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**Geospatial Information System for Disaster Risk Management in
Asia and the Pacific ***

* Prepared by Dr. Ram S. Tiwaree, Economic Affairs Officer, ICT and DRR Division, United Nations Economic and Social Commission for Asia and the Pacific (UN-ESCAP)

Geospatial Information System for Disaster Risk Management in Asia and the Pacific¹

Abstract

This paper briefly presents the current gaps and needs of the geospatial information for disaster risk management in Asia and the Pacific, particularly in least developed and land-locked and small island developing countries. It highlights ESCAP secretariat's initiative to address the current gaps through capacity building, developing geo-reference portals in selected countries and establishing the community of the practices and its linkage with regional level networks.

Disasters losses in Asia and the Pacific

Asian and the Pacific region which houses 61% of the world population in 2010 [1] and has been suffering largely from natural disasters. It is the most disaster prone and the most affected region from natural disasters in the world. In the decade from 2000-2009 the total reported loss in the region was USD 366 billion, whereas the economic losses reported only in 2011 had grown to USD 294 billion or equivalent to fully 80 per cent of the losses reported in the preceding decade. In fact, this is also almost 80 per cent of global economic losses of USD 366.1 billion in disasters in 2011 [2, 3].

The earthquakes that occurred in Japan, New Zealand, and Turkey in 2011, as well as the unprecedented floods in Australia and Thailand resulted in massive destruction and the loss of thousands of people's lives. Almost 90 per cent of the Asia-Pacific losses were attributed to the two major disasters in Japan and Thailand. Losses reported in 2011 for South-East Asia alone almost doubled from the preceding decade [3].

The Global Assessment Report 2011 [4] suggests that deaths due to natural disasters are declining globally. However the concentration of human losses has been enormous in the Asia-Pacific region. 75% of all deaths due to disasters from 1970 to 2011 are concentrated in the region. There is a continuous rise in death due to small-scale disasters.

Impacts of disasters to low income/small economies

For low income/small economies, small-scale disasters have proved equally destructive compared to large-scale disasters. For example, in Nepal, the number of deaths and the damage to housing is similar from large scale but rare disasters as compared to small scale but frequent ones. Small economies are more vulnerable to the effects of external shocks such as disasters. These countries suffer much higher percentages of gross

¹ Space Applications Section, Information and Communications Technology and Disaster Risk Reduction Division, United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), Rajadamnern Nok Avenue, Bangkok 10200, Thailand.

domestic product (GDP) affected by natural disasters, as compared to medium and large developing countries. In the case of the Maldives, the estimated damage and losses from the Indian Ocean earthquake and tsunami was 62 per cent of GDP as per the post-disaster needs assessment [3]. Disaster has impact on the rate of achievement of millennium development goals (MDGs) by many least developed countries (LDCs) and small island developing states (SIDS).

Geospatial information for disaster risk management

Effectiveness of disaster risk management depends greatly on the efficiency in managing relevant information. In a disaster situation, authorities need up-to-date information, particularly the geospatial information to make decisions quickly and take the appropriate and timely action. They need to quickly grasp the overall extent of the disaster to determine both the type, and scale of assistance as well as to assess the individual needs of each affected community.

Poor or non-interoperable information exchanges between key players can be catastrophic. A mechanism that integrates data and manages workflow between disaster risk management authorities and their service providers is essential. There is a need of analyzing geospatial data in a geographical information system (GIS) in the form of satellite imagery and field data cannot be analyzed which need to be geo-referenced to each other. There are several space agencies and organizations providing geospatial data in the region. Some developed countries have well established facilities and institutions which can geo-reference such data and also analyze them into useful information base for Disaster Risk Management (DRM).

While some high risk developing countries have such data holding systems targeted at natural disasters, there is a lack of consistency and standardization. This severely limits the level of disaster risk reduction, preparedness and early recovery efforts. The lack of such data becomes most visible in the wake of a disaster. Moreover, such dedicated geospatial data processing system for DRM are absent in developing countries, especially least developed countries (LDCs), land-locked developing countries (LLDCs) and small island developing states (SIDS) in the region. Disaster management authorities in those countries do not have sufficient technical and institutional capacities to use geo-referenced data and information. This is a major bottleneck in the efforts towards effective disaster preparedness, response and recovery.

One of the objectives set out at the World Conference on Disaster Reduction (WCDR) held in Kobe, Japan in 2005 was “to increase the reliability and availability of appropriate disaster-related information to the public and disaster management agencies in all regions”. Accordingly, one of the strategic goals listed in the Hyogo Framework for Action (HFA) (2005-2015) is “the development and strengthening of institutions, mechanisms and capacities at all levels, in particular at the community level, that can systematically contribute to building resilience to hazards” Further, the Seoul Declaration on 26 October 2011 on United Nations Global Geospatial Information Management (UN-GGIM) has recognized the need for full interoperability of multi-

dimensional geospatial information and integration with other data sources at national, regional, and global level not only for sustainable development but also for disaster risk management.

ESCAP secretariat initiative on geospatial information

In order to address the issues mentioned previously, strengthening capacity of disaster management authorities particularly in LDCs, LLDCs and SIDS has been realized. The United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) has embarked on a project: “Improving disaster risk preparedness in the ESCAP region” [5]. The project aims to strengthen government capacities in the implementation of the Hyogo Framework for Action (HFA) through the use of geo-referenced/geospatial information tools for the implementation of disaster risk preparedness, and timely early recovery efforts in the Asia-Pacific region. The project targets up-to 30 ESCAP member countries including LDCs, LLDCs, SIDS and other disaster-prone/high risk developing countries. The target group includes senior level policy and decision makers as well as the middle level/professional staff in those countries who have responsibility or are involved in managing disaster risk.

The project’s expected accomplishments (EAs) are: (i) to build the governments capacity to establish and use geo-referenced information platform for disaster risk reduction and management, including risk identification, preparedness, response planning, post-disaster assessment and recovery planning; and (ii) to establish the communities of practices for spatial data infrastructure and its linkage to regional-level networks supportive of disaster risk identification, preparedness and related information sharing and analysis.

In its implementation process, the project has given utmost importance to collaborate with its sub-regional organizations (SROs), as well as to its partnership with international and regional partners, such as United Nations Office for the Coordination of the Humanitarian Affairs (OCHA) and United Nations International Strategies for Disaster Reduction (ISDR), United Nations Development Programme (UNDP), United Nations Office for Outer Space Affairs (OOSA), South Asian Association for Regional Cooperation (SAARC), Association of the South-East Asian Nations (ASEAN) and other relevant players in the region. It will build on the existing initiatives of its partner organizations. The project is expected to contribute the overall goal of the ESCAP promoted Regional Space Applications Programme for Sustainable Development (RESAP), and also that of ESCAP’s Information and Communications Technology and Disaster Risk Reduction Subprogramme.

Preliminary outcome of ESCAP initiative and way forward

As a first step in implementing the project, a preliminary survey on data needs and gaps to establish geo-referenced disaster risk management (Geo-DRM) system was conducted [6]. All the surveyed countries² under LDCs, LLDCs and SIDS categories and other high

² Surveyed countries were: Afghanistan, Kyrgyzstan, Maldives, Mongolia, Myanmar, Nepal, Fiji, Indonesia, Philippines, Pakistan, and Japan (as high risk developed country).

risk developing countries have no availability of space-based information from their own sources. All countries except Indonesia and Philippines have no digital maps produced by their mapping/surveying agency/department. However, all surveyed countries except Afghanistan have availability of socio-economic statistics generated by them. It was also noted that all the surveyed countries under the category of LDCs, LLDCs and SIDS do not have prominent disaster risk management agency at the national level and they also do lack capacity/skills for working on geo-referenced system for DRM, such as geo-referencing and information development, and reporting; remote sensing data processing for GIS database; and GNSS/GPS skill for location mapping for GIS database. The survey also revealed that countries in the region have geospatial data in variety of map scales. There is a need to standardize the scales to which the data should be stored. A three-pronged strategy for the database generation/ collection/ compilation for disaster were proposed to be adopted. Maps at 1:50,000 scales for entire country are needed for country/ province level DRM actions, whereas, 1:10,000 scale is suggested for the multi-hazard prone areas such as coastal belts, mountainous region and flood plains. For certain type of disasters such as earth-quake and flooding in urban areas, scales 1:2000 or better may be required in the geo-referenced system.

The experts participating in the Expert Group Meetings (EGM) [7] organized by the secretariat from 15 to 17 February 2012 in Bangkok, Thailand shared their national/regional experiences and recommended that countries with special needs (CSN), particularly LDCs, LLDCs and SIDS in the region were to be empowered by geo-referenced information, which had been the unmet needs for disaster preparedness. This has to be enabled by developing synergy through regional cooperation of sharing geo-referenced information and capacity building efforts for their adaptation and effective utilization. For this purpose, the disaster management agencies in those countries were encouraged to promote country specific spatial data infrastructure (SDI) in-line with regional/global SDI.

The experts recommended organization of the regional workshops for senior level policy makers for awareness creation, development of Geo-DRM portals in selected countries with special needs, and establishment of a network of Community of Practices (COP) among the disaster risk management stakeholders. The proposed COP is expected to be expanding to other users including academic institutions and private sector once the establishment and commissioning phases are completed. It was recommended that the technical training programmes, study and also advisory services/technical assistance be arranged for national disaster management agencies and authorities, and other relevant national organizations of those countries where geo-DRM portal may be developed.

During the regional workshop organized for south and south-west Asian and north and central Asian countries in Kathmandu in July 2012 [8], the participating ESCAP member countries agreed on the importance of harnessing the potentials of Geo-DRM portal for facilitating data sharing for disaster risk management. The Geo-DRM portal was envisaged as an integral part of ESCAP DRR Gateway. The Geo-DRM was recommended to be dovetailed to the existing initiatives at country as well as sub-regional levels. High level dialogues were advised to initiate with South Asia Association

of Regional Cooperation (SAARC), Economic Cooperation Organization (ECO) and Central Asian Centre for Disaster Response and Risk Reduction by ESCAP Secretariat through its Sub-regional Offices for South and South-West Asia, New Delhi, India and North and Central Asia, Almaty, Kazakhstan. Technical assistance for feasibility study towards implementing the Geo-DRM in Bangladesh, Kyrgyzstan, Maldives and Nepal followed up by capacity development training was recommended.

The ESCAP secretariat has already initiated its work to realize the major outcome of the regional workshop held in Kathmandu and also that of the EGM held in February 2012 to realize the goal of the project which anticipates to empower the governments in the region to establish and use geo-referenced information platforms for disaster risk management, and also establish the community of practices of spatial data infrastructure and its linkage to regional level networks on disaster risk management.

Conclusion

Asia-Pacific is the hardest hit region by natural disasters and its impact is largely felt by small/low income economies. In a disaster situation, authorities need up-to-date information, particularly the geospatial information to make decisions quickly and take the appropriate and timely action. However many developing countries, particularly LDCs, LLDCs and SIDS do not have sufficient capacities to develop and use such information. ESCAP initiative which being currently implemented and aimed to strengthen government capacities in the implementation of the Hyogo Framework for Action through the use of geo-referenced/geospatial information tools for effective disaster risk management, is an important step although there are challenges ahead including the sustainability of the geo-portals and community of practices to be established.

References

1. ESCAP, Statistical Yearbook for Asia and the Pacific, 2011.
2. ESCAP, Economic and Social Survey, 2012.
3. ESCAP-ISDR, Asia-Pacific Disaster Report, 2012 (*in press*).
4. ISDR, Global assessment report on disaster risk reduction, United Nations, Geneva, 2011.
5. ESCAP, Improving disaster risk preparedness in the Economic and Social Commission for Asia and the Pacific region, United Nations Development Account Project (*unpublished*).
6. ESCAP, Survey report on analytical overview of unmet data needs and critical gaps to establish a geo-referenced disaster management information system/platform in the high risk developing countries of Asia and the Pacific, March 2012, <http://www.unescap.org/idd/events/2012-DA7-EGM-on-Geo-reference/Need-Assessment-Report-Draft.pdf>
7. Meeting report of the Expert Group Meetings on geo-reference disaster risk management information system in Asia-Pacific region, Bangkok, February 2012,

<http://www.unescap.org/idd/events/2012-DA7-EGM-on-Geo-reference/Summary-meeting-report-Final.pdf>

8. Meeting report of the regional workshop on geo-referenced disaster risk management information system in South and South-west, and Central Asia, Kathmandu, Nepal, July 2012, <http://www.unescap.org/idd/events/2012-WS-Georeferenced-DRR-Nepal-10-12-Jul-12/Report-summary-Kathmandu-July-2012.pdf>