

UNITED NATIONS ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE
PACIFIC

Specialised Training on Disaster Rapid Impact Assessment using Space-Based Information

3-5 December 2014
Dehradun, India

Summary Training Report

Prepared by the Secretariat

I. Conclusions and Recommendations

1. The participants noted that rapid assessment of disaster is prompted by the need to immediately start the recovery and reconstruction work, especially in the most affected areas and to understand the nature of damages post disaster. Thus, damage and losses of the disaster need to be assessed for recovery/reconstruction, mainstreaming disaster risk reduction into development. In South Asia, damage and loss assessments following standard UN ECLAC methodology have been conducted only for few major disasters and that too with the support from development partners. In most of the cases, at national level – only damage is assessed and losses are not accounted for.
2. The participants recognized that there are huge gaps in estimating value of disaster effects in terms of damage and loss, including:
 - (1) Damage: assign a monetary replacement value to affected infrastructure and assets. It is valued at current price for both public, private and community goods.
 - (2) Loss: changes in flows due to the disaster linked with effects on production of goods and service delivery, governance processes and increased risks.
3. The participants also recognized that the rapid assessment has a huge opportunity cost as a result of time delay involved in detailed damage and loss assessment. In this regard, producing rapid assessment would be urgently needed for immediate financial support, recovery and reconstruction. In this case, using adequate and reliable innovative tools and techniques (Space/GIS/Navigation/Crowdsourcing) for assessment, produce evidence based assessments to bring in transparency and trust for financing recovery and reconstruction would be critical.
4. The participants noted with appreciation that there is an emerging trend in performing rapid assessment of disaster impacts by downscaling PDNA and attaching priority to the context specific limited sectors for assessment. For rapid assessment, there is a need to attach priority to the context specific limited sectors for assessment. For example, in case of earthquake, assessment of housing and infrastructure sectors is critical, while cyclone and floods require assessment of agriculture as well. New disaster risk is a common critical need. The rapid assessment has been driven by advances in STI, particularly space technology and GIS applications, statistical time-series analysis/simulations and semi-empirical loss assessment models. The next steps on enhancing the capacity of SAARC member countries, would be using smart tools and techniques for rapid assessment by coming up with a technical manual, which would highlight the methodology of rapid damage and loss assessment by key sectors, based on the type of disaster. The technical manual should be designed in a manner where it contributes substantially to the PDNA process, in case, it is taken up by the Government and development partners at a later date.
5. The participants benefited from the case studies and hands-on training. They expressed their appreciations to the organizers on: (1) learning the tools and techniques of Damage and Loss Assessment; (2) understanding how damage and loss assessment

could be made rapid, precise and evidence based; and (3) understanding how space/GIS/Navigation/Crowd Sourcing can add value to damage and loss assessment

6. The participants expressed their appreciation to the training that included demonstrative case studies drawn from South Asia, which helped in understanding the operational needs and institutional gaps along with the recent technologies being used for rapid assessment in South Asia. The participants also acknowledged that the demonstrative case studies would be included in the development of a Technical Manual on Rapid Assessment for South Asia Recovery by ESCAP and SAARC DMC, which would be used for regular capacity development training programmes as well as for conducting rapid assessment of damage and loss in the region.
7. The participants recognized that the skills required for performing rapid impact assessment should be developed with additional detailed training at required levels of disaster management within SAARC countries, and institutional capacity development amongst SAARC countries is still required, for performing rapid impact assessments that are efficient, timely and quantitative in nature. In this regard, the participants recommended that ESCAP secretariat should work closely with SAARC DMC and CSSTEAP on further enhancing the capacity of countries in using innovative technologies for rapid disaster assessment.
8. The participants expressed the willingness on developing a methodological framework for post-disaster damage and loss assessment using innovative tools/techniques. The participants also endorsed the proposed outline of Rapid Assessment for Resilient Recovery (RARR) technical manual presented at the end of the training. (See Annex 4) and expressing willingness to use the tools and technologies presented for rapid assessment. The participants also recommended SAARC Member Countries to work closely through the regional and sub-regional cooperative frameworks, in particular for the need of developing a common template of baseline data, regular updating and validation, for member states to access at regional and nation level for rapid assessment.
9. The participants recommended that ESCAP, in collaboration with SAARC DMC should take initiative for developing database or geo-database for easy access for member states for rapid assessment.
10. The participants expressed the appreciation to ESCAP and SAARC Disaster Management Centre (DMC) on joint working for developing the methodology of Rapid Assessment of Damage and Loss for South-Asia as it will contribute to the South Asia Recovery Framework led by SAARC.

