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INFORMATION AND COMMUNICATIONS TECHNOLOGY–ENABLED DISASTER RISK REDUCTION IN ASIA AND THE PACIFIC

(Item 5 of the provisional agenda)

Note by the secretariat

SUMMARY

Information and communications technology (ICT), including space-based technology, can be an important tool for assisting in all stages of disaster risk reduction activities; however, many decision makers may not be fully aware of the potential such technologies hold.

In the present document, the secretariat describes trends related to the development and application of ICT in support of disaster risk reduction. It highlights areas where ICT does or can play a key role, including: (a) effective early warning systems, emergency communications and disaster management systems; (b) the implementation of the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters; and (c) strategy support to help address key issues of disaster risk reduction.

Governments at all levels must be able to access necessary information in order to deal effectively with disaster risk reduction plans, programmes and response actions. Experiences and evolving trends in regional cooperation that can broaden this access are discussed in the document, as are specific areas where cooperation can be effective, such as in: (a) the development and sharing of information, communications and space infrastructure and resources; (b) multi-hazard information networks; and (c) capacity-building in the use of ICT for disaster management.

The Committee may wish to provide further guidance on the secretariat's future strategic direction in this area, including possible outputs that could be reflected in the programme of work for the biennium 2010-2011.

CONTENTS

Introduction

1. The Asia-Pacific region, home to 61 per cent of the world's population, experiences a disproportionate share of loss of life and negative impact on socio-economic development owing to disasters. In 2007, 37 per cent of the world's disasters occurred in this region, accounting for more than 90 per cent of all reported victims and almost half of the economic damage due to natural disasters.[1] Among the 10 most affected countries in 2007 in terms of number of victims, six are from Asia and the Pacific.[2]

2. In May 2008, 130,000 people were dead or missing and an estimated 2.4 million people were affected in Myanmar as a result of Cyclone Nargis.[3] In the same month, about 70,000 people were killed and more than 45 million people were affected as a result of an earthquake in Sichuan Province, China.[4] These disasters brought to the fore the importance of information, communications and space tools for supporting effective disaster reduction practices regarding vulnerability assessment, preparedness, early warning, and emergency response.

3. Although the occurrence of hazards[5] cannot be prevented, measures could be taken to prevent disasters by reducing the vulnerability of communities that are exposed to major hazards. Disasters pose a great developmental challenge to all countries. For sustainable development to be achieved, disaster risk reduction should be mainstreamed into development policies, planning and implementation. That requires the collective action of Governments, civil society, communities, regional and international organizations, and other concerned actors.

4. At the World Conference on Disaster Reduction, held in Kobe, Japan in January 2005, a global strategy for disaster risk reduction, the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters, was adopted.[6] The expected outcome of this global strategy is a substantial reduction of losses resulting from disasters, in terms of lives and the social, economic and environmental assets of communities and countries. The Hyogo Declaration[7]

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[1] ESCAP calculations based on J-M. Scheuren and others, *Annual Disaster Statistical Review: The Numbers and Trends 2007* (The Centre for Research on the Epidemiology of Disasters 2008), pp. 33 and 37. Accessed from www.emdat.be/Documents/Publications/publications.html on 3 August 2008.

[2] Ibid, p. 7. The countries are: Bangladesh, China, India, Pakistan, Philippines and Viet Nam.

[3] Office for the Coordination of Humanitarian Affairs, "Myanmar Cyclone Nargis", OCHA Situation Report 35, 26 June 2008. Accessed from www.reliefweb.int/rw/RWFiles2008.nsf/FilesByRWDocUnidFilename/EDIS-7FYSXY-full_report. pdf/$File/full_report.pdf on 2 July 2008.

[4] Office for the Coordination of Humanitarian Affairs, "Sichuan Province, China–earthquake", OCHA Situation Report 10, 30 May 2008. Accessed from www.reliefweb.int/rw/RWFiles2008.nsf/FilesByRWDocUnidFilename/EDIS-7F5U8S-full_report.pdf/$File/full_report.pdf on 2 July 2008.

[5] In its online reference, "Terminology: basic terms of disaster risk reduction", the International Strategy for Disaster Reduction defines a hazard as "a potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation", while a disaster "results from the combination of hazards, conditions of vulnerability and insufficient capacity or measures to reduce the potential negative consequences of risk". Accessed from www.unisdr.org/eng/library/lib-terminology-eng%20home.htm on 3 August 2008

[6] A/CONF.206/6 and Corr.1, chap. I, resolution 2.

[7] Ibid., resolution 1.

emphasized the need for developing and strengthening coordinated regional approaches and creating or upgrading regional policies, operational mechanisms, plans and communications systems in order to prepare for and ensure rapid and effective response to disasters that exceed national coping capacities.

