

# Space applications for sustainable development in Asia and the Pacific

**Dr. Shamika N. Sirimanne**

**Director**

**Information and Communications Technology and**

**Disaster Risk Reduction Division (IDD)**

**UN ESCAP**



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# Structure of the Presentation: 4 Key Questions

1. Why the UN Regional Commission (ESCAP) has put in place space applications to realize its vision?
2. How ESCAP facilitates promoting space applications?
3. What has been the overall impact?
4. Conclusions to be shared with COPOUS



# Achieving Sustainable Development in Asia –Pacific

## Key Challenges

- Eradicating poverty and narrowing inequality
- Pursuing sustained and inclusive economic growth
- Gender Equality and Empowerment
- Building resilience to economic crisis, climate change and disasters
- Responding to population dynamics and urbanization
- Enhancing resource efficiency and natural resource management
- Deepening regional integration and connectivity

**ESCAP Recognizes  
that Space  
Applications  
leapfrog and fill the  
gaps**

## Key Enablers

- Financing
- Science, Technology and Innovation
- Trade
- Capacity Building
- Partnership
- Governance



# How ESCAP facilitates space applications...?

**...Strong Political Commitments , Ownership and Support**

**69/11: 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 (2013)**

**68/5: Asia-Pacific Years of Action for Applications of Space Technology and the Geographic Information System for Disaster Risk Reduction and Sustainable Development, 2012-2017 (2012)**

**Regional Cooperative Mechanism for Drought Monitoring and Early Warning was launched**

**.. Institutionalization of RESAP: ESCAP acts as the secretariat of RESAP**

**RESAP: Education and Training Networks (China, India and Indonesia)**

**Regional Space Applications for Sustainable Development in Asia and the Pacific (RESAP)**

**2<sup>nd</sup> Space Ministerial Conference**

**New Delhi (1999)**

**Capacity Building**

**1<sup>st</sup> Space Ministerial Conference**

**Beijing (1994)**

**... + Regional /South-South Cooperation**

**Inception of RESAP: – Intergovernmental Consultative Committee, Thematic Regional Working Groups**



# Implementing the Asia-Pacific Plan of Action 2012 - 2017

## Applications of Space Technology and GIS for Disaster Risk Reduction and Sustainable Development

- ESCAP was tasked to take the lead in implementing the Asia-Pacific Plan of Action at the regional level
  - Harmonize and enhance existing regional initiatives, pool expertise and resources at the regional and sub-regional levels and share good practices and lessons.
- Enhance collaboration with space related UN agencies and regional initiatives, including UNITAR/UNOSAT, UN-SPIDER, ISDR, the Charter, APRSAF, APSCO, Sentinel Asia,
  - MOA between ESCAP and UNITAR signed in 2013.
  - Provision of space based information to disaster affected countries.
  - Joint advisor mission with UN-SPIDER.
  - Joint organization of workshop/training programme on space technology applications.
  - Cross participation activities and share of the information.
- Deliver capacity-building to address the main technical gaps in developing countries.
  - Establish the Geo-DRM portal in CSNs for disaster risk management.
  - Joint organization of workshop/training programme on space technology applications with UNITAR/UNOSAT, UN-SPIDER and AHA centre.

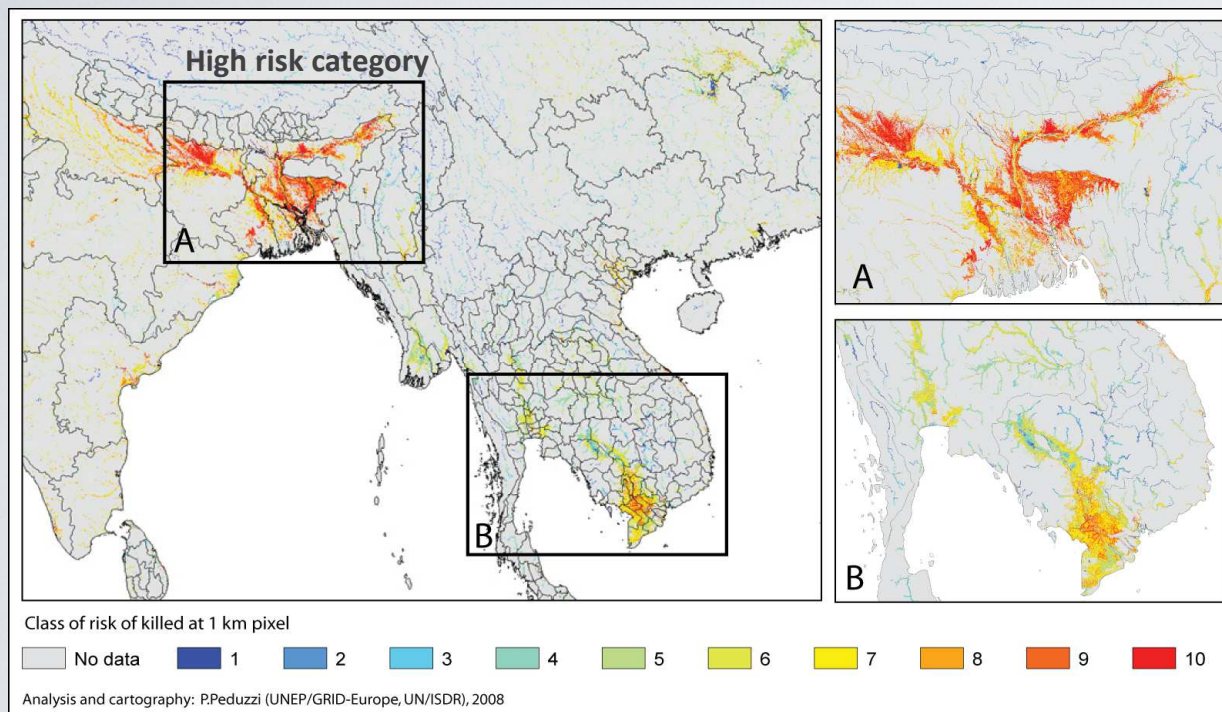


## **ESCAP Space Applications : 3 Visible Impacts**

- I. Analytical Research for Public Policy, Regional and South-South Cooperation**
- II. Bridging the Gaps between EO products/services and its down-the-line utilization**
- III. Strengthening Institutional Capacity**

# I. Analytical Work for Public Policy, Regional and South-South Cooperation

A person living in the region faces 4 times more risk than in Africa and 25 times more than in Europe or North America.



