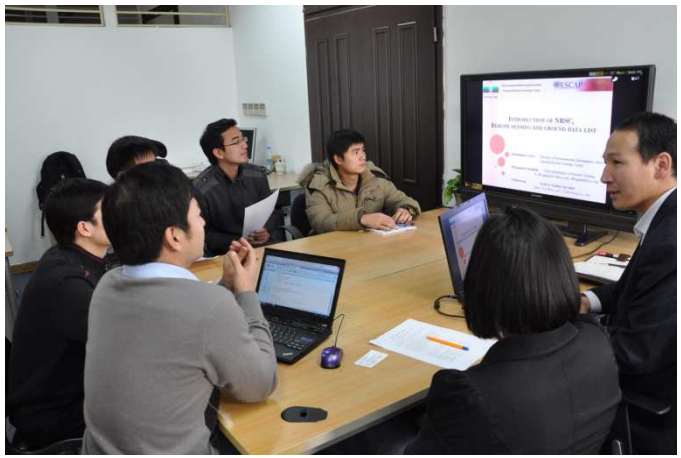


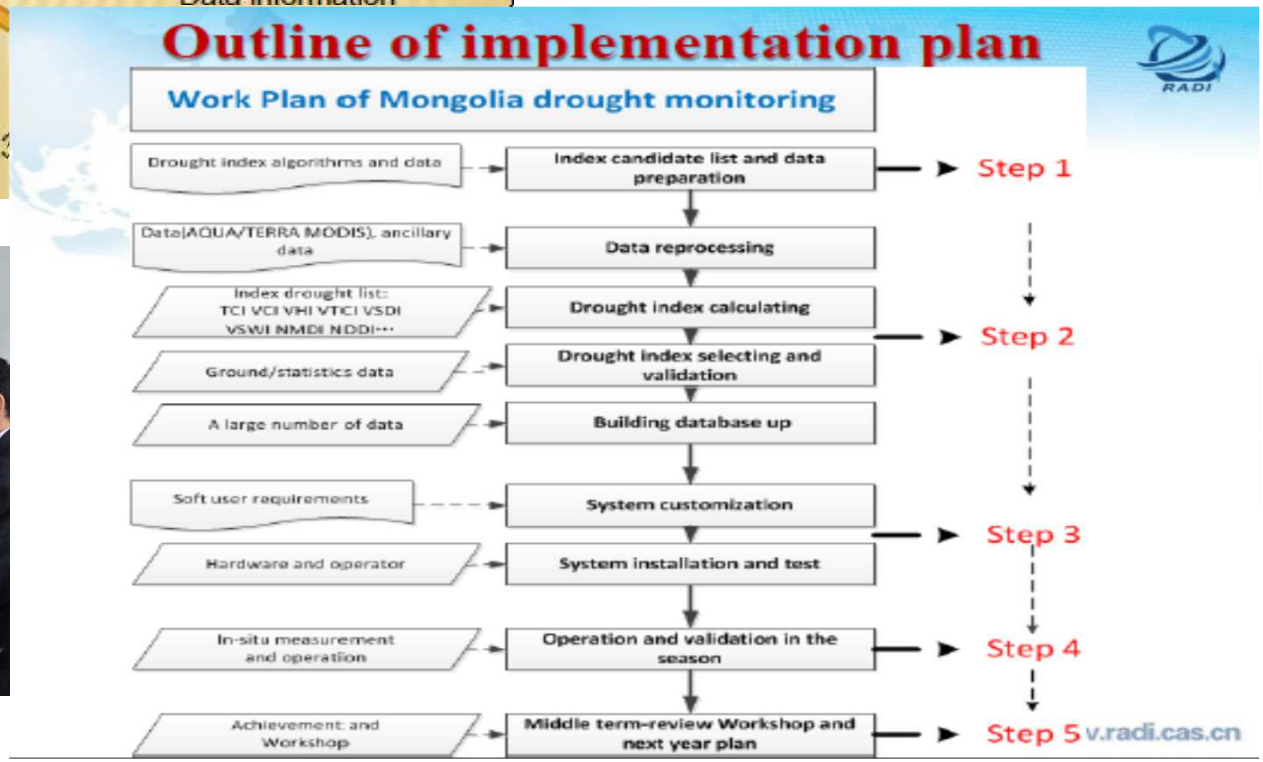
Drought monitoring results





Two experts from Mongolia have been trained in China for two months to develop and assess indices appropriate for Mongolia, one filed mission has been conducted, field mission to verify the customized drought indices and methodology.





Specialized training on drought monitoring for country team in Sri Lanka, in February 2015.

Drought Monitoring System and Drought Watch system developed by India and China have been installed for the users in Sri Lanka.

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IV. Strengthening capacity to build multi-disciplinary approach, collating and consolidating information system for disaster risk management

- Special focus on high-risk and low capacity developing countries. Over 400 experts, and government officials from 31 countries trained since 2014

- Focus areas
  - Mainstreaming space applications into disaster risk management.
  - Use of space and GIS in flood-risk mapping, drought monitoring and early warning.
  - Facilitate the establishment and use of the geo-referenced information system for DRR (Geo-DRM) in CSNs.
  - Technical advisory service in effective use of space and GIS for DRR.

- Needs identified through Surveys and Regional Inventory on capacity of space applications

- RESAP Training and Education Networks – China, India (CSSTEAP – Dehradun), Indonesia and ESCAP – APCICT (Republic of Korea)

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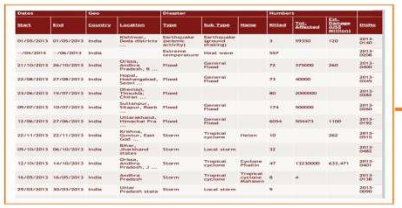
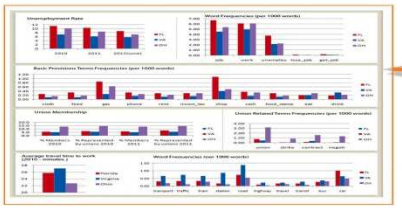
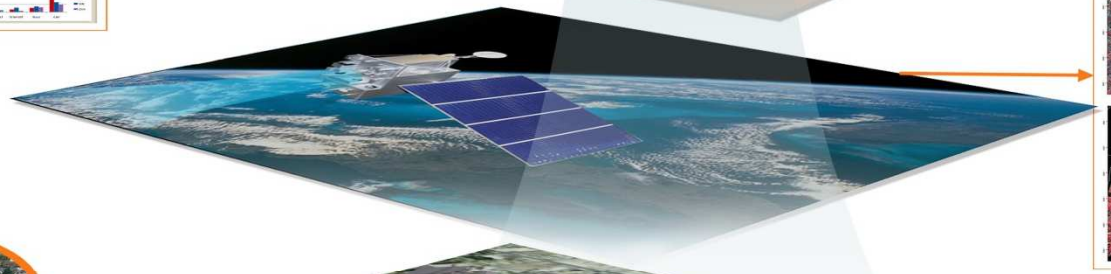
Evidence based decision making-Geo-referenced information system for disaster risk management (Geo-DRM)

