

# ESCAP's regional cooperation programme on EO data applications for disaster risk reduction

Keran Wang  
Chief, Space Applications Section  
Information and Communications Technology and  
Disaster Risk Reduction Division

# Key messages

- ESCAP is mandated to assist the implementation of COP21, SDGs and Sendai Framework for DRR at the regional level;
- ESCAP's space applications programme is accordingly customized to satisfy the needs of the region and member States;
- Way forward.

# DISASTERS WITHOUT BORDERS

## Regional Resilience for Sustainable Development



Asia-Pacific Disaster Report 2015

- Asia-Pacific is the most disaster-prone region and prone to cross-border disasters.
- Existing risks are being exacerbated, and new risks are created.
- Climate change has added a further layer of risk and uncertainty.
- Several neglected areas in the region where governments have a role to play.
- Significant gaps lie in integrating DRR into multispectral development, emphasis is still on response and recovery.
- Disaster Risk Reduction is central to achieving the SDGs in Asia-Pacific.
- Regional cooperation is the way-forward for addressing disasters without borders.

# Asia-Pacific is the most disaster-prone region

## Over the period of 2005-2014 in Asia-Pacific



**1,625**  
reported disaster  
events

=

accounted for



**40%**



Global disaster  
events



**500,000**  
people lost their lives due  
to disasters

=

accounted for



**60%**



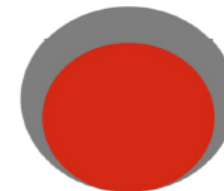
global deaths due  
to disasters



**1.4  
billion**  
people affected by  
disasters

=

accounted for



**80%**



global population  
affected by disasters



**US 523  
billion**  
worth of economic  
damage caused by  
disasters

=

accounted for



**45%**

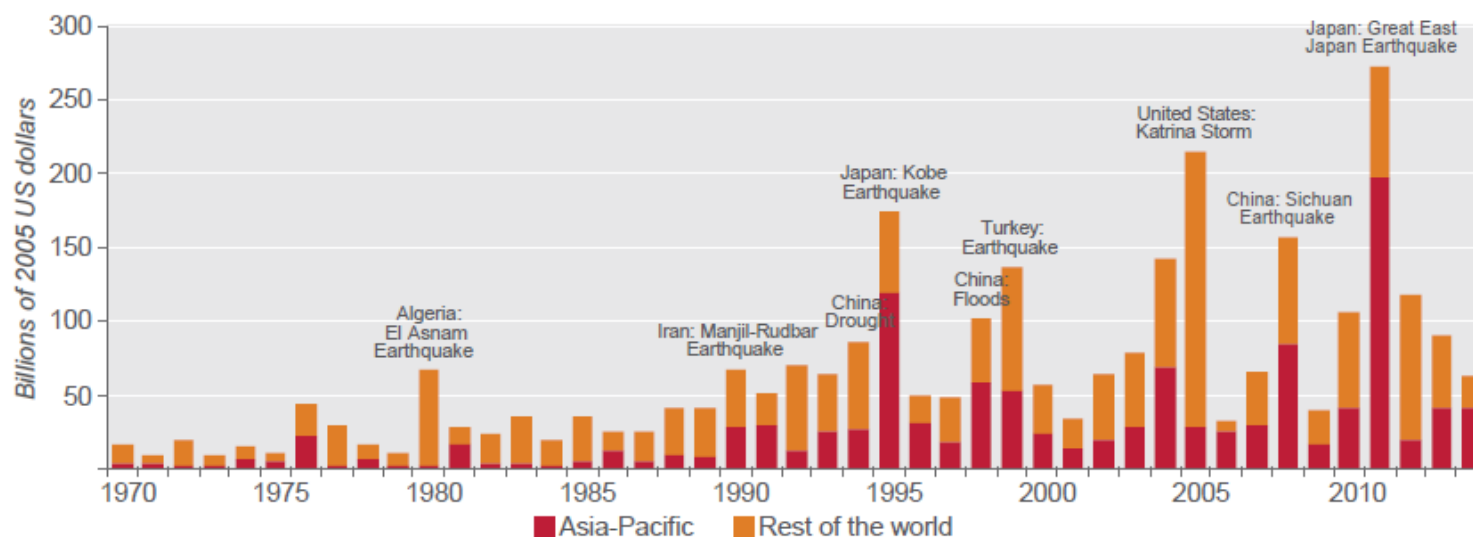


global economic  
damage caused  
by disasters

# Asia-Pacific is increasingly at risk

- Between the 1970s and the decade 2005-2014 damage from disasters increased from \$52 billion to over \$523 billion.
- Based on present trends, by 2030, annual losses in the region could average US\$160 billion a year.

Damage from natural disasters rising, 1970-2014



Source: ESCAP based on data from EM-DAT: The OFDA/CRED International Disaster Database. Available from <http://www.emdat.be/> (Accessed April 2015).

Notes: Labels in the figure show major disasters that contributed to high damage and loss in selected years.