Use Space to demonstrate how the risk and vulnerability are intensively concentrated in high risk countries and are on the rise

## Protecting Development Gains

Reducing Disaster Vulnerability and Building Resilience in Asia and the Pacific

The Asia Pacific Disaster Report, 2010



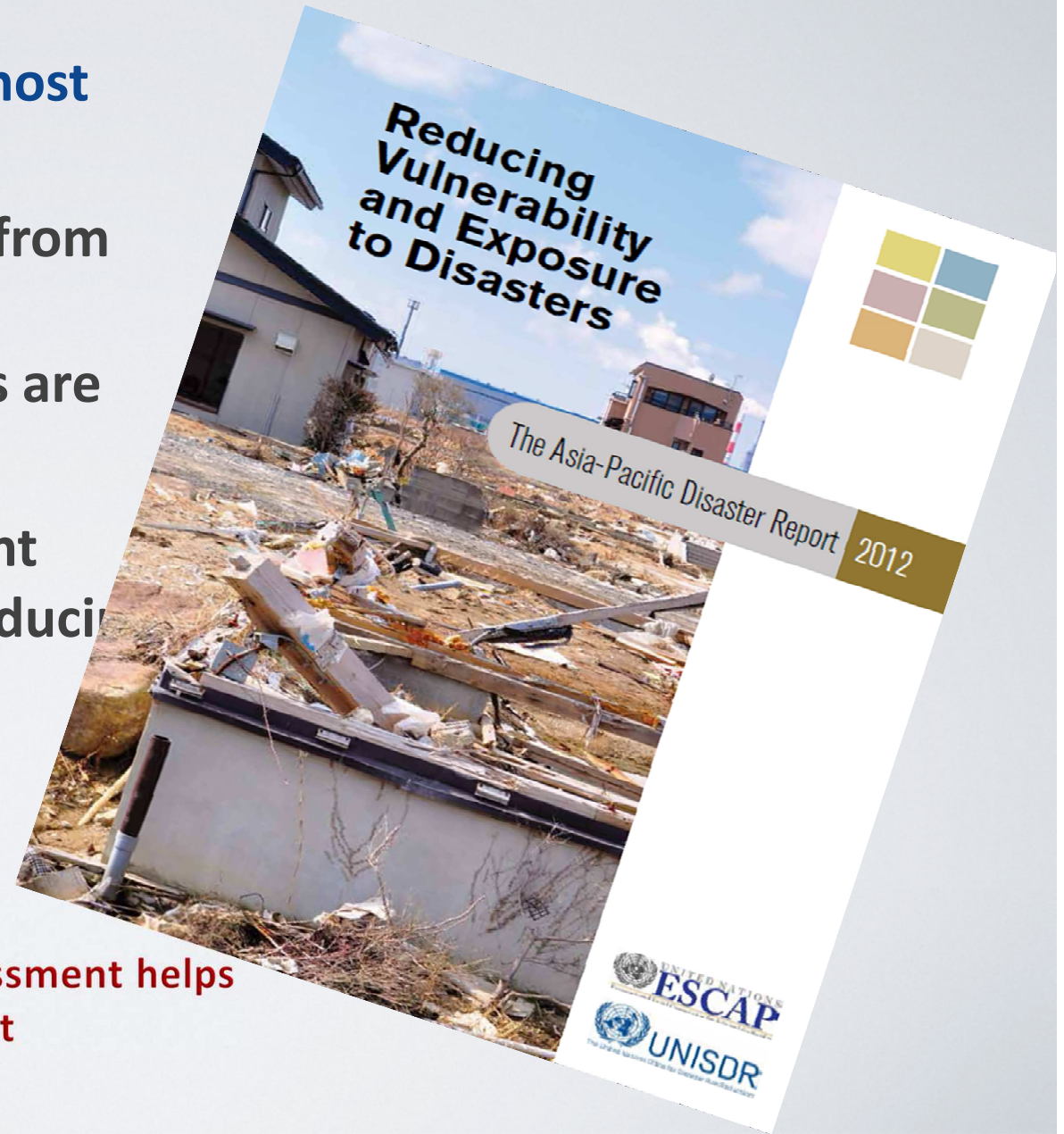
# I. Analytical Work for Public Policy, Regional and South-South Cooperation

Asia and Pacific is the world's most disaster-prone region

a. The loss of life is decreasing from hydro-meteorological hazards, while the economic losses are alarmingly on the rise.