II. PROCEEDINGS

B. Organization of the Meeting

The Specialized Training on Disaster Rapid Impact Assessment using Space-Based Information was held at the Lemon Tree Hotel, Dehradun, India from 3 to 5 December 2014. The United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), SAARC Disaster Management Centre (SDMC) and the Centre for Space Science and Technology Education in Asia and the Pacific (CSSTEAP), part of the Indian Institute of Remote Sensing (IIRS) of the Indian Space Research Organisation (ISRO) jointly organized the training.

Taking advantage of the Expert Group Meeting (EGM) on the Rapid Assessment of Post-disaster Damage and Losses from 1 to 3 December 2014 at the same venue, the specialized training was organized in conjunction and some of the key outcomes of the EGM were utilized in the proceedings of the training programme. The specialized training was attended by some additional participants, with hands on experiences in post-disaster damage and loss assessment.

C. Attendance

The specialized training was attended by experts and practitioners from Afghanistan, Bangladesh, Bhutan, India, Maldives and Nepal. The complete list of the participants is included in Annex 3 of this report.

D. Specialized Training

The specialized training sessions provided experts and practitioners with hands-on experience in using space/GIS/Navigation/Crowd Sourcing techniques for rapid assessment of post-disaster damage and loss.

- Dr. H. Karnatak, an Expert on GIS, Navigation System and Crowdsourcing from CSSTEAP/IIRS, trained the participants on real-time GIS data collection and its integration to a central server using mobile GIS. The case study of “Mapping the Neighborhood of Uttarakhand” (MANU) was discussed introducing the concept of “Crowdsourcing” and its participatory approach using Web 2.0 for collecting data through an online, distributed problem solving and production model. Recent trends of Volunteered Geographic Information (VGIs) and Public Participation GIS (PPGIS) for instance Wikimapia.org, Openstreetmap.org, etc. and how these technologies are adding power to the people or community (crowd) was shared with the participants. Such tools may be very effective and can be replicated in other countries for primary data collection, data analysis and modeling for rapid assessment of post-disaster damage and loss with reasonable accuracy and evidence based geo-spatial attributes. While hands on session on the crowd-sourcing, Dr Karnatak also demonstrated the Bhuvan geo-portal (www.bhuvan.nrsc.gov.in), that provides 2D and 3D display capabilities and offers diversified geospatial services including visualization and decision support.