5. Recognizing that disaster risk reduction is a cross-cutting issue of great complexity, requiring understanding, knowledge, commitment and action, ESCAP adopted resolution 64/2 of 30 April 2008 on regional cooperation in the implementation of the Hyogo Framework for Action. In the resolution, the Commission requests the Executive Secretary to, inter alia, strengthen the role and capacity of ESCAP in the area of disaster risk reduction and take effective measures to facilitate, in cooperation with relevant United Nations entities, the implementation of the Hyogo Framework for Action in the region.

6. In the present document, the secretariat (a) describes trends related to the development and application of information and communications technology (ICT)[8] in support of disaster risk reduction, (b) highlights the framework for disaster risk reduction and relevant key activities where ICT has a major role to play in supporting strategy and (c) identifies experiences and evolving trends, and discusses areas for regional cooperation in ICT for disaster management.

7. Mention of firm names, commercial products and specific technologies does not imply the endorsement of the United Nations.

I. ICT FOR DISASTER RISK REDUCTION

8. ICT is an important tool for assisting in all stages of disaster risk reduction activities, which cover mitigation, preparedness, response and recovery from disasters.[9] Those technologies include spatial information systems (such as information integration and analysis, disaster risk assessment and modelling, mitigation and response planning); remote sensing (monitoring and data gathering); the Internet, websites and Portals (information sharing, warehousing, knowledge hubs); communication systems (television, radio, satellite and cellular mobile, broadband); and ICT applications (disaster management systems).[10]

[8] The term “information and communications technology”, as used in the present document, should be understood to include space-based technology, as appropriate.

[9] Mitigation: structural and non-structural measures undertaken to limit the adverse impact of natural hazards, environmental degradation and technological hazards. Preparedness: activities and measures taken in advance to ensure effective response to the impact of hazards. Response: the provision of assistance or intervention during or immediately after a disaster to meet the life preservation and basic subsistence needs of those people affected. Recovery: decisions and actions taken after a disaster with a view to restoring or improving the pre-disaster living conditions of the stricken community, while encouraging and facilitating necessary adjustments to reduce disaster risk. International Strategy for Disaster Reduction, “Terminology: basic terms of disaster risk reduction”. Accessed from www.unisdr.org/eng/library/lib-terminology-eng%20home.htm on 18 July 2008.

[10] For a comprehensive discussion of the use of ICT as a tool to support the different phases of disaster management, see C. Wattegama, *ICT for Disaster Management* (the United Nations Development Programme-Asia-Pacific Development Information Programme and Asian and Pacific Training Centre for Information and Communication Technology for Development 2007). Accessed from www.unapcict.org/ecohub/resources/ict-for-disaster-management on 18 July 2008.

9. However, many decision makers working on activities related to disaster risk reduction may not be well aware of the appropriate good practices of ICT-enabled tools elsewhere, and the potential such practices may hold for their work. Decision makers may also lack the technical capacity to integrate such tools into their daily work. It is the responsibility of national ICT stakeholders to promote the use and improve the affordability of ICT and related services to support disaster risk reduction.

A. Preparedness and early warning

10. When the Indian Ocean tsunami hit several Asian countries in 2004, it caused the loss of about 200,000 lives, mainly due to the lack of timely disaster warning dissemination. There was a similar lack of early warning in Myanmar in 2008.[11] On the other hand, Bangladesh was relatively well prepared when it was hit in November 2007 by Cyclone Sidr, a category-4 super cyclone. The long-established preparation and early warning systems of the Government of Bangladesh were activated before the cyclone made landfall, which greatly reduced the humanitarian impact of that disaster. Preparedness measures included the evacuation of approximately 3.2 million people.[12]

11. ICT provides crucial support for the development of reliable early warning systems to ensure timely and understandable alerts to those at risk. Interlinked information from different sources is collected, used early in risk assessment and disaster modelling, and analysed quickly for early warning. One or more communication channels are used to send the alert from the central authority that monitors and issues the warning to the intended recipients.

12. An early warning system, depending on the availability of the necessary infrastructure, may use more than one communication medium in parallel. These can be either traditional media, such as public radio and televisions, fixed telephones, amateur and community radios and sirens, or modern media, such as short message service, cell broadcast messaging[13] and satellite radio.[14] Services such as e-mail or instant messaging can also be used, but they require Internet access. Online media play an important role in early warning, as demonstrated by AlertNet, a humanitarian news network based around a website that attracts more than 10 million users per year.[15] Whatever channel is used, it is not a question of valuing one medium over another: the goal is to transmit the warning as quickly and accurately as possible.

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[11] Office for the Coordination of Humanitarian Affairs, “Myanmar Cyclone Nargis”, OCHA Situation Report 35, 26 June 2008, p. 2. Accessed from www.reliefweb.int/rw/RWFiles2008.nsf/FilesByRWDocUnidFilename/EDIS-7FYSXY-full_ report. pdf/$File/full_report.pdf on 2 July 2008.

