



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

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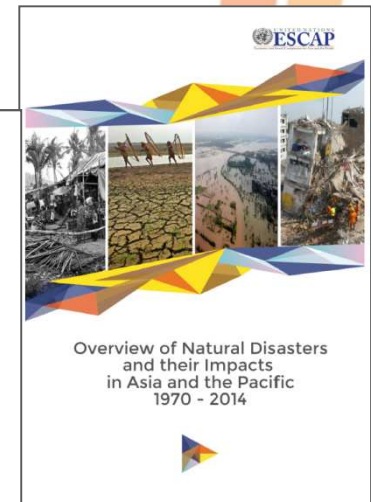
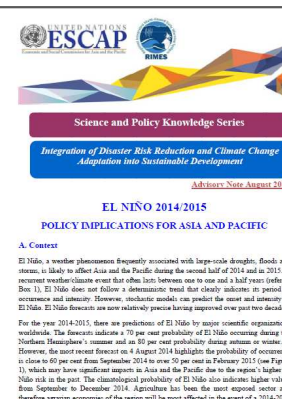
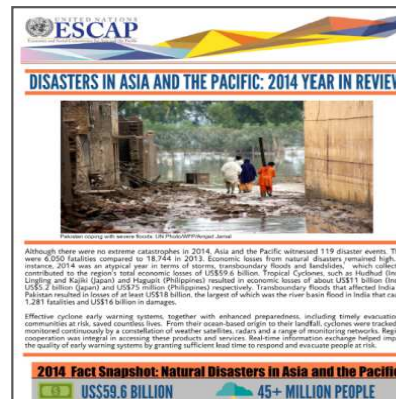
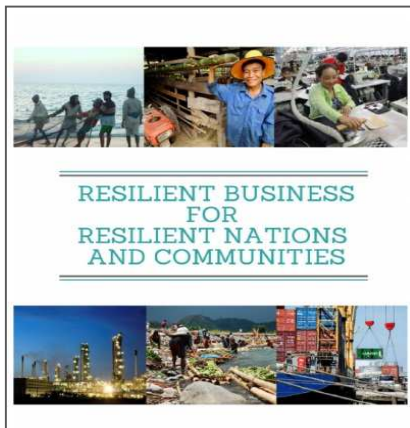
I. Overview of ESCAP: Building resilience for disaster risk reduction

- **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



Taking forward the Sendai Framework for DRR

- **Evidence-based policy for mainstreaming DRR into development strategy**
 - Analysis: *Overview of natural disasters and their impacts in Asia and the Pacific 1970-2014; Resilient 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

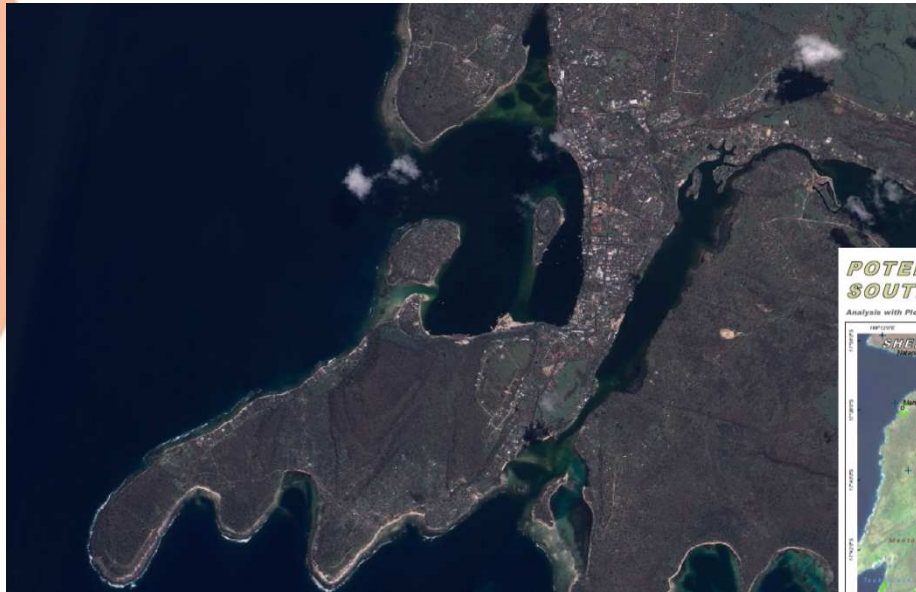


II. Enables timely access to and use of space-derived products and GIS for effective disaster risk reduction

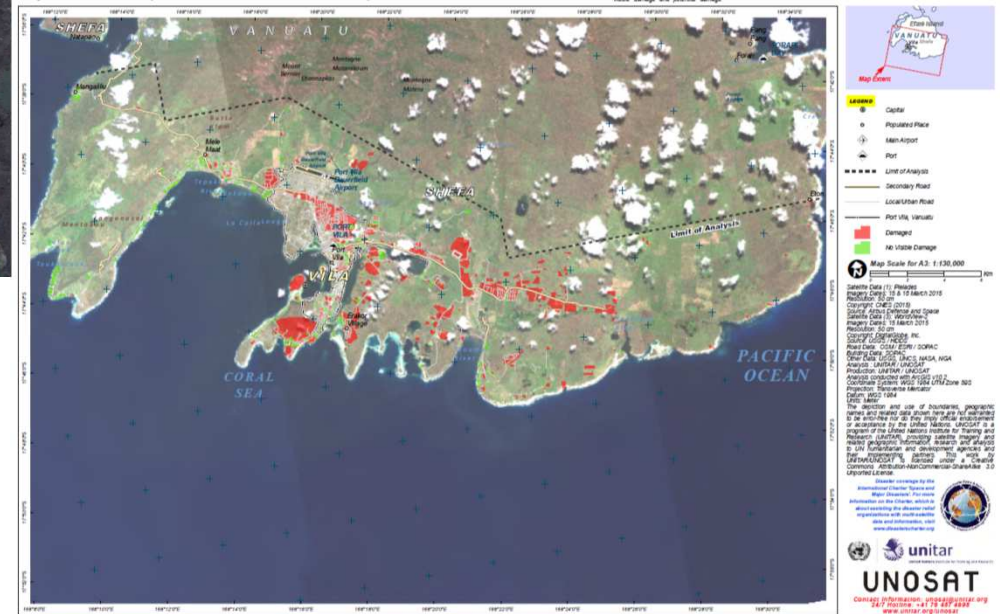
- Just in 2015, 130 Near real-time satellite imagery and 25 damage maps have been provided to Vanuatu, Tuvalu and Nepal for effective disaster response and relief;
- Guidelines on rapid assessment of damage and losses (with SAARC);
- SOPs for utilizing space based data during disasters (with ASEAN);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



Satellite Image and damage map of Cyclone Pam Vanuatu



POTENTIALLY DAMAGED ZONES IN SOUTHERN EFATÉ ISLAND, VANUATU
 Analysis with Pleiades Data Acquired 15 & 16 March 2015 and WorldView2 Data Acquired 15 March 2015



Pontoon Bay, Weila Bay

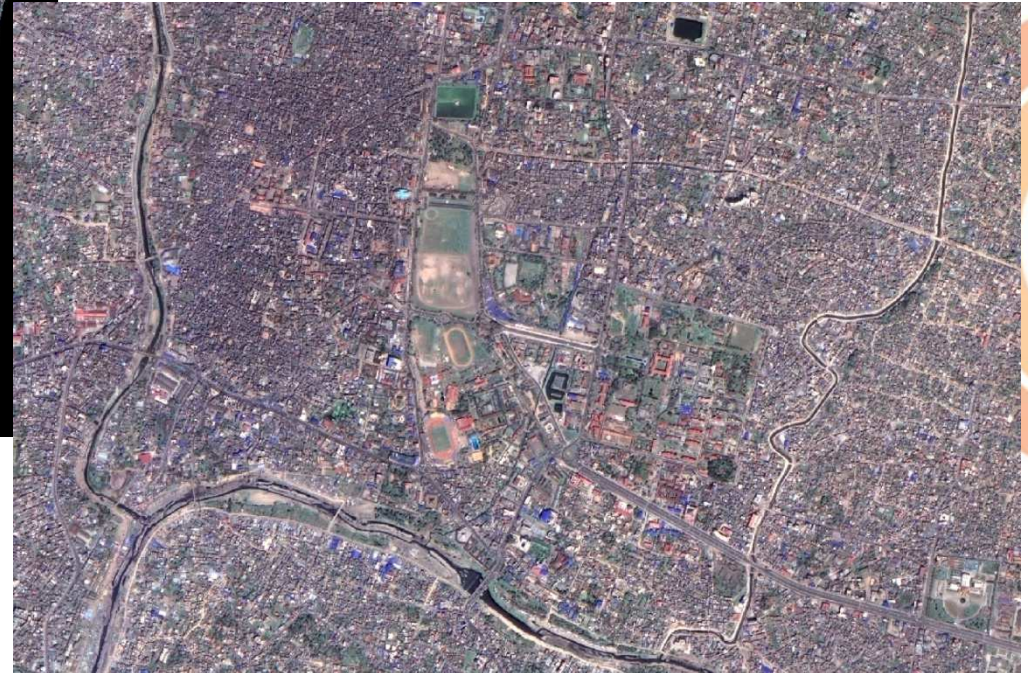
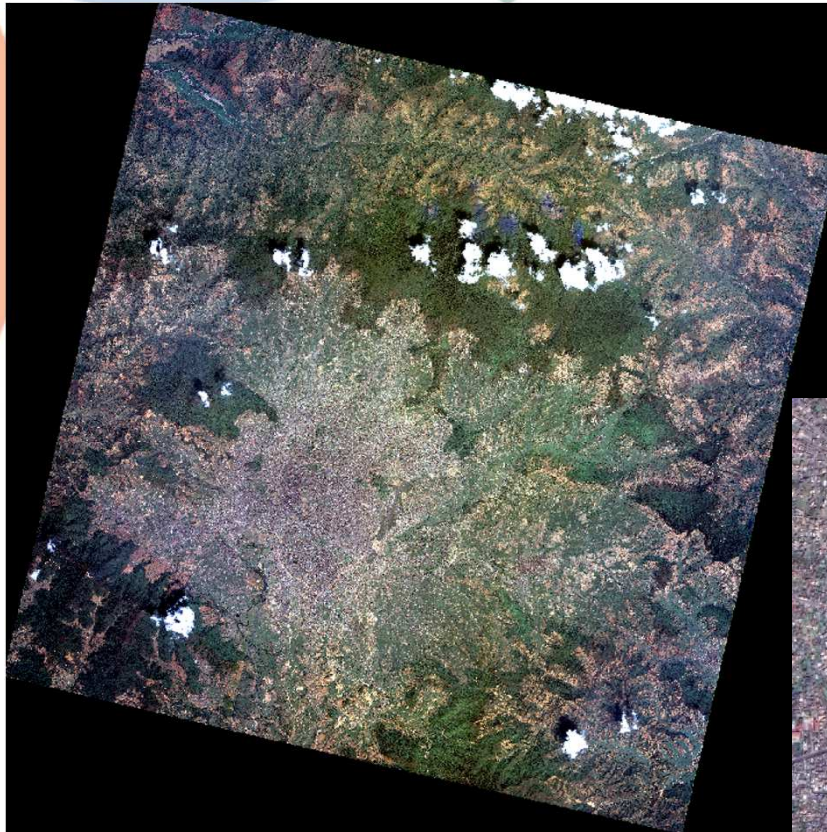