- Dr. S.P. Aggarwal, an Expert on Floods and Water Resources from CSSTEAP/IIRS demonstrated innovative tools for the Flood Inundation Mapping, Damage assessment and Vulnerability Analysis and conducted hands on training session for the participants. Different types of requirements during the Preparedness, Response & Recovery and Mitigation Phases along with reference to the type of space data were also demonstrated. Determination of Flood spatial extent, Delineation of Flood Depths from Radarsat imageries and Digital Elevation Model (DEM), Base Map Generation for mapping elements at risk, Analysis of housing structural types, road types and agricultural crop with its spatial distribution were demonstrated during the hand on session. Cases such as Damage due to Mud Flow with case study in Leh, India (2010), 2013 Cyclone Inundated areas in part of Odisha State and Flood Damage Assessment and identification of safe routes for evacuation using a Micro-level approach in part of Birupa river basin, Odisha, India, were also demonstrated.
- Dr. N.R.Patel, an Expert on Agricultural Drought from CSSTEAP/IIRS demonstrated the know-how of agricultural drought assessment and monitoring using earth observation data and highlighted an overview of various satellite derived meteorological drought indices and its spatial analysis. He highlighted that as of now, monitoring and assessment of drought using satellite based drought indicators are available but this information has not been used for drought based agricultural damage assessment.
- Dr. C.M. Bhatt, an Expert on Disaster Risk Management from National Remote Sensing Centre, Hyderabad, demonstrated the geospatial tools for disaster monitoring, early warning and damage assessment. He introduced the Disaster Management Support Programme of ISRO and the various operational products and services including the rapid assessment of post-disaster damage and loss. Mapping of Major Floods/Cyclones in India for preparedness and monitoring at country, state and district level were also highlighted with specific cases of Cyclone HUDHUD October 2014, Jammu & Kashmir Floods September 2014, Sunkoshi Landslide August 2014, Cyclone Phailin October 2013(also including damage assessment), Kedarnath Floods June 2013 (also including damage assessment), Kosi Floods August 2008. He also briefly presented the assessment of flood hazard zonation for mitigation and early warning along with In Season Agricultural Drought Assessment of Sri Lanka - Yala 2014.
- Dr. S. Saran, an Expert on Spatial Data Infrastructure from CSSTEAP/IIRS, demonstrated the National spatial data infrastructure concept for disaster management. He also demonstrated Geonetwork Open Source to build SDI to enable access to geo-referenced databases and cartographic products from a variety of data providers through descriptive metadata, enhancing the spatial information exchange and sharing between organizations and their audiences, reducing duplication, enhancing information consistency, quality and to improve the accessibility.
- Satellite communications systems for early warning, search, rescue and emergency response, was presented by Dr. Sudhir Aggarwal, an Expert on Emergency Communication from Space Applications Centre, Ahmedabad. Tsunami Early Warning System was also introduced along with the present DMS system and its limitations. Certain technical challenges were identified as Development of Rapid

Deployable terminals, Integration & convergence of last-mile connectivity services, WiFi, GSM, CDMA extensions for quick reach, efficient satellite bandwidth management, etc. To overcome some of these challenges the new proposed National Disaster Management Network is under design.

- Ms. Charu Singh, an Expert on Meteorology from CSSTEAP/IIRS, presented on the Fundamentals of satellite meteorology and study of extreme rainfall events. She also shared cyclone experience on satellite based rainfall data sources, availability and usage.
- Dr. A.K. Mishra, an Expert on Meteorology and Oceanography from CSSTEAP/IIRS, shared the know-how of weather forecasting, track prediction of cyclones and early warning for hydro-meteorological hazards including access to data required for storm surge studies for example eSurge Data Viewer, ADCCIRC Model Forecast, etc. Examples of the means of communication, planning and preparation prior to the landfall of Phailin in Odisha, was also discussed.
- Dr. A. Goswami, Expert on landslides, demonstrated how remote sensing data and weather sensors were used, for vulnerability assessment and mapping of all glacial lakes over the study area (Arunachal Pradesh, Sikkim, Uttarakhand, and Jammu & Kashmir Himalaya) and all potentially hazardous glacial lakes. The presentation also mentioned, how SONAR instrument was developed, to study the Glacier Lake Bathymetry with further acquisition of ground based geological data of glacial lakes surroundings, to be used as factors to describe the chance of glacial dam breach.

List of Annex Documents

1. Annex 1: Concept note
2. Annex 2: Programme
3. Annex 3: List of Participants
4. Annex 4: Outline of technical manual for rapid impact assessment for building resilience



Expert Group Meeting and Specialised Training on Disaster Rapid Impact Assessment using Space-Based Information

1-5 December 2014
Dehradun, India
CSSTEAP Campus

Concept Note

Background and Context

The ESCAP-ISDR Asia Pacific Disaster Report 2012 highlights that the Asia Pacific region accounted for more than 74.6 % of the global human fatalities due to natural disasters between 1970 and 2011, while South Asia and South West Asia emerged as the subregion with the largest share of human fatalities. South Asia is home to 23 % of the world population though it accounts for only less than 2 % of the world's income, reflecting poverty, deprivation and vulnerability of its people, while facing an onslaught of recurring natural disasters. Some of the major disasters faced by South Asian countries in the recent past include the Bhutan earthquake in 2009, the Pakistan floods in 2010, the Sikkim earthquake in India in 2011, the building collapse in Dhaka in April 2013, the devastating floods in Uttarakhand (India) in June 2013, cyclone Phailin (Odisha, India) in October 2013, Badakhshan (Afghanistan) mudslides in April 2014, landslide across the Saptakoshi River (Nepal) in August 2014, floods in Northern India (Jammu and Kashmir) and Pakistan in October 2014 and cyclone Hudhud (Andhra Pradesh and Odisha, India) in October 2014.