[12] United Nations, “Cyclone Sidr: United Nations rapid initial assessment report, with a focus on 9 worst affected districts”, 22 November, 2007. Accessed from http://ochaonline.un.org/OchaLinkClick.aspx?link=ocha&docId=1082340 on 3 August.

[13] Cell broadcast messaging is a feature supported by some wireless systems that allows a public warning text message to be sent to the screens of all mobile devices that have such a capability.

[14] Satellite radio plays a key role during both the disaster warning and disaster recovery phases, since it works even outside of areas not covered by normal radio channels.

[15] See www.alertnet.org/.

13. Spatial information technologies such as geographic information systems and communication technologies such as multiband radio frequencies[16] and satellite and mobile phones are now integrated into daily operations in emergency management. Increasingly, such technologies are being applied to support risk assessment, early warning and response, and are being used to design programmes that address specific problems of disaster risk reduction. Several programmes around the world are disseminating real-time spatial information through the Internet via map server, for example. With proper access, these elements can be an essential tool for emergency managers in planning and executing early warning plans.

B. Response and relief

14. ICT also supports the provision of assistance during or immediately after a disaster to protect life and meet the basic subsistence needs of those people affected. ICT networks disseminate disaster alerts and support actions for disaster response. During an emergency, the ability of responding agencies and field teams to communicate is vital to the establishment of a coordinated effort to mitigate the impact and aftermath of disasters. All these teams must be able to communicate, potentially across borders, to ensure the efficiency of their coordinated actions.

15. While certain technologies are an obvious fit for emergency needs, the use of multiple emergency communications maximizes the advantages of each technology, as described below:

(a) Terrestrial fixed services, satellite communications including satellite mobile phones, as well as mobile and wireless services make possible voice and information exchange between different relief teams, for planning and coordination of relief activities;

(b) Amateur services (such as ham radio) can assist in organizing relief operations in impacted areas, especially when other services are not yet operational;

(c) Terrestrial and satellite broadcasting services, if still functioning, can help with the coordination of relief activities by disseminating information from relief planning teams to the population. Using multiple media (television, radio, short message service, public announcement) to broadcast the same message ensures a broader reach and enables confirmation and validation of the message as it is received multiple times through different channels;

(d) The Earth observation satellite service, by providing current and past geospatial information, facilitates assessment and planning of relief activities.

16. Usually, the first ICT tools deployed after a disaster are satellite mobile systems, as they are immediately useable and are scalable from small to larger networks. Nevertheless, satellite mobile systems have some drawbacks. First, the cost of usage is high and, generally, could not be sustained

[16] A multiband radio frequency could allow a single radio device to operate on all public safety radio bands. Thus, emergency responders (such as police officers, firefighters and emergency medical service personnel) could communicate with partner agencies regardless of which radio band they are on.

even for the medium term. Second, their handling capacity for simultaneous calls is limited, although new satellite phones capable of terrestrial GSM wireless service are now available.

17. While voice transmission is traditionally viewed as the most immediate need when providing assistance during or immediately after a disaster, data access is also of primary importance. Geospatial information facilitates the assessment of damage and the planning of relief activities, and the use of ICT applications, such as disaster management systems, enables better coordination between all the relief actors. ICT-based disaster management systems address the common coordination needs that arise during a disaster, from finding missing people to managing aid and volunteers.

18. For example, the Sahana Disaster Management System, a web-based collaboration tool, is the result of a project initiated by volunteers in the Sri Lankan free and open source software development community after the Indian Ocean tsunami in December 2004. The system was officially used by the Government of Sri Lanka and released as free and open source software. Subsequently, a rewrite version (phase II) was developed as a generic disaster management tool with the sponsorship of the Swedish International Development Cooperation Agency, IBM and the National Science Foundation, a federal agency in the United States of America. It has been used by Governments and non-governmental organizations in Indonesia, Pakistan, the Philippines and Sri Lanka, and most recently in China and Myanmar.[17]

II. ICT IN SUPPORT OF THE HYOGO FRAMEWORK FOR ACTION 2005-2015: BUILDING THE RESILIENCE OF NATIONS AND COMMUNITIES TO DISASTERS

19. The role of ICT in helping achieve disaster risk reduction objectives was recognized at the World Conference on Disaster Reduction, 2005. The Hyogo Framework for Action captured a collective vision to mitigate natural disasters by mainstreaming sustainable development, multi-hazard preparation and prevention strategies and well-knit institutional infrastructures for early warning systems. The framework envisaged paradigm shifts from crisis management to risk reduction, from unidimensional to multidimensional risk assessment, from agency-specific to government-wide issues and from sectoral to community-wide issues.

20. The Hyogo Declaration proposes five priorities for action: (a) ensure that disaster risk reduction is a national and local priority with strong institutional basis for implementation; (b) identify, assess and monitor disaster risks and enhance early warning; (c) use knowledge, innovation and education to build a culture of safety and resilience at all levels; (d) reduce the underlying risk factors; and (e) strengthen disaster preparedness for effective response at all levels.