Satellite Image of Nepal

Satellite: China's GF-1

Location: Kathmandu, Nepal

Date: 11 Apr., 2015



Damage assessment (ThaiChote Satellite)

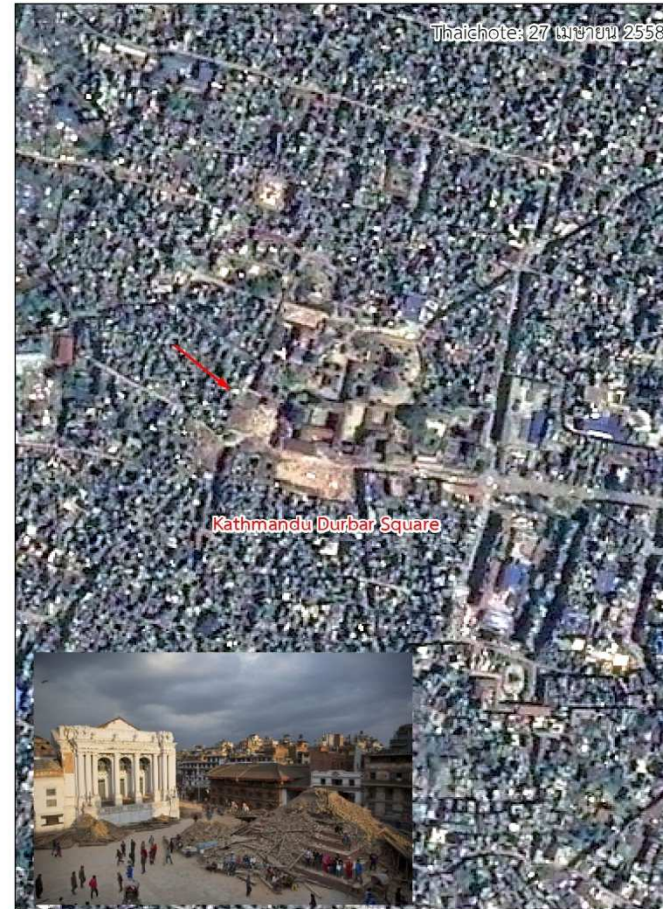


ข้อมูลจากดาวเทียม ThaiChote บันทึกภาพวันที่ 8 เมษายน 2557 และวันที่ 27 เมษายน 2558 พื้นที่ที่ได้รับผลกระทบจากแผ่นดินไหว เมื่อวันที่ 25 เมษายน 2558
บริเวณจตุรัสกาฐมาณฑุ ดุบาร์ เมืองกาฐมาณฑุ ประเทศเนปาล

GISTDA



(a) Before earthquake

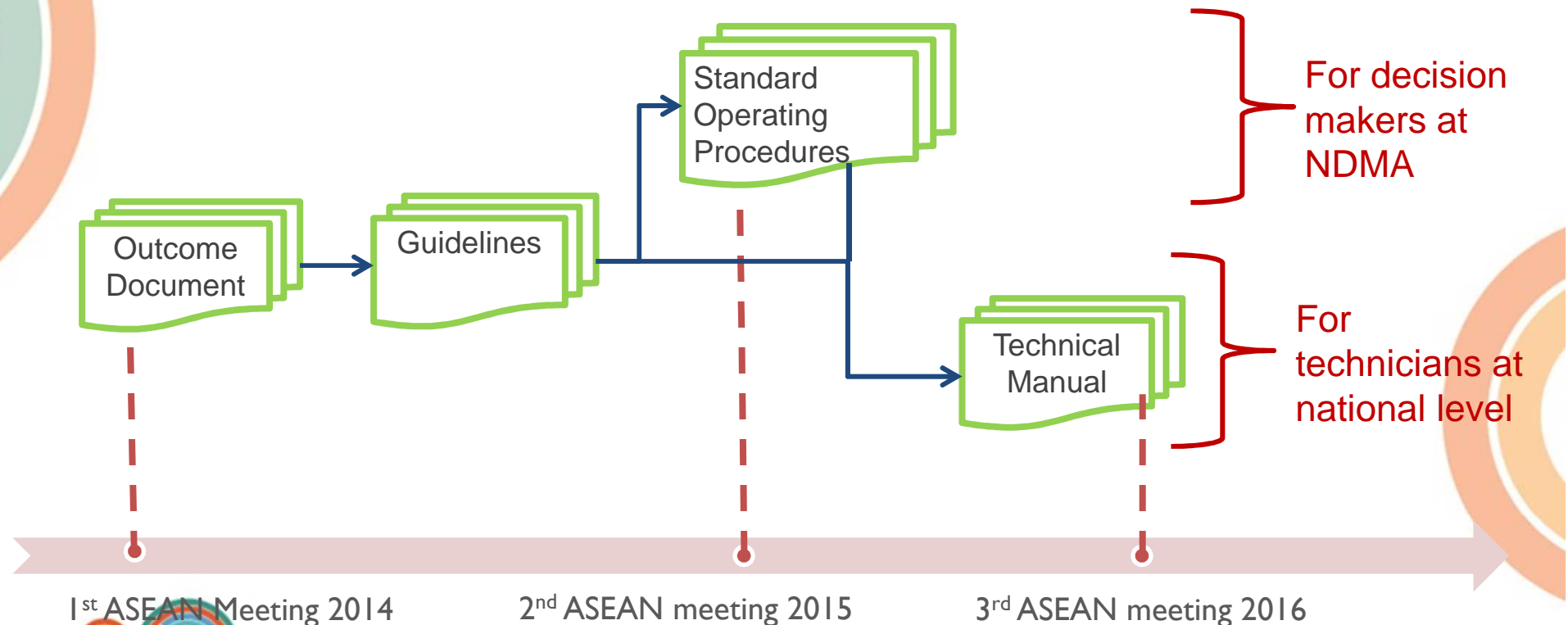


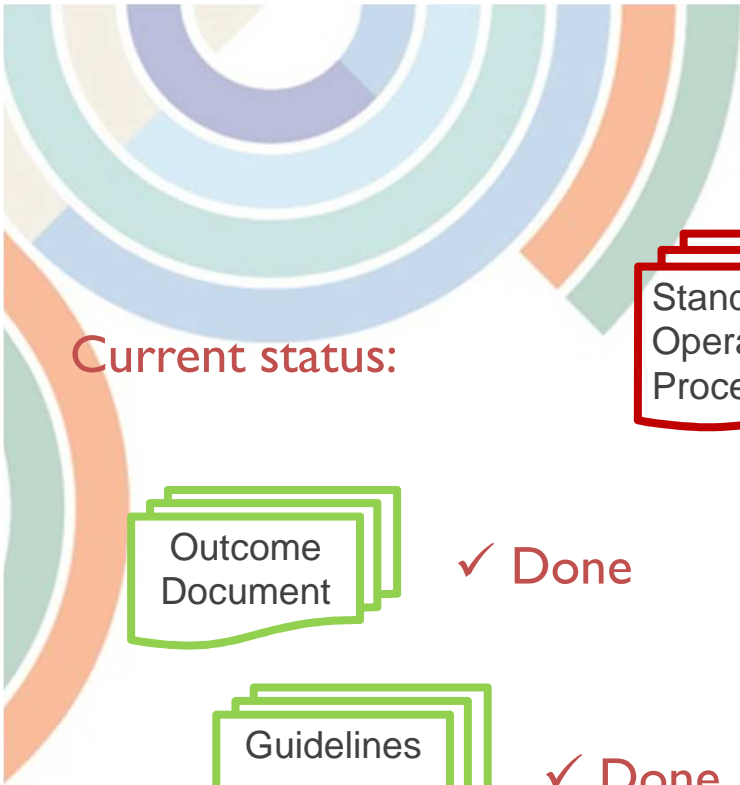
(b) After earthquake



UN-ASEAN workshops on SOPs and guidelines

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





Current status:

Standard Operating Procedures

Outcome Document

✓ Done

Guidelines

✓ Done

Standard Operating Procedures

- In progress

Technical Manual



... waiting to initiate



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.



Manual

Rapid Assessment of Damage and Loss
using innovative technology and space applications



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?



Rapid Assessment : Quantify damages across the sectors

The Assessment Process

Collateral data/info

Satellite data/products

Identification of Damage and Losses

Sector by Sector

Aggregation of Total Effects

Impact Assessment

Macro-economic

Personal/Household

Cross-cutting Issues

Estimation of Needs

Recovery

Reconstruction

Risk Reduction

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.



