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**Committee on the Peaceful  
Uses of Outer Space****Report on the United Nations/International Astronautical  
Federation Workshop on the Use of Space Technology for  
Water Resources Management****(Valencia, Spain, 29 and 30 September 2006)****Contents**

	<i>Paragraphs</i>	<i>Page</i>
I. Introduction .....	1-19	2
A. Background and objectives .....	1-8	2
B. Programme .....	9-15	3
C. Attendance and financial support .....	16-19	4
II. On-site evaluation of the Workshop.....	20-25	5
III. Observations and recommendations .....	26-32	5
IV. Follow-up action .....	33-34	7



## 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 resolution entitled “The Space Millennium: Vienna Declaration on Space and Human Development”,<sup>1</sup> recommended that activities of the United Nations Programme on Space Applications should promote collaborative participation among Member States at the regional and international levels and emphasize the development of knowledge and skills in developing countries.<sup>2</sup>
2. At its forty-eighth session, in 2005, the Committee on the Peaceful Uses of Outer Space endorsed the programme of workshops, training courses, symposiums and conferences planned for 2006 as proposed in the report of the Expert on Space Applications (A/AC.105/840). Subsequently, the General Assembly, in its resolution 60/99, endorsed the activities to be carried out under the United Nations Programme on Space Applications for 2006.
3. Pursuant to General Assembly resolution 60/99 and in accordance with the recommendations of UNISPACE III, the United Nations/International Astronautical Federation Workshop on the Use of Space Technology for Water Resources Management was held in Valencia, Spain, on 29 and 30 September 2006, in conjunction with and as an associated event of the 57th International Astronautical Congress, held in Valencia from 2 to 6 October 2006.
4. The Workshop was organized by the Office for Outer Space Affairs of the Secretariat, as part of the activities of the United Nations Programme on Space Applications for 2006, and the International Astronautical Federation (IAF). It was co-sponsored by the European Space Agency (ESA) and the University of Valencia.
5. The Workshop was the sixteenth workshop organized jointly by the Office for Outer Space Affairs and IAF. It built upon the recommendations and experience gained from the previous 15 workshops, held between 1991 and 2005.
6. The Workshop discussed how space technology could contribute to the management of water resources, including combating desertification, ensuring access to safe drinking water and managing water-related emergencies such as floods, tsunamis and mudslides, with the following primary objectives: (a) to increase awareness among decision makers and the academic community of space technology applications for improving water resource management in developing countries; (b) to promote educational and public awareness initiatives in the area of water resources management; (c) to examine low-cost space-related technologies and information resources available for addressing water-related challenges in developing countries; and (d) to strengthen international and regional cooperation in that area.

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<sup>1</sup> *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.

<sup>2</sup> *Ibid.*, chap. II, para. 409 (d) (i).

7. The Workshop also provided a forum for discussions between space technology experts, policymakers and decision makers and representatives of the academic community and private industry from both developing and developed countries. All participants were encouraged to share their experiences and to examine opportunities for better cooperation.

8. The present report describes the background and objectives of the Workshop and provides a summary of the observations made by the participants. It has been prepared for submission to the Committee on the Peaceful Uses of Outer Space at its fiftieth session and to its Scientific and Technical Subcommittee at its forty-fourth session, both to be held in 2007.

## **B. Programme**

9. The programme of the Workshop was developed jointly by the Office for Outer Space Affairs and the programme committee of the Workshop, which included representatives of a number of national space agencies, international organizations and academic institutions. A substantial contribution was made by the honorary committee of the Workshop, which consisted of prominent representatives of the host country, IAF and the Secretariat. The input received from both the honorary committee and the programme committee, as well as the direct participation of members of those committees in the Workshop, ensured that the aims of the Workshop were achieved.

10. The programme of the Workshop focused on various applications of space technology for the efficient management of water resources and on ways to enhance the capacity of developing countries in that area by developing human and technical resources at various levels, enhancing regional and international cooperation, increasing public awareness and developing appropriate infrastructure.

11. The programme of the Workshop included four technical sessions: (a) on the use of space technologies for enhancing the management, protection and restoration of water resources, as well as for mitigating water-related emergencies and combating desertification; (b) on education, training and public awareness activities required by various target groups to address water-related challenges; (c) on strengthening international and regional cooperation to support initiatives to enhance the use of space technologies for water management; and (d) case studies presented by participants from developing countries on the successful application of space technologies to enhance the management of water resources. Two working groups were established to develop the observations of the Workshop.