21. ICT plays a fundamental role in addressing these five priorities. The following sections provide further details on key strategic issues related to disaster risk reduction that require direct engagement of national stakeholders dealing with ICT.

[17] See www.sahana.lk.

A. The role of ICT in national platforms for disaster risk reduction

22. As part of nationally integrated disaster risk reduction mechanisms, a multisectoral national platform for disaster risk reduction mobilizes the combined knowledge, skills and resources required for disaster risk reduction in a country. Through a coordinated and participatory process, a national platform advocates disaster risk reduction at different levels, facilitates coordination of such activities across sectors, and provides analysis and advice on areas of priority requiring concerted action.[18]

23. ICT stakeholders must be engaged in a national platform to enhance collaboration and coordination on the ICT components of disaster risk reduction. For example, telecommunications agencies are not always given the required equipment and systems for disaster emergency communications due to budgetary constraints. Through participation in the national platform, these agencies could advocate the importance of an effective emergency communications system and provide advice on the allocation of appropriate resources.

24. The national platform for disaster risk reduction is also part of the national e-government infrastructure. Effective operation of the national platform relies heavily on relevant networks and information sharing mechanisms.

B. Mitigation and recovery of ICT infrastructure and applications

25. National ICT infrastructure is a fundamental pillar for any country. It plays a critical role in transmitting information and facilitating communication during emergency situations, when lives are at risk. Regulations that promote the robustness and reliability of ICT infrastructure are important to secure the continuity of ICT-enabled services and products when a disaster strikes.

26. Disasters have many impacts, including damage to telecommunications systems and networks, which degrade or interrupt services. During the emergency response to a major disaster, telecommunications infrastructure in affected areas may be overloaded. The damage, degradation and overload may have major consequences for both the emergency response and public safety. Mitigation of the impact of disaster on ICT infrastructure is the best policy choice.

27. Making the ICT infrastructure more resilient is an important part of disaster preparation. When disaster happens, in current liberalized telecommunications environments, private operators might not be willing or able to rebuild their networks on their own: the question of who will pay for the reconstruction arises.[19] When the government does not directly control the infrastructure, licence and concession contracts should have explicit and assessable requirements regarding hardened infrastructure.

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[18] United Nations/International Strategy for Disaster Reduction, "Guidelines: national platforms for disaster risk reduction", (Geneva, 2007), p. 4. Accessed from www.preventionweb.net/files/601_engguidelinesnpdrr.pdf on 18 July 2008.

[19] Rohan Samarajiva, "Disaster preparedness and recovery: a priority for telecom regulatory agencies in liberalized environments", paper presented at the ITU Telecom Africa 2001: Policy and Development Summit, Johannesburg, South Africa, 12-16 November 2001. Available at itu.int/TELECOM/aft2001/cfp/auth/4858/pap_4858.pdf.

28. In the same way, e-government applications might benefit from being built with disaster risk taken into account. In particular, proper identification of important data for emergencies (such as city and housing plans, maps, archived geospatial information, phone management databases) and later recovery (housing deeds, financial records, birth and medical records) is essential, so these data can be preserved and made accessible when needed. Since storing confidential or high security information outside the country may not be an option, there might be a need to set up national hardened data centres, resilient to disaster and capable of archiving identified important digital data, running essential e-government services and providing computational support for emergency coordination.

29. The second key preparation is to have in place a government continuity plan, modelled on a private sector business continuity plan, which should encompass all government assets and human resources in an effective and integrated way, as physical, ICT and human resources plans cannot be developed in isolation from each other. This plan should be put to the test regularly, validated through simulations, and updated to take into account technical and other changes. The dual role of ICT infrastructure and applications, first as powerful enablers of daily government functions, second as crucial components of emergency response, needs to be taken into account.

30. The third key preparation is to reach the national private sector, small and medium-sized enterprises in particular, and raise their awareness of the need for risk mitigation in their businesses. Knowledge economies are dependent on regional and international connectivity and digital data, thus the ICT component is a huge part of the continuity plan. The Government can raise awareness regarding the need for such planning. Another means of action is the setting of procurement requirements, which would force companies doing business with the Government to have a proper disaster risk strategy.

Box 1

A growing market for disaster recovery and enterprise business continuity solutions

A recent report estimated that spending on business continuity and disaster recovery reached $15.1 billion in 2006 in North America alone and is expected to reach $23.3 billion in 2012; consulting, hosting services and certifications present opportunities for Asian and Pacific companies.[a] While currently no international standard covers business continuity in the public and private sectors, a few national standards exist, such as the British standard BS 25999 for business continuity management, which might be used by the International Organization for Standardization (ISO) as the basis for its own standard. The ISO 27005 standard covers information security risk management, based on ISO 13335 and the British standard BS7799-3. Demand is growing hardened backup data centres and business process outsourcing, which offer multiple advantages as well as business continuity.