# Harnessing space technology applications for SDGs and Sendai Framework for DRR

## DRR is factored in a number of goals of SDGs

Goal 1  
End Poverty

Goal 2  
Food security

Goal 9  
Infrastructure

Goal 11  
Human  
settlements

Goal 13  
climate change

Goal 15  
Protect  
Ecosystems

**Space Technology Application: agriculture, urban development, land use monitoring, risk assessment, disaster response and recovery, natural resource management, El Nino monitoring...**

Priority 1  
Understanding  
disaster risk

Priority 2  
Strengthening  
disaster risk  
governance

Priority 3  
Investing in disaster  
risk reduction for  
resilience

Priority 4  
Enhancing disaster  
preparedness, and to  
“Build Back Better”

**ESCAP is mandated to strengthen regional mechanisms for implementation of Sendai Framework for DRR 2015-2030.**

# Regional cooperation is critical to effectively address shared challenges and opportunities

- To develop seamless integration between the Asian Ministerial Conference on DRR and Committee on DRR

- To strengthen Regional Space Applications (RESAP) with Regional Action Plans aligned with SDGs/SFDRR

## ESCAP: Multi-sectoral, Inter-governmental platform

- To capitalize on Asia-Pacific Regional Coordination Mechanism (TWG-EDRM): Strengthen ASEAN-UN partnership and extend it to SAARC, ECO and Pacific

- To enhance innovative financing mechanisms -ESCAP Trust Fund for Tsunami, Disaster and Climate Preparedness

# Regional cooperation in space technology applications —a priority of ESCAP

## ➤ Mandates given by member States

- Series of resolutions on “Strengthening regional mechanisms for the implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030 in Asia and the Pacific” and “Implementation of the Asia-Pacific Plan of Action for Applications of Space Technology and Geographic Information Systems for Disaster Risk Reduction and Sustainable Development, 2012-2017”;

## ➤ Resources provided by member States

- Experts, facilities and technical assistant from RESAP member countries.
- Funds from China, India, Japan, Republic of Korea.
- Education and training network in China, India, Indonesia and Republic of Korea.

## ➤ Partnership with global and regional initiatives

- Delivering as one: UNITAR/UNOSAT, UN-SPIDER, UN-GGIM, WMO, FAO, GEO, OCHA, UNDP, Space Charter, APRSAF, Sentinel Asia, AHA Center, SAARC DMC, SOPAC, APSCO, CSSTEAP, RIMES, AIT GIC, CUHK.

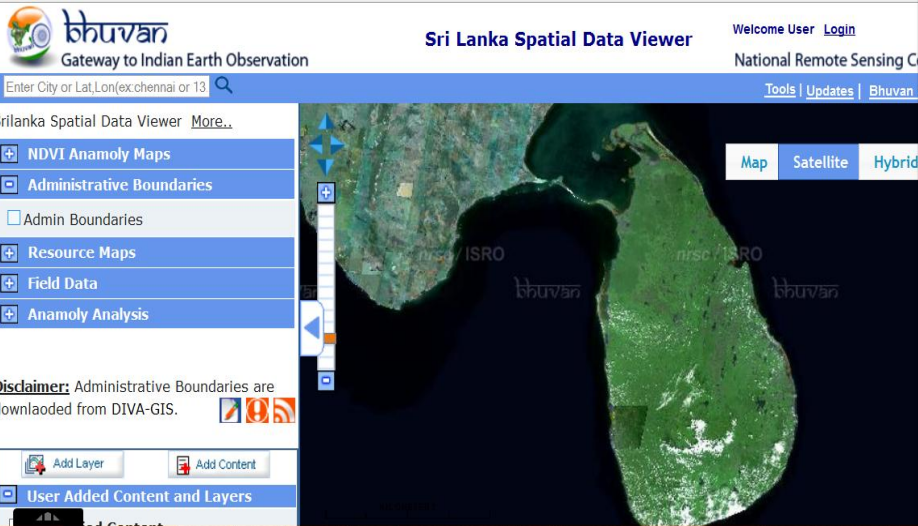


## Flagship programmes

- **Regional Drought Mechanism:** integrates space applications, hydrology, meteorology, climate risk models to monitor and predict drought, which is an often forgotten and complex disaster, through enhanced national and regional capacity/coordination.
- **Geo-DRM portals to support evidence-based decision-making:** combines socioeconomic information with satellite imagery and other disaster-related data in one online platform, provides the right information, to the right people, at the right time.
- **Mobilizing space-based information:** for timely and effective disaster response and rapid damage assessment.
- **Strengthening institutional capacity:** focus on risk mapping, flood monitoring, disaster damage assessment, drought monitoring and geospatial information management.

## ➤ Operationalization of the Regional Drought Mechanism

- Drought, an often forgotten and complex disaster, exacerbates poverty and adversely affects land and water resources.
- Using science and technology: space applications, hydrology, meteorology, climate risk models.
- Multisectoral coordination: involving many government ministries and other stakeholders.
- Strengthening national and regional capacity/coordination for effective early warning.
- Two Regional Service Nodes are put into place in National Remote Sensing Centers in China and India. 8 pilots from most drought prone countries: Mongolia, Sri Lanka, Cambodia, Kyrgyzstan, Myanmar, Nepal , Bangladesh and Afghanistan.



- National team has been established in Sri Lanka though signing MOUs among line ministries related to Drought Monitoring.
- Experts from key ministers of Sri Lanka have been trained in NRSC ISRO in the use of a Drought Monitoring System customized for specific country circumstance. India also uploaded satellite-derived databases for drought monitoring in Sri Lanka.
- NRSC ISRO provides technical support to Sri Lanka to including historical data, software, capacity building and transfer the medium resolution near real time data under ESCAP's Regional Drought Mechanism.