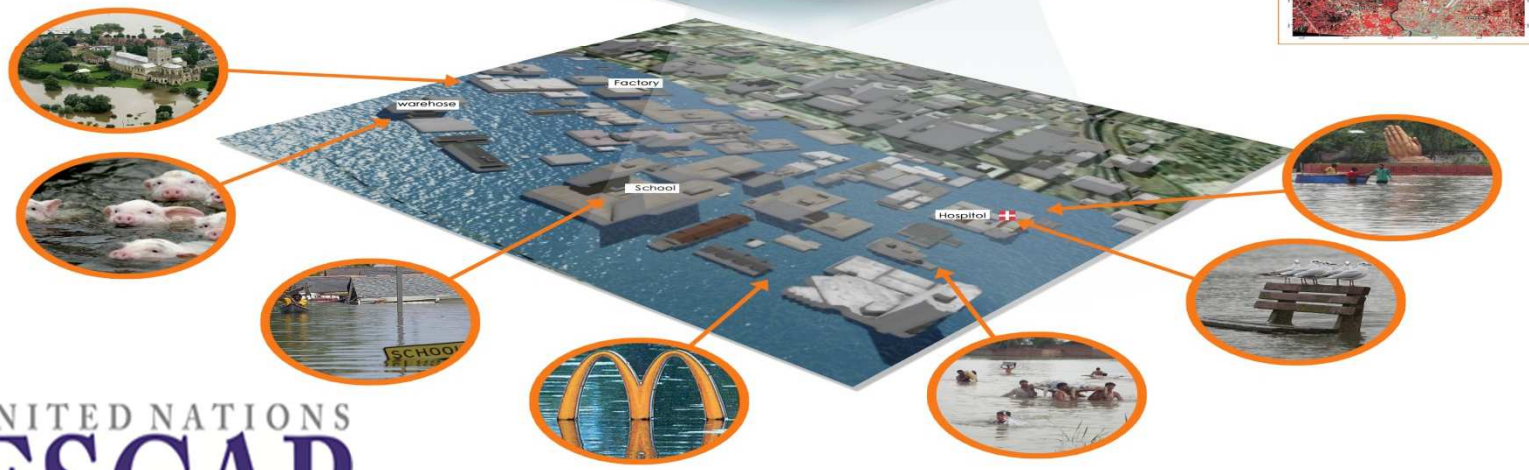


Est. Damage and Killed



Critial Social Economy Data





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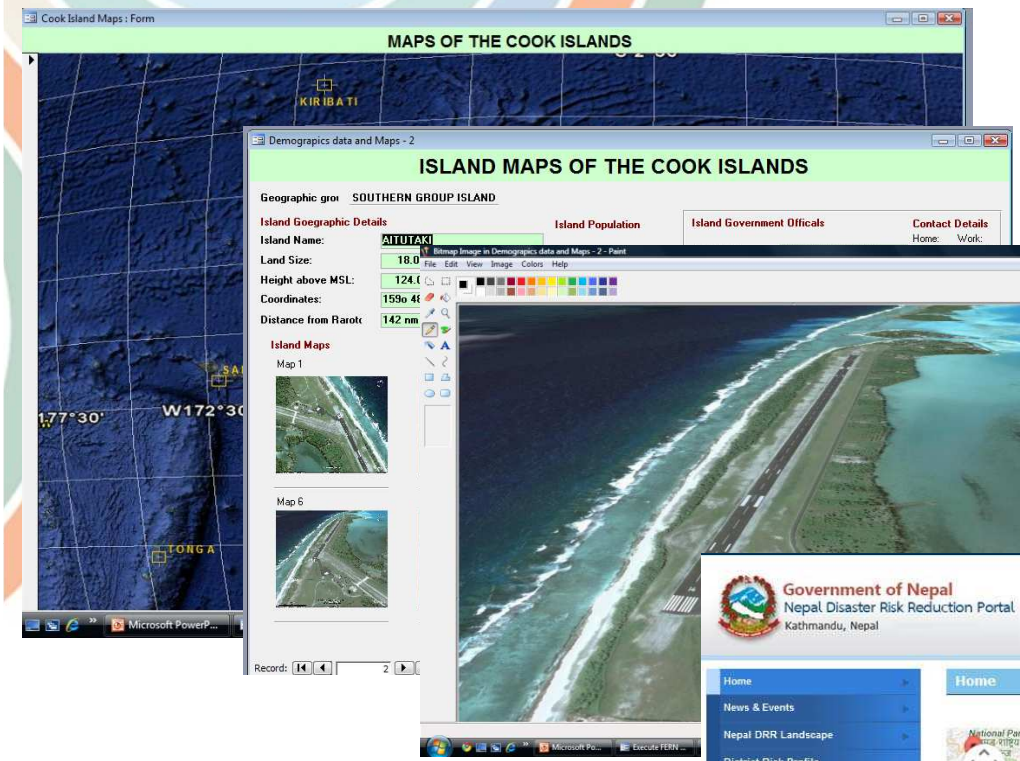
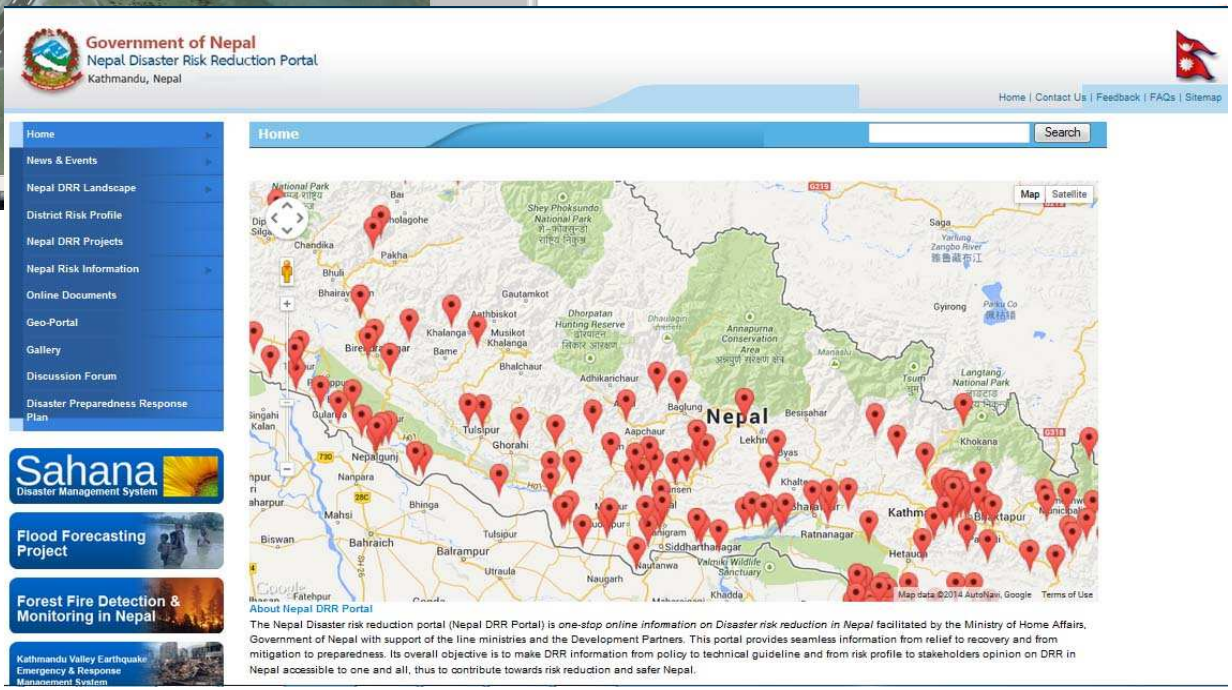
ESCAP facilitated Bangladesh, Cook Islands, Fiji, Kyrgyzstan, Mongolia an Nepal establishing the Geo-DRM portal