[a] Frost & Sullivan, “North American business continuity and disaster recovery markets”, market research report, in “Potential financial and productivity losses from network downtime drive demand for business continuity and disaster services in North America”, press release, Frost & Sullivan website, 17 April 2007 (available at www.frost.com/prod/servlet/press-release.pag?docid=97399016).

C. Information dissemination and access

31. To ensure effective and efficient disaster management, some information gaps must be filled. There is a shortage of basic information for disaster risk assessment and impact estimation at all scales, from local to global. Disaster risk is not a static condition. It shifts according to flux in global processes, in particular those related to economic globalization, global climate change and changing local conditions.

32. An updated, working information base is essential for developing, implementing, evaluating and recording plans and programmes to address current and future risks. Such bases are keys to sound disaster management. For example, the India Disaster Resource Network, initiated by the Ministry of Home Affairs of India in collaboration with the United Nations Development Programme (UNDP), is a nationwide electronic inventory of resources for disaster response, covering equipment, human expertise and critical supplies. The information, from both the district and State levels, is collected and transmitted so that disaster managers can quickly mobilize required resources. This online information system, updated every three months, can be accessed by authorized Government officials, district level nodal persons, corporate bodies and units of the public sector.[20]

33. At the community level, up-to-date input and access to the information base are also fundamental. In many cases, this could be facilitated by telecentres, which have considerable potential to empower communities and provide forms of direct media communication for the dissemination and access of information.

34. Management of historical information also contributes to risk modelling as well as disaster predictions. The collection and management of such information should be considered one of the prerequisites of disaster risk management.

D. Emergency communication systems

35. On 12 May 2008, the Sichuan earthquake interrupted telecommunication connections for more than 30 hours in the eight most seriously hit counties. Emergency communication facilities were urgently deployed to the disaster areas. It was the largest emergency communications deployment in the history of disaster response in China.

36. Numerous emergency telecommunications vehicles, many equipped with satellite communications facilities, were quickly dispatched, but due to severe road damage, they could not reach several seriously hit remote areas. More than 2,000 satellite mobile handsets were also deployed: the first call was sent out, through Inmarsat,[21] 30 hours after the quake. Temporary satellite mobile base stations and broadband transmissions were established. Some terminals had to be carried by helicopter or on foot. They were used to transmit data, including remote sensing images and video

[20] India, “ICT for disaster risk reduction: the Indian experience” (New Delhi, National Disaster Management Division, Ministry of Home Affairs). Accessed from www.ndmindia.nic.in/wcdr_official_documents.htm on 13 August 2008.

[21] Inmarsat is an international telecommunications company that operates geosynchronous telecommunications satellites to provide global mobile satellite services for use on land, at sea and in the air.

for teleconferences and telemedicine. In complement, amateur radio operators around Chengdu organized themselves. One amateur repeater was set up on 13 May, to relay Government instructions, and more were put up to provide communications in several vital areas.[22]

37. As shown in the above example, countries have recognized the importance of emergency communications in supporting disaster response, have made emergency communications the highest priority in telecommunications and information services, and have formulated laws and policies to appoint responsible Government agencies to coordinate the development of emergency communication plans and the implementation of relevant programmes.

38. The magnitude, time and place of disasters are unforeseeable thus relevant preparation in disaster management communications should cover all disaster-prone areas as well as hotspots where public safety is a concern. It is important to create or upgrade policies, operational mechanisms, contingency plans and communication systems in order to prepare for and ensure rapid and effective communications support for disaster response.

39. The impact of today's dynamic technological and regulatory environment is profound: new technologies and the increasingly competitive marketplace combine to bring both new opportunities and new vulnerabilities to the information infrastructure. Governments must find ways to (a) maximize the opportunities by leveraging this dynamic environment to enrich emergency communications capabilities and ensure that new architectures are resilient enough to support emergency operations, and, at the same time, (b) avoid introducing vulnerabilities into the information infrastructure.

40. A recent study has identified key factors that impact the effectiveness of emergency ICT response to disasters: (a) equipment and technology requirements, (b) inter- and intra-agency coordination, (c) personnel, (d) standards and governance, (e) interoperability, and (f) sustained advance preparedness.[23]

41. A comprehensive national action plan on emergency telecommunications and ICT management should be developed as a multidisciplinary arrangement among telecommunications authorities and industries, agencies, that handle emergency response in disasters, and information support organizations. Such a plan should guide actions to ensure: (a) enough resources for the rapid deployment of equipment and provision of services; (b) reliability of equipment; (c) effective management of communications resources and relevant information; (d) the existence of communications networks among organizations and agencies; (e) proper coordination of preparedness and response operations; (f) power and fuel supply; (g) transportation and delivery means; (h) access to warnings and advices; and (i) information to raise community awareness of hazard risks,

[22] Chinese Radio Sports Association, "Amateur Radio Emergency Communication in Action", presentation at the fourth Global Amateur Radio Emergency Communications Conference, Friedrichshafen, Germany, 26 and 27 June 2008 (available at www.iaru.org/emergency/SiChuan_Earthquake.ppt).