# Customized drought monitoring system and field verification-Mongolia

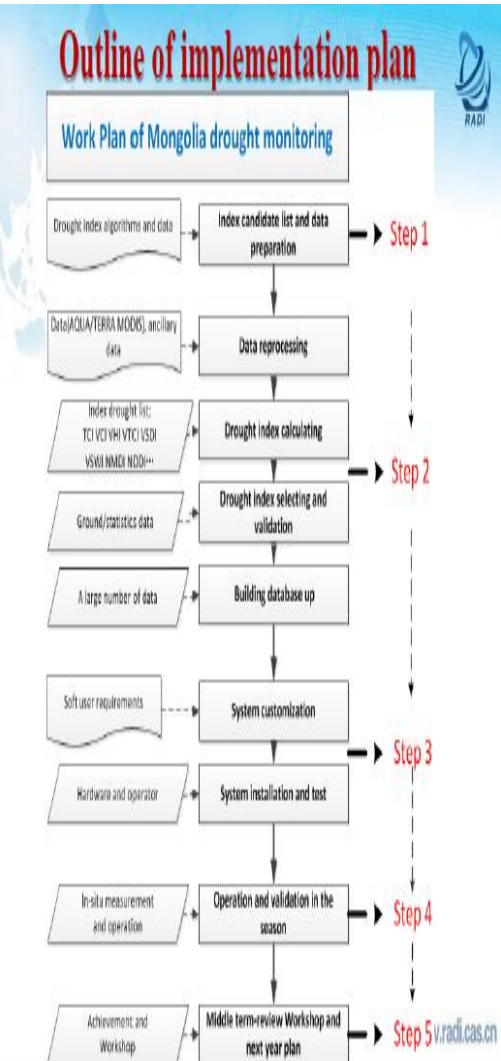
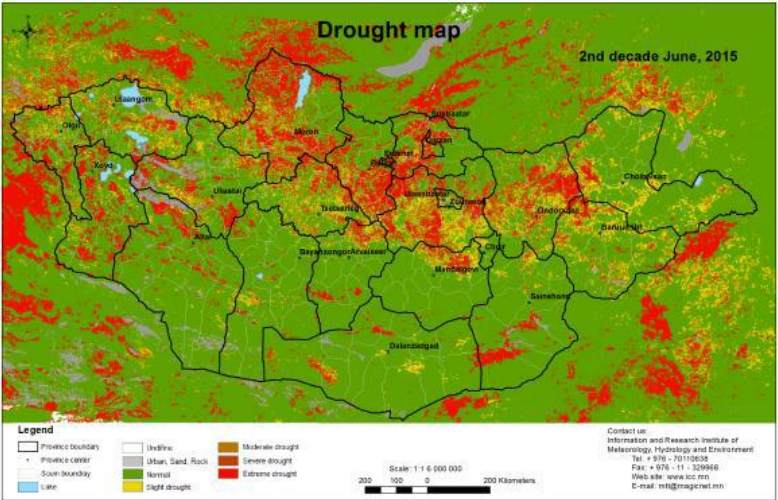
**3rd week**

## PRECIPITATION

**Disarrangement data** → **Good arrangement data with other information**

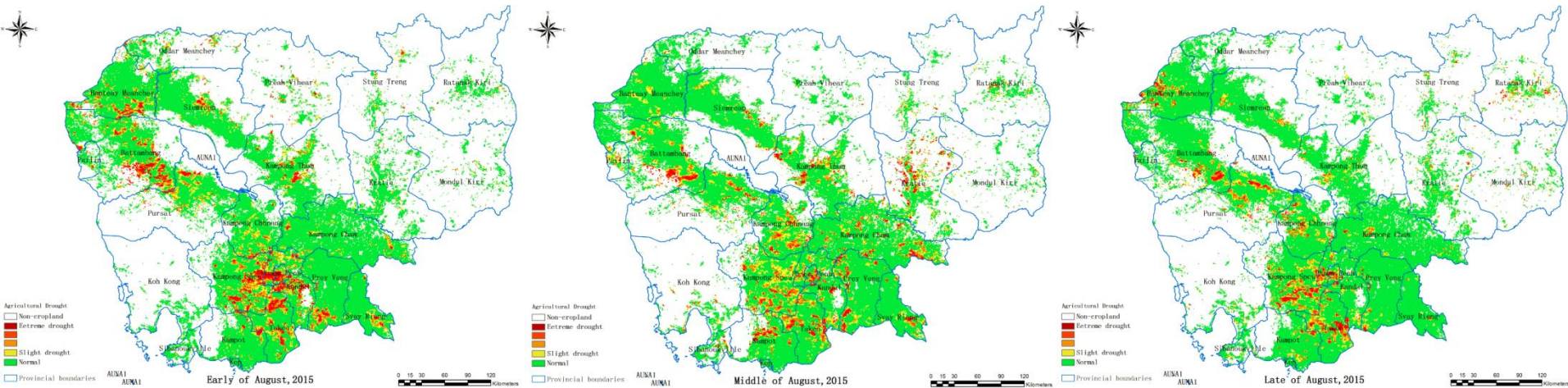
**Finally arrangement data record is totally 23475**

Data information		
1	Type	Air temperature
2	Time	2000-2013
3	Frequency	10 days
4	Unit	mm
5	Altitude	0
6	Missing value	-9999
7	Station information	114



# Improving national capacity on drought monitoring – Cambodia

Drought in August, 2015 in Cambodia(ten-days).



# Supporting evidence-based decision-making

Utilization of Geo-DRM portals: combines socioeconomic information with satellite imagery and other disaster-related data in one online platform.

- Providing the right information, to the right people, at the right time is critical for understanding risk and managing the flow of life-saving information.
- Targeting high risk and low capacity developing countries.

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

**Decision and Management**

**Geo-DRM portal in the Cook Islands, Bhutan and Kyrgyzstan**

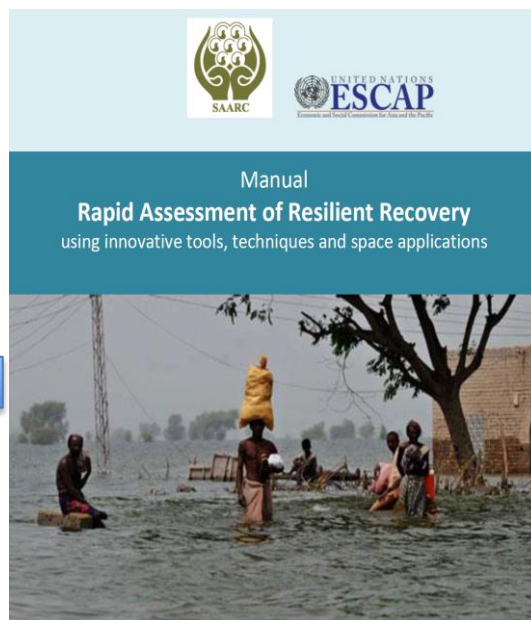
ISLAND Geographic Details		Island Population		Island Government Officials		Contact Details	
Island Name	SOUTHERN GROUP ISLAND	Year	Population	Govt Rep.	Savage Lockington	Phone	9770
Land Size	141.8 (sq km)		7001	Mayor	Tookatai Hokoman	20248	20207
Height above MSL	124.6 (metres)		2006	Island Secretary	Subaiti Subomana	0	20207
Coordinates	153° 48' 18" W, 18° 51' 40" S						
Distance from	2,134						