Geo-portal of the Cook Islands



Geo-portal of ministry of Home Affairs, Nepal

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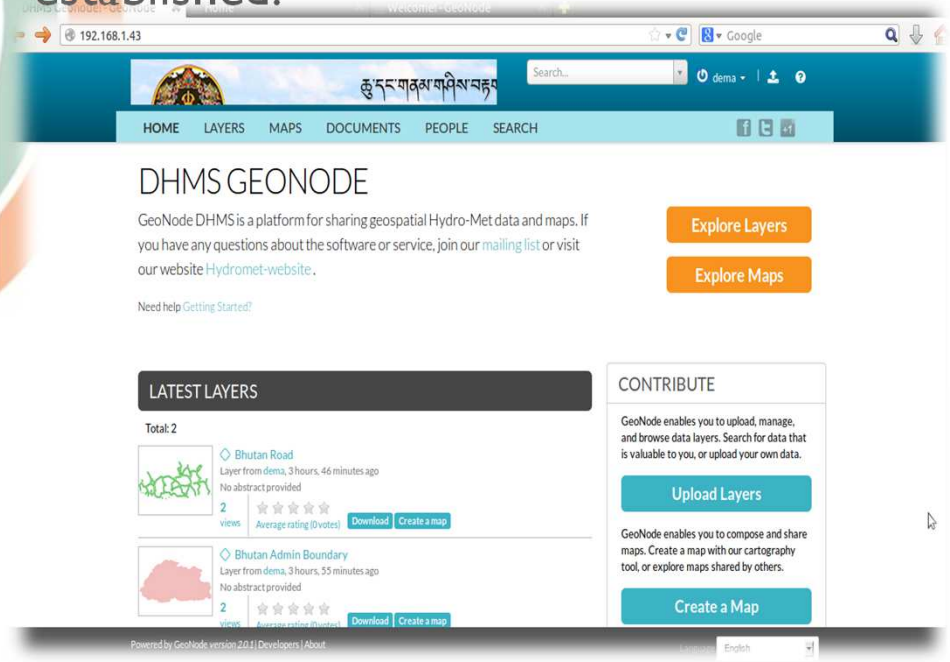
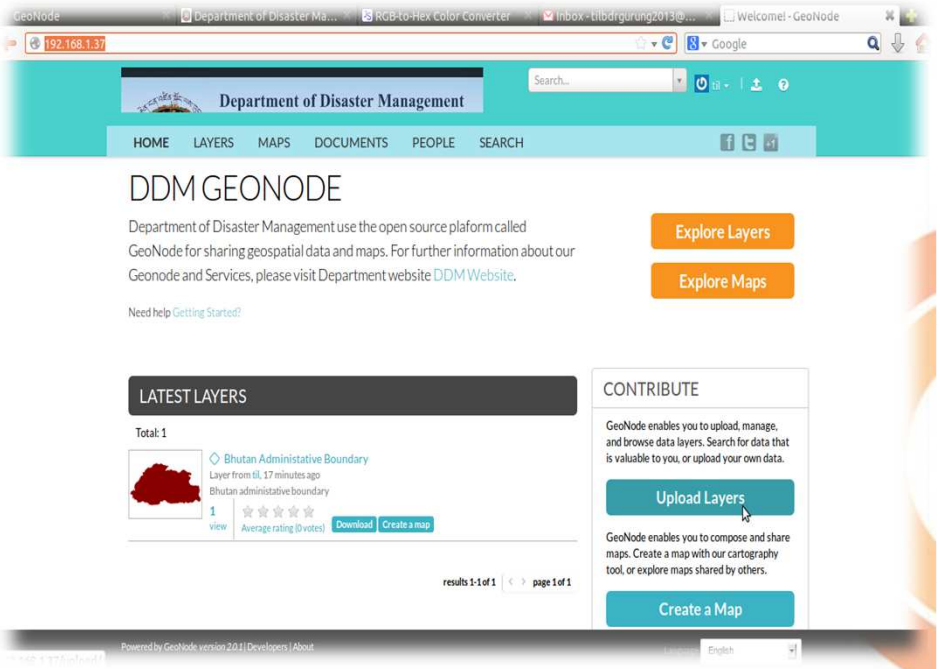
Technical assistance to Bhutan

Participants from Department of Disaster Management (DDM), Ministry of Home & Cultural Affairs (MoHCA) and Department of Hydro Met Services, Ministry of Economic Affairs (MoEA) have been trained and the Geo-DRM portal have been established.





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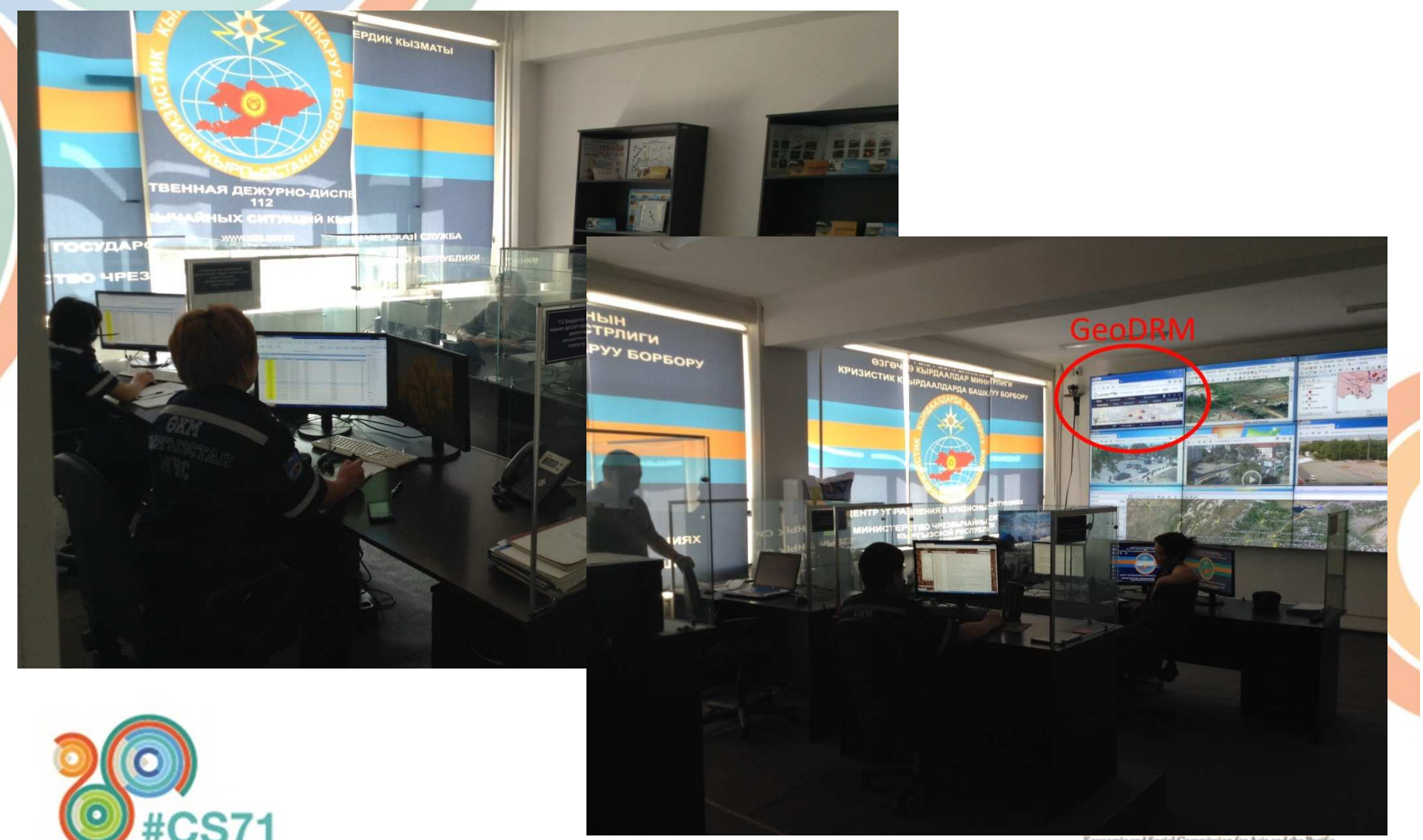
Technical assistance on establishing Geo-DRM portal at Center of Minister of Emergency Situation in Bishkek and Osh, Kyrgyzstan, in May 2015