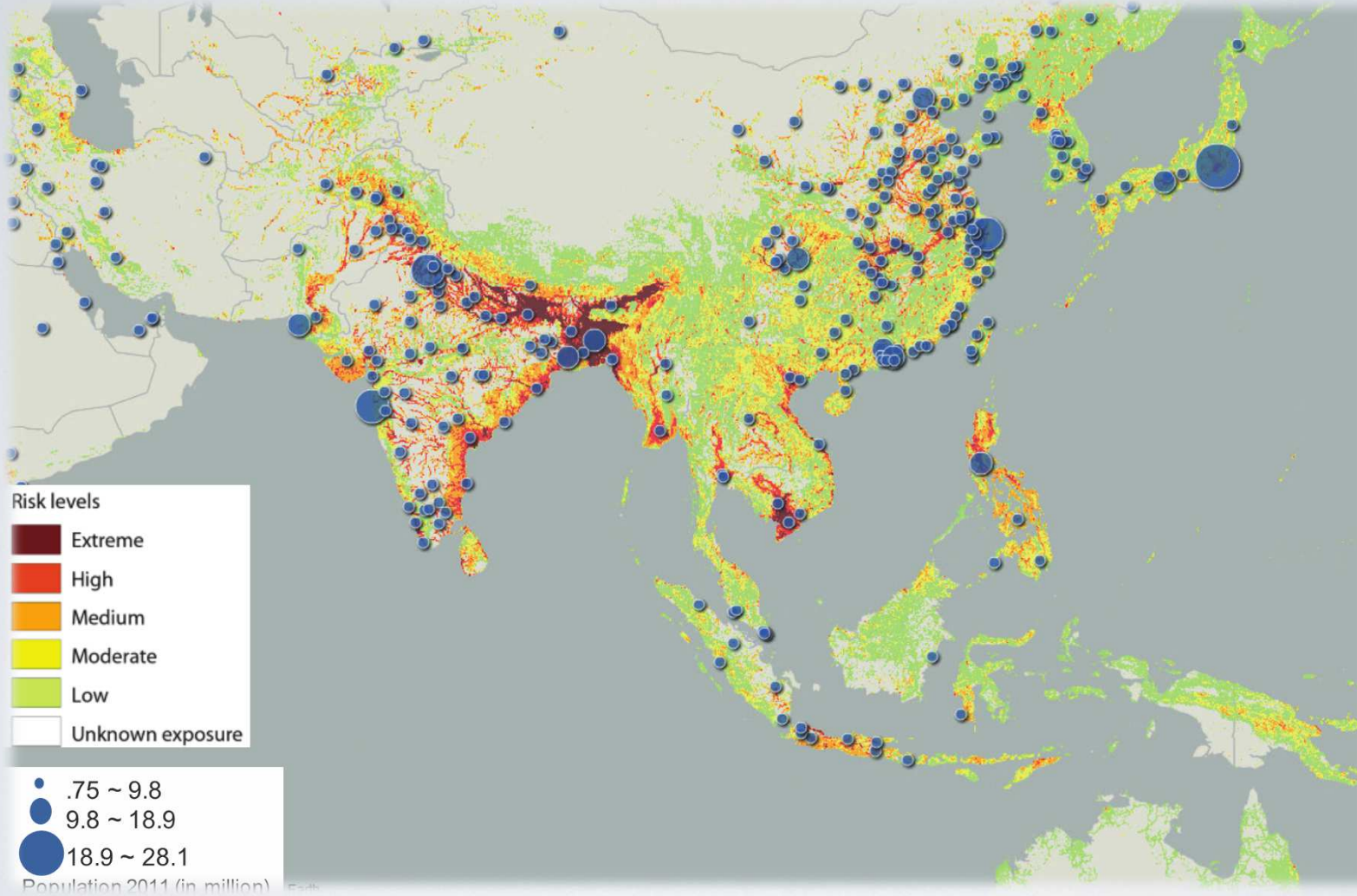
a. Spatial land use plans, resilient critical infrastructure help in reducing economic losses.

Space for early warning, risk assessment and post-disaster damage and loss assessment helps substantially in disaster risk management





# Many urban risk hot spots in Asia-Pacific...



**Of the 305 urban agglomerations, 119 are situated along coastlines, large number of cities with high seismic risk**

# I. Analytical Work for Public Policy, Regional and South-South Cooperati

Asia-Pacific Leaders Convene to  
Discuss Strategies to Build Resilience  
to Natural Disaster and Economic  
Crises in the Region