# Mobilizing regional resources for space-based information

- Provision of near real-time satellite imagery to countries affected by severe disasters. Data, products and services equivalent to over \$1.2 Million since 2014.
- New SOPs and customized guidelines on effective utilization of satellite imagery during emergencies (for ASEAN member States).
- Guidelines on rapid assessment of damage and losses (for SAARC member countries).
- Deliver in collaboration with RESAP members, UNOSAT, Charter, UN-SPIDER, Sentinel Asia, AHA Center, SAARC DMC.



PDNA  
Tool




**Space, GIS and crowdsourcing for sectoral (agriculture, housing and Infrastructure sector) damage and loss assessment**



# Timely provision of near real-time satellite imagery to countries affected by severe disasters

- Since 2014, 400 satellite images and damage maps are provided, on request.
- ❑ Afghanistan, Bangladesh, China, Fiji, India, Malaysia, Myanmar, Nepal, Pakistan, the Philippines, the Solomon Islands, Vanuatu and Viet Nam.
- ❑ Space based data, products and services equivalent to over \$1.2 Million.

ข้อมูลจากดาวเทียม Thaichote บันทึกภาพวันที่ 8 เมษายน 2557 และวันที่ 27 เมษายน 2558 พื้นที่ที่ได้รับผลกระทบจากแผ่นดินไหว เมื่อวันที่ 25 เมษายน 2558 บริเวณจัตุรัสการฆาตกรรมคูบาร เมืองการฆาตกรรม ประเทศเนปาล 