Approach and Methodology

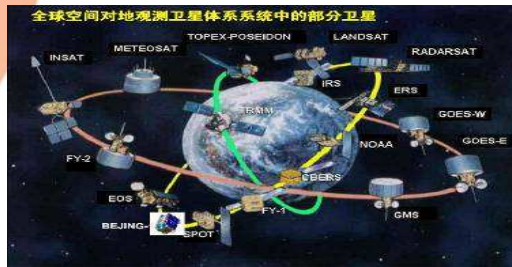
Need assessment

Specialized training

Country Profile

Regional Service Nodes

Regional Service Nodes



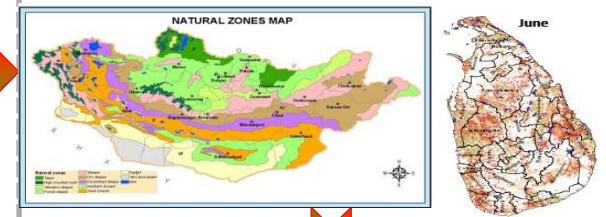
Field observation



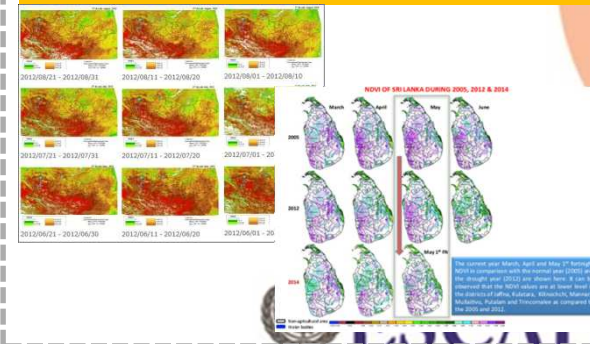
Meteorological data



Data processing
Drought Index calculating



Drought monitoring results



3rd week

PRECIPITATION

Disarrangement data

Good arrangement data with other information

Year	Date	Depth	Wind	Year	Date	Depth	Wind
200	4/01/2000	1	11.8	100	4/01/2000	2	12.7
200	4/04/2000	1	8.8	100	4/04/2000	0	7.9
200	4/06/2000	1	11.8	100	4/06/2000	1	13.8
200	4/08/2000	1	1.8	100	4/08/2000	2	12.0
200	4/10/2000	1	10.8	100	4/10/2000	2	12.6
200	4/12/2000	1	4.4	100	4/12/2000	2	3.8
200	4/14/2000	1	1.0	100	4/14/2000	2	0.8
200	4/16/2000	1	10.8	100	4/16/2000	2	11.0
200	4/18/2000	1	5.3	100	4/18/2000	1	6.6
200	4/20/2000	1	25.8	100	4/20/2000	2	15.2
200	4/22/2000	1	9.2	100	4/22/2000	2	13.0
200	4/24/2000	1	24.8	100	4/24/2000	2	24.8
200	4/26/2000	1	8.8	100	4/26/2000	2	9.4
200	4/28/2000	1	6.1	100	4/28/2000	2	5.6
200	4/30/2000	1	11.4	100	4/30/2000	2	14.3
200	5/01/2000	1	6.8	100	5/01/2000	1	7.8
200	5/03/2000	1	9.1	100	5/03/2000	2	8.8
200	5/05/2000	1	3.8	100	5/05/2000	1	10.0
200	5/07/2000	1	8.0	100	5/07/2000	2	8.3
200	5/09/2000	1	19.1	100	5/09/2000	2	19.9
200	5/11/2000	1	1.3	100	5/11/2000	2	8.1
200	5/13/2000	1	8.4	100	5/13/2000	2	9.8

Station ID	Station name	Station name	Station	Longitude	Plus	Month	Precipitation	Unit	Station ID	Station name	Station name	Station	Longitude	Plus	Month	Precipitation	Unit
11370041	Yanchi	Yanchi	107.1880	101.1880	2000	0	200000	0.00	11370041	Yanchi	Yanchi	107.1880	101.1880	2000	0	200000	0.00
11370042	Yanchi	Yanchi	107.1880	101.1880	2000	1	200000	0.00	11370042	Yanchi	Yanchi	107.1880	101.1880	2000	1	200000	0.00
11370043	Yanchi	Yanchi	107.1880	101.1880	2000	2	200000	11.80	11370043	Yanchi	Yanchi	107.1880	101.1880	2000	2	200000	11.80
11370044	Yanchi	Yanchi	107.1880	101.1880	2000	3	200000	11.70	11370044	Yanchi	Yanchi	107.1880	101.1880	2000	3	200000	11.70
11370045	Yanchi	Yanchi	107.1880	101.1880	2000	4	200000	11.70	11370045	Yanchi	Yanchi	107.1880	101.1880	2000	4	200000	11.70
11370046	Yanchi	Yanchi	107.1880	101.1880	2000	5	200000	11.70	11370046	Yanchi	Yanchi	107.1880	101.1880	2000	5	200000	11.70
11370047	Yanchi	Yanchi	107.1880	101.1880	2000	6	200000	11.70	11370047	Yanchi	Yanchi	107.1880	101.1880	2000	6	200000	11.70
11370048	Yanchi	Yanchi	107.1880	101.1880	2000	7	200000	11.70	11370048	Yanchi	Yanchi	107.1880	101.1880	2000	7	200000	11.70
11370049	Yanchi	Yanchi	107.1880	101.1880	2000	8	200000	11.70	11370049	Yanchi	Yanchi	107.1880	101.1880	2000	8	200000	11.70
11370050	Yanchi	Yanchi	107.1880	101.1880	2000	9	200000	11.70	11370050	Yanchi	Yanchi	107.1880	101.1880	2000	9	200000	11.70
11370051	Yanchi	Yanchi	107.1880	101.1880	2000	10	200000	11.70	11370051	Yanchi	Yanchi	107.1880	101.1880	2000	10	200000	11.70
11370052	Yanchi	Yanchi	107.1880	101.1880	2000	11	200000	11.70	11370052	Yanchi	Yanchi	107.1880	101.1880	2000	11	200000	11.70
11370053	Yanchi	Yanchi	107.1880	101.1880	2000	12	200000	11.70	11370053	Yanchi	Yanchi	107.1880	101.1880	2000	12	200000	11.70

Data information

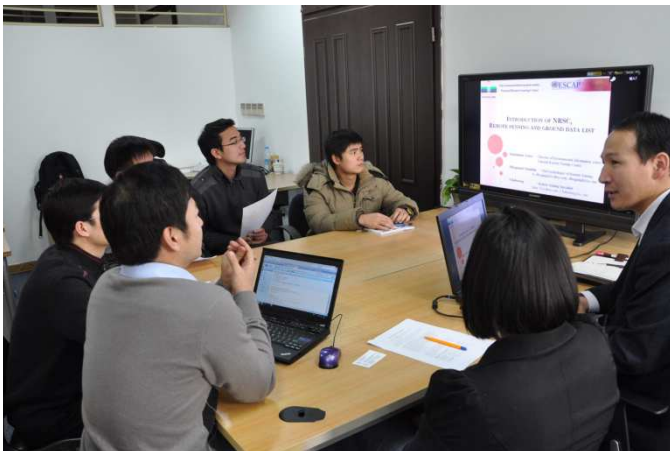
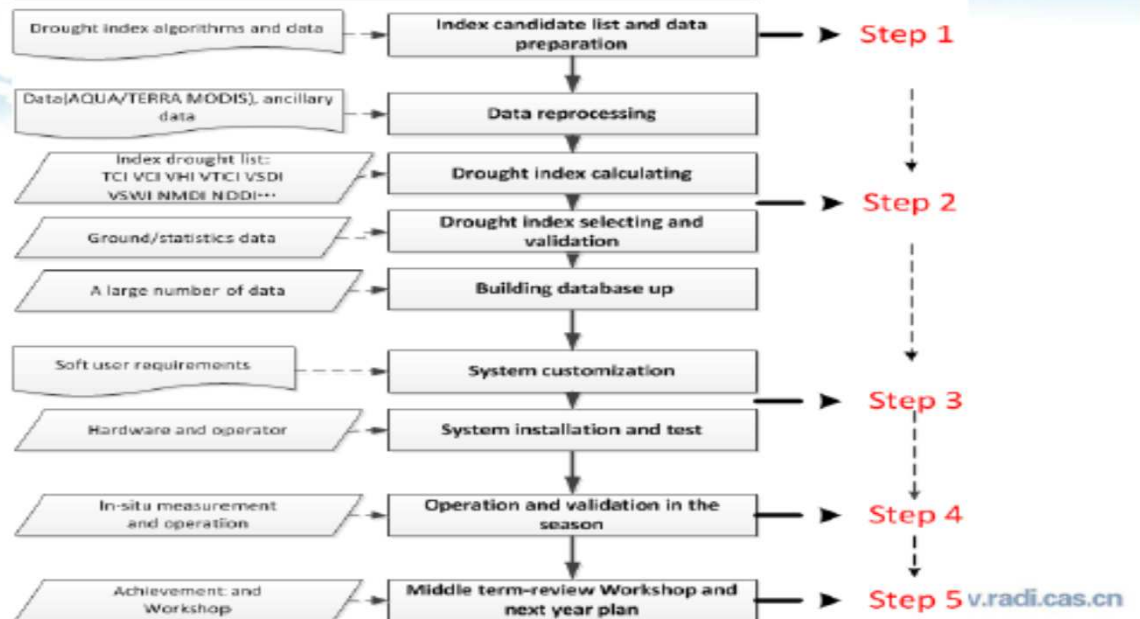
Finally arrangement data record is totally 23