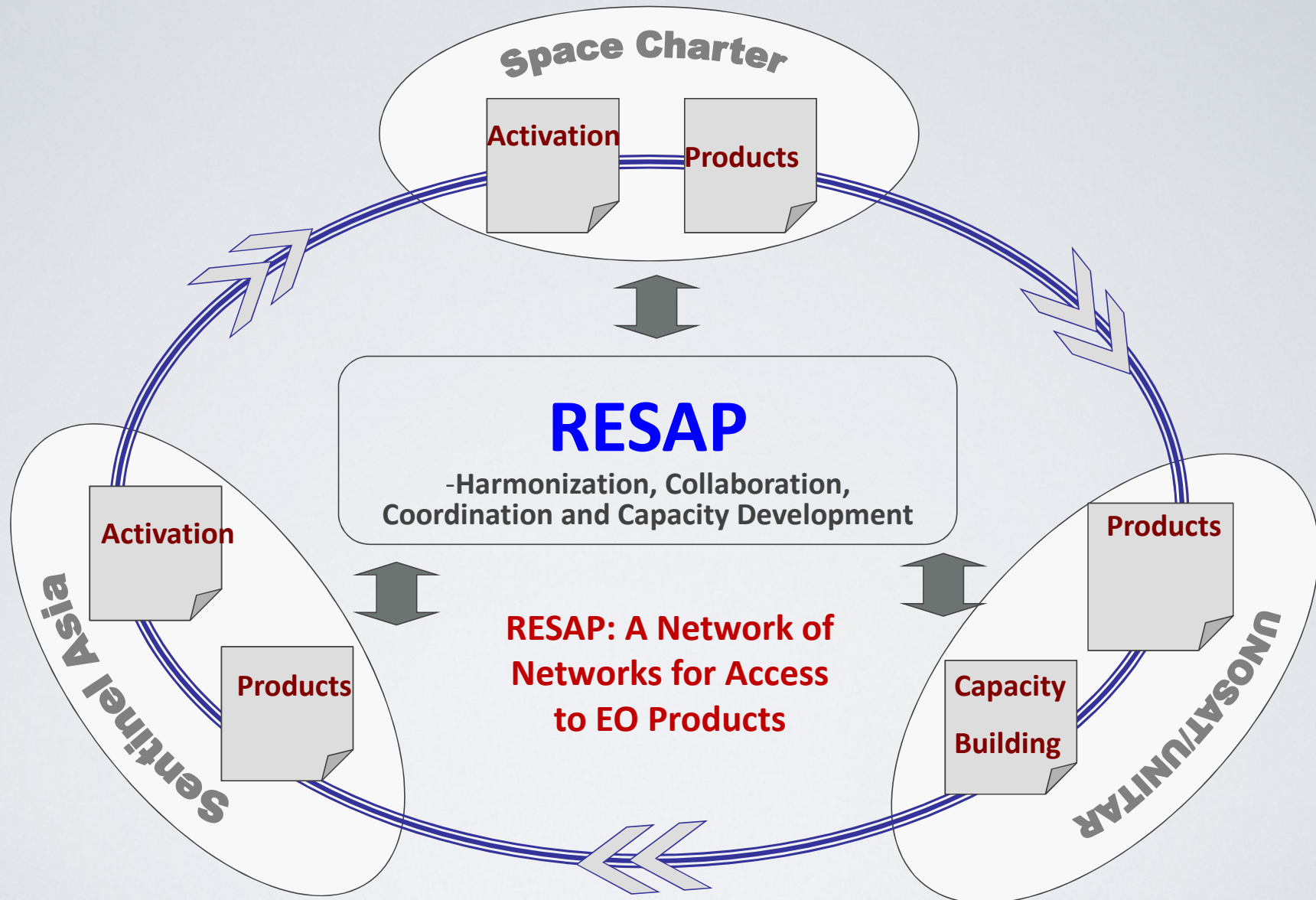
**Use Space to study the specific  
resilience  
issues - economic, social,  
environment, critical infrastructure  
and supply chains**

Building Resilience to  
Natural Disasters and  
Major Economic Crises





## II. Bridging the Gaps between EO products/services and its down-the-line utilization



It enable access to data products from the global and regional constellations of EO satellites



# Maximizing Access to Earth Observation Products

- Timely provision of near real-time imagery is critical for disaster response, relief and impact assessments-support disaster governance.
- In last 2 years, ESCAP has provided more than 150 near real-time satellite images and damage maps to Afghanistan, Bangladesh, China, Pakistan, the Philippines, Solomon Islands and others
  - Typhoon Haiyan--Under the RESAP framework, 19 scenes of radar and high resolution images by the Indian space agency, ISRO have been provided to the Philippines; More than 30 links of damage assessment maps and satellite images provided by UNOSAT.
  - Hailstorm and landslide in Afghanistan-ESCAP worked with UNITAR/UNOSAT to provide near real time satellite imagery to disaster management authority.
- Innovative technical tools for disaster early warning, response, relief and damage assessment
  - Provision of satellite imagery downloading supported by RESAP members and UN family, such as UNITAR/UNOSAT and UN-SOIDER
  - Establish networks of space based information/products sharing for DRR.

## ESTIMATED RAINFALL ACCUMULATION FROM 25 TO 29 APRIL 2014, AFGHANISTAN

Rainfall Accumulation Analysis with TRMM (TMPA-RT 3B42RT) Derived Data Acquired 25 to 29 April 2014