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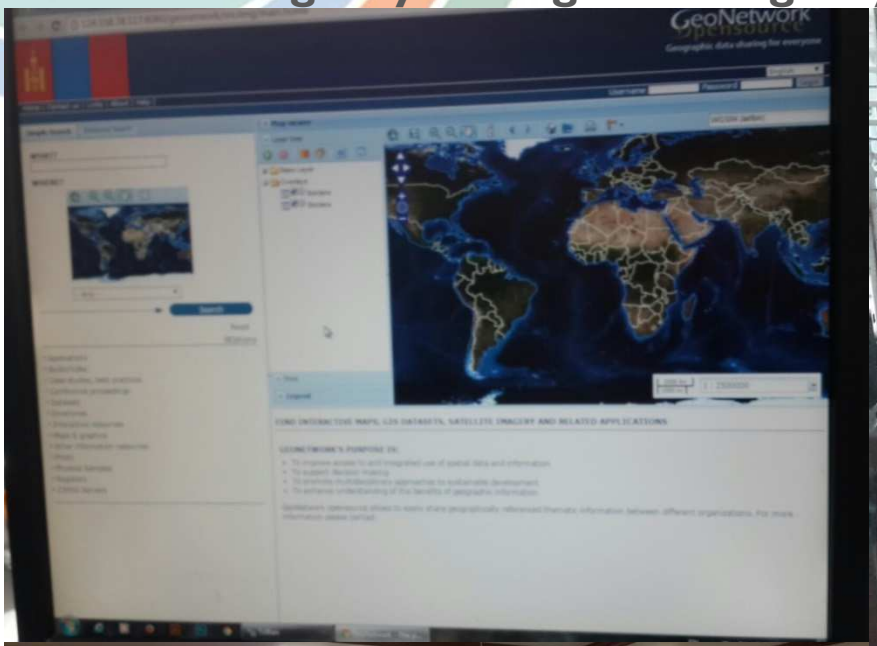
Technical assistance on establishing Geo-DRM portal at National Emergency Management Agency, Mongolia, in April 2015



NEW ESCAP's DRM E-Learning Platform

1.

INTRO TO RS&GIS USING QGIS

Course for those new to GIS and remote sensing and who want to use GPS in their work.

PRESS TO ENTER

2.

FLOOD MODELLING

A brief introduction on the use of HEC- GeoRAS 10.1 with ArcGIS 10.1 and HEC- RAS 4.1.0

PRESS TO ENTER

3.

CONFIGURING GEODRM

Course on installing, configuring and population data on GeoNode and GeoNetwork.

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4.

QGIS FOR DISASTER MGMT

A QGIS tutorial with a focus on natural disaster mitigation, management and rehabilitation.

PRESS TO ENTER

Approach

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Launch and Future Plans

- End of June 2015 - - Initial focus now is Geo-DRM, but plans are underway to:

1. Support existing and new space and GIS applications programmes

Elements:

Geo-DRM Portal Development within countries etc.

Regional Drought Mechanism-Drought watch and Drought Monitoring System.

Satellite-derived data for exchange and sharing for disaster response.

2. Establish a DRR compendium

Makeup:

Collection and analysis of regional DRR info and data,

Regional online network of DRR practitioners,

Knowledge sharing network and profiling regional cooperation mechanisms.

3. Incorporate the Asia-Pacific Gateway for DRR and Development

Objective:

Serve as an online "one-stop shop" or "toolbox"

Promote the mainstreaming of DRR policies and sustainable development.

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V. Implementation of Sendai Framework 2015-2030: mandate to ESCAP

Sendai Framework

1. Understanding disaster risk;
2. Strengthening disaster risk governance to manage disaster risk;
3. Investing in disaster risk reduction for resilience;
4. Enhancing disaster preparedness for effective response, and to "Build Back Better" in recovery, rehabilitation and reconstruction.

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Implementation of Sendai Framework 2015-2030: mandate to ESCAP

Res. 71/12: Strengthening regional mechanisms for the implementation of the Sendai Framework 2015-2030

Invites member States:

to attach priority to promoting ICT and space applications for effective disaster risk management.

Request the secretariat:

1. **Lead the implementation of Sendai Framework at regional level;**
2. **Strengthen disaster risk modelling, assessment, mapping, monitoring and multi-hazard early warning systems;**
3. **Enhance the technical assistance to the developing countries in applications of space technology and GIS;**
4. **Strengthen regional cooperative mechanisms and collaboration with other UN agencies and international/regional organizations;**

VI. Understanding the risk: Regional Land Cover Dataset

- Develop the customized methodology and tools;
- Select the pilot countries in Asia and the Pacific;
- Enhance the capacity of the developing counties on developing their own dataset, tools and products to assess the risk and monitor the changes;
- Conduct thematic research, including urbanization, disaster management, agriculture, forestry, coast hazard, environment, etc.;
- Update the regional land cover may every five years.
- In collaboration with NASG, UN-GGIM, UNOSAT, GEO, related UN agencies and regional organizations.