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

Outline of implementation plan

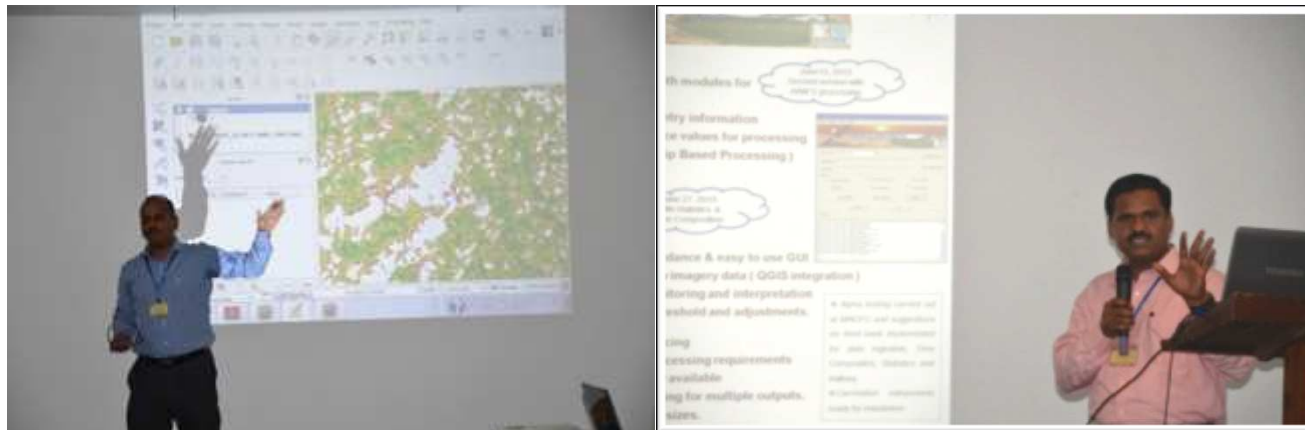


Work Plan of Mongolia drought monitoring



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.





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

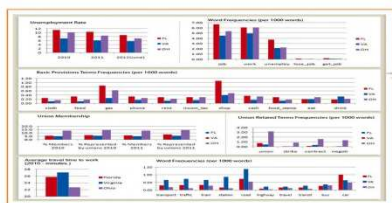
- RESAP Training and Education Networks – China, India (CSSTEAP – Dehradun), Indonesia and ESCAP – APCICT (Republic of Korea)



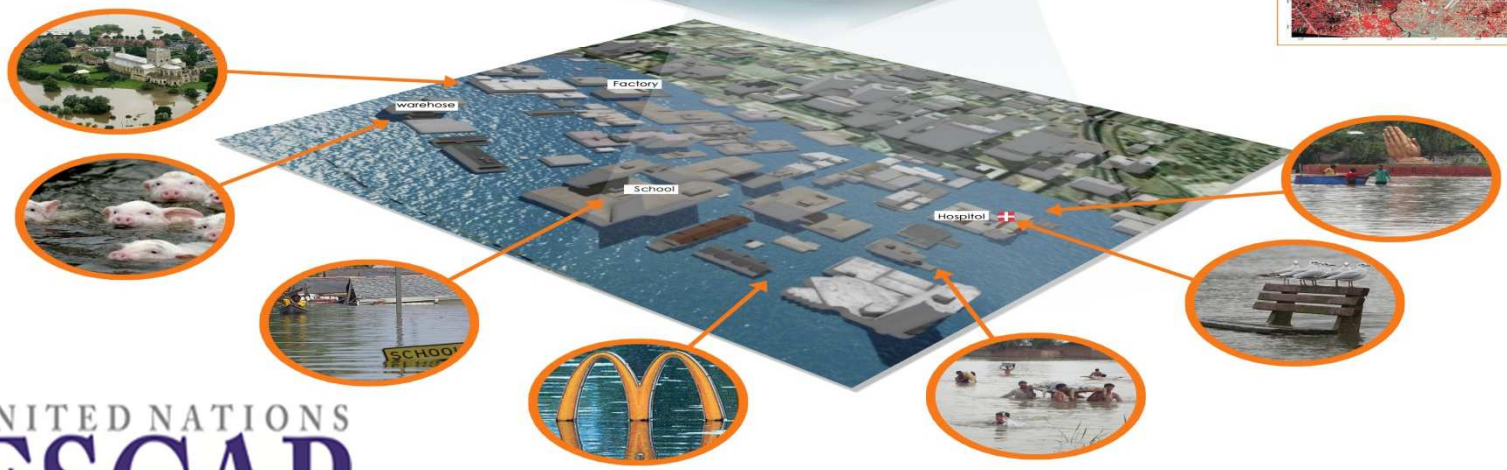
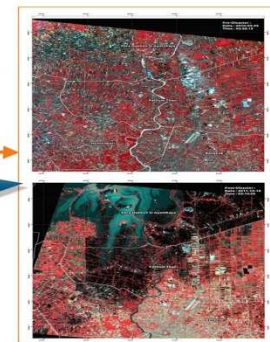
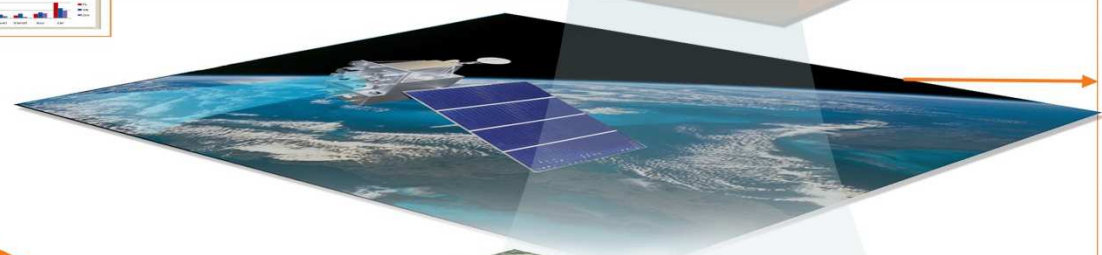
Evidence based decision making-Geo-referenced information system for disaster risk management (Geo-DRM)

Date	Year	Geo	Disaster	Type	Sub-Type	Phase	Impact	Est. Damage	Est. Killed
04/05/2013	2013	India	Earthquake	Earthquake	Earthquake	Phase 1	3	99000	120
04/05/2013	2013	India	Earthquake	Earthquake	Earthquake	Phase 2	1	10000	100
21/10/2013	2013	India	Earthquake	Earthquake	Earthquake	Phase 1	72	170000	840
23/08/2013	2013	India	Earthquake	Earthquake	Earthquake	Phase 1	73	40000	100
23/08/2013	2013	India	Earthquake	Earthquake	Earthquake	Phase 2	60	1000000	100
09/07/2013	2013	India	Earthquake	Earthquake	Earthquake	Phase 1	174	100000	100
13/08/2013	2013	India	Earthquake	Earthquake	Earthquake	Phase 1	4004	100000	1100
22/11/2013	2013	India	Earthquake	Earthquake	Earthquake	Phase 1	10	100	100
22/10/2013	2013	India	Earthquake	Earthquake	Earthquake	Phase 1	31	100	100
01/05/2013	2013	India	Earthquake	Earthquake	Earthquake	Phase 1	49	100000	100
14/05/2013	2013	India	Earthquake	Earthquake	Earthquake	Phase 1	4	100	100
24/05/2013	2013	India	Earthquake	Earthquake	Earthquake	Phase 1	8	100	100

Est. Damage and Killed



Critical Social Economy Data

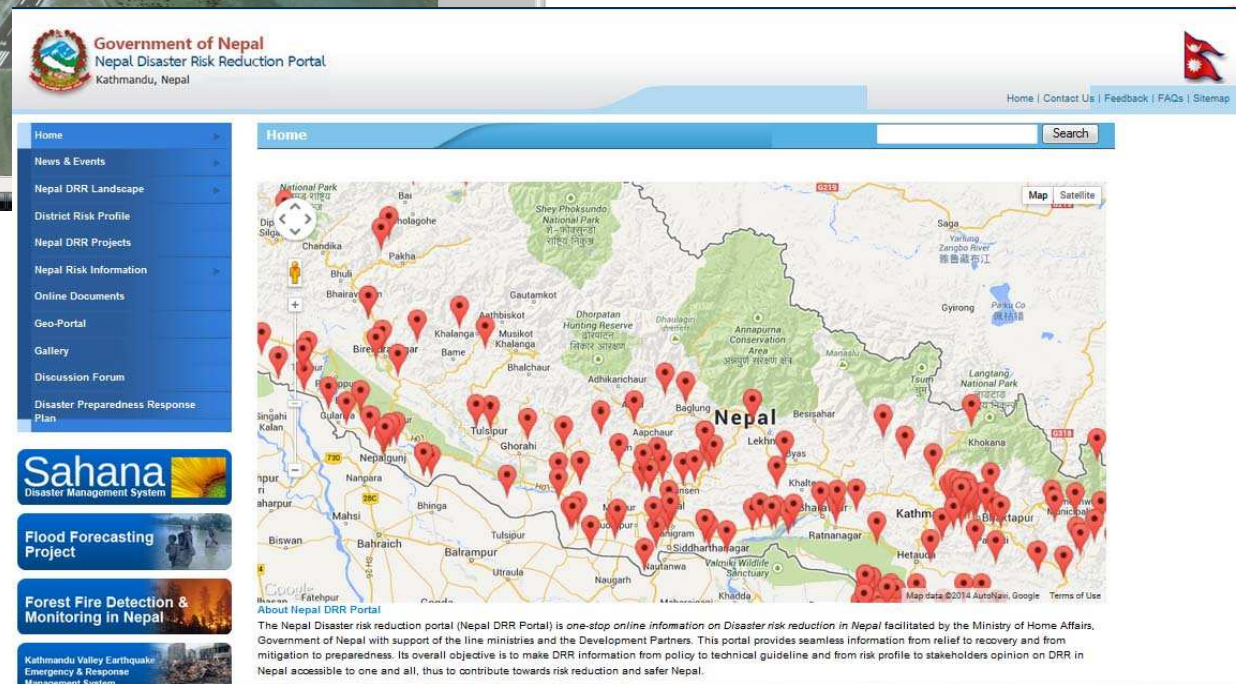


ESCAP facilitated Bangladesh, Cook Islands, Fiji, Kyrgyzstan, Mongolia and Nepal establishing the Geo-DRM portal