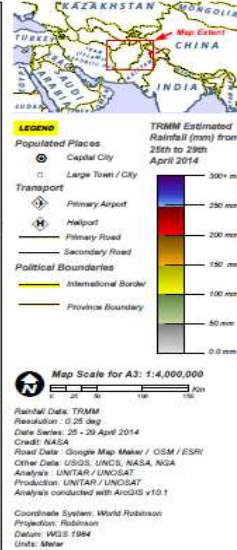
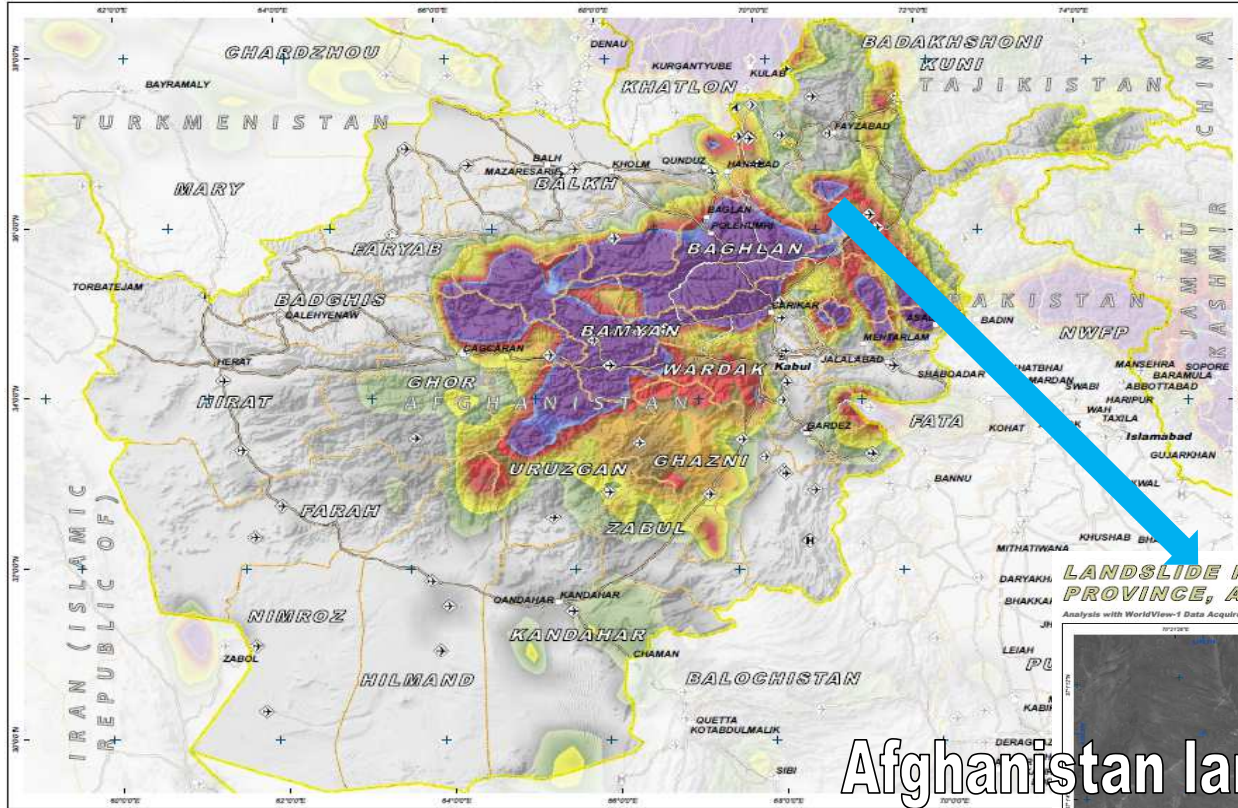
This map presents the estimated total rainfall accumulation for Afghanistan covering the period from 25 to 29 April 2014. This total estimate was derived from the Tropical Rainfall Measuring Mission (TRMM) precipitation dataset at a spatial resolution of approximately 0.25 degrees for this region. It is possible that precipitation levels may have been underestimated for local areas, and is not a substitute for ground station measurements.

Disaster coverage by the International Charter 'Space and Major Disasters'. For more information on the Charter, visit [www.internationalcharter-spaceandmajordisasters.org](http://www.internationalcharter-spaceandmajordisasters.org)



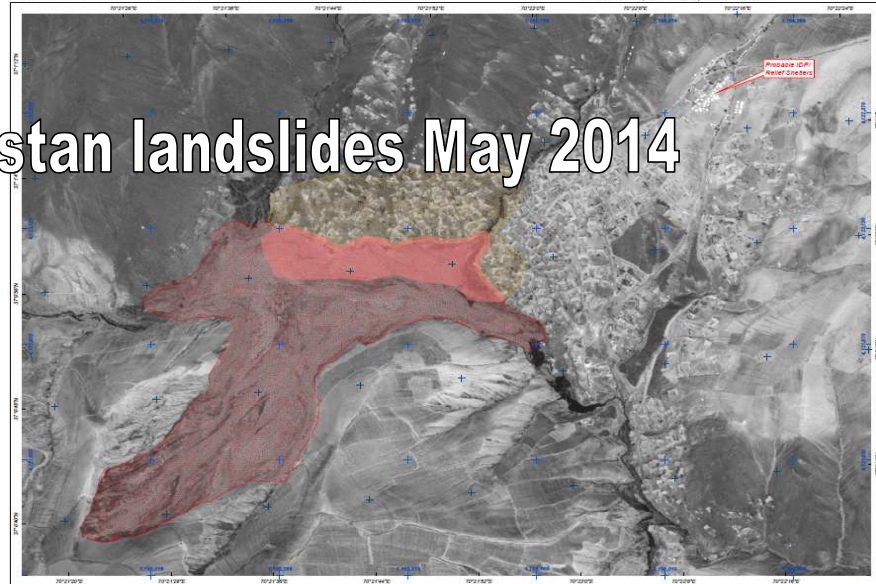
Heavy Rainfall & Flooding Event

Production Date: 01-May-14  
Version 1.0  
Activation Number: FL20140430AFG



## LANDSLIDE IN AB BAREK, BADAKSHAN PROVINCE, AFGHANISTAN

Analysis with WorldView-2 Data Acquired 3 May 2014 & Landsat 8 Data Acquired 30 March 2014



## Afghanistan landslides May 2014

**ESCAP: Mobilizing support from member Countries and partners to support disaster-affected countries for response, relief and impact assessments.**

ESCAP coordinated UNITAR/UNOSAT to provide landslide damage map to Afghanistan National Disaster Management Authority

Bridging the Gaps between EO products/services and its down-the-line utilization





# Regional Drought Mechanism

## -Monitoring, early warning and preparedness

- Drought is creeping disaster, long term socio-economic ramifications, affects more severely in developing countries due to the agrarian nature of the economy and low coping capacity. Between 1985 and 2013, 110 drought events occurred in the region, affecting 1.2 billion people and costing US\$52 billion.
- Aims to enhance the capacity of governments to use space-based data for effective drought monitoring and early warning.
- Apply science and technology to support the Asia-Pacific region in better addressing drought. Participating countries benefit from:
  - Enhanced access to space-based data;
  - Capacity building in preparedness and response;
  - Strengthened institutional coordination and policies at the country level; and,
  - Regional and South-South cooperation and support networks.
  - At present, two Regional Service Nodes have been put in place in China and India to provide space-based data/products as well as capacity building.
  - Cambodia, Mongolia, Myanmar, Nepal and Sri Lanka have applied for the pilot countries of the Mechanism.
  - Specialized training has been conducted in Mongolia and Sri Lanka.
- Delivery as “ONE UN”: partnership with UNITAR/UNOSAT, UN-SPIDER, UNCCD, FAO, WMO, ISDR, WFP and UNEP.