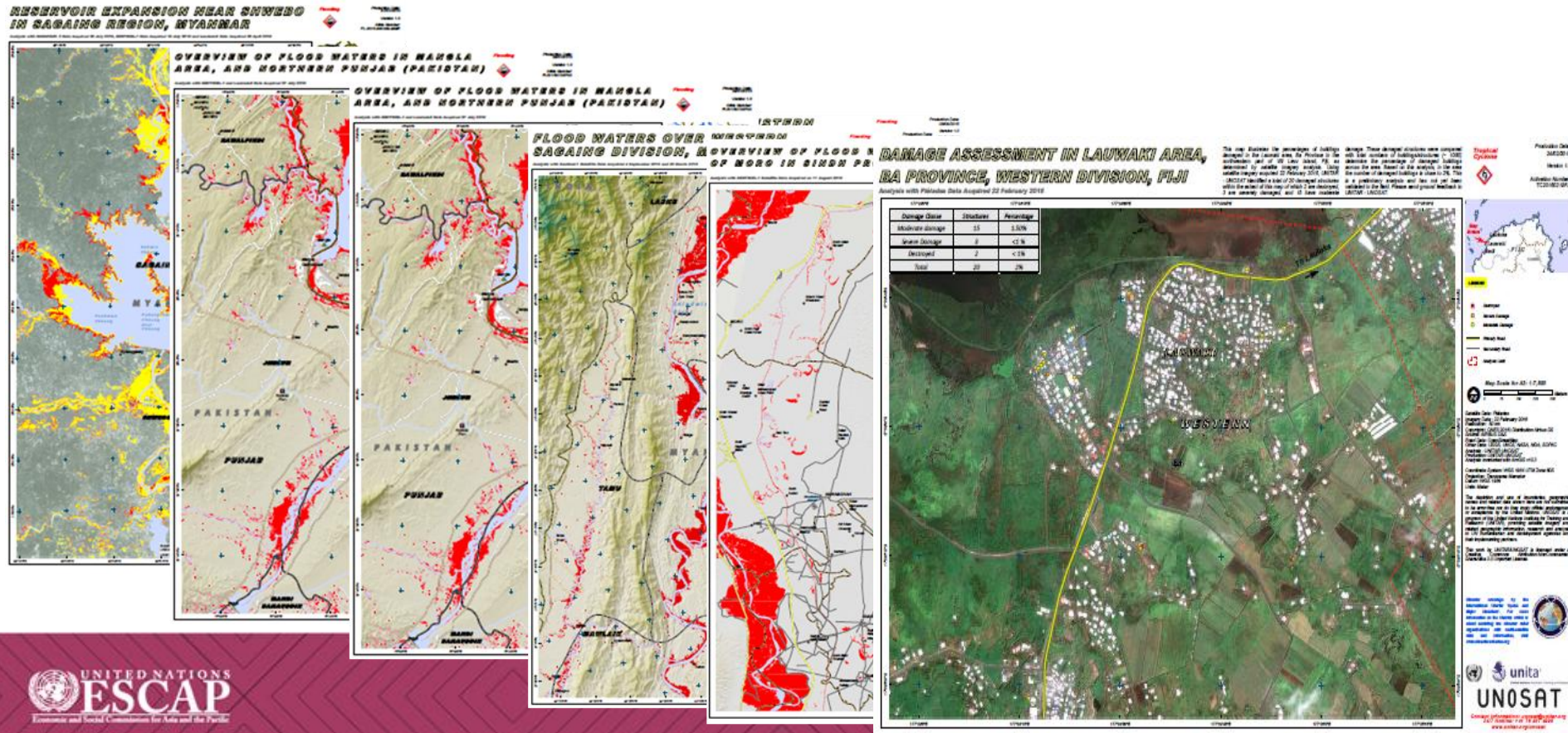
Before

After



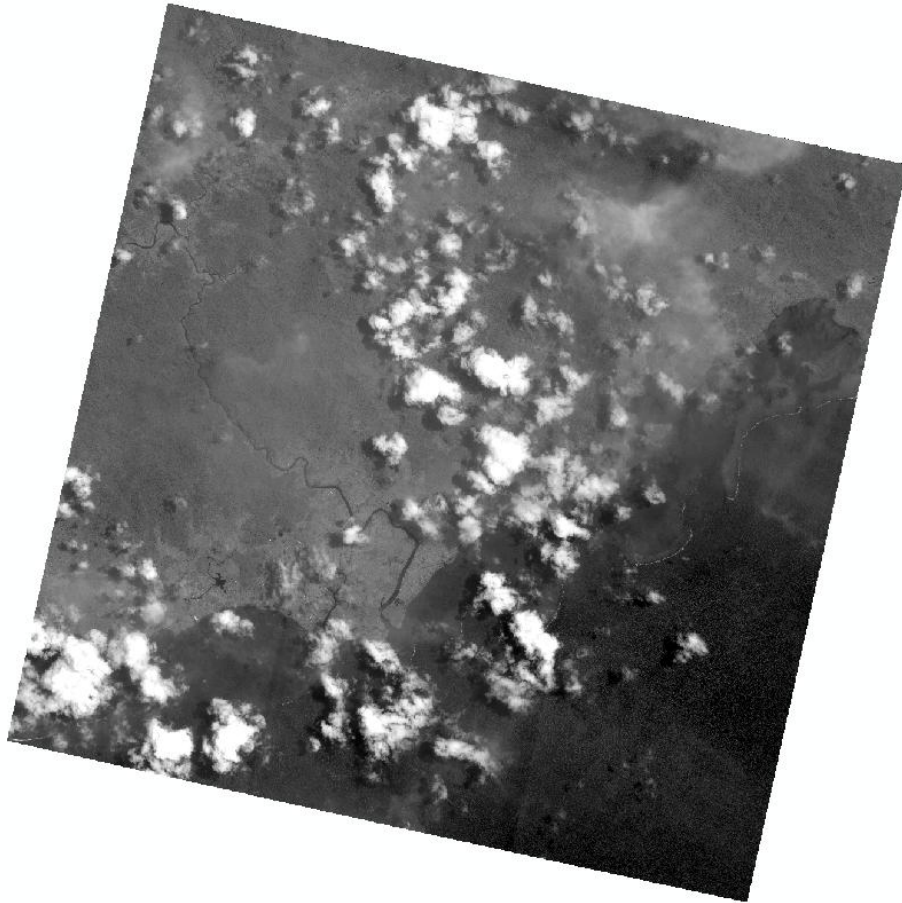
➤ Supported disaster-affected member States for effective response and post-disaster impact assessment.

❑ Damage maps for flood in Fiji, Myanmar, Pakistan and Vietnam- in collaboration with UNOSAT, space Charter and Sentinel Asia.