Geo-portal of the Cook Islands

Geo-portal of ministry of Home Affairs, Nepal



Technical assistance to Bhutan

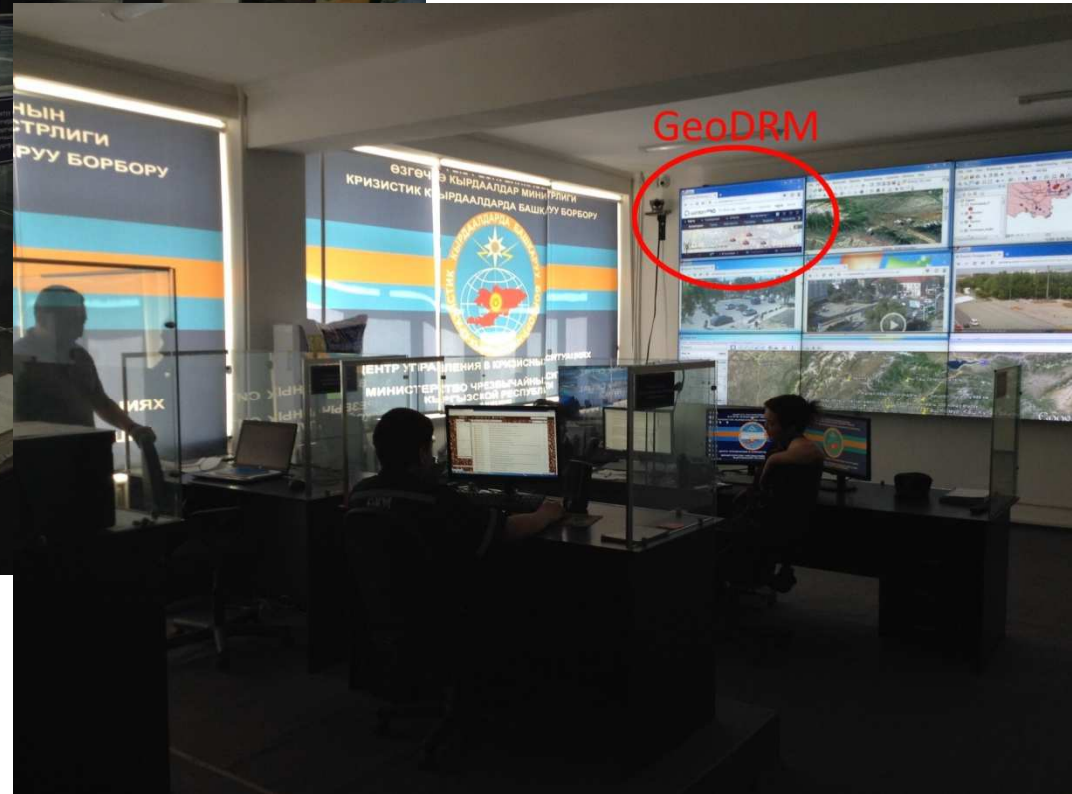
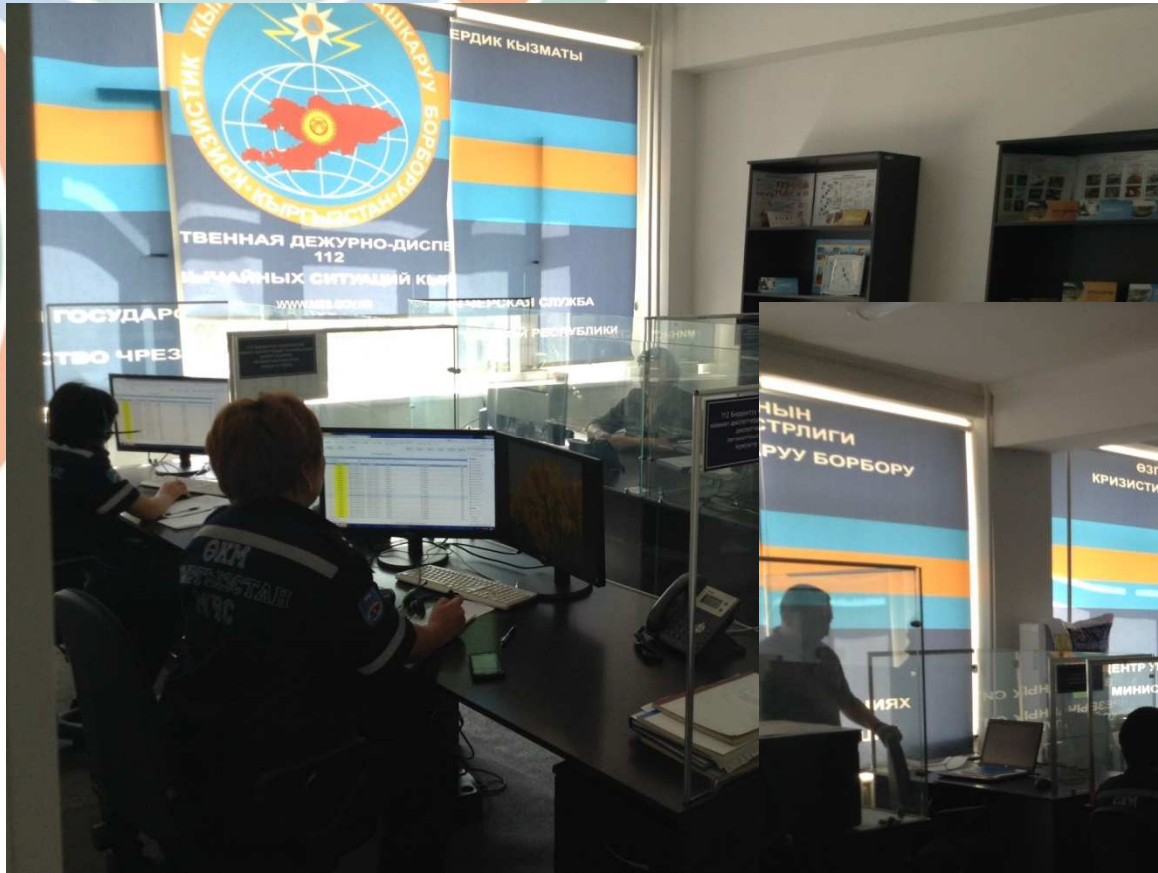
Participants from Department of Disaster Management (DDM), Ministry of Home & Cultural Affairs (MoHCA) and Department of Hydro Met Services, Ministry of Economic Affairs (MoEA) have been trained and the Geo-DRM portal have been established.

The screenshot shows the DHMS GEONODE portal. The header includes the text 'འཕེལ་གྲོལ་གཞིའི་འཛུགས་ཁང་།' and navigation links: HOME, LAYERS, MAPS, DOCUMENTS, PEOPLE, SEARCH. The main heading is 'DHMS GEONODE'. Below it, a paragraph states: 'GeoNode DHMS is a platform for sharing geospatial Hydro-Met data and maps. If you have any questions about the software or service, join our mailing list or visit our website Hydromet-website.' There are two orange buttons: 'Explore Layers' and 'Explore Maps'. A 'Need help Getting Started?' link is present. The 'LATEST LAYERS' section shows two items: 'Bhutan Road' (Layer from dema, 3 hours, 46 minutes ago) and 'Bhutan Admin Boundary' (Layer from dema, 3 hours, 55 minutes ago). The 'CONTRIBUTE' section contains instructions on how to upload layers and create maps.

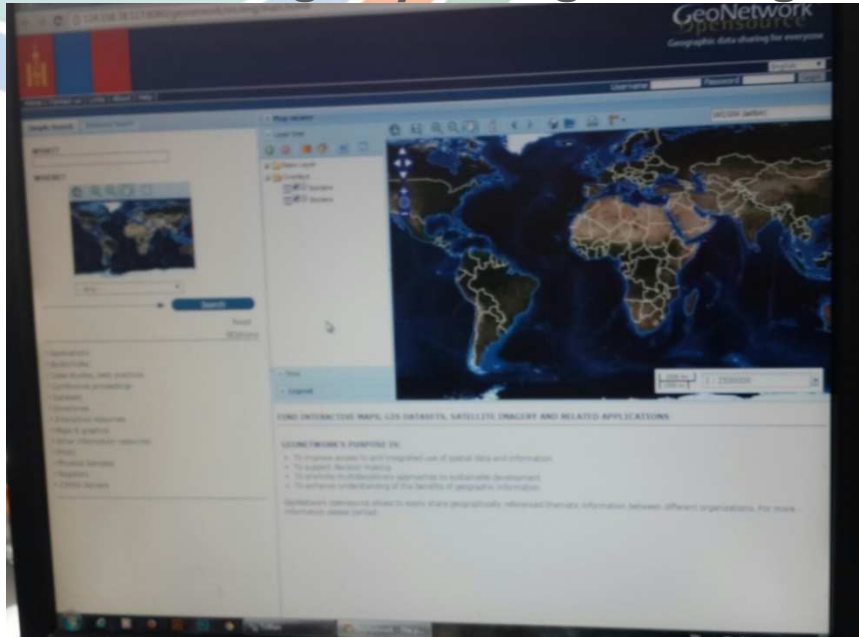
The screenshot shows the DDM GEONODE portal. The header includes the text 'འཕེལ་གྲོལ་གཞིའི་འཛུགས་ཁང་།' and navigation links: HOME, LAYERS, MAPS, DOCUMENTS, PEOPLE, SEARCH. The main heading is 'DDM GEONODE'. Below it, a paragraph states: 'Department of Disaster Management use the open source platform called GeoNode for sharing geospatial data and maps. For further information about our Geonode and Services, please visit Department website DDM Website.' There are two orange buttons: 'Explore Layers' and 'Explore Maps'. A 'Need help Getting Started?' link is present. The 'LATEST LAYERS' section shows one item: 'Bhutan Administrative Boundary' (Layer from il, 17 minutes ago). The 'CONTRIBUTE' section contains instructions on how to upload layers and create maps.