# The Drought Mechanism

## Four main components

Regional Service Nodes



Thematic and scientific communities



Pilot countries



The agricultural community



ESCAP facilitates interaction between these components

## Key Steps

How it all works



Provide satellite imagery and products



Monitoring



Government agencies analyse and share space-based information

Space-based information

Capacity building in space and GIS



Capacity building

Experts provide feedback on the scientific and technical methodology and procedures

Technical feedback



Networks share knowledge and good practices

Knowledge transfer



National institutions perform soil and moisture analysis



Ground-based information

Government provides early warning notifications and initiates timely relief measures



Early warning and timely relief



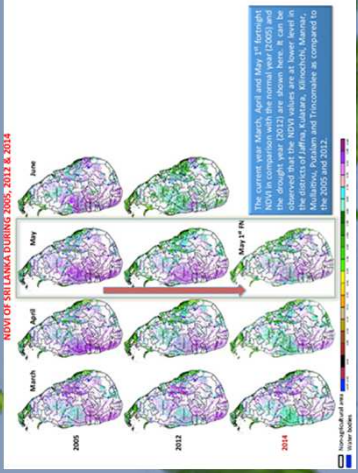
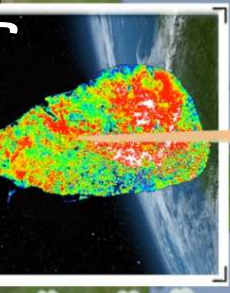
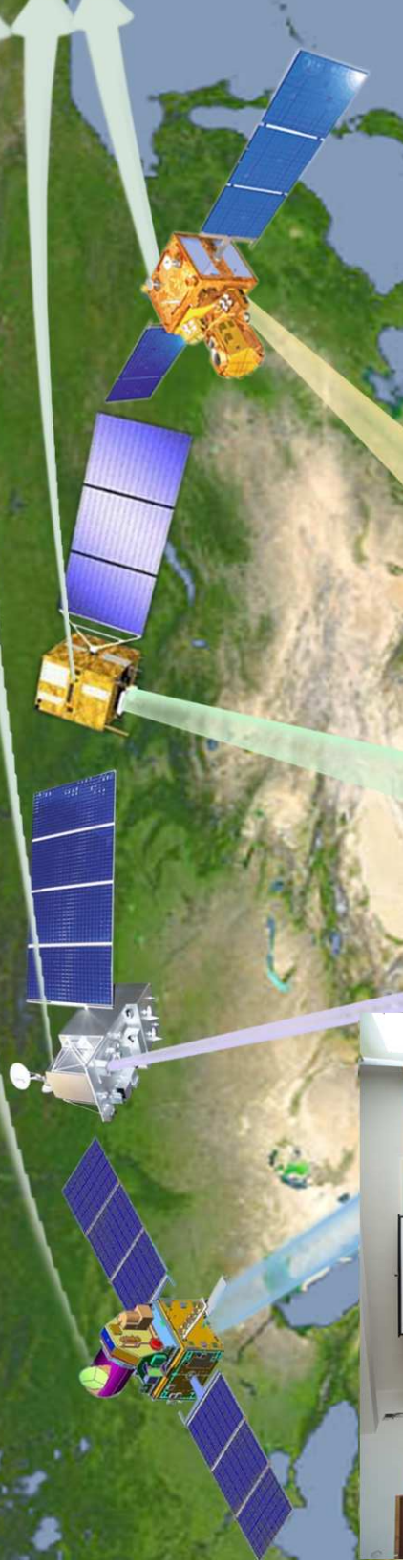
Agricultural community responds accordingly to minimise the effects of drought

Early action



**Piktochart**  
make information beautiful

# ESCAP Drought Monitoring and Early Warning - Sri Lanka Pilot Project



**Information**

Year	Frequency	Unit	Missing value	Status information
2002	10	mm	-99999	130
2003	10	mm	-99999	130
2004	10	mm	-99999	130
2005	10	mm	-99999	130
2006	10	mm	-99999	130
2007	10	mm	-99999	130
2008	10	mm	-99999	130
2009	10	mm	-99999	130
2010	10	mm	-99999	130
2011	10	mm	-99999	130
2012	10	mm	-99999	130
2013	10	mm	-99999	130
2014	10	mm	-99999	130

**Data information**

Type	Year	Unit	Frequency	Missing value	Status information
1	2002-2011	mm	10 days	-99999	130
2	2002-2011	mm	10 days	-99999	130
3	2002-2011	mm	10 days	-99999	130
4	2002-2011	mm	10 days	-99999	130
5	2002-2011	mm	10 days	-99999	130
6	2002-2011	mm	10 days	-99999	130
7	2002-2011	mm	10 days	-99999	130

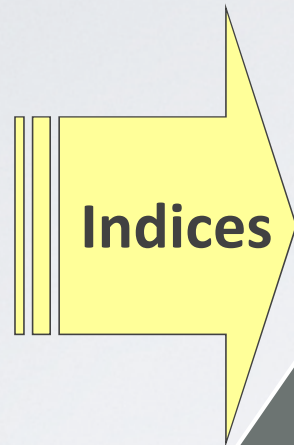
Finally arrangement data record is totally 30183