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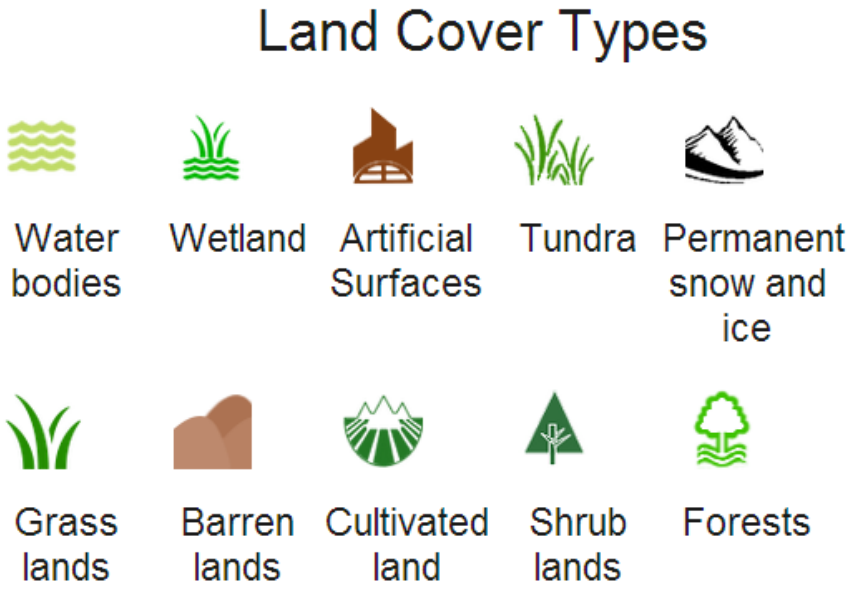
Ten classes of RLC

- Cultivated land
- Forest
- Grassland
- Shrubland
- Wetland
- Water bodies
- Tundra
- Artificial Surfaces
- Bareland
- Permanent snow and ice



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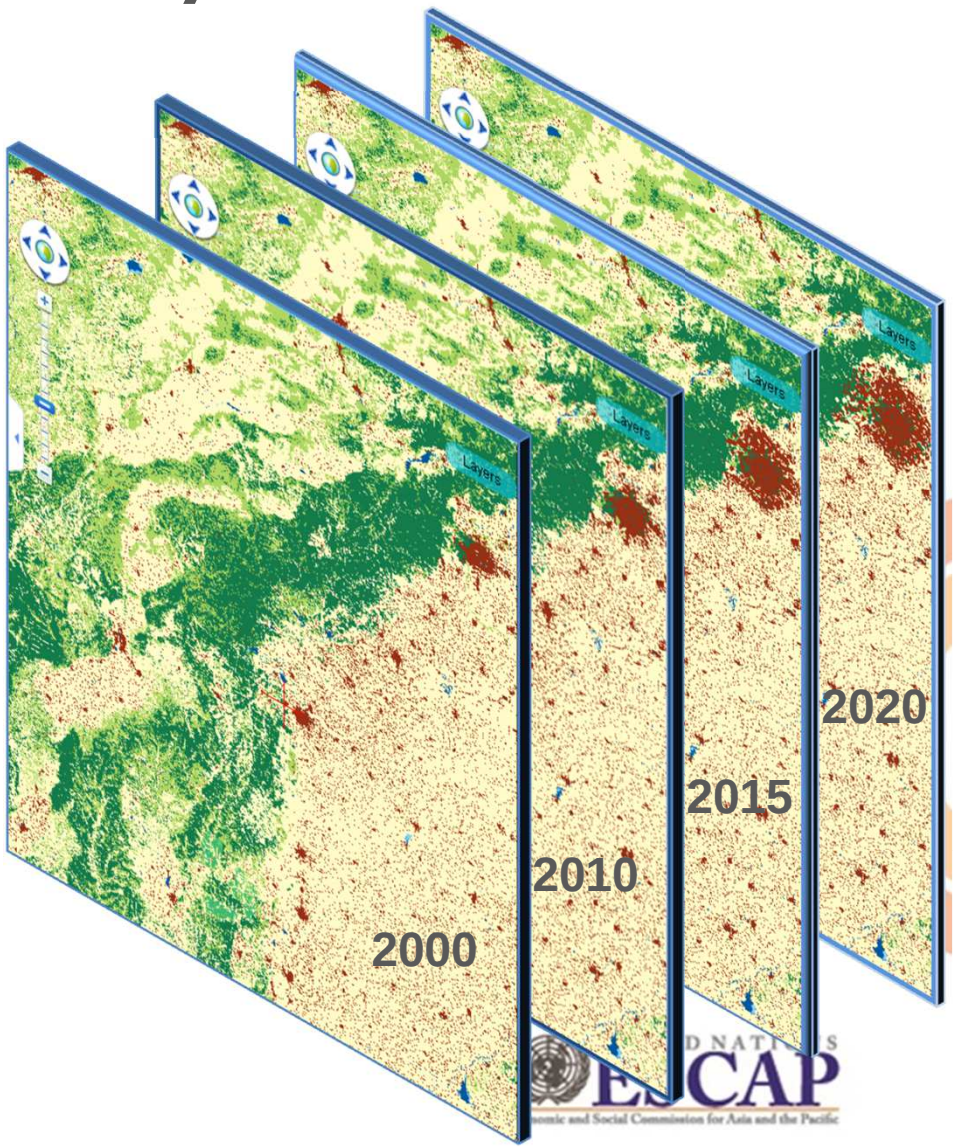
Necessity

- ✓ The current situation and development trend of each class;
- ✓ The temporal and spatial pattern of each class every five years from 2015 ;
- ✓ The horizontal comparison between different classes.



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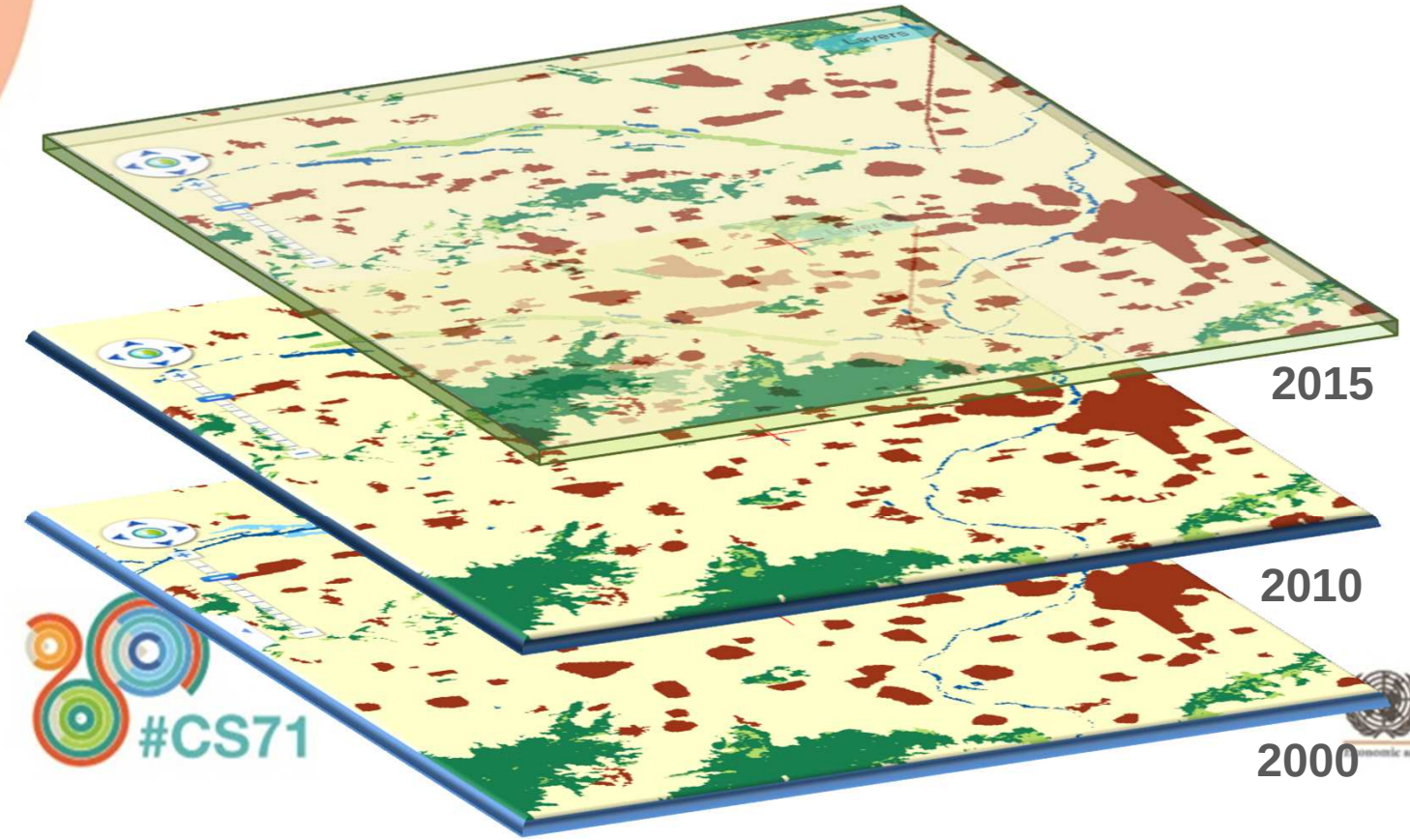
Baseline data

