United Nations E/ESCAP/CDR(3)/5

Economic and Social Council

Distr.: General
18 September 2013

Original: English

Economic and Social Commission for Asia and the Pacific
Committee on Disaster Risk Reduction

Third session
Bangkok, 27-29 November 2013
Item 7 of the provisional agenda*
Promoting regional cooperation on applications of space technology and geographic information systems for disaster risk reduction

Promoting regional cooperation on applications of space technology and geographic information systems for disaster risk reduction

Note by the secretariat

Summary

The present document outlines the secretariat's efforts to implement the Asia-Pacific Plan of Action for Applications of Space Technology and Geographic Information Systems for Disaster Risk Reduction and Sustainable Development, 2012-2017. The importance of regional cooperation in deepening and broadening the applications of space technology and geographic information systems for disaster risk reduction in the Asia-Pacific region are also highlighted. The key activities and achievements under the Regional Space Applications Programme for Sustainable Development and the Regional Cooperative Mechanism for Disaster Monitoring and Early Warning, Particularly Drought are further highlighted. The present document contains a brief overview of the secretariat's work in enhancing capacity-building for the developing countries in the region, within the context of using space-based information for disaster risk reduction, providing efficient and effective services to the countries affected by severe natural disasters, promoting the establishment and use of geo-referenced information systems for disaster management and enhancing partnerships with other international and regional initiatives. The Committee's guidance on enhancing regional cooperation in building resilience to disasters is also sought in the present document. A number of issues that the Committee may wish to consider are also presented.

* E/ESCAP/CDR(3)/L.1/Rev.1.

Contents

I. Introduction

1. Space technology and geographic information systems (GIS) applications are key tools in reducing levels of risk and the damage and losses that result from natural disasters. This is possible by enabling comprehensive hazard and risk assessments, disaster response, relief and impact assessments. The major information and knowledge products emanating from space technology and GIS applications are near real-time satellite imagery, geo-referenced information, emergency communications tools and positioning, navigation and time information. Effective use of such space-based information, along with other monitoring systems, can help in mapping out hazards and vulnerabilities for evidence-based policymaking and planning, provide accurate warnings of impending disasters and provide disaster impact assessments at the regional, subregional and national levels; thus significantly mitigating the adverse impacts of natural disasters in countries in Asia-Pacific region.

2. As clearly recognized in the outcome document of the United Nations Conference on Sustainable Development, which is entitled "The future we want",[1] the use of space technology and GIS applications can contribute significantly to disaster risk reduction and management. In the outcome document, there is recognition of the importance of comprehensive hazard and risk assessments, and knowledge and information sharing, including reliable geospatial information, together with the importance of early warning systems. This forms part of effective disaster risk reduction at all levels in order to reduce economic and social damage, including the loss of human life. Further affirming the importance of space technology and regional cooperation in disaster risk reduction and management, the Commission adopted resolution 69/11 on 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. This builds on resolution 68/5, in which there is recognition of the importance of enhancing regional cooperation for improving disasters and associated socioeconomic risk management and the urgent need to promote

[1] General Assembly resolution 66/288, annex.

information and communications technology applications for inclusive and sustainable development in Asia and the Pacific.

3. Despite the significant progress achieved in this region, the spread of these technology applications has been uneven. Although the Asia-Pacific region has a growing number of space-faring countries with a number of existing and planned remote sensing satellites, these technologies are yet to fully benefit the most vulnerable in our societies. Space technology and GIS applications continue to be underutilized, primarily because of the lack of capacity in developing countries in terms of human, scientific, technological, organizational and institutional resources. Moreover, the relatively prohibitive costs of higher-resolution and radar satellite data, and the uneven level of connectivity in accessing free data, exacerbates the problem even further. Despite several efforts to harness the potential of space technology and GIS, their application continues to be hindered in many developing countries, particularly in countries with special needs in the region.

II. Enhanced regional cooperation for developing member States' capacity for effective disaster risk reduction

A. The secretariat's efforts in implementing the Asia-Pacific Plan of Action for Applications of Space Technology and Geographic Information Systems for Disaster Risk Reduction and Sustainable Development, 2012-2017

4. Regional and subregional cooperation has become increasingly critical in sharing good practices and enhancing the capacity of member States in the active use of space-based information, near real-time satellite imagery and data, including scale, geographic coverage and maps, as well as learning from good policy practices.

