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Committee on the Peaceful Uses of Outer Space

United Nations Regional Workshop on the Use of Space Technology for Disaster Management for Europe

(Poiana-Brasov, Romania, 19-23 May 2003)

Contents

		Paragraphs	*Page*
I.	Introduction	1-26	2
	A. Background and objectives	1-22	2
	B. Programme	23-24	6
	C. Attendance	25-26	6
II.	Observations and recommendations	27-52	7
	A. Approach to establishing a plan of action	27-32	7
	B. Current status and needs	33-43	8
	C. A vision for Europe	44-52	9
III.	A plan of action for Europe	53-68	11
	A. Building partnerships	53-63	11
	B. Role of the Office for Outer Space Affairs	64-66	12
	C. Maintaining the momentum	67-68	13

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I. Introduction

A. Background and objectives

1. The Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III), in particular through its Vienna Declaration on Space and Human Development, [1] recommended that activities of the United Nations Programme on Space Applications should promote collaborative participation among Member States at both the regional and international level, emphasizing the development of knowledge and skills in developing countries.

2. Disaster management has been singled out as one of the areas of focus. Earth observation satellites and other space-based technologies provide important and unique solutions in all phases of disaster management: disaster mitigation, disaster preparedness, disaster relief and disaster rehabilitation. Such solutions are already an integral part of disaster management activities in many developed and even developing countries.

3. Although national capabilities in the use of space technologies in developing countries have increased significantly in recent years, there is still a need to support, in a more direct way, the transfer of available solutions for use in disaster management activities, while fine-tuning some of the approaches to meet the specific needs of a country.

4. In order to promote the use of space technology for disaster management in developing countries and in countries with economies in transition, the Office for Outer Space Affairs, within the framework of the United Nations Programme on Space Applications, is organizing, over a five-year period, six workshops (five regional workshops and one final international workshop which will bring together experts from all five regions) on the use of space technology for disaster management, bringing together specialists that have already developed space-based technology solutions for dealing with disaster management and those responsible for dealing with disaster management and the use of space technology in developing countries.

5. The overall objective of the above-mentioned efforts is the successful integration of space technology solutions in a sustainable manner into the operational disaster management programmes of Member States, through the definition and implementation of appropriate pilot projects. The regional workshops are the first step towards defining the pilot projects. In addition to the workshops and pilot projects, the approach also includes a training component and the presentation of best practices to high-level disaster managers and decision makers from national and international institutions, including potential funding institutions.

6. The Romanian Space Agency (ROSA), as the leading institution in the national space programme and international representative of Romania in major space-related organizations and agreements, is developing and planning applications of space technology to risk and disaster management bearing in mind specific national and regional issues. Projects and studies on specific natural disasters such as floods, earthquakes and landslides, together with action towards increasing security to environmental and human risk factors are being developed by ROSA

centres and affiliated institutes, universities and companies. In Europe, ROSA has taken a lead role in promoting the use of space technology for disaster management.

7. The specific objectives of the regional workshops are: (a) to increase awareness among managers and decision makers involved in disaster management of the potential benefits and the cost-effectiveness of using space technologies; (b) to determine the types of information and communications needed in managing specific disasters and the extent to which they could be met by space technologies; and (c) to develop a regional plan of action that will contribute to defining one or more pilot projects that incorporated and tested the use of space tools in disaster management and that will also help to define the structure of a regional network to support the use of space technology in disaster management activities.

8. The pilot projects will be designed and carried out with international cooperation and will be aimed at creating synergy among the regional initiatives of various institutions or groups of institutions. Institutions willing to cooperate on the pilot projects will be invited to participate in expert meetings to determine the terms of reference of the pilot projects and to prepare a joint implementation strategy.

9. Several initiatives, many within the United Nations system, focus on making space technology solutions available to those responsible for dealing with disaster-related activities in developing countries. The workshops, together with the follow-up activities, are being planned and implemented taking into consideration the initiatives described below.