[23] Disaster Resource Network, "Emergency information and communications technology in disaster response, final report" (2007) (available at www.drnglobal.org/news/drn-releases-report-on-emergency-ict-in-disaster-response/).

prevention, preparedness, response and recovery. Relevant authorities and service providers should be given a mandate by legislative bodies as well as the necessary budgetary support for a comprehensive national action plan on emergency telecommunications.

42. Emphasis should be given to preparedness at the national level. In terms of emergency communications, planners should identify: (a) the minimum needs for different kinds of telecommunications services for responding to major disasters; (b) the threats and network vulnerabilities of relevant telecommunications infrastructures; and (c) the private and public networks that will be asked to participate in the emergency responses. Such efforts should also establish partnership, activation procedures and detailed response arrangements.

43. Governments should also address the following issues related to the development and preparedness of emergency telecommunication systems:

(a) Infrastructure. At the national level, the last-mile infrastructure is a key to reaching the population with disaster warnings. At the regional level, issues of network interconnection and cross-border movement of telecommunications equipment need to be resolved. Convergence needs to be taken into account, to minimize its potential negative impact on network resilience;

(b) Regulatory framework. This includes regional and national harmonization regarding emergency telecommunications, including standardization; licensing issues, including frequency management for emergency communications; interconnection agreements; emergency provisions, such as public emergency call services and priority fault repair services for emergency organizations; and rapid restoration of services during emergencies;

(c) Regional cooperation. This is required for the use of satellite communications services to support emergency communications. Best practices and lessons learned from previous disasters can be shared among national and regional actors.

Box 2

The Tampere Convention on the Provision of Telecommunication Resources for Disaster Mitigation and Relief Operations

The Convention[a] was unanimously adopted by the delegations of the 60 States participating in the Intergovernmental Conference on Emergency Telecommunications, held in Tampere, Finland, from 16 to18 June 1998, and went into force on 8 January 2005. The Convention urges Governments to take all practical steps for facilitating the rapid deployment and effective use of telecommunications equipment for disaster mitigation and relief operations by reducing and removing regulatory barriers for, inter alia, emergency telecom equipment import, putting in place a structure for managing requests for assistance, facilitating emergency telecommunications before disasters occur, and creating mechanisms for establishing best practices and model agreements, while protecting the interests of host States.

[a] United Nations, *Treaty Series*, vol. 1586, No. 27688.

III. REGIONAL COOPERATION IN ICT FOR DISASTER RISK REDUCTION

44. Regional cooperation is the key to expanding operational applications of relevant ICT tools for disaster risk reduction, especially in least developed countries and landlocked and island nations. Regional cooperative mechanisms must take into account the overall capacity, the technological and institutional infrastructure, the enabling policy environment, and the economic and social disparities among countries in the region.

45. ESCAP has worked for several decades to help Asia and the Pacific prepare for, and respond to, disasters of various types. It has contributed to the creation of the Mekong River Commission, and, in cooperation with the World Meteorological Organization, the Typhoon Committee and the Panel on Tropical Cyclones. The Commission has also promoted the formation of regional cooperation mechanisms in disaster management, including disaster communications. The lessons learned from these experiences could be used for promoting regional cooperative mechanisms in ICT for disaster risk reduction, as described below.

A. Developing and sharing infrastructures and resources

46. The increasing integration and mutual dependency of information and communications technologies is accelerating the provision of information services at a lower cost and with broader penetration. Optical fibre will continue to serve as the backbone of the Internet and telephony services, while satellites will play a major role in large geographical areas where terrestrial infrastructure is not cost-efficient. Satellite remote sensing, global navigation satellite systems and ground and satellite integrated meteorological networks provide content to information services, while satellite communication, with its vast reach, provides the conduit.

47. As many smaller economies still cannot afford to have their own full-fledged disaster management information systems, there is a need to explore affordable ways to share the infrastructure and information resources at the regional or subregional levels. To respond efficiently to natural disasters that span borders, international cooperation has become an indispensable means of providing affordable access to information and products for effective disaster management.

1. Promoting regional emergency communication systems

48. The absence of an effective communications infrastructure is a major obstacle for many least developed countries, landlocked developing countries and Pacific island developing States. This deficiency prevents timely access to telecommunications and information products and services, which is a serious impediment to preparedness for and rapid response to major disasters.

49. Although communications technology has a role in all the phases of disaster management, most applications have traditionally been in the response and recovery phases. The convergence of technologies leads to greater possibilities for integrating different communications systems. Therefore, the interoperability of various systems, including the Internet, mobile phones, fax, e-mail,

radio and television, is becoming increasingly functional. As a result, the possibilities for their use in the mitigation and preparedness phases are also increasing. An assessment of such use in developing countries of the region is summarized in table 1.