- RLC is the baseline data for multiple applications

  e.g. analyze the urbanization, land degradation, deforestation



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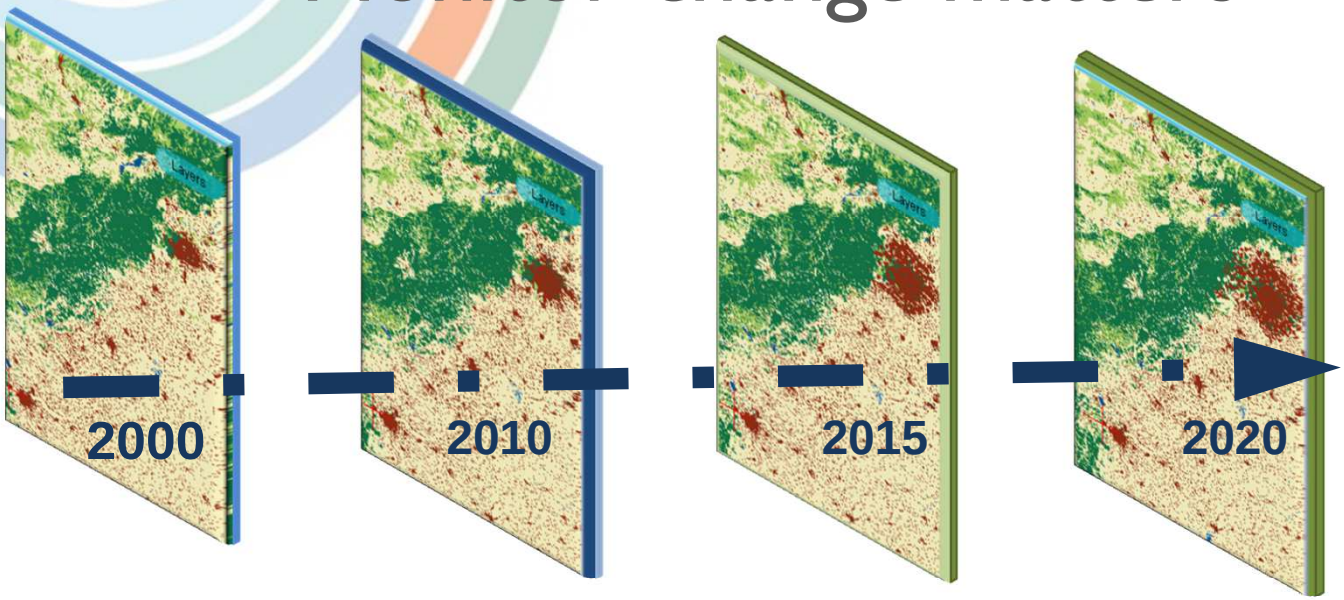
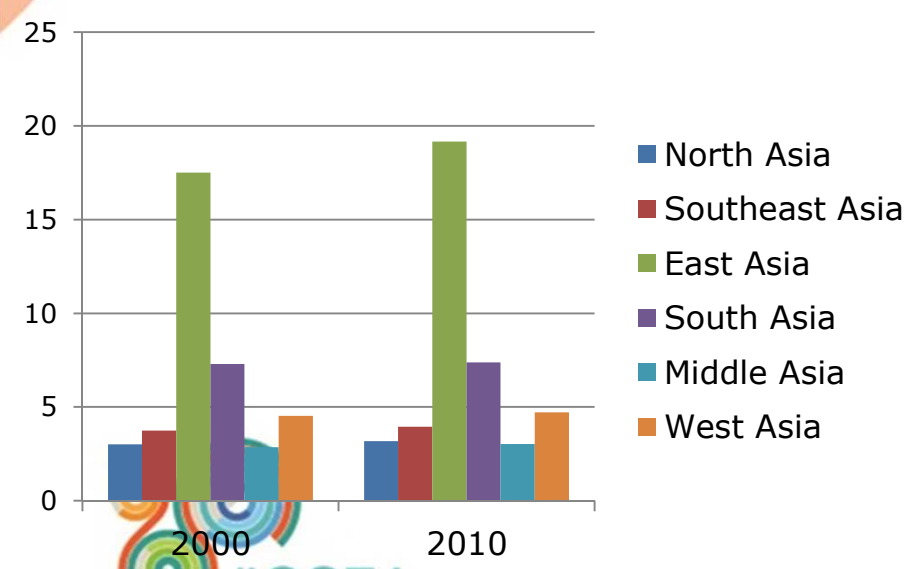
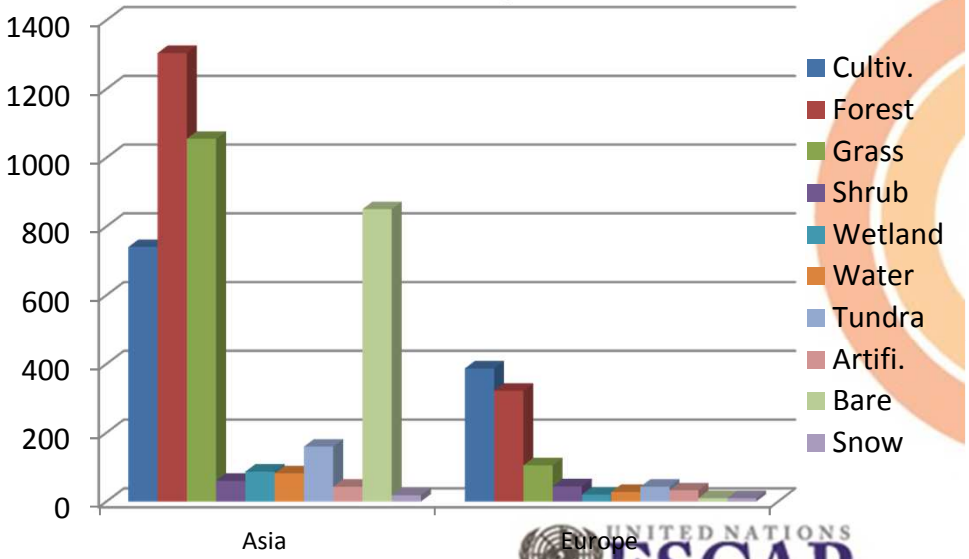
Monitor change matters