Post-disaster damage and loss assessments have been conducted by the affected countries for emergency response, recovery and reconstruction. However, often, due to a lack of standardized methodologies, these assessments are not precise neither always multi-sectoral. The UN Global Assessment Report 2013 observes that direct disaster losses are at least 50 percent higher than internationally reported figures. The quality of timely and multi-sectoral assessments contribute substantially to recovery and reconstruction, which is an important window for the ex-post investments towards mainstreaming disaster risk reduction into sustainable development. The UN ECLAC Damage and Loss Assessment (DaLA) based Post-Disaster Needs Assessment (PDNA) serves as an important tool for the valuation of physical damages and economic losses to support the financing needs for recovery and reconstruction. With the standardized methodology adopted by several development partners, the PDNA enables sector-wise damage and loss assessment and helps the affected countries to mobilize the financial resources for recovery and reconstruction including assistance from donors and development partners.

While PDNA missions are always led by the affected countries, lack of institutional capacity has been the constraining factor in adopting and institutionalizing DaLA methodology into the national disaster damage and loss assessment system. Furthermore, in the recent times, there is an emerging trend in performing rapid assessment of disaster impacts by downscaling PDNA and attaching priority to the context specific limited sectors for assessment. The rapid assessment is also driven by advances in Science, Technology and Innovation, particularly space applications, Geographical Information System (GIS), statistical time-series analysis/simulations and semi-empirical loss assessment models, such as ShakeCast and Early Post-Earthquake Damage Assessment Tool (EPEDAT) for potential earthquake damage assessment. Using smart tools and techniques, the rapid assessment needs to be designed in a manner where it contributes substantially to the PDNA process, in case it is taken up by the Government and development partners at a later date.

The Centre for Space Science and Technology Education in Asia and the Pacific (CSSTEAP), hosted by the Government of India's Department of Space (DOS), is the premier institution for capacity development in space and GIS applications. The CSSTEAP, which is affiliated to the United Nations, is a part of the education and training network under the Regional Space Applications Programme for Sustainable Development in Asia and the Pacific (RESAP) of ESCAP. CSSTEAP also works with SAARC Disaster Management Centre for capacity development in remote sensing and GIS applications for disaster risk management.

The SAARC is working on the development of the South Asia Recovery Framework and requested technical assistance from ESCAP for developing the methodology of Rapid Assessment of Damage and Loss based on smart DaLA/PDNA tools. Similarly, in the second phase of ASEAN-UN Strategic Plan of Action on Disaster Management (SPA/DM II), ESCAP is working with ASEAN on space applications in damage and loss assessment. ESCAP Resolutions 70/13, 69/11 and 69/12 lay emphasis on the implementation of the strategies and policies for mainstreaming disaster risk reduction and to work with ASEAN, SAARC and SPC/SOPAC. The Expert Group Meeting (EGM) on space applications for damage and loss assessment, jointly with SAARC and CSSTEAP, scheduled from 1-5 December 2014, in Dehra Dun, India aims to discuss the details of rapid assessment with the stakeholders from SAARC member countries. The case studies of using smart tools and techniques for rapid assessment in recent disasters, such as the Pakistan floods in 2010, Haiti earthquake 2011, the devastating floods in Uttarakhand (2013), Cyclone Phailin (2013), Badakhshan mudslides (2014), Floods in Jammu and Kashmir and Pakistan (2014) and Cyclone Hudhud (2014) and 2014 drought in India and Sri Lanka will be used to develop the rapid

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