50. Disaster risk communication helps ensure that at-risk communities become more aware of the threats they face and the protective actions they can take. In emergency response and management, it is extremely important to have operational communication links between decision makers at various levels and operational response teams or personnel on the site. Unfortunately, the regular telecommunications infrastructure of public wired and wireless telephones is usually disrupted by the disaster. It is essential to set up reliable information and communications networks employing both terrestrial and satellite-based technologies with redundancies to establish a base network for the national emergency communication plan.

Table 1. Elements of emergency communication

Emergency communication systems	Mitigation and preparedness	Information management	Response (post-disaster)
Public networks	• Information exchange • Survival and recovery capability of networks	• Routine telecommunications (phone, fax, telex, data) • Access to data networks	• International links • Local and regional links (if available) • Distribution of reports
Satellite	• Local and regional collection of data • Data transmission for remote sensing	• Backbone network • Thin-route network • Permanent digital links	• International links from disaster site • Backup for regional and international links
HF and VHF radio	• Decentralized means of telecommunication with high survival capability • Frequency allocations for humanitarian needs	• Interface between emergency telecommunications and routine systems	• Regional and local emergency telecommunication links • Backup for international links
Cellular mobile			• Voice and short message service among response teams

Source: ESCAP, “Towards regional cooperative mechanisms for managing floods and drought in Asia and the Pacific using space technology” (ST/ESCAP/2318).

51. Communications satellites have been particularly instrumental in facilitating the necessary last-mile connectivity and extending the reach of ICT services to remote and isolated regions. Because of their ability to provide rapid broadband communication deployment, satellites can form the backbone of a communications system during an emergency. Satellite broadband communication has been recognized as one of the most useful means of supporting disaster response. Satellite communication—based services, providing large bandwidth connectivity, could be rapidly and easily redeployed to other locations when and where needed. IP-based platforms support voice, data and video communication requirements, and a network of relevant nodes within a disaster management system would ensure the flow of information. Satellite phones, recharged by solar power, are deployable all but everywhere and are portable.

52. Countries need to be prepared and establish standby capacities, including plans for the restoration of communications facilities and services, to provide communication support to disaster response actions and temporary services to the affected people. Standby emergency communications arrangements, which would involve not only the telecommunications authorities and service providers but also the disaster management authorities, should be an integral part of national disaster reduction strategy.

53. The establishment of regional and subregional standby communication systems for disaster management and emergency response would benefit many developing countries that cannot afford to establish their own full standby systems, particularly since their use is expected to be infrequent. Standby emergency communications systems under such cooperative arrangements should periodically be reviewed and approved for use by the participating (provider and recipient) countries. Participating countries should develop their internal capacities, including trained personnel, to ensure that they can make use of the systems in the event of a major disaster.

2. Promoting mechanisms for regional sharing of space information

54. Many recent initiatives, mainly promoted by space agencies at the global and regional levels, support cross-border sharing of information from Earth observation satellites to support disaster management in the region. However, some countries lack the capacity required to access and process the information and integrate such tools with national disaster management practices. Furthermore, space-capable countries tend to lack committed policies for the long-term provision of such services. Countries in the region have thus realized the necessity of developing a harmonized regional cooperative mechanism to ensure easy and affordable access to such services and to facilitate the effective use of information in national disaster risk reduction practices. In this respect, the secretariat has been working to prepare for such cooperation and intends to complete this task with interested members.

55. The International Charter: Space and Major Disasters began operating in 2000. It brings together space agencies to provide gratis space imagery products and services in support of responses

to major disasters. The Charter has been activated over 20 times in Asia and the Pacific, providing imagery, maps and data. Current Asia-Pacific members of the Charter are China, India, Japan and Turkey. At various meetings, the secretariat has provided interested members with information on how to benefit from these resources.

56. The United Nations Platform for Space-based Information for Disaster Management and Emergency Response[24] is an initiative aimed at, among other things, ensuring that all countries have access to and develop the capacity to use all types of space-based information to support the full disaster management cycle. The initiative aims at developing a gateway to space-based information for disaster management support, connecting the disaster management and space communities and facilitating capacity-building and institutional strengthening. ESCAP will coordinate with the Office for Outer Space Affairs for regional activities under the Platform.

57. Within the region, the Sentinel Asia initiative, initiated in 2005 by the Asia-Pacific Regional Space Agency Forum, aims at integrating space information and value-added products and services from Earth observation satellites, Internet-based dissemination means and communication satellite capability into a regional support system for disaster reduction by 2010. The web-based platform established under this initiative would be used to develop a harmonized regional cooperative mechanism for ICT applications for disaster management in the Asia-Pacific region. Currently, India and Japan are providing existing satellite resources, and some other countries in the region are contributing with their ground and processing facilities, and have expressed an interest in providing support with their future satellites. ESCAP is working closely with the Japan Aerospace Exploration Agency in promoting this initiative.