5. Even if individual countries possess their own space infrastructure and maintain supporting institutional capacities, they can still benefit from well-established regional and international cooperation mechanisms. Countries obtain benefits from these international and regional cooperation mechanisms, such as near real-time satellite imagery and other essential space-based information products and services, in order to forecast and respond to, or recover from, region-wide disasters, such as typhoons, floods, drought and forest fires. More importantly, the mechanisms are useful resources for sharing good policies, expertise and practices, strengthening capacity-building, conducting regional/subregional joint training programmes, and carrying out joint actions on regional disasters in a particular area of mutual interest. Despite the expected benefits, these regional mechanisms and activity programmes are seldom coordinated and harmonized properly, often failing to have a significant impact on disaster risk prevention and reduction.

6. Against this backdrop, member States have tasked the secretariat to take the lead in implementing the Asia-Pacific Plan of Action for Applications of Space Technology and Geographic Information Systems for Disaster Risk Reduction and Sustainable Development, 2012-2017 (hereinafter, "Asia-Pacific Plan of Action") at the regional level, to harmonize and enhance existing regional initiatives, to pool expertise and resources at the regional and subregional levels and to act as a clearing house for good practices and lessons.

7. ESCAP has undertaken several initiatives to implement the Asia-Pacific Plan of Action. The efforts of ESCAP in promoting regional cooperation through the use of space technology and GIS are noted in a report of the Secretary General.[2]

8. The secretariat has been focusing on: (a) capacity-building to address the main technical gaps in developing countries in their use of space technology and GIS applications in disaster risk reduction; (b) research and policy analysis on the application of emerging technologies; (c) provision of near real-time satellite imagery to the countries affected by severe disasters; and (d) standardization of operating procedures on drought monitoring and early warning that will be rolled out shortly in the region.

9. These programmes are delivered in collaboration, or as part of, the Regional Space Applications Programme for Sustainable Development (RESAP) of ESCAP, and in close collaboration with: United Nations Institute for Training and Research (UNITAR) and its Operational Satellite Applications Programme (UNOSAT); United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER); International Charter Space and Major Disaster (the Charter); Asia-Pacific Space Cooperation Organization (APSCO); Sentinel Asia; and Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES).

10. The secretariat gives high priority to capacity-building programmes. Since the second session of the Committee on Disaster Risk Reduction, the secretariat has organized a series of workshops and training on space technology and GIS applications for effective disaster risk reduction, which benefitted approximately 400 governmental policymakers, administrative officials, planners, professional staff, researchers and project managers from 38 member States, 20 United Nations entities, international bodies, academic institutes and NGOs.

11. Analytical work on space applications, particularly the important role and good practices of space technology and GIS applications for building resilience to disasters, was highlighted in the ESCAP 2013 Theme Study.[3] In addition, the innovative space technology and GIS applications, which have been recognized as cost-effective tools for disaster risk reduction, were emphasized in chapter 5, “Harnessing innovative technologies”, in *Reducing Vulnerability and Exposure to Disasters: the Asia-Pacific Disaster Report 2012*,[4] the flagship publication of ESCAP and ISDR.

12. When severe disasters such as floods, earthquakes and cyclones hit countries in the region, the secretariat mobilized more than 50 scenes of near real-time and archived satellite imagery to support the disaster response, relief efforts and damage assessment. In addition, the secretariat is promoting the use of the online geo-referenced information system for disaster risk management (Geo-DRM) in some of the countries with special needs. The Geo-DRM will combine disaster data with disaggregated socioeconomic data for evidence-based policymaking and to provide effective disaster management.

[2] A/AC.105/1014.

[3] *Building Resilience to Natural Disasters and Major Economic Crises* (United Nations publication, Sales No. E.13.II.F.3).

[4] ST/ESCAP/2639.

13. At present, the secretariat is working on standardization of the operational drought monitoring mechanism, including modalities and standard operating procedures, which would serve as guidelines for drought assessment and monitoring in the Asia-Pacific region. Some of the recent highlights of the secretariat's work in this regard are outlined below.

B. Regional Space Applications Programme for Sustainable Development

14. The Regional Space Applications Programme for Sustainable Development (RESAP) was launched by ESCAP during the first Ministerial Conference on Space Applications for Development in Asia and the Pacific in 1994. RESAP is mandated to promote and coordinate regional space cooperation for development; organize and implement space application projects of regional interest; and provide policies, models, techniques, information and analysis. It is also tasked to conduct studies related to various issues on space applications; establish regional networks comprising national focal points and working groups in major space technology application fields; and promote national capacity-building for space applications. Numerous activities have been initiated that have contributed towards raising the status of the region's deployment of space technology for supporting sustainable development goals, particularly in capacity-building and promoting regional space cooperation for disaster risk reduction and development.