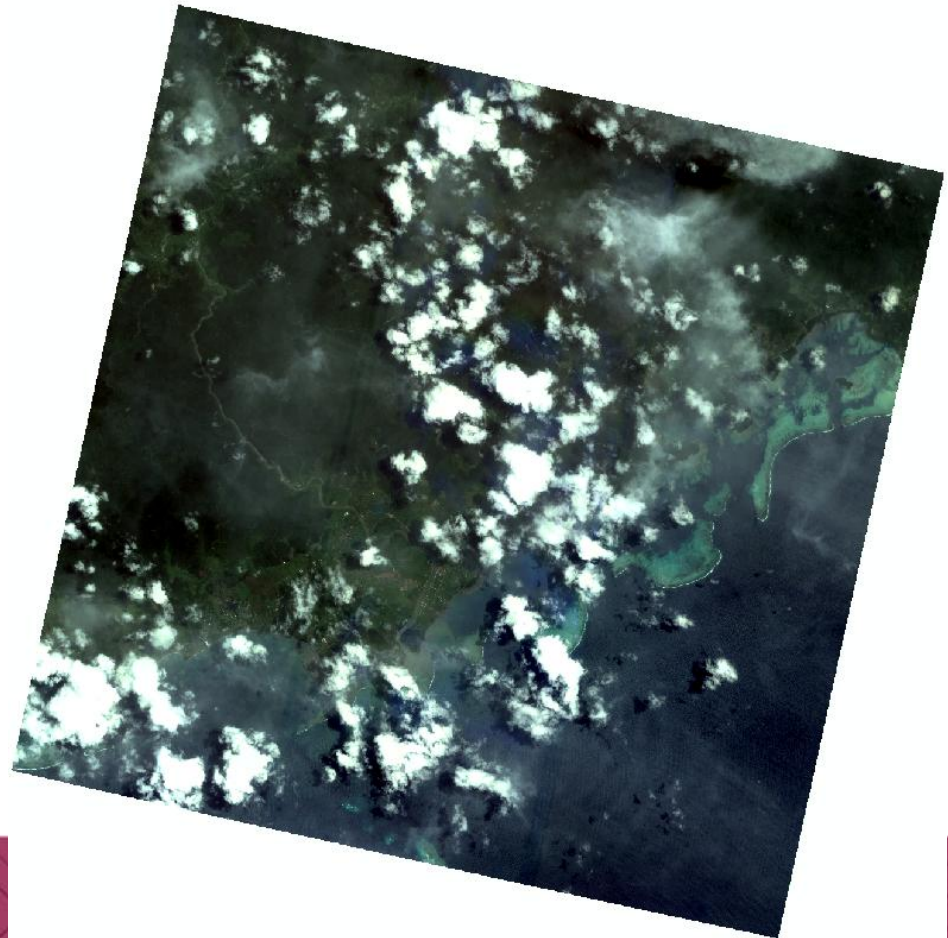


# GF-1, Receive Date:2016-02-23

- PAN, RES: 2 meter

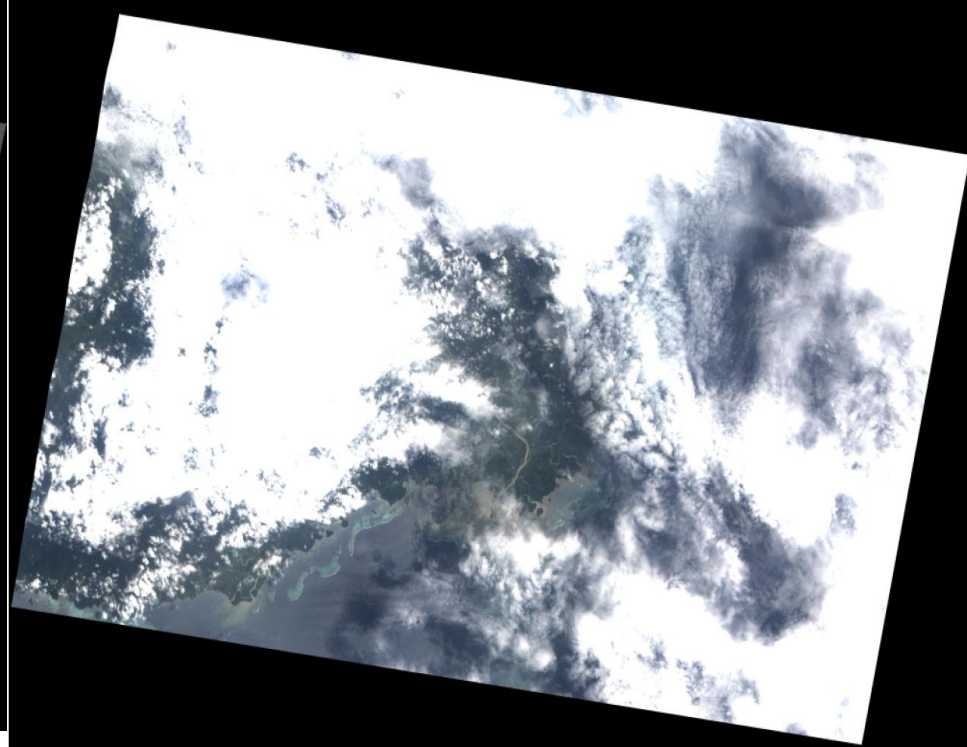
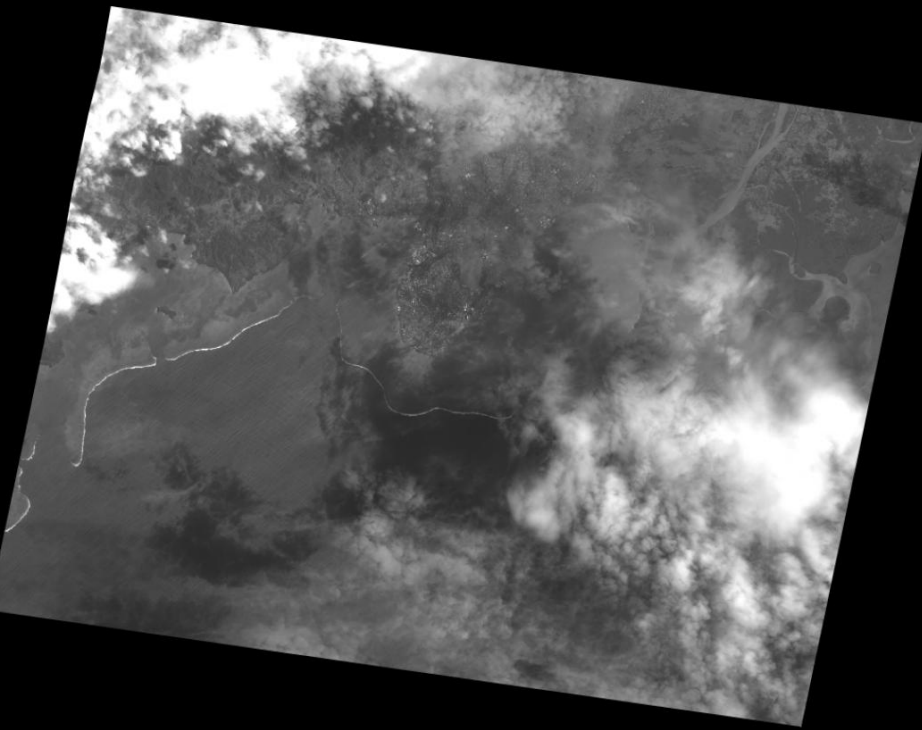