Committee on the Peaceful Uses of Outer Space

10. In its resolution 54/68 of 6 December 1999, the General Assembly endorsed the resolution entitled "The Space Millennium: Vienna Declaration on Space and Human Development" [2] and urged, inter alia, organizations within the United Nations system to take the necessary action for the effective implementation of the Vienna Declaration. The Vienna Declaration included a number of recommendations, one of which called for action to be taken to implement an integrated, global system, especially through international cooperation, to manage natural disaster mitigation, relief and prevention efforts, especially of an international nature, through Earth observation, communications and other space-based services, making maximum use of existing capabilities and filling gaps in worldwide satellite coverage.[3]

11. At its forty-fourth session, the Committee on the Peaceful Uses of Outer Space decided that it would address several of the recommendations, including the one mentioned in paragraph 11 above, through action teams with the voluntary leadership of member States.[4] The Committee received offers from Canada, China and France to lead the action team on the implementation of an integrated, global system to manage natural disaster mitigation, relief and prevention efforts. The initial three-year work plan of the action team includes the compilation of information on user needs for disaster management, on national capacity for utilizing space-derived information on disaster management and on existing and planned operational space systems in support of disaster management.

International Strategy for Disaster Reduction

12. Recognition of the fact that disasters were an increasing problem led to the launching of the International Decade for Natural Disaster Reduction for the period

1990-1999, which, in turn, led to the establishment of the International Strategy for Disaster Reduction, a global strategy with two institutional components. The first one is the Inter-Agency Task Force for Disaster Reduction and the second component is the secretariat of the Task Force. The International Strategy focuses on consolidating a global strategy to encourage and facilitate concerted action to reduce risk and vulnerability to natural and related technological and environmental hazards, bringing together governments, business, academia and civil society at the international, regional and local level facilitating concerted action and dialogue among experts, decision makers and project managers.

13. In 2003, the International Strategy for Disaster Reduction promoted two activities that provided opportunities to focus on space technology for disaster management: the first was the Euro-Mediterranean Forum on Disaster Reduction, held in Madrid, from 6 to 8 October 2003, and the second was the Second International Conference on Early Warning, held in Bonn, from 16 to 18 October 2003.

Office of the United Nations High Commissioner for Refugees

14. The Office of the United Nations High Commissioner for Refugees (UNHCR) is mandated to lead and coordinate international action to protect refugees and resolve refugee problems worldwide. In order to carry out its mandates, UNHCR is increasingly using space-based technologies such as satellite imagery and global navigation satellite systems to help manage refugee camps around the globe.

Office for the Coordination of Humanitarian Affairs

15. The work of the Office for the Coordination of Humanitarian Affairs of the Secretariat focuses on three core areas: (a) policy development and coordination functions in support of the Secretary-General, ensuring that all humanitarian issues, including those which fall in gaps between existing mandates of agencies, such as protection and assistance for internally displaced persons, are addressed; (b) advocacy of humanitarian issues with political organs, notably the Security Council; and (c) coordination of humanitarian emergency response on the ground, by ensuring that an appropriate response mechanism is established through Inter-Agency Standing Committee consultations. In order to support its coordination activities during humanitarian emergency response, the Office for the Coordination of Humanitarian Affairs is increasingly using space-based technologies.

United Nations Educational, Scientific and Cultural Organization

16. Within the framework of the International Strategy for Disaster Reduction, the United Nations Educational, Scientific and Cultural Organization (UNESCO) is focusing on building a culture of prevention to counter disasters and reduce vulnerability of populations at risk. UNESCO is engaged in the assessment and mitigation of risks arising from hazards of geological origin (earthquakes, tsunamis, volcanic eruptions and landslides) and contributes to the study of hazards of meteorological origin (storms, floods, prolonged drought and desertification).

17. UNESCO also fosters information, education, transfer of data and experience among countries and communities aiming at integrating geohazard knowledge and expertise in decision-making processes in order to encourage the adoption of

policies and actions for sound planning and management of land-use and construction techniques and to promote the development of preventive and preparedness plans, including the implementation of global to local warning systems.