15. Since the second session of the Committee on Disaster Risk Reduction, the secretariat has undertaken several initiatives to support member States in implementing disaster risk reduction and management. Some of the highlights are presented below.

1. Regional support to disaster-affected countries including timely provision of near real-time imagery for disaster response, relief and impact assessments

16. The Asia-Pacific region is the area most affected by disasters. Moreover, floods and storms remain the main threats in Asia and the Pacific, causing major economic damage to the region in 2012 and 2013. In 2012, floods caused 54 per cent of the total death toll for all natural disasters in Asia, 78 per cent of the total number of people affected and 56 per cent of the total economic damage in the region.[5] Despite the rapid economic growth in the region, many developing countries are increasingly vulnerable to disasters, as the coping capacities of communities have not expanded at the same rate as the frequency of disasters.

17. The secretariat has been promoting regional cooperation among member States to support rapid disaster mapping, and disaster response, relief and impact assessments through timely provision of near real-time data and other space-based information services, after receiving requests from disaster-affected countries. In 2012, when Typhoons Haikui and Bopha hit the Philippines, the secretariat coordinated with RESAP members as well as its strategic partners, including UNITAR/UNOSAT, UN-SPIDER, International Charter Space and Major Disaster and Sentinel Asia to contribute to near real-time satellite imagery and products to the Philippines

[5] United Nations Office for Disaster Risk Reduction, "2012 Asian disaster figures: flood deaths down but economic losses significant", press release, Bangkok, 11 December 2012. Available from http://cred.be/sites/default/files/2012.12.21-PressRealease-Erratum.pdf.

and the Association of Southeast Asian Nations (ASEAN). Several other countries have also benefited from similar products and services during disasters. In 2013 — when tropical cyclone Mahasen hit Bangladesh and Myanmar in May 2013; when an earthquake brought deadly destruction to Lushan County, China, in April 2013; and when serious floods, caused by heavy rain, occurred in Pakistan and northeast China, in August 2013 — the secretariat immediately mobilized near real-time satellite imagery, through the RESAP network of space agencies, together with other strategic partners, such as the UNITAR/UNOSAT, at the onset of each disaster, upon receiving requests for support from the affected countries.

18. These efforts have resulted in timely provision of more than 50 scenes of near real-time and archived satellite imagery, which were provided by China, India, Japan, Thailand and other RESAP members, as well as UNOSAT. The imagery from the Indian Radar Imaging Satellite proved extremely valuable to the relief efforts that were mobilized in response to these disasters. The secretariat is also working on an institutional mechanism through the development of standard operating procedures and the use of up-to-date information and communication technology tools that will enable effective, reliable and easy access to communication in times of disaster.

2. Capacity development

19. Under the auspices of RESAP, the secretariat has conducted a series of capacity-building programmes, especially in high-risk developing countries that lack the capacity to access space technologies and GIS applications. The training courses and workshops covered flood-risk mapping, modelling and assessment, regional and subregional geo-referenced information for disaster management and satellite imagery for disaster management in the Pacific, among other things. These capacity-building programmes benefitted approximately 120 governmental officials, researchers and managers from 20 member States.

20. Most of these capacity-building activities were conducted through the nodes of RESAP training networks at the Centre for Space Science and Technology Education in Asia and the Pacific (CSSTEAP) in Dehradun, India, the National Coordination Agency for Surveys and Mapping in Indonesia and training partners at the Chinese University of Hong Kong, China. Such programmes were delivered in close collaboration with UNITAR/UNOSAT; secretariat of the United Nations Convention to Combat Desertification (UNCCD); UN-SPIDER; Applied Geoscience and Technology Division of the Secretariat of the Pacific Community; Pacific Islands Telecommunications Association; GeoInformatics Center of the Asian Institute of Technology; International Water Management Institute; and with technical and financial support from China, India, Indonesia, Japan and the Republic of Korea.

3. Strengthening cooperation

21. The secretariat also made an effort to harmonize regional cooperation mechanisms and initiatives. For instance, a memorandum of agreement was signed in Bangkok in February 2013 to strengthen the strategic partnership between ESCAP and UNITAR to provide effective support to member States, in order to achieve better and more comprehensive access to and use of space-related services, as well as to benefit from geospatial information for effective disaster risk reduction. In November 2013, a three-week training course on GIS applications for disaster risk management will take place; it is being jointly organized by ESCAP, the Korea International Cooperation

Agency and UNITAR. Government officials from national disaster management authorities and the space agencies of countries with special needs will be trained in Seoul.