12. A total of 29 oral technical presentations were delivered during the two days of the Workshop, and two papers were presented at the poster session. They focused on national, regional and international projects and initiatives in the area of the application of space technology for better water resources management and the contribution of such technology to sustainable development programmes in developing countries.

13. Opening statements were delivered by representatives of the City of Valencia, IAF, the University of Valencia and the Office for Outer Space Affairs. At the opening session, keynote addresses were made by U. R. Rao (IAF) and F. Tomás

(University of Valencia). Closing remarks were made by representatives of IAF, the University of Valencia, the Office for Outer Space Affairs and the local organizing committee for the 58th International Astronautical Congress, to be held in Hyderabad, India, in 2007.

14. Each of the technical sessions was followed by open discussions, which focused on specific topics of interest and provided additional opportunities for participants to voice their opinions. The discussions were continued in depth and summarized by two working groups established by participants to develop a set of recommendations that could enhance the use of space technologies for water resources management in developing countries, to contribute to international and regional cooperation and to promote education and public awareness efforts in that area.

15. A detailed programme of the Workshop and its proceedings, together with the list of participants, are available on the website of the Office for Outer Space Affairs (<http://www.unoosa.org>).

### **C. Attendance and financial support**

16. The United Nations, on behalf of the co-sponsors, invited developing countries to nominate candidates to participate in the Workshop. Participants were required to have a university degree or well-established professional working experience in a field related to the overall theme of the Workshop. In addition, participants were selected on the basis of their work experience in programmes, projects or enterprises that had already been using space technology applications or that could potentially benefit from using space technology. The participation of specialists at the decision-making level of both national and international entities was particularly encouraged.

17. Funds allocated by the United Nations, IAF, ESA and the local organizing committee for the organization of the Workshop were used to provide financial support for the participation of 27 participants from developing countries. Full financial support was received by 19 participants for international round trip air travel, hotel accommodation, living allowance for the duration of the Workshop and the International Astronautical Congress and the registration fee of the Congress. Eight participants received partial funding (air travel, hotel and living allowance or Congress registration). The 27 participants came from 20 countries. The co-sponsors also covered the cost of the registration fee for 25 participants from developing countries to attend the 57th Congress, held immediately after the Workshop.

18. The local organizing committee provided conference facilities, secretarial and technical support and local transportation to and from the airport for funded participants and organized a number of social events for all Workshop participants. In addition, the committee provided hotel accommodations for 20 participants from developing countries and supported the international air travel of two participants from Latin America.

19. The Workshop was attended by a total of 55 participants from the following 35 countries: Australia, Austria, Azerbaijan, Bangladesh, Brazil, Cambodia, Canada, China, Colombia, Egypt, Germany, Haiti, India, Iran (Islamic Republic of), Iraq,

Israel, Japan, Jordan, Kazakhstan, Kenya, Mexico, Mongolia, Morocco, Nigeria, Pakistan, Philippines, Portugal, Saudi Arabia, Spain, Togo, Turkey, United Kingdom of Great Britain and Northern Ireland, United Republic of Tanzania, United States of America and Viet Nam. The following international organizations and other entities were also represented at the Workshop: ESA, the International Academy of Astronautics, IAF, the Space Generation Advisory Council, the United Nations Educational, Scientific and Cultural Organization and the Office for Outer Space Affairs.

## **II. On-site evaluation of the Workshop**

20. On the second day of the Workshop, the organizers used a questionnaire to conduct a survey of the participants. A total of 26 completed questionnaires (16 from funded participants and 10 from self-funded participants and speakers) were submitted to the organizers. Some of the results of the survey are presented briefly below.

21. All (100 per cent) of the participants who submitted replies to the questionnaire felt that the theme of the Workshop was relevant to their current work and that the programme of the Workshop met their professional needs and expectations. All respondents would also recommend to their colleagues participation in future United Nations/IAF workshops.

22. Sixty-six per cent of respondents believed that the overall quality of the presentations at the Workshop was good, and 34 per cent considered it to be very good. A total of 73 per cent of respondents considered the overall organization of the workshop to be very good, and 27 per cent considered it to be good.

23. Participants indicated that participation in the Workshop helped them: to gain and enhance knowledge of space technology and applications (20 replies); to confirm ideas and concepts in space technology and applications (20 replies); to generate new application project ideas (18 replies); to enable potential cooperation with other groups (21 replies); and to enable possible partnerships (12 replies).

24