Charter on Cooperation to Achieve the Coordinated Use of Space in the Event of Natural or Technological Disasters

18. The Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters (also known as the International Charter "Space and Major Disasters") enables countries where a natural or technological disaster has occurred to receive products derived from satellite images to support disaster mitigation activities. The institutions participating in the Charter are the European Space Agency (ESA), the Centre national d'études spatiales (CNES) of France, the Canadian Space Agency, the Indian Space Research Organization, the National Oceanic and Atmospheric Administration (NOAA) of the United States of America, and the Comisión Nacional de Actividades Espaciales (CONAE) of Argentina. The Office for Outer Space Affairs is a cooperating body of the Charter, which enables it to have access to support in the event of disasters concerning the United Nations system and Member States.

Committee on Earth Observation Satellites

19. The Committee on Earth Observation Satellites (CEOS) is an international organization charged with coordinating international civil space-borne missions designed to observe and study the Earth. CEOS, whose membership is comprised of space agencies and other national and international organizations, is recognized as the major international forum for the coordination of Earth observation satellite programmes and for interaction of those programmes with users of satellite data worldwide.

20. The CEOS Disaster Management Support Group completed its work in 2002, delivering its final report in November 2002 during the CEOS plenary meeting and CEOS endorsed its recommendation that activities of the Support Group be integrated into the International Charter "Space and Major Disasters", the workshops organized by the Office for Outer Space Affairs and their follow-up activities and the geohazards theme of the Integrated Global Observing Strategy.

21. At the same meeting, focusing on building upon the Plan of Implementation of the World Summit on Sustainable Development ("Johannesburg Plan of Implementation"),[5] CEOS initiated the World Summit on Sustainable Development Follow-up Programme specifically in the areas where Earth observation played an important role for sustainable development. One of the areas that CEOS identified was disaster management and conflicts.

Other global initiatives

22. In addition to the initiatives mentioned above, the following other global initiatives were also considered: Global Terrestrial Observing System, Global Climate Observing System, Global Ocean Observing System, World Weather Watch, Integrational Geosphere-Biosphere Programme, International Human Dimensions Programme on Global Environmental Change, World Climate Research Programme,

International Ocean-Colour Coordinating Group, Global Coral Reef Monitoring Network, Global Warming International Center, Global Water Partnership, Integrated Regional Information Network and Global Fire Monitoring Center.

B. Programme

23. The United Nations Regional Workshop on the Use of Space Technology for Disaster Management for Europe was organized by the Office for Outer Space Affairs and the Romanian Space Agency, co-sponsored by ESA and CNES and co-organized with the secretariat of the International Strategy for Disaster Reduction. The Workshop was hosted by ROSA and held in Poiana-Brasov, Romania, from 19 to 23 May 2003.

24. At the opening session of the Workshop, statements were made by representatives of ROSA, ESA, CNES and the Office for Outer Space Affairs. The Chief Executive Officer of ROSA delivered the opening address, which was entitled "Risk monitoring in the Danube region". A total of 27 presentations were delivered in six thematic sessions and 14 presentations were delivered in the open session covering all aspects of the current use of space technology for disaster management. Three discussion panels were held on the following topics: "Space technology and disaster management: a vision for Europe"; "Current trends in the development of space technology and the importance for disaster management"; and "Strengthening the institutional aspects of space technology and disaster management". Four discussion sessions enabled further deliberation on the main topics that subsequently formed the framework of a proposed plan of action and the definition of the steps forward.

C. Attendance

25. A total of 73 participants attended the Workshop and came from the following 24 countries: Armenia, Austria, Azerbaijan, Barbados, Belgium, Bulgaria, Canada, Cyprus, France, Germany, Hungary, Italy, Norway, Poland, Romania, Russian Federation, Serbia and Montenegro, South Africa, Switzerland, Syrian Arab Republic, Turkey, Ukraine, United Kingdom of Great Britain and Northern Ireland and United States of America. The Cartographic Section of the United Nations, the United Nations Environment Programme, the secretariat of the International Strategy for Disaster Reduction, the Caribbean Disaster Emergency Response Agency, ESA, the European Commission and the Office for Outer Space Affairs were also represented.