# Addressing Drought Risk Pyramid

## Piloting Drought Mechanisms: A Framework from Sri Lanka Proto Type

Mechanism  
EO data/  
Products



**Warning**

**Monitoring and Alert**  
(In-season)

Specialized and In-depth  
Training for sharing know-how  
and institutionalization

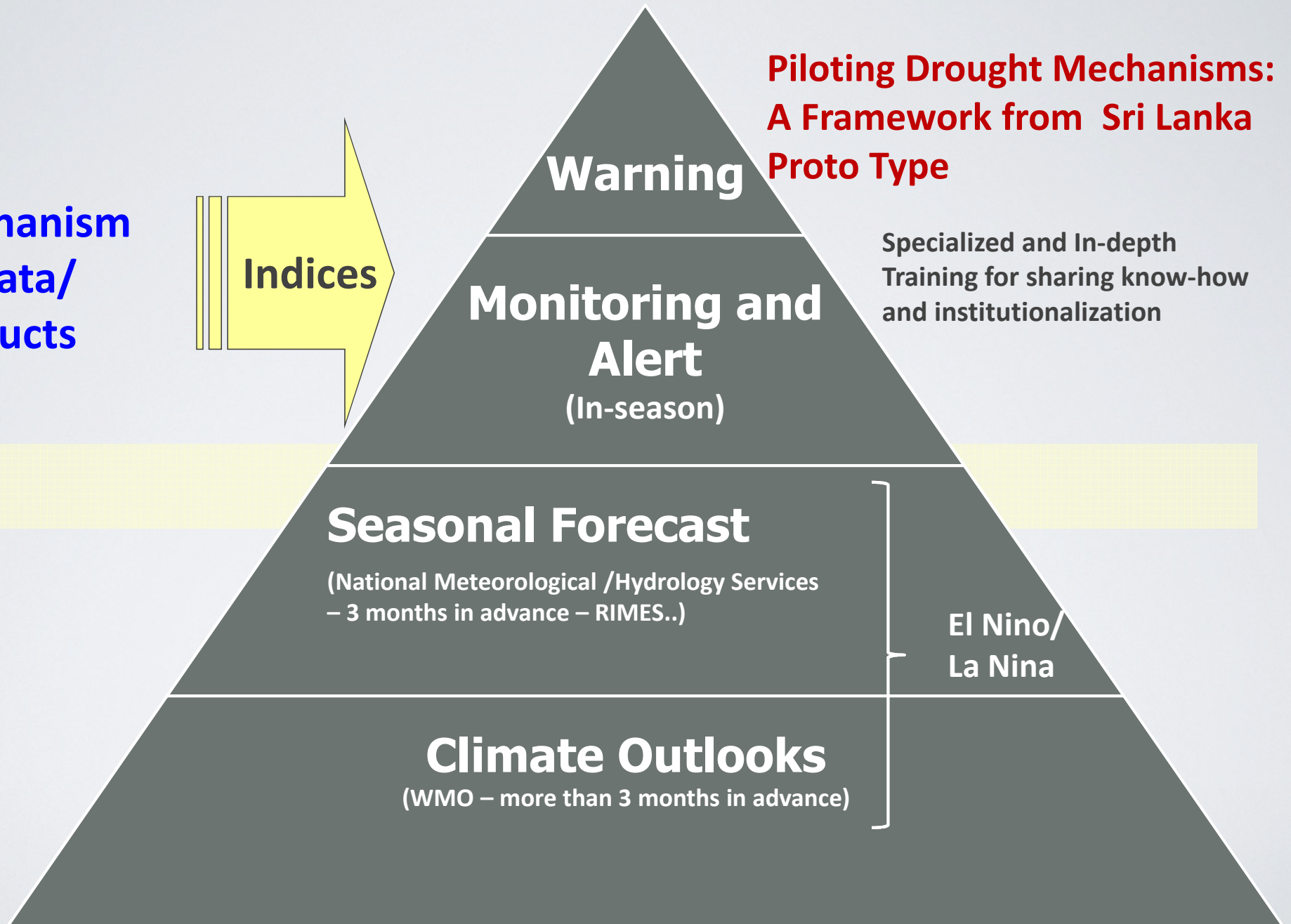
**Seasonal Forecast**

(National Meteorological /Hydrology Services  
– 3 months in advance – RIMES..)

El Nino/  
La Nina

**Climate Outlooks**

(WMO – more than 3 months in advance)

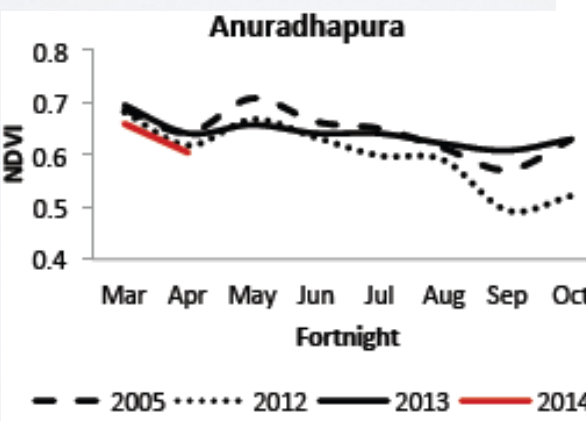
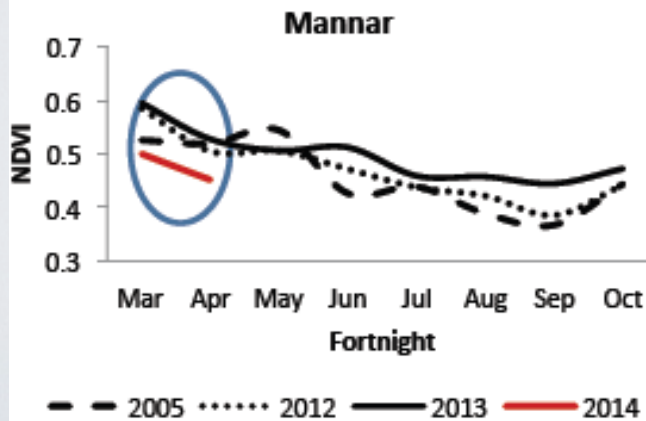
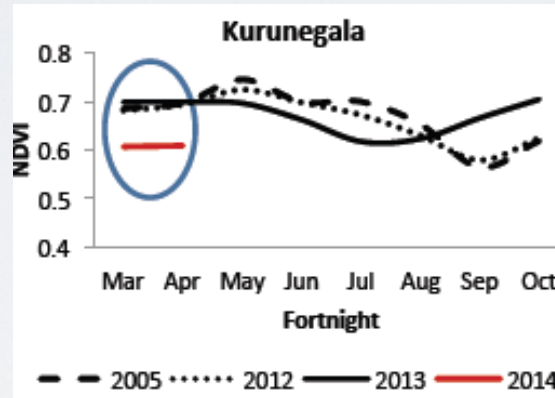


