UNITED NATIONS
ECONOMIC
AND
SOCIAL COUNCIL

GENERAL

E/ESCAP/CICT/2
25 August 2008

ORIGINAL: ENGLISH

ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC

Committee on Information and Communications Technology

First session
19-21 November 2008
Bangkok

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

Page

Introduction 1

I. ICT FOR DISASTER RISK REDUCTION 2

A. Preparedness and early warning 3

B. Response and relief 4

II. ICT IN SUPPORT OF THE HYOGO FRAMEWORK FOR ACTION 2005-2015: BUILDING THE RESILIENCE OF NATIONS AND COMMUNITIES TO DISASTERS 5

A. The role of ICT in national platforms for disaster risk reduction 6

B. Mitigation and recovery of ICT infrastructure and applications 6

C. Information dissemination and access 8

D. Emergency communication systems 8

III. REGIONAL COOPERATION IN ICT FOR DISASTER RISK REDUCTION 11

A. Developing and sharing infrastructures and resources 11

B. Regional disaster information networks 14

C. Capacity-building 15

IV. ISSUES FOR CONSIDERATION 16

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]

---

[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.

---

[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.