26. Funds allocated by the United Nations and by the co-sponsors (ESA and CNES) were used to defray the costs of air travel and daily subsistence allowance of 17 participants and two representatives of the Office for Outer Space Affairs.

II. Observations and recommendations

A. Approach to establishing a plan of action

27. The six thematic sessions focused on building an understanding of the current needs, the current institutional environment and the current available space-based solutions. The three discussion panels were provided an ideal forum for discussing a vision for Europe, current trends, new innovative developments and initiatives and also institutional aspects that should be further considered. Building upon what had been presented at the thematic sessions and by the panellists at the discussion panel sessions, participants defined during four discussion sessions a strategy for the region, together with a plan of action.

28. Presentations on the current status and needs centred on the availability of information and technology, capacity-building and institutional environment. This included understanding the types of hazards that were specific to the region, the data needed to deal with such hazards, current data availability, including having access to the data at the appropriate time and in the appropriate format, and finally the existing available technologies and the solutions developed that made use of such technologies.

29. It was noted that a number of available technologies could provide data for use in disaster management: remote sensing technologies (satellite and aerial photography), which provided data on terrain, land cover, vegetation and so forth; light detection and ranging (lidar) devices, which were being used to create elevation models for natural landscape features and buildings; ground-surveying tools, which produced maps for boundaries and other landscape elements; governmental censuses and surveys, which provided socio-economic data for defined spatial units; global navigation satellite systems, which offered a means of obtaining positional information for stationary or moving objects; wireless telecommunication developments, which facilitated emergency communication and interpersonal contacts during disasters; wireless technologies, which provided a means for data logging in the field; and Internet products and services, which provided access to and dissemination and sharing of data, other information and knowledge on a real-time basis.

30. The Workshop considered that “institutional environment” referred not only to the existence of institutions that were involved in disaster management or that already had competence in the use of space-based solutions, but also to current national and regional policies with regard to disaster management. Consideration also needed to be given to existing initiatives that would support or complement the development of applications of space-based technologies. Important aspects of the institutional environment were the communication channels already in place and the strength of the networks and partnerships. Dealing with disasters was a multidisciplinary activity that involved all sectors of society.

31. It was noted that capacity-building, the final of the three presentation areas, referred to the need to continuously capacitate the end-user and to develop solutions that were specific to the region. Appropriate human resources could be considered the single most important resource to have available during a crisis, but the training of staff required time and effort.

32. After 41 presentations and many hours of discussion, valuable observations were made and important conclusions were drawn and a plan of action was put forward.

B. Current status and needs

33. Several presentations gave participants the opportunity to learn of the extent that space technology had been incorporated into disaster management activities in the region, particularly those relating to floods, droughts, seismic activity, landslides, snowmelt run-off, fire detection and monitoring, technological risks, volcanic activity and human health and to those that supported the study of risks of vector-borne diseases.

34. Participants of the Workshop were informed of the wide availability of remotely sensed images with various spatial, spectral and temporal resolutions. Several presentations stressed the availability of imagery with resolution of 0.5-1,000 metres and the potential application to disaster management and the need to consider building integrated solutions that made use of data obtained from different sensors.

35. Several presentations stressed that radar imagery, such as the images received from the Synthetic Aperture Radar Satellite RADARSAT-1 and the European remote sensing satellite ERS-2, was useful to several hazard themes, in particular flood monitoring, oil spills, snow and ice storms, volcanic eruptions and earthquakes.

36. At a presentation given on behalf of ESA, workshop participants learned about the Environmental Satellite (ENVISAT). Launched in March 2002, it carried on board 11 instruments that made possible the simultaneous imaging of Earth's surface by different sensors, thereby providing an invaluable source of data to support various areas, including disaster management.

37. At a presentation given on behalf of the German Aerospace Center (DLR), workshop participants were informed of the possibility of taking advantage of the imagery provided by the Bi-spectral Infrared Detection (BIRD) mission for pilot projects. That mission was testing a new generation of infrared sensors and was useful for remote sensing of fires and land surface from space. The mission also provided an opportunity to demonstrate the technological importance of micro-satellite solutions.