# Sri Lanka: *In-season* Drought Monitoring Pilot

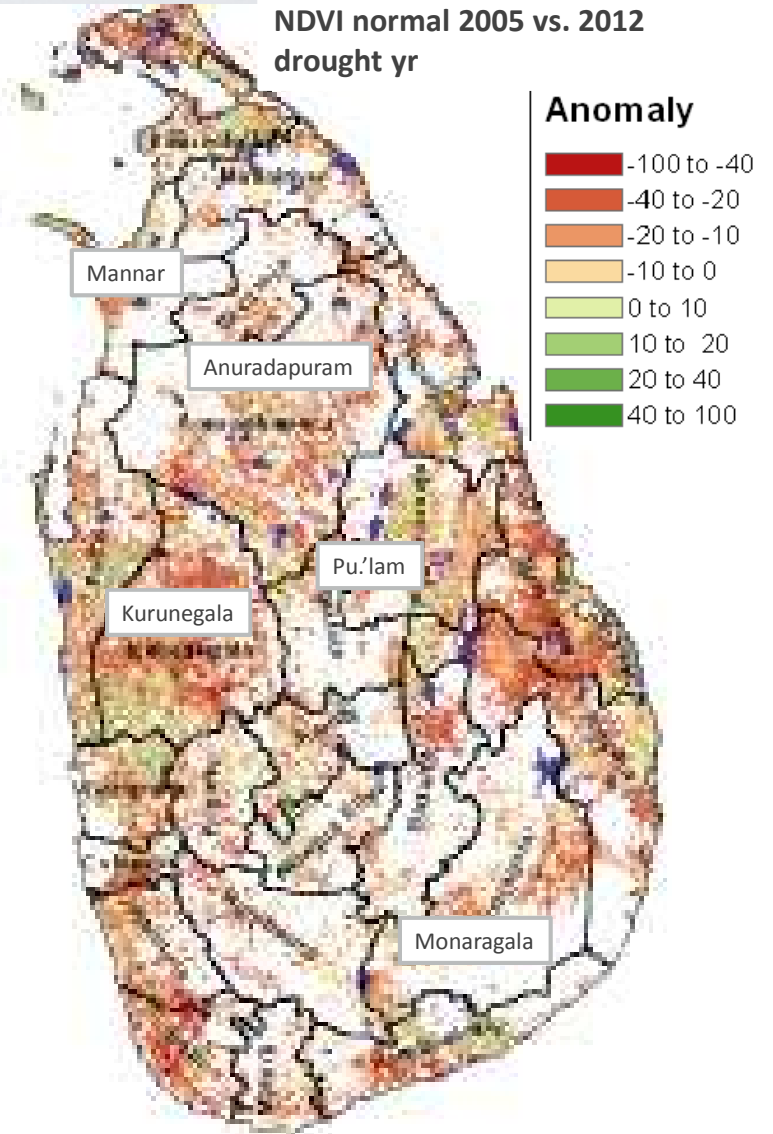
Reference : 2005 normal, 2012 drought and 2014 monitoring

	Cumulative (mm)	Average (mm)	Rainfall %	Reduction in production %
Anuradapuram	40.3	234.6	17.2	21%
Kurunegala	333.7	715.8	46.6	50%
Mannar	51.2	114.6	44.7	55%
Puttalam	78	230.7	33.8	58%

Coarse (NOAA/MODIS)  
@ national and  
Moderate (IRS AWiFA)  
@ district Levels



Anomalies analysis:  
NDVI normal 2005 vs. 2012  
drought yr



NDVI anomalies closely linked with  
reduction in crop production



### III. Capacity building to enhance the national capacity of developing countries

- Special focus on high-risk and low capacity developing countries.
  - Since 2012, 400 government officials/ practitioners of 38 member countries trained
- 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 – Dehra Dun), Indonesia and ESCAP – APCICT (Incheon, Republic of Korea)



## Conclusion

- While Science, Technology and Innovation are the key enablers for Post 2015 Development Agenda, Space Applications hold the key.
- Focus areas
  - **'Actionable' multi-hazard risk assessment, spatial land use planning, post-disaster needs assessment with efficient tools and techniques**
  - **Development of 'smart' insurance products, knowledge based decision support tools with data mining and cloud computing technologies**
  - **Precision agriculture for food security, regional geospatial data infrastructure for disaster risk management and sustainable development**
- RESAP collaborations with GEO, CEOS and other international bodies not only for data sharing, technology transfer and capacity development, but also for analytical policy research and advocacy

**Thank You !**