- M, RES: 8 meter



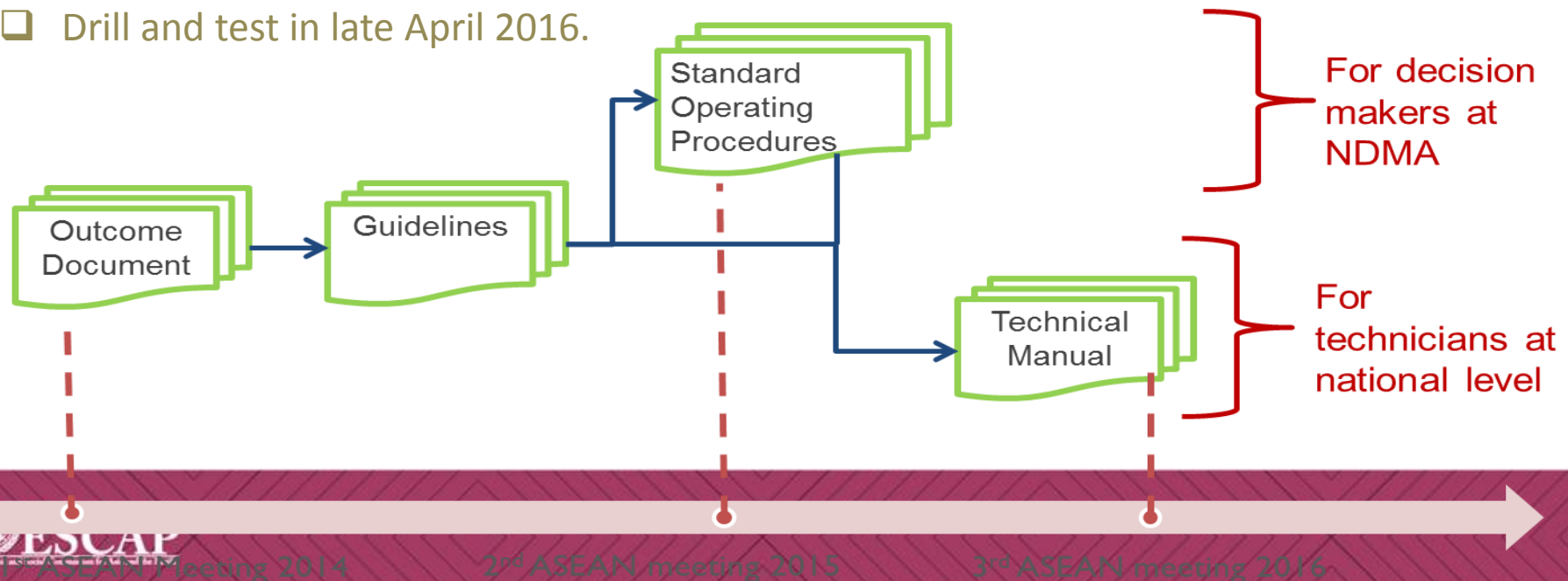
# Thaichote, Receive Date:2016-02-22

- PAN, Res: 2 meter
- M, Res: 15 meter



➤ New SOPs and customized guidelines on effective utilizing satellite imagery during emergencies (for ASEAN countries and AHA Center, in collaboration with UN-SPIDER and UNOSAT).

- ❑ Covering whole process of using satellite imagery for emergency response.
- ❑ Linking to most of regional and global initiatives, public and private resources on space-based data for emergency response.
- ❑ Comprehensive technical manual to supplement the SOPs.
- ❑ Drill and test in late April 2016.



# Strengthening institutional capacity to address gaps and emerging challenges

Risk mapping, flood monitoring, disaster damage assessment, drought monitoring and early warning, microwave remote sensing applications, satellite imagery for emergency response, geospatial information management.

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



**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](#)

**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](#)

**CONFIGURING GEODRM**  
Course on installing, configuring and population data on GeoNode and GeoNetwork.  
[PRESS TO ENTER](#)

**QGIS FOR DISASTER MGMT**  
A QGIS tutorial with a focus on natural disaster mitigation, management and rehabilitation.  
[PRESS TO ENTER](#)

# Way forward: expansion of applications of emerging technologies

## Regional land cover change monitoring

- Understanding the risk and supporting sustainable development.
- Accurate baseline data and add value to multi-sectoral applications.
- Fill in the gaps of real-time information and data infrastructure.
- Visualize the changes and risks.

## Strengthening multi-hazard risk assessment and early warning systems in Pacific

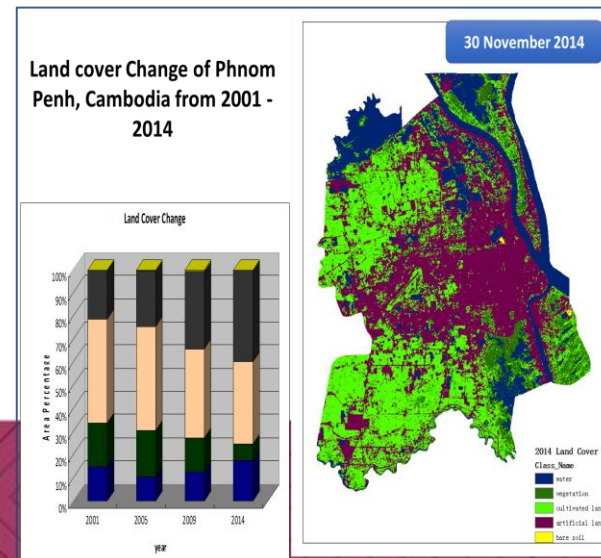
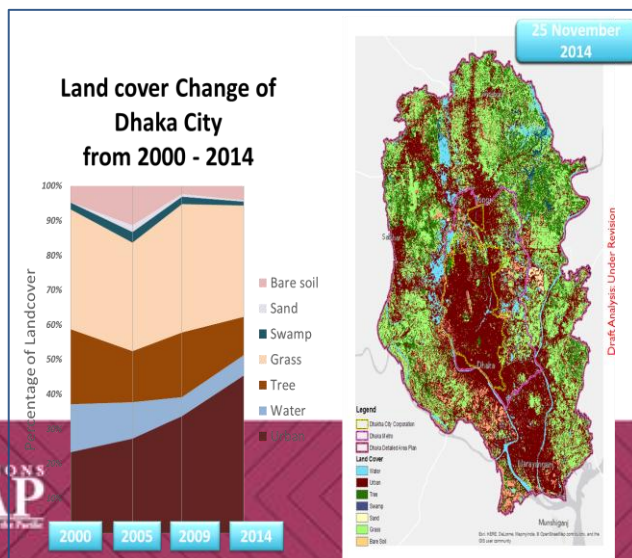
- Enable Pacific countries for multi-hazard end-to-end early warning at the national and local level.
- Greater access to space technology and GIS applications for long term planning, early warning, rapid assessment of damage and response.
- Establish the end-to-end flood forecasting and early warning systems in transboundary river basins based on state-of-the-art space applications and advanced modeling systems
- Minimize the gaps and enhance the capacity in utilizing innovative technical tools for disaster management.