38. Participants at the workshop were informed about the establishment of the Disaster Monitoring Constellation of small, low-cost satellites, coordinated by Surrey Satellite Technology of the United Kingdom, which would give users the possibility, once all four of the planned satellites were launched, of a daily revisit over a disaster area.

39. At a presentation given on behalf of the European Commission, workshop participants were informed of European efforts to achieve full autonomy in satellite navigation through the consolidation of the European Geostationary Overlay Service (EGNOS) and implementation of Galileo, Europe's global navigation satellite system solution. Galileo which was a joint European Commission and ESA programme would join existing global navigation satellite systems, such as the Global Positioning System (GPS) and the Global Navigation Satellite System

(GLONASS), and would be particularly important for applications in the area of emergency and disaster management (natural disaster management, emergency operations, humanitarian intervention and infrastructure development and reconstruction). Galileo would also improve the existing International Satellite System for Search and Rescue (COSPAS-SARSAT) that was being used for search and rescue operations.

40. A presentation given on behalf of the International Strategy for Disaster Reduction stressed that in the previous 25 years both the number of occurrences of natural disasters and the number of people reported to be affected by these disasters had increased. That was due to the trend in the increase of extreme events and the vulnerability to natural and related technological and environmental hazards. The increase in extreme events was attributable to climate change and variability and also the compound effect of several hazards occurring in the same area. The increase in vulnerability was due to increased poverty, environmental degradation, urban growth, value of constructed environment and unsuitable development processes.

41. Global Monitoring for Environment and Security (GMES) was an important regional initiative which was being carried out by the European Commission and ESA. Its goal was to establish by 2008 an operational and autonomous European capacity for GMES. An assessment report to be finalized in 2003 would contribute to the identification of the strengths and weaknesses of the current capacity and the needs for improvement in the scientific, technical, socio-economic and institutional domains.

42. A presentation given on behalf of the International Charter "Space and Major Disasters" demonstrated the success of joint efforts since the Charter had become operational on 1 November 2000. It was noted that the Charter had been activated a total of 31 times, mostly in response to flood emergencies (13 times).

43. It was noted that in the period 1998-2002, the European Commission, within the Fifth Framework Programme (FP5), had provided support totalling 70 million euros to more than 80 research projects dealing with floods, landslides, avalanches, forest fires, earthquakes, volcano eruptions and industrial risks.

C. A vision for Europe

44. Building upon the information provided during the thematic sessions, participants of the workshop outlined during various discussion sessions a path leading to a common vision of how space technology should be incorporated into disaster management activities. Topics included the need to focus on prevention, the need to make data available, the need for developing integrated regional systems and finally concern for insufficient funding.

45. In several presentations it was argued that disaster management activities should be pro-active instead of reactive. Participants agreed during discussion sessions that emphasis should be placed more on disaster prevention and mitigation and less on emergency disaster response. Although space technology could be used in every phase of the disaster cycle, workshop participants clearly distinguished two types of systems. The first type of system was the one that focused on the response

phase to a crisis, in which a system "on demand" was needed and the second type of system supported the inter-crisis phase, when a system that was "always on" was needed. Whereas, during a crisis, high-resolution imagery was usually needed, the "always-on" system could probably be designed at lower cost or with free imagery. That fact, together with the need to focus on vulnerability and risk analysis, reflected the need for a shift from emergency response to prevention. Emphasis should be on improving the prediction of the occurrence of disasters and the mitigation of the impacts.

46. It was noted that the availability and use of spatial data affected every aspect of society. Spatial data should be made available to the people who needed them, when they needed them and in a form that enable decisions to be made with minimal pre-processing. The focus should be on sharing information on existing capacities, ensuring compatibility of approaches and procedures and carrying out joint initiatives to achieve tangible results. Priority should be given to addressing institutional fragmentation of information and responsibilities, the upgrading of existing technological capacity to monitor hazards nationwide and the implementation of effective information management systems for the collection, analysis and dissemination of information. It was recommended that regional systems could be based upon successful operational systems at the national level and that, through international cooperation, spatial data and technology could be shared.