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



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



NEW

ESCAP's DRM E-Learning Platform

UNITED NATIONS
ESCAP
Economic and Social Commission for Asia and the Pacific

Disaster Risk Management
E-Learning Platform

Username

Password

Welcome

Search website



Navigation

Home

- Courses
 - GeoDRM
 - HEC-RAS
 - GISSD
 - OSG for NDMMR

Available Courses



INTRO TO RS&GIS USING QGIS



FLOOD MODELLING



SPATIAL DATABASES



QGIS

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.

PRESS TO ENTER

4.

QGIS FOR DISASTER MGMT

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

PRESS TO ENTER



Approach



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.



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.



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

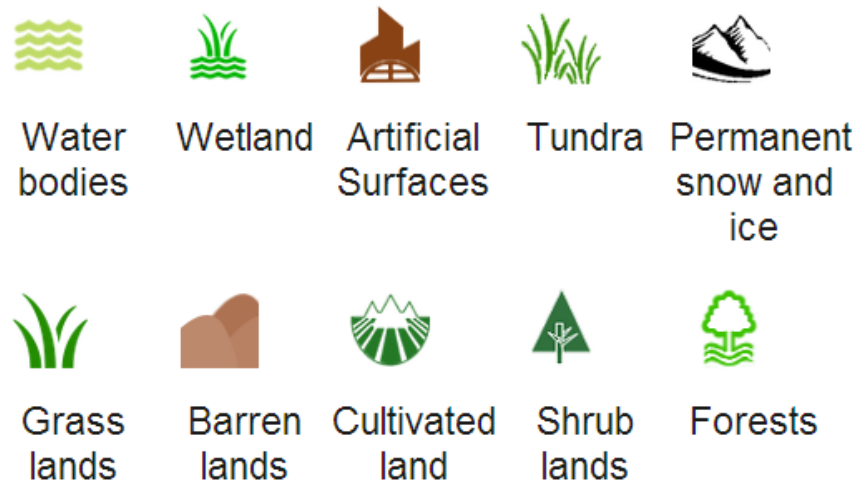
- **Develop the customized methodology and tools;**
- **Select the pilot countries in Asia and the Pacific;**
- **Enhance the capacity of the developing countries on developing their own dataset, tools and products to assess the risk and monitor the changes;**
- **Conduct thematic research, including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



Ten classes of RLC

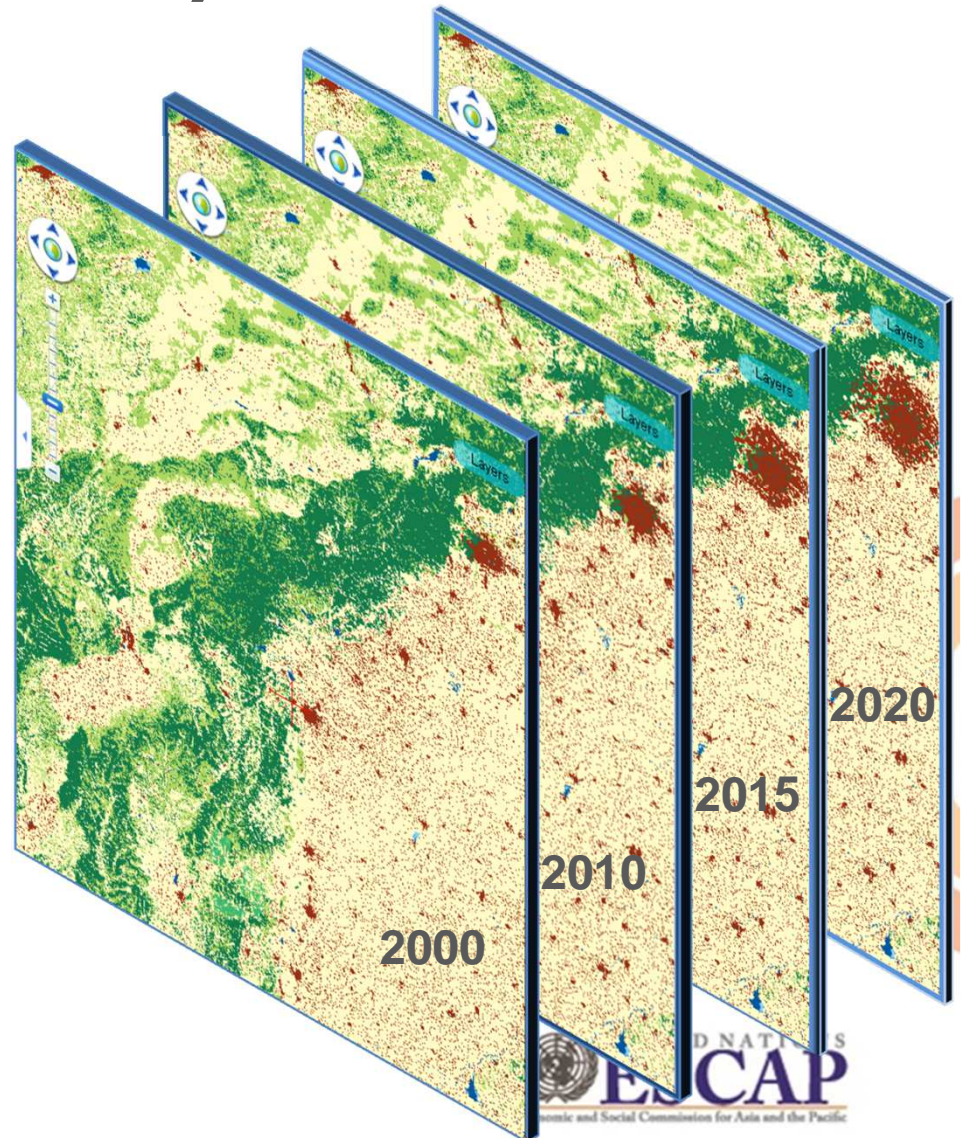
- Cultivated land
- Forest
- Grassland
- Shrubland
- Wetland
- Water bodies
- Tundra
- Artificial Surfaces
- Bareland
- Permanent snow and ice

Land Cover Types



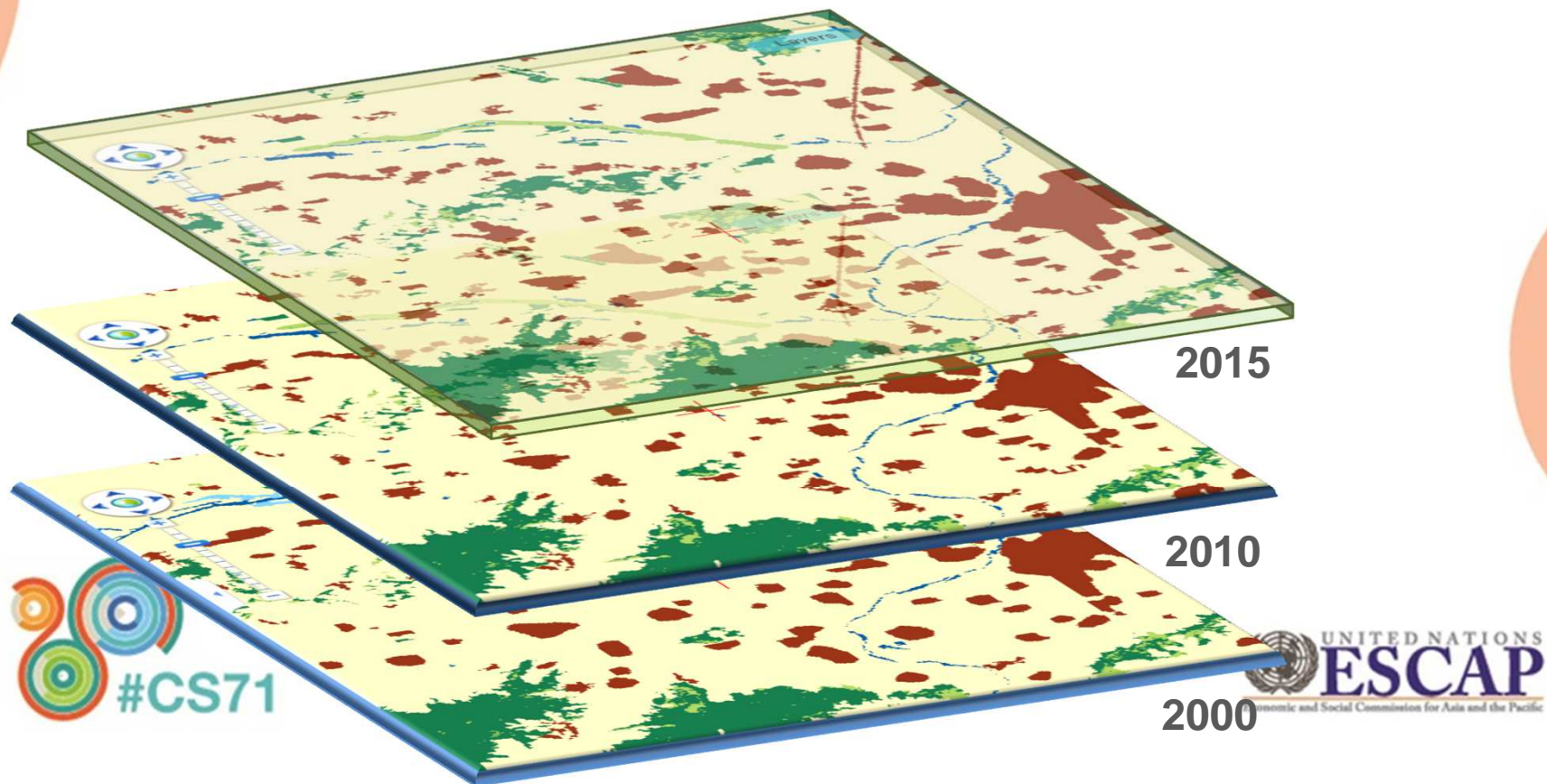
Necessity

- ✓ 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.