58. A constellation of eight Earth observation satellites for disaster management is under development by the Asia-Pacific Multilateral Cooperation in Space Technology and Applications; China will launch the first three in 2008. China has invited the participation of other regional spacefaring countries to join the initiative for the full deployment of the constellation and continued operation and services.

B. Regional disaster information networks

59. Governments at all levels must be able to access necessary information in order to deal effectively with plans, programmes and response actions related to disaster risk reduction. When a country is hit by a catastrophic event, the Government urgently needs access to information on regional and global good practices and expertise in organizing and coordinating complicated, large-scale emergency response actions, as well as advice from relevant experts. By accessing experiences of communities that have dealt with disaster impacts, and by using knowledge, innovation and education to improve the culture of safety and resilience, communities may strengthen their disaster preparedness for effective response.

[24] See General Assembly resolution 61/110 of 14 December 2006.

60. National and regional networks are useful for effective information sharing and coordination. A regional platform for information sharing between Governments, to exchange best practices, current knowledge and information bases (potentially with confidential information removed) could be an invaluable resource.

61. For example, the Governments of Indonesia, Maldives, Sri Lanka and Thailand have, with UNDP support, established nationally owned systems for aid information management in order to trace tsunami aid resources and project results more effectively. An information portal has been developed as a resource for coordination at the regional level. This brings together results and resource-allocation data from each country and makes them available at the website http://tsunamitracking.org.

62. A comprehensive database of inventory related to disaster management and an organized information dissemination system on the availability of specialized resources are essential for mobilizing resources to respond immediately during a disaster. A lack of adequate information has hampered quick and measured response resulting in delays which were critical. An online inventory of emergency resources could be developed through South-South cooperation. Valuable non-confidential information, in addition to being managed at national data centres, can be replicated in subregional or regional data centres through bilateral or regional agreements among partnering countries.

C. Capacity-building

63. Institutional capacity is essential for assessing gaps in access, adoption and value in the utilization of ICT products and services in developing countries. All steps necessary for making ICT services operational in support of disaster risk reduction depend upon possessing and maintaining capacity: converting data into useful information and services, establishing infrastructure, training stakeholders to use services effectively, and integrating national endeavours with international systems. Developing countries, especially least developed countries, still need support in these areas.

64. The absence of integrated national ICT plans in many countries is leading to a fragmented approach to ICT adoption and suboptimal use of resources. Such countries are not optimally prepared to access information, communications and space tools for effective disaster management, particularly for major disaster responses. While these countries should develop national action plans for ICT that cover all economic and social sectors and mainstream disaster risk reduction into national socio-economic development plans, the development of regional cooperative mechanisms to provide such support at the regional and subregional levels would significantly strengthen their capacity in using ICT to deal with issues of disaster risk reduction.

65. The Geneva Plan of Action of the World Summit on the Information Society[25] emphasizes capacity-building as the route to build competence in ICT development and applications. Capacity-building in the use of ICT tools for disaster risk reduction encompasses not only education and training (building skills) for governmental officials and technical personnel, but also organizational and institutional strengthening.

IV. ISSUES FOR CONSIDERATION

66. The Committee may wish to review the issues covered in the present document and advise the secretariat on priority areas of work to support regional cooperation in the following areas:

(a) Development and sharing of information, communications and space infrastructure and resources;

(b) Development of regional emergency communications systems. ESCAP could work towards the establishment of regional and subregional disaster communication standby systems in synergy with the International Telecommunication Union, the Asia-Pacific Telecommunity and other relevant stakeholders in this field. These systems could be deployed from key locations in the region to any country that pre-signed an appropriate agreement;

(c) Development of a regional network of all disaster information sharing networks in the region, addressing multi-hazards. The secretariat could promote the system of networks on information sharing and analysis for disaster risk reduction with the International Strategy for Disaster Reduction and other international and regional partners working in this field;

(d) Capacity-building in the use of ICT for disaster management. The secretariat could, through the Asian and Pacific Training Centre for Information and Communication Technology for Development and the Regional Space Applications Programme for Sustainable Development network and in cooperation with relevant organizations which have capacity-building programmes, contribute to building the capacities of member countries at the policy, institutional and technical levels to address the integrated use of ICT for disaster risk reduction;

(e) Preparation of regional cooperation mechanisms for information sharing, and for using specialized facilities and knowledge to improve the disaster preparedness and response of all interested members.

67. The Committee may wish to provide guidance in undertaking activities to address the issues that are of common concern to members and associate members. It may also wish to provide guidance on the secretariat's future strategic direction in ICT for disaster risk reduction, including possible outputs that could be reflected in the programme of work for the biennium 2010-2011.

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[25] A/C.2/59/3, annex.