22. In line with the One UN policy, ESCAP also participated in technical advisory missions conducted by UN-SPIDER in Sri Lanka and Myanmar, and continues to enhance this collaboration through joint efforts to implement the recommendations provided by these technical advisory missions. As part of implementing the Asia-Pacific Plan of Action with respect to enhancing collaboration and harmonization, a mapping exercise was undertaken to develop an inventory and calendar of events (2013-2017) of related United Nations entities and regional initiatives, in the context of capacity-building in the use of space technology and GIS applications for effective disaster risk reduction, strengthening cooperation, creating synergy, pooling resources and reducing duplication.

C. Operationalization of the Regional Cooperative Mechanism for Disaster Monitoring and Early Warning, Particularly Drought

23. Among natural disasters, drought gets relatively less attention from policymakers even though it has serious long-term socioeconomic implications. Owing to its slow and gradual onset, it is often regarded as a transient event not to be taken seriously once the rainfalls return. In the 4th Assessment Report of Working Group I of the Intergovernmental Panel on Climate Change (IPCC),[6] it was concluded that the area of land affected by drought since the 1970s has increased significantly, adversely affecting socioeconomic development and exacerbating poverty among millions of people who depend directly on the land as a source of livelihood. Due to the impacts of climate change, there is a global consensus that the frequency and intensity of droughts will be greater in the future.

24. A comparison of the data on drought reveals that Asia has the largest number of people affected by droughts of any continent. A total of 123 drought events in the Asia-Pacific region affected more than 1.31 billion people, causing damage amounting to more than $53 billion (at 2005 prices), over the last 29 years.[7] In severe cases, drought has devastating effects on vulnerable people as well as natural resources, such as water, for agriculture and eco-systems; it also causes long-term environmental degradation and biodiversity loss. Droughts combined with human activities lead to desertification of vulnerable arid, semiarid and dry subhumid areas, resulting in degradation of the soil structure and fertility.[8] It is important to comprehend the inter-relationship among drought, land degradation, desertification, agriculture, ecosystems and socioeconomic development plans.

25. An effective regional cooperative mechanism for monitoring and early warning of drought events could assist stakeholders, particularly Governments with regard to national and local levels, to more effectively reduce drought risks. It should include the capacity to predict and comprehend the possible threats and impacts in terms of coverage, severity and probable economic, environmental and social consequences. This would allow effective prevention and mitigation measures to reduce the potential

[6] Intergovernmental Panel on Climate Change, *Climate Change 2007: the Physical Science Basis* (New York, Cambridge University Press, 2007).

[7] Data from the International Disaster Database.

[8] Z.W. Kundzewicz, "Water resources for sustainable development", *Hydrological Sciences Journal*, vol. 42, No. 4, pp. 467-480.

risks and hazards and, subsequently, to enable timely recovery from the serious impacts of drought disasters.

26. Many countries in the region face tremendous challenges in the area of drought monitoring and early warning. These challenges include relatively little capacity to access and analyze critical information, lack of effective methodology to combine space-based information products with ground-based information for appropriate decision-making, very few regional platforms for sharing knowledge and good practices, and a lack of coordination among agencies and institutions at the national level.

27. In order to address such challenges, ESCAP has been promoting the Regional Cooperative Mechanism for Disaster Monitoring and Early Warning, Particularly Drought (hereinafter the “Drought Mechanism”) under RESAP. The drought mechanism aims to enable drought-prone countries to establish or strengthen their systems for effective and collaborative drought monitoring and early warning. Key components of the Drought Mechanism include standard operating procedures, the establishment of regional service nodes, an information portal for drought disaster management, and assistance to member States on capacity-building measures through training and technical assistance, and the exchange of good practices.

28. In December 2012, RESAP members agreed to establish regional operational service nodes and expressed their support for the operationalization of the Drought Mechanism and stand ready to share good practices, experiences and expertise in space-based information for drought modelling. For example, China offered to host one of the service nodes of the Drought Mechanism and will provide and host training courses on drought monitoring and early warning through the use of space technology and GIS applications; it also offered to make available GIS software to developing countries in the region through RESAP. In addition, India offered to consider hosting a service node in the region and support disaster mechanisms by providing access to its data from its satellites, increasing such access from 50 scenes to 100 scenes per year. India also offers training at CSSTEAP to support the establishment of geo-portals and to host the data on the Bhuvan portal (a geoportal of the Indian Space Research Organization) for countries that are yet to establish their own mechanism. Such offers from RESAP members will allow the Drought Mechanism to begin offering services to identify high-risk drought-prone areas and thus have a positive impact on the issues of food security and poverty in many at-risk agrarian countries in the region.

29. Drought monitoring and assessment are two facets of effective