47. It was emphasized that there was a need to consolidate data-sharing and data exchange policies which built upon the ongoing discussions of metadata standards and the establishment of national spatial data infrastructures. In addition, efforts should be made to improve the delivery time of imagery. Data access was an issue, particularly for Eastern Europe, because of slow Internet connections for transmitting data. Even though compression software was available that was able to reduce the size of the images by a factor of 10 with no significant loss of information, there was a need to seek creative approaches that would take advantage of other available solutions, such as telecommunication satellites, distribution systems and processing data and analysis on remote servers.

48. Given that decision makers had diverse needs, the solution envisaged that would make use of space technology was an integrated information platform that could accommodate information from different sources, in different forms and on varying scales. Solutions should be developed that took advantage of all types of space technologies, such as telecommunication satellites and global navigation satellite systems.

49. The lack of early warning systems was identified as a problem that weakened the disaster preparedness of most European countries. Thus, there was a need for neighbouring countries to work towards implementing and consolidating early warning systems.

50. A better understanding of identifying the users was needed, so that solutions could be designed, from the bottom up, based on the needs of the end-users. The main users identified were not only all levels of government, but also joint international programmes and initiatives and, increasingly, the commercial sector, for example, insurance companies.

51. Capacity-building should be aimed at increasing the capability of organizations and individuals to use geospatial information effectively for disaster preparedness, response and recovery. The following user groups needed to be trained: policy and decision makers and administrators, scientists and engineers responsible for databases and information systems and various end-users of geospatial information such as planners and civil protection and rescue personnel.

52. Insufficient funding was considered a major concern, particularly as pilot projects turned into permanent activities; therefore, efforts should be made to seek and consolidate alternative funding sources, such as the European Commission's Sixth Framework Programme (FP6), covering the period 2002-2006, which presented opportunities for carrying out research in the area of natural and technological hazards.

III. A plan of action for Europe

A. Building partnerships

53. The central point of the plan of action discussed at the Workshop was the need to build partnerships and carry out joint pilot projects to demonstrate the benefits of incorporating solutions based on space technology, thereby contributing to raising the level of awareness of decision makers. The starting point in defining possible partnerships was to seek common interests, through the identification of common hazard areas.

54. The Workshop took a two-stage approach in defining common hazard areas. During the first stage, participants defined 22 hazards that should be considered separately: avalanches, drought, floods, extreme weather conditions (thunderstorms, snowstorms, windstorms, lightning), earthquakes, landslides, subsidence, volcanoes, climate change and sea-level changes, coastal erosion, oil and industrial pollution, technological and nuclear risks, transportation accidents, water pollution, landmines, plagues, refugee flows, deforestation, forest fires, soil erosion, development of information technology and space technology systems and solutions and support capacity-building.

55. During the second stage, institutions expressed their interest in participating in each of the 22 hazard areas. A total of 34 institutions demonstrated their interest by making an initial commitment to participating in efforts in one or more hazard areas.

56. The workshop participants were divided into four discussion groups focusing on the main interest areas: floods, fires, earthquakes and technological risks. Group discussions conducted during the discussion sessions outlined several guidelines for proposing joint pilot projects, such as the need to build an understanding of user needs and their data requirements (including issues of data standards), to compile a survey of existing systems, to develop a list of the available data sets including historical data, to develop pilot projects with a regional focus and also contributing to the development of integrated early warning systems (thus focusing on prevention) and, finally, to bridge the gap between the user community and those that understood the technology by seeking greater involvement of disaster management institutions.

57. The group discussions also pointed out additional common points such as the synergy of hazards as was the case of forest fires and radioactive contamination in Ukraine, the fact that methodological solutions for fire and floods depended on the same analytical tools and spatial and ancillary data and the fact that integrated approaches were needed such as the proposed environmental disaster management for the Danube Basin which should simultaneously address not only floods but also technological hazards.

58. All four discussion groups proposed to work together towards developing and carrying out pilot projects. In particular, there was consensus that one specific area of interest would be to develop a pilot study in the area of the Tisza tributary of the Danube.