The build-up area of Asia(2000-2010)

unit: 10,000 Km^2



Area Statistics for all 10 Classes (2010)

unit: 10,000 Km^2

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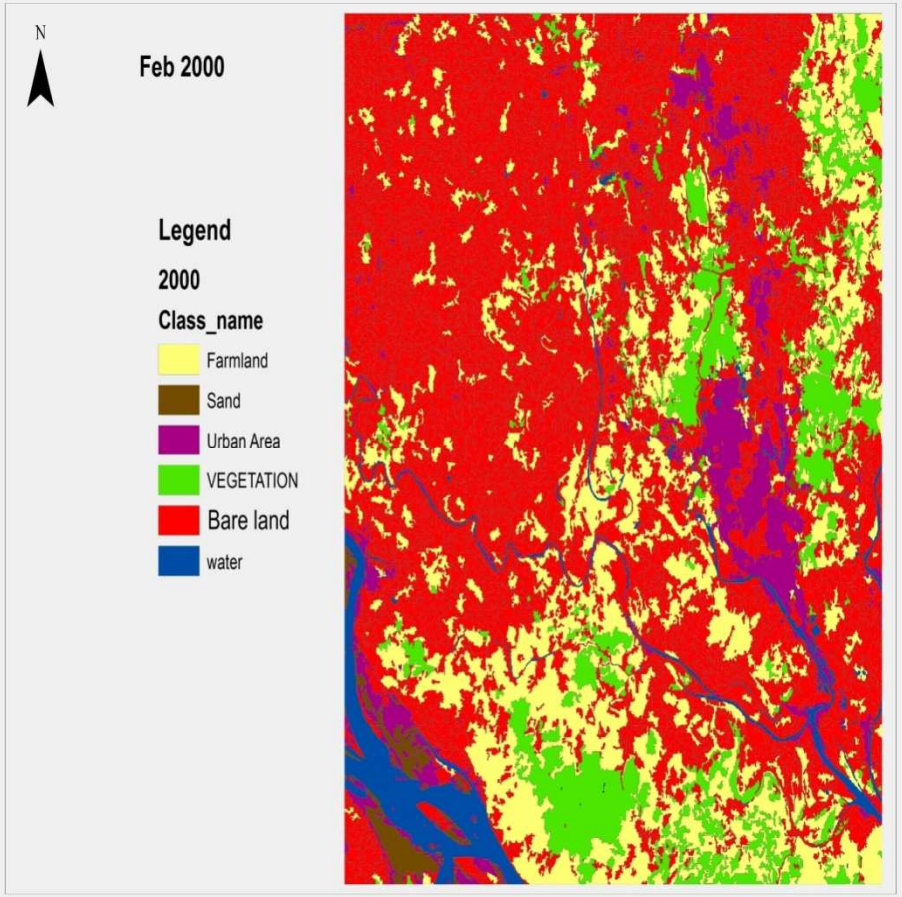
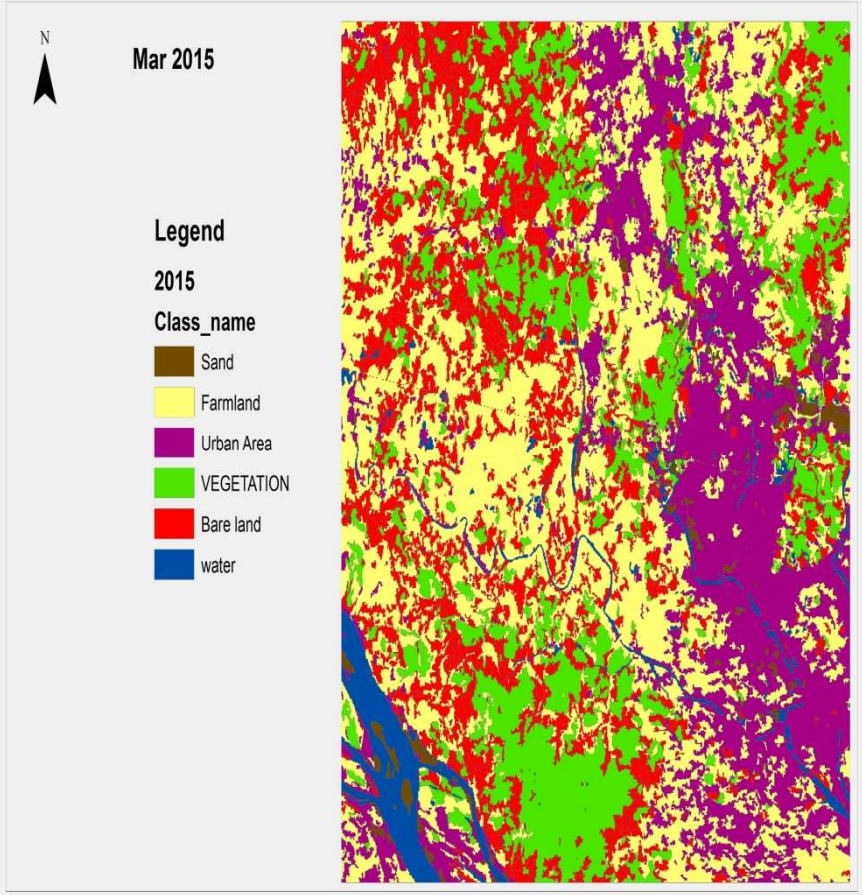
Example: Urbanization in Dhaka, Bangladesh