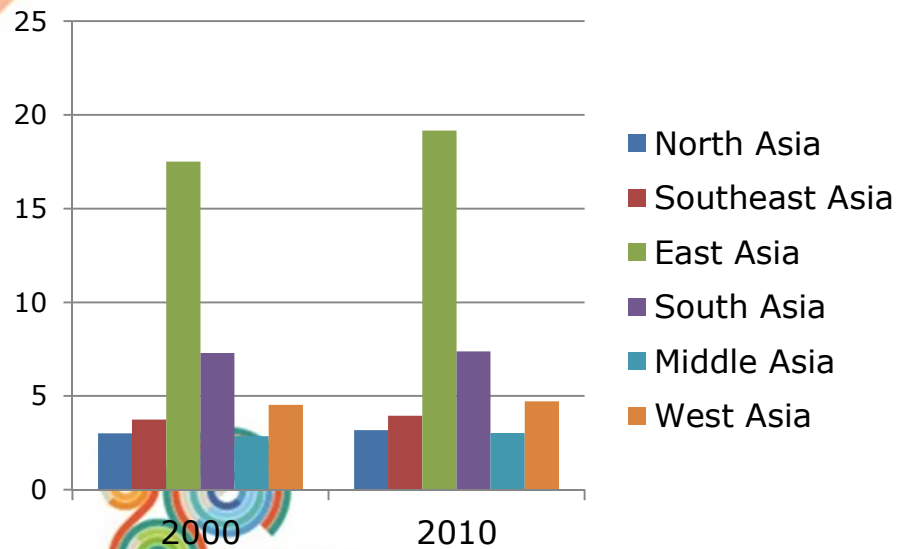
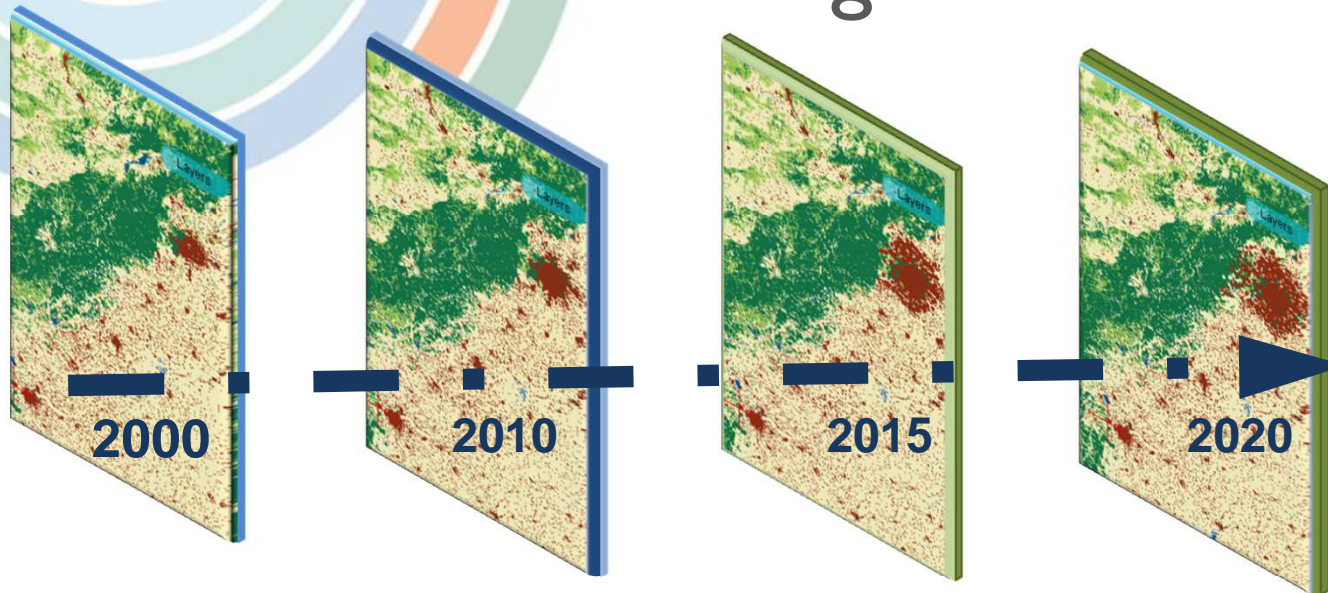


Baseline data

- RLC is the baseline data for multiple applications
e.g. analyze the urbanization, land degradation, deforestation

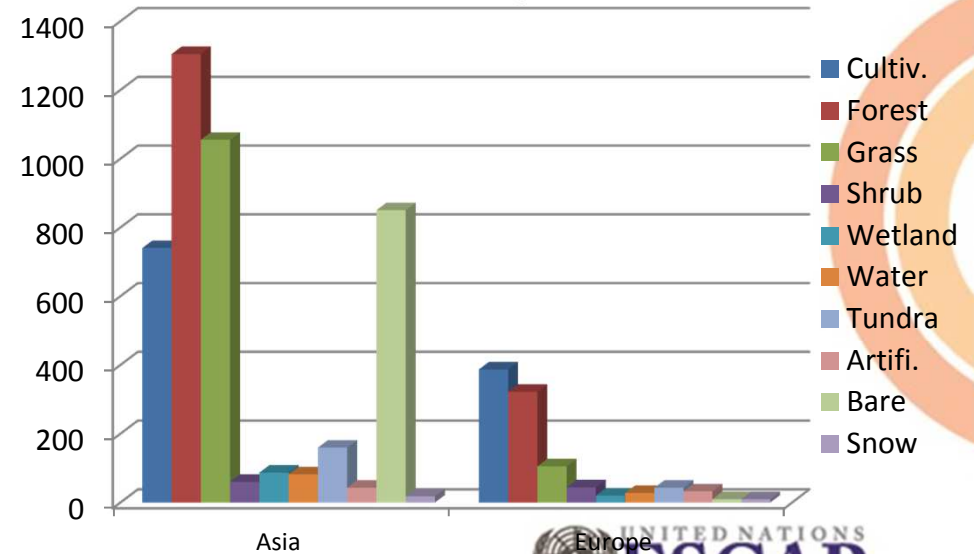


Monitor change matters



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

unit: 10,000 Km²

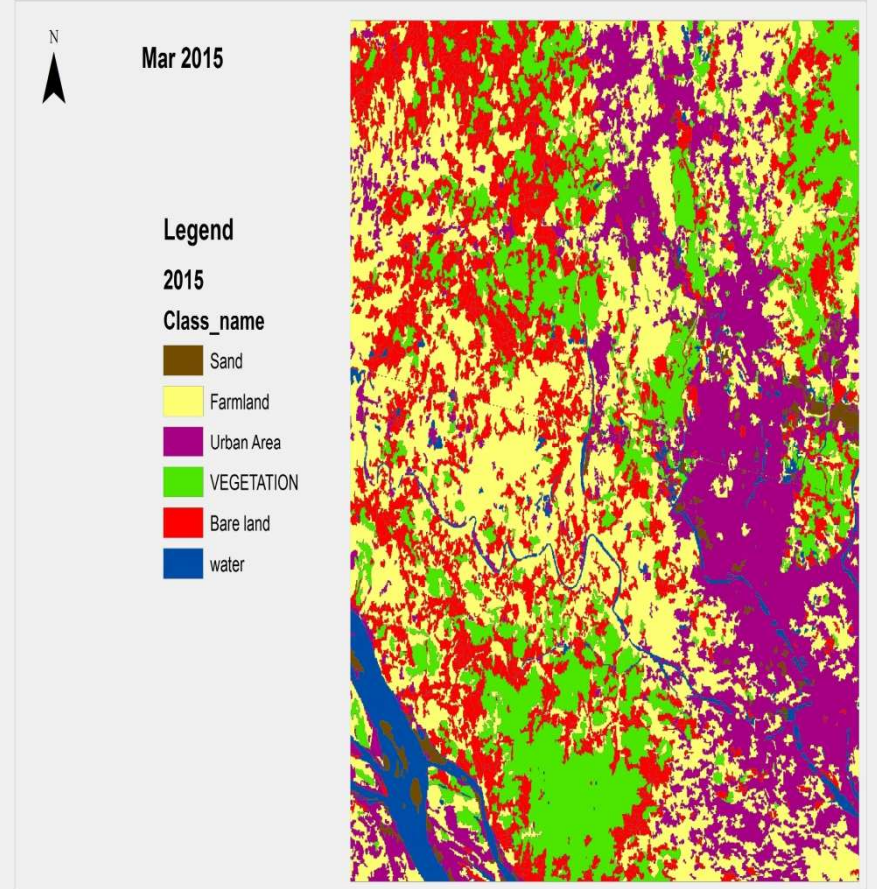
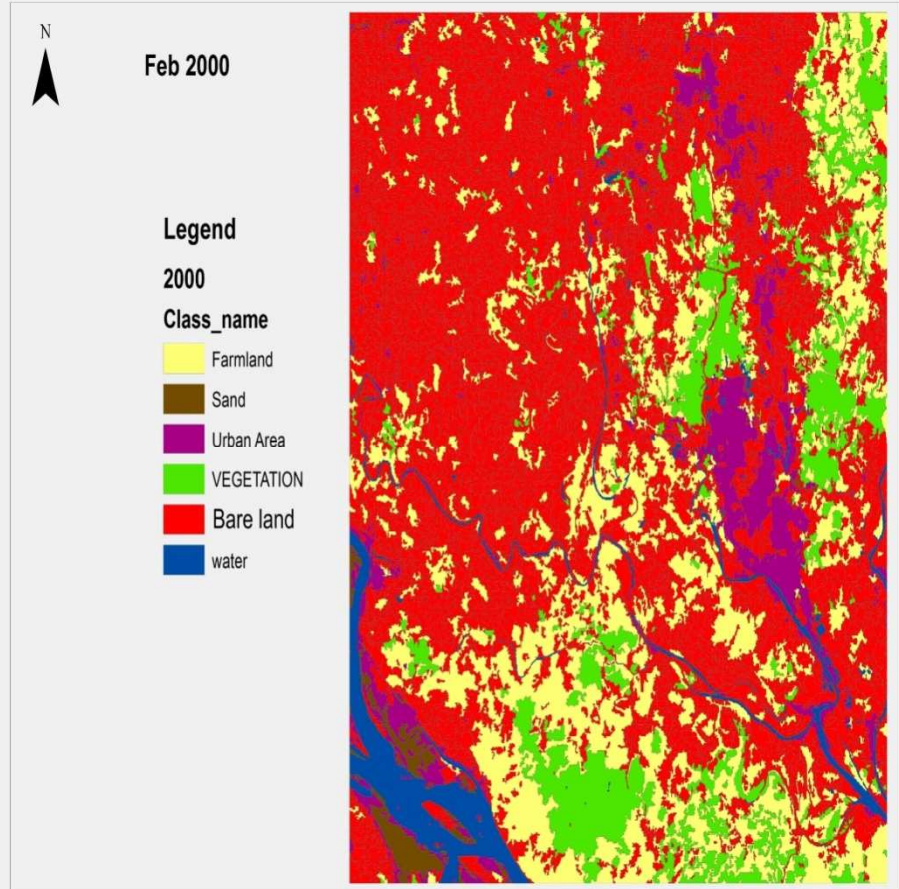


Area Statistics for all 10 Classes (2010)

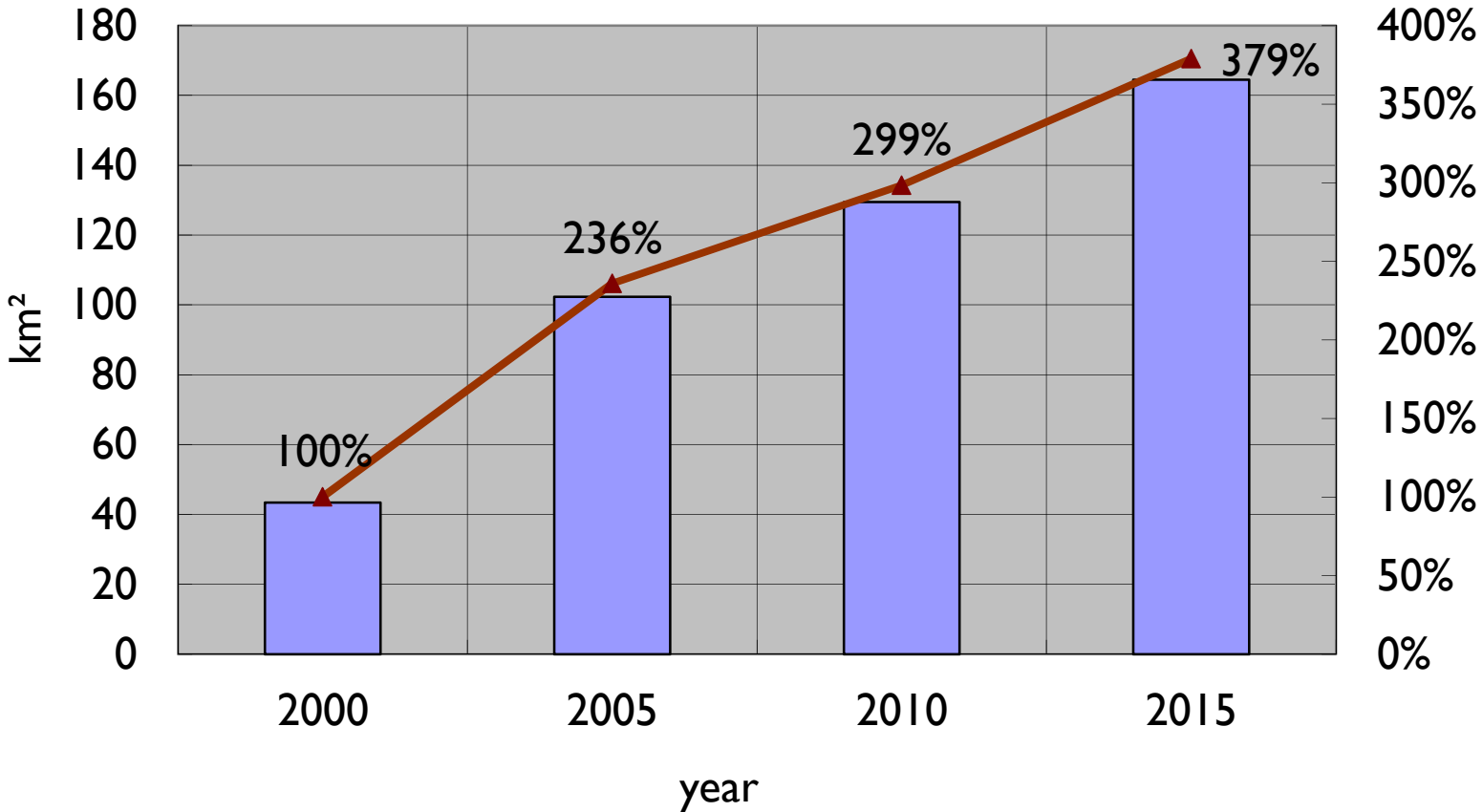
unit: 10,000 Km²



Example: Urbanization in Dhaka, Bangladesh

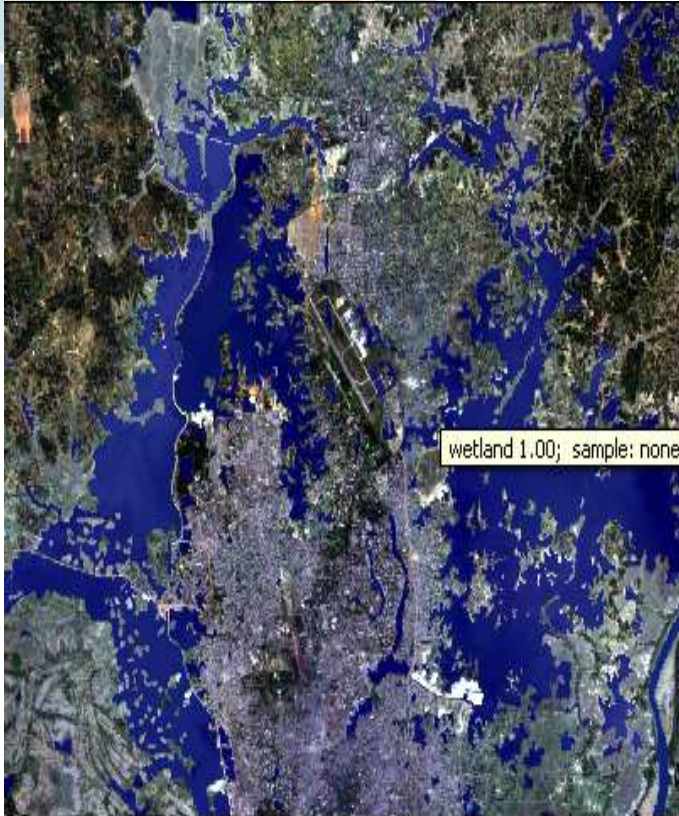


Artificial area change

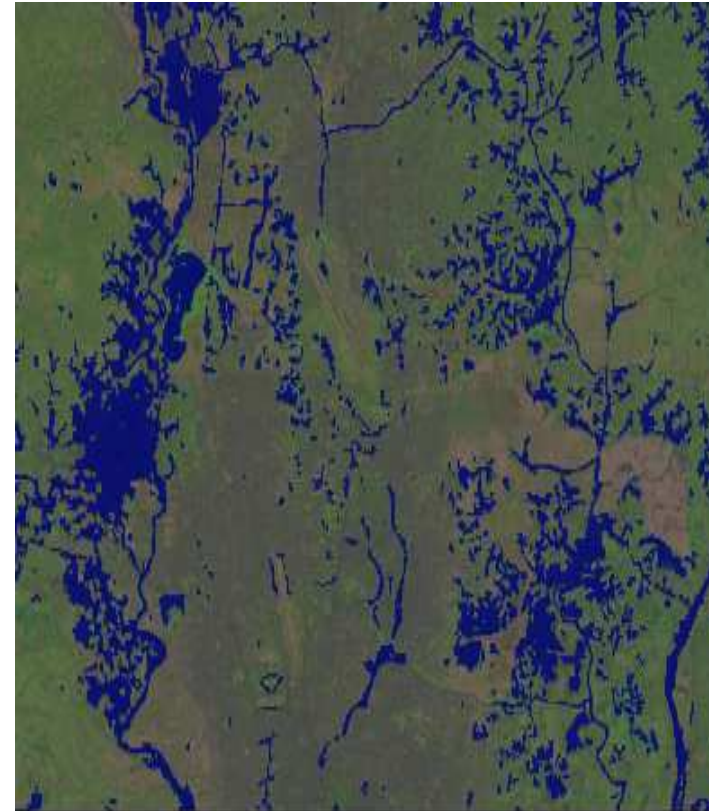


■ Area ▲ Percentage

Example: Buffer Shrink in Dhaka, Bangladesh



Buffer area in 1999



Buffer area in 2004

The buffer area in 2014 shrinks about 59% than in 1999. Among the decreased area:

- 23% is contributed by urbanization;
- 27% is bare land in 2014;
- 9% is vegetation.





Thank you

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