# Expansion of applications to new fields and new territories

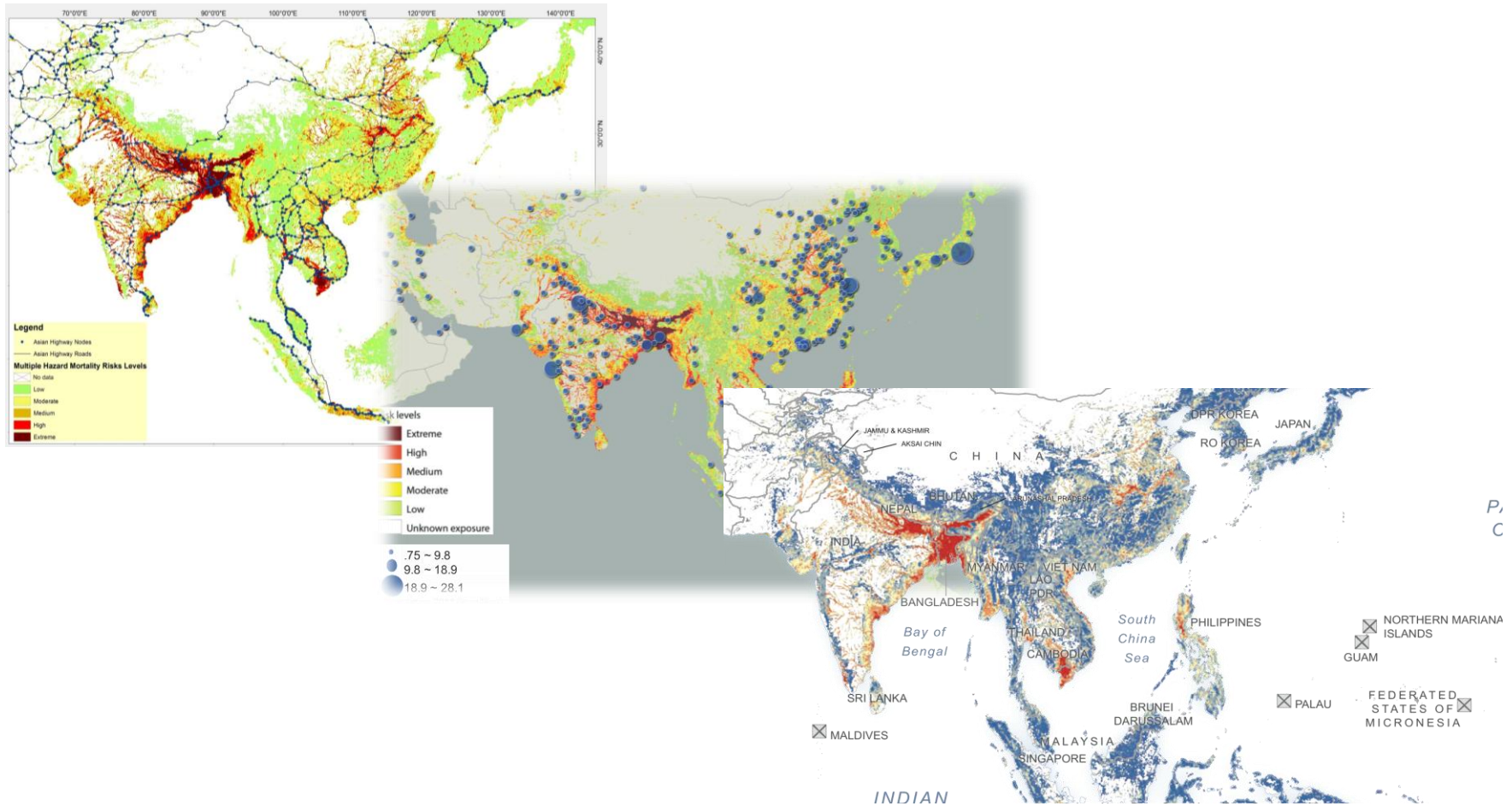
## ➤ New fields: Regional land cover change monitoring

- ❑ Land use monitoring is critical to situation awareness for risk reduction and sustainable development.
- ❑ Provide accurate baseline data and add value to multi-sectors applications.
- ❑ Fill in the gaps of real-time information and baseline data infrastructure and for generating actionable information.
- ❑ Visualize the changes and risks.


## Demo of land use change monitoring in last 15 years in Dhaka, Bangladesh and Phnom Penh, Cambodia



# Risk assessment of infrastructures, urban risk hot spots and river basin





- 
- **New Territories: Space and GIS applications for strengthening multi-hazard risk assessment and early warning systems in Pacific countries.**
    - ❑ Pacific Island developing countries are exposed to a variety of disaster risks.
    - ❑ Enable Pacific countries for multi-hazard end-to-end early warning at the national and local level, and greater access to space technology and GIS applications for long term planning, early warning, rapid assessment of damage and response.
    - ❑ Building resilience to disasters, establish the multi-hazard end-to-end early warning systems, minimize the gaps in use of satellite imagery and GIS, and enhance the capacity in utilizing innovative technical tools for disaster management.
    - ❑ Implemented through 1 million USD grant from Japan.



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Thank you !