59. When identifying possible pilot projects, institutions should recognize work in progress, especially work that already had local commitment. Institutions involved would interact primarily using the Internet and facsimile, providing information to all interested institutions on activities being proposed or carried out and fostering viable partnerships among the different initiatives and interests.

60. It was agreed that the table with commitments should develop into a regional network of cooperation and that the implementation of the regional network would involve the following activities: extending the network to other institutions; setting up a Web-based discussion list (to support both regional and global activities); setting up a web site to disseminate information on progress and achievements and following up on all initial commitments.

61. The regional network proposed at the Workshop was aimed at attracting the participation of governmental and academic institutions, non-governmental organizations, private industry and United Nations bodies. Any institution that incorporated space technology for disaster management activities and was interested in developing activities in the region would be able to join the regional network.

62. In order to define the responsibilities of each institution, the terms of reference for suggested pilot projects and a strategy for their implementation, it was suggested that the interested institutions should convene expert meetings to discuss those topics.

63. Teams would work on a “best efforts” basis. Each institution would be responsible for its own expenses. If additional funding support was needed for satellite imagery or hardware and software, or both, the team could contact interested space agencies or bilateral and multilateral development institutions, or both, to secure the additional support required.

B. Role of the Office for Outer Space Affairs

64. It was agreed that, as follow-up to the initial commitments made at the Workshop, the Office for Outer Space Affairs would contact the institutions that had expressed an interest in joining the network and request them to confirm their participation in the hazard themes in which they were interested. The regional network database would be maintained and updated by ROSA with the support from the Office for Outer Space Affairs and other interested institutions.

65. The Office for Outer Space Affairs would also support, to the extent possible, expert meetings convened by institutions that used space technology for disaster management activities and that were interested in developing joint pilot projects. At those meetings, terms of reference for the pilot projects would be defined and implementation strategies would be developed, including the securing of any additional funding, if necessary.

66. The web sites of the Office for Outer Space Affairs (www.oosa.unvienna.org/SAP/stdm) and ROSA (www.rosa.ro) would be enhanced by the addition of relevant links and information on space technology applications for disaster management, for the benefit of the regional network. All institutions would be responsible for providing information to be posted on the web sites. A discussion list had already been set up on the web site of ROSA to support participants of the regional network.

C. Maintaining the momentum

67. It was noted that the seemingly interminable succession of disasters, floods, droughts, storms, earthquakes, landslides, volcanic eruptions and wildfires was causing growing concern. The number of people at risk had been growing steadily, by between 70 million and 80 million per year.[6] Action needed to be taken immediately to alleviate the effects of future disasters by taking advantage of recent technological developments.

68. The Workshop demonstrated that space-based technologies had a real contribution to make in all areas of disaster management and that measures needed to be taken to ensure the deployment of the technologies currently available. The establishment of a regional network of institutions interested in fostering partnerships and developing joint pilot project was an important step towards achieving greater use of space technology to support disaster management activities. It was noted that the 34 institutions that had expressed an interest in participating, as well as the other institutions and the private sector that would be invited to join, should seize the opportunity offered by those cutting-edge technologies to define and implement solutions to the pressing disaster threats that had become an everyday reality in the region.

Notes

[1] *Report of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, 19-30 July 1999* (United Nations publication, Sales No. E.00.I.3), chap. I, resolution 1.

[2] Ibid.

[3] Ibid., sect. I, para. 1 (b) (ii).

[4] *Official Records of the General Assembly, Fifty-sixth Session, Supplement No. 20* (A/56/20 and Corr.1), paras. 44-62.

[5] *Report of the World Summit on Sustainable Development, Johannesburg, South Africa, 26 August-4 September 2002* (United Nations publication, Sales No. E.03.II.A.1 and corrigendum), chap. I, resolution 2, annex.

[6] *Living with Risk: a Global Review of Disaster Reduction Initiatives* (http://www.unisdr.org/unisdr/Globalreport.htm). The report will subsequently be issued as a United Nations publication.