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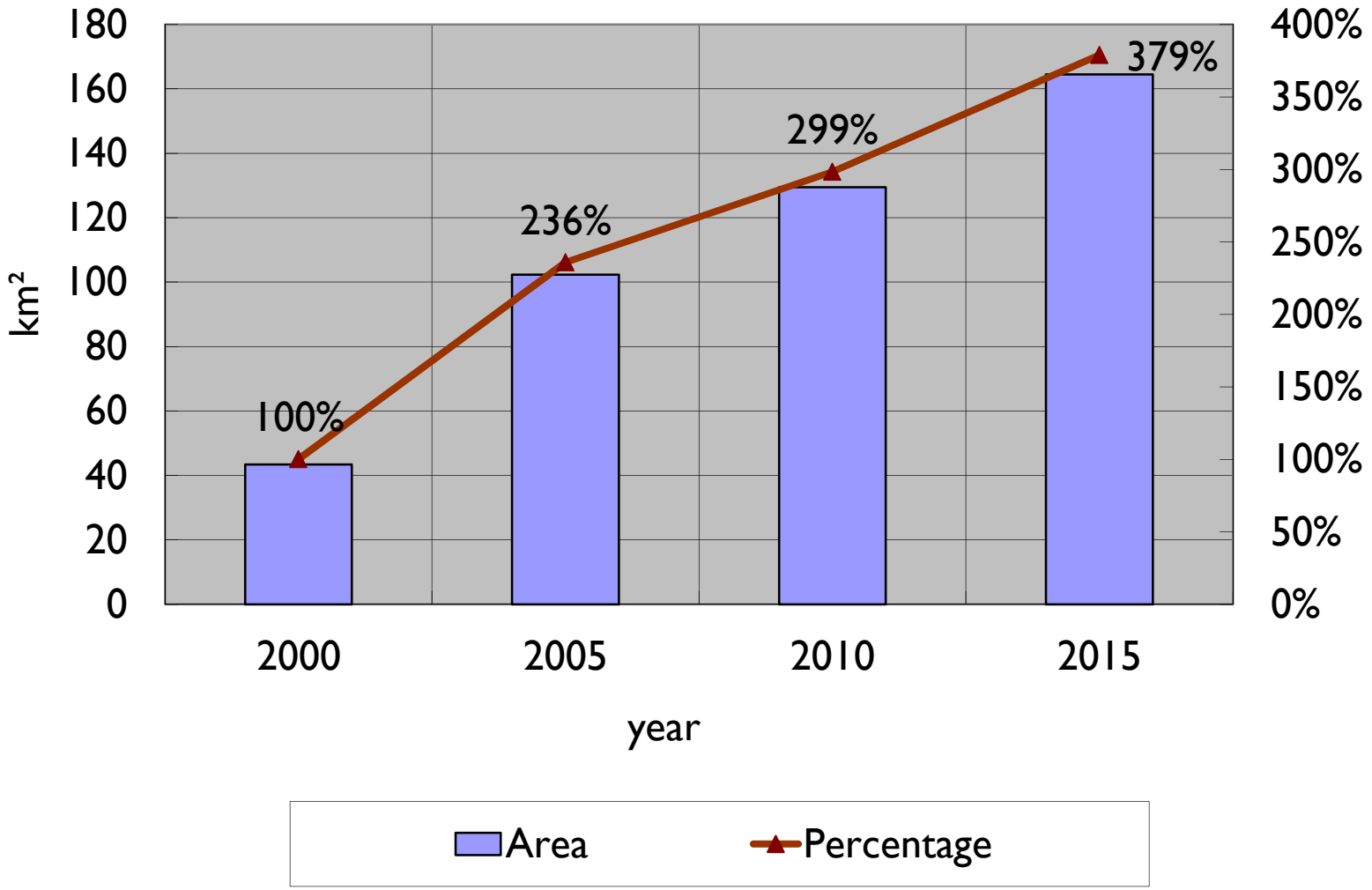
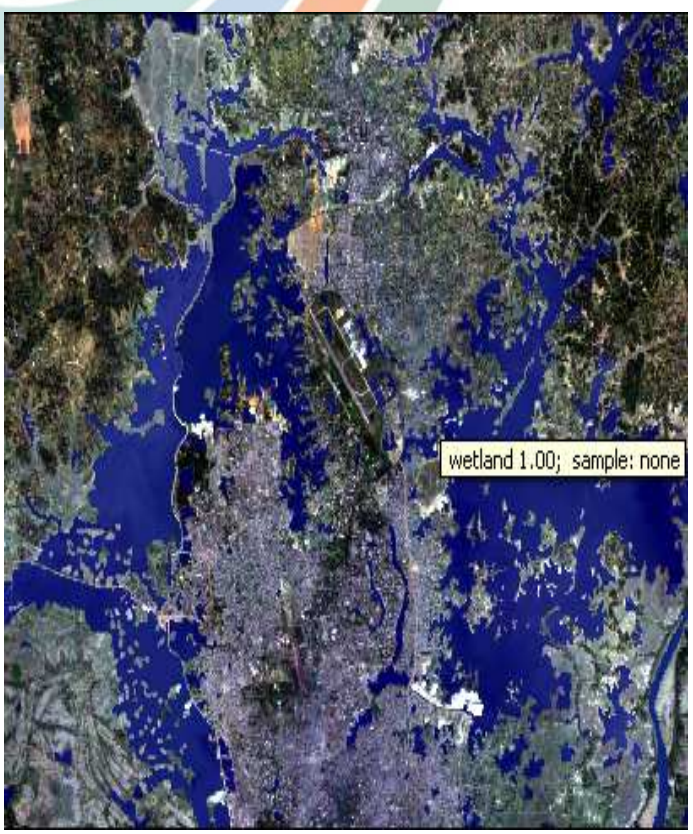
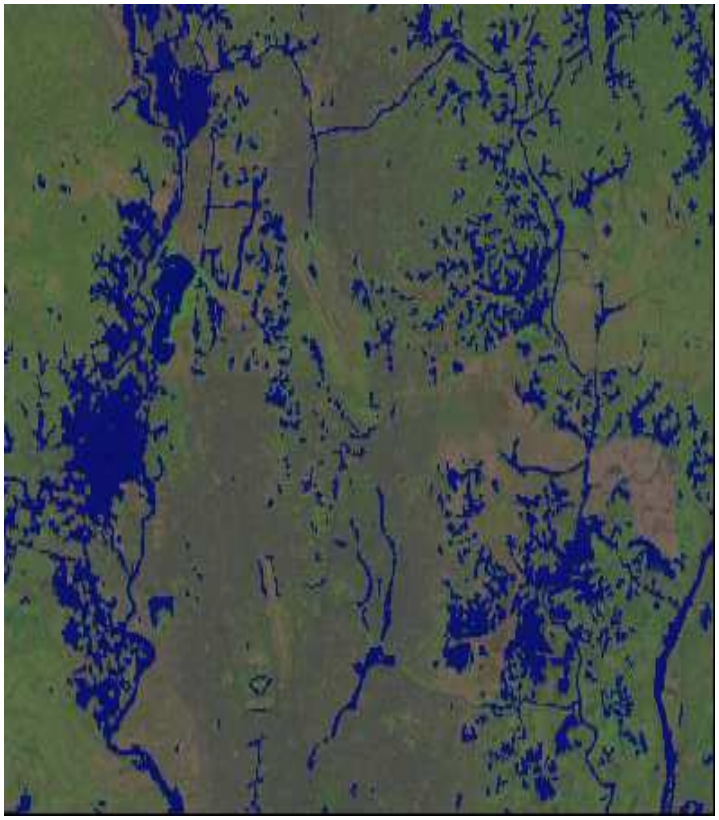

Artificial area change
180
160
140
120
100
80
60
40
20
0
km²
400%
350%
300%
250%
200%
150%
100%
50%
0%
100%
236%
299%
379%
2000
2005
2010
2015
year
Area
Percentage

Example: Buffer Shrink in Dhaka, Bangladesh



Buffer area in 1999



Buffer area in 2004

The buffer area in 2014 shrinks about 59% than in1999. Among the decreased area:

-23% is contributed by urbanization;

-27% is bare land in 2014;

-9% is vegetation.

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Thank you

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