



Workshop on Space Applications for Disaster Risk Reduction and Management and Second Workshop on the Use of Multi-Global Navigation Satellite Systems for Sustainable Development

> 5-7 March 2013 UNCC meeting room A Bangkok, Thailand

Meeting Summary

A. Organization of the Meeting

- Two workshops, "The Workshop on Space Applications for Disaster Risk Reduction and Management" and the "Second Workshop on the Use of Multi-Global Navigation Satellite Systems for Sustainable Development" were jointly held back to back from 5-7 March 2013. The program for the workshops is attached as Annex 1.
- 2. The workshops were attended by representatives and experts from the disaster management divisions of the governments of following countries: Bangladesh, Bhutan, Cambodia, China, Fiji, Indonesia, Lao People's Democratic Republic, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Samoa, Sri Lanka, and Vanuatu. The most of the participants were from Land-Locked countries and Small Islands countries as well as the participants of the Multi-GNSS workshop held in March 2012.
- 3. The workshops were also attended by the representatives and the experts from following regional/intergovernmental disaster management organizations and initiatives: Regional Space Applications Programme for Sustainable Development (RESAP), Sentinel Asia, Regional Integrated Multi-hazard Early Warning System for Asia and Africa (RIMES) and Asian Disaster Reduction Center (ADRC).
- 4. The workshops were also attended by the representatives and the experts from Multi-Global Navigation Satellites Systems of Asia (MGA), Quasi-Zenith Satellites System (QZSS) and BeiDou Navigation Satellites System.

- 5. The workshops were also attended by the representatives of development funds, Asian Development Bank (ADB) and the ESCAP Trust Fund for Tsunami, Disaster and Climate Preparedness.
- 6. The Workshops were also attended by the representatives of United Nations entities: Food and Agriculture Organization (FAO), United Nations Convention to Combat Desertification (UNCCD) as well as other entities: Asian Institute of Technology (AIT), China Electronic Technology Group Corporation (CETC), China Satellite Navigation Office, China Shanghai Compass Navigation Company, Geo-Informatics and Space Technology Development Agency (GISTDA), Japan Aerospace Exploration Agency (JAXA), Mobile Innovation Company Limited (MICL), Remote Sensing Technology Center of Japan (RESTEC), Tokyo University of Marine Science and Technology, PASCO Company, and Wuhan IT Outsource Services and Research Center. List of the participants is attached as Annex 2.
- 7. Ms. Shamika Sirimmane, Director of Information and Communications Technology and Disaster Risk Reduction Division (IDD), ESCAP welcomed participants of the Workshops by delivering her opening remarks. Then Mr. Michio Ito, Expert of Disaster Risk Reduction Section (DRS), IDD, ESCAP presented the purpose and expected outcomes of the two workshops. The facilitator of "The Workshop on Space Applications for Disaster Risk Reduction and Management" on Day 1 was Mr. Nokeo Ratanavong, Officer in Charge (OIC) of DRS/IDD/ESCAP. Mr. Wang Keran, Chief of Space Applications Section (SAS)/IDD/ESCAP facilitated the "Second Workshop on the Use of Multi-Global Navigation Satellite Systems for Sustainable Development" on Day 2.

B. Purpose and Expected Outcomes

8. Given the advances in space technologies including global navigation satellite use for Disaster Risk Reduction and Management (DRRM), the purpose of the workshops was to share information and to discuss cooperative activities as a start line of implementing the "Asia-Pacific Plan of Action for Applications of Space Technology and Geographical Information Systems for Disaster Risk Reduction and Sustainable Development, 2012-2017" (Plan of Action)". The expected outcomes were to encourage invited countries to participate in the initiatives of space utilization for regional disaster management, to discover common desires on the use of space technologies for DRRM, to make a statement to achieve common targets of implementation, and to commence to cooperate to achieve the targets.

C. Country Presentations on DRRM (Part 1 and Part 2)

9. The representative from each country' disaster management division presented its disaster management status such as preparedness, early warning, evacuation and rescue, damage monitoring/assessment and rebuilding related to the latest or serious disasters in each

country as well as issues and requests that they might have on disaster management, according to the request by ESCAP secretariat in advance.

- 10. **Bangladesh**: Major disasters are Flood and Cyclones. Remote sensing technology has been utilized for the last four decades. Further improvement among the operational and institutional arrangements with satellite service provider and users is required.
- 11. **Myanmar**: Myanmar is prone to multi disasters such as Fire, Forest Fire, Cyclone, Storm Surge, Tsunami, Earthquake, Flood and Landslide. Each national level department has its GIS facilities but functional mainly for DEPT's function. Formation of space-based early warning system is one of next challenges.
- 12. Sri Lanka: Sri Lanka is multi disaster prone country but relatively matured in DRRM. National legal disaster management plan established in 2005 and GIS using satellite remote sensing is used for preparedness, Damage and Loss Assessment (DaLA) and also for disaster mitigation. But still lack of a proper mechanism for damage estimation, as well as forecasting technology, scientific risk assessment are issues.
- 13. Lao PDR: Main disasters are flood, drought, landslide and fire. In 2008, Lao government set up the Department of Space Technology and planning to launch two communication satellites, LAOSAT-1 and LAOSTAR-1 at the end of 2015. After the Typhoon Ketsana in 2009, which total damaged cost around 58 million USD, the government enhanced the strategy for preparedness, higher resilience and post disaster loss assessment.
- 14. Mongolia: National Emergency Management Agency uses remote sensing data and GIS for many years and now NOAA AVHRR and TERRA MODIS satellites data are used to monitor forest and steppe fires, droughts, dzuds, strong snow and dust storms. In 2012 NEMA installed WINDS communication ground station for ALOS data acquisition under the frame work of Sentinel Asia. Early warning system for earthquakes is already established. Recently damage from extreme temperature is increasing.
- 15. **Bhutan**: Disaster Management Division created in 2005 and upgraded to a Department in August 2008. Most critical disasters in Bhutan are Glacial Lake Outburst Floods (GLOF) and Flash Floods. The effect of climate change increases the risk of disasters. In order to reduce the climate change-induced risks, climate change risk advocacy and awareness, installation of GLOF early warning system and artificial lowering of lake is important.
- 16. Cambodia: Over decades, Cambodia has been affected by series of exceptional floods, widespread local agricultural droughts and lightnings. Flood emergency response such as drinking water, shelter, food, rice seeds, temporary repair and connectivity of communication is required. National Mapping Agency (NMA) communicate with space agencies and

National Committee for Disaster Management (NCDM) for their operation. Cambodia has no GIS/RS school, lack of human resource and capacity building on GIS/RS.

- 17. **Fiji**: National Disaster Management Office (NDMO) created National Disaster Management Plan in 1995, which applies all government related activities in terms of disaster management including mitigation, preparedness, response and rehabilitation. Fiji requires ESCAP to coordinate the sharing information among Asia-Pacific countries and store the information centrally.
- 18. Samoa: Samoa is highly vulnerable to tropical cyclones. National Disaster Management Plan developed in 2006 and revised in 2010 to take into account tsunami 2009. No GEO-DRM system in place due to the lack of local capacity and resources. GIS data accessible through UN-SPIDER, UNOOSA and assistance from Pacific regional organizations such as SOPAC.
- Maldives: 2004 tsunami destroyed 13, major damaged 56 and flooded 121 islands out of 198 inhabited islands of the country. Sea level hazard is uniform across the country. Maldives Land Survey Authority (MLSA) is undertaking the development of National Geographic Information System (NGIS). QuickBird image between 2006-2008 were purchased from DigitalGlobe.
- 20. **Vanuatu**: The population of Vanuatu is about 250,000. Vanuatu is prone to seismic, tsunami and cyclone disasters. Most of the country is remote islands. It is expected that space technology connects the remote islands in communication and monitoring.
- 21. Pakistan: Pakistan is highly prone to disasters. In last few years Pakistan has faced many disasters, Necessary steps are required to effectively manage any such condition in future. GNSS based technology can serve the needs to effectively manage disasters and provide early warnings. GNSS and mobile networks should be efficiently used for emergency response.
- **D.** Regional Activities on DRRM and Success Stories
- 22. The representatives from regional disaster management initiatives and organizations as well as GIS researchers of regional institutions presented their activity status. Follows were introduced: RESAP, RIMES, Sentinel Asia, ADRC, Geoinformatics Center (GIC) of AIT, RESTEC, GISTDA and JAXA.
- 23. Mr. Agus Hidayat from National Institute of Aeronautics and Space of Indonesia (LAPAN) presented its success story of space and GIS applications. LAPAN is responsible for data acquisition and processing, research and development, disaster management support and dissemination in Indonesia. LAPAN has its own data base and a satellite as well as international and regional cooperation with ADRC, Sentinel Asia, UNSPIDER and also JST/JICA project.

- 24. Mr. Giriraj Amarnath from the International Water Management Institute (IWMI) of Colombo, Sri Lanka, presented the status of flood mapping of South Asia and success stories from floods events in Pakistan.
- 25. Mr. Pema Thinley from ICT/GIS office of the Disaster Management Department of Bhutan presented success stories of disaster risk reduction of the Glacial Lake Outburst Floods (GLOFs) in Bhutan from 1994. Using GLOF hazard maps, under the cooperation of international development programme, Bhutan has been succeeded in mitigation of the risk of GLOFs.
- 26. Mr. ARTURO S. DAAG and Ms. SUSAN R. ESPINUEVA from Philippine Institute of Volcanology and Seismology (PHIVOLCS-DOST) and Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA-DOST) presented Sentinel Asia success stories in the Philippines.

E. Multi-Global Navigation Satellite Systems (Multi-GNSS) /GNSS and their utilization

- 27. Quasi-Zenith Satellites System (QZSS) of Japan and BEIDOU of China as well as the initiative of Multi-Global Navigation Satellites Systems of Asia was introduced by each representative. Subsequently some countries and institutions presented their research status on Multi-GNSS/GNSS utilization.
- 28. Mr. Ahmad Shuhaimi Ibrahim from the Slope Engineering Division of Public Works Department Malaysia presented the status of landslide monitoring experiment using Multi-GNSS application. He said that, at present, tropical climate and weather, environment and physical terrain and accuracy are still issues.
- 29. Mr. Akio Yasuda of Tokyo University of Marine Science and Technology introduced university consortium on GIS/GNSS education. And he also introduced open source program package for RTK-GPS and Summer Seminar of GNSS in August 2013 in Tokyo.
- 30. Mr. Aimrun Wayayok from Universiti Putra Malaysia presented the status of Precision Farming (PF) experiment, that optimizes fertilizing crop to increase the profit of farming. He still has issue of using open source software such as RTKlib to navigate to a proposed planting point.
- 31. Mr. Jagat Raj Paudel and Mr. Niraj Manandher from Survey Department of Nepal introduced their approach for future utilization on MGNSS/GNSS in geodetic survey. They also proposed to establish a regional GNSS/QZSS receiving and training station in Nepal.
- 32. Mr. Chathura Hasanka Wickramasinghe of GIC/AIT introduced their status of Growing Navis Project, JAXA MGA joint experiment of flood modeling and improvement of LEX based PPP positioning accuracy.

- 33. Mr. Tatiya Chuentragun from GISTDA Thailand introduce their future strategy on utilization of GNSS for National Mapping, GIS and disaster management. He also proposed some GNSS application tests for future utilization.
- 34. Mr. Hiroaki Tateshita presented the status of an experiment of next –generation tsunami monitoring system using LEX-PPP signal of QZSS. He explained that this system can get earlier and precise tsunami warning information without any coastal equipment other than buoys.

F. Development and Funding Support System

- 35. Mr. Sanjay K. Srivastava, Regional Adviser of IDD/ESCAP presented issues on disaster assessment, needs and aspirations for space applications in DRM. He explained that using EO products for Disaster Loss Assessment (DaLA) is very important but still have gaps such as "lack of capacity" and "not just in time".
- 36. Mr. Yusuke Muraki from ADB introduced some examples of space technology applications for DRRM by ADB funds. He emphasized that capacity buildings for the utilization of space technologies on disaster management authorities were required to made them recognize the existence of many support systems on the use of space applications for DRRM and sustainable development.
- 37. Mr. Alf I. Blikberg, Programme Officer of IDD/ESCAP introduced Trust Fund for Tsunami, Disaster and Climate Preparedness. He explained that the priorities of the funding are regional intergovernmental mechanisms, specific country needs and civil society innovations.

G. Major Comments from the Discussions

- Note: Discussions were separated into 3 sessions mainly. The first discussion session was after the country presentations of "Workshop on Space Applications for Disaster Risk Reduction and Management" session on Day 1, and the second discussion session was after the presentations on the initiatives of the "Second Workshop on the Use of Multi-Global Navigation Satellite Systems for Sustainable Development" on Day 2. The third discussion session was on the third day morning. Dr. Nitin Kumar Tripathi of AIT chaired the third discussion session. As an opening of the discussion, he stated that comprehensive utilization of space technologies not only remote sensing is applicable for DRRM and sustainable development. Also he stated that capacity building for policy makers of national disaster management is important.
- 38. Joint research programs among countries, initiatives, agencies and institutions would be useful for regional DRRM.
- Disaster managing centers in countries are still not effectively using remote sensing data.
 Even in the disaster management sectors of satellite data providing countries, remote sensing

data is not effectively used. Minimizing the gap between RS data providers and disaster management authorities is an issue. Capacity building for stake holders of disaster management is important. ESCAP should play a part in bridging this gap.

- 40. When the big floods of 2011 inundated Bangkok and other parts of Thailand, the large companies and factories and institutes that were effected did not imagine that such a big disaster could happen. Even with remote sensing data, authorities could not predict the effect of the flooding.
- 41. Hazard maps need to be revised continuously, because the disaster management scenarios are changing all the time.
- 42. For DRRM, maps are very important. When it comes to comprehensive disaster management, disaster databases are very important. However, most countries feel uncomfortable about sharing certain types of information such as information on critical infrastructure because of privacy and national security issues. So ESCAP has an important role to play in enabling information sharing to improve DRRM.
- 43. When predicting and estimating the magnitude of disasters, both ground stations and space technologies are important.
- 44. Comprehensive flood warning systems are very necessary but not yet developed.
- 45. Solutions to agricultural and drinking water management should be included in DRRM. The most important and the first aid required just after a disaster such as drought and floods, is drinking water and agricultural water.
- 46. Space technologies should be linked to the full cycle of DRRM, from preparedness before disasters, monitoring and early warning, rescue, damage assessments and rebuilding after disasters to increase the benefits for the people. This will also help to increase national budget allocations for space technologies development and use in DRRM.
- 47. It is important to understand who needs to be informed about the findings of DaLA (Damage and Loss Assessments). Budget decision makers of each country should be aware of the DaLA findings. A Regional DRRM forum is very important in this regard.
- 48. EO satellite data should be accumulated and compiled and contribute towards developing a "Flood Early Warning System". Sri Lanka, Indonesia and many other countries in the Indian Ocean have a good Tsunami Early Warning Systems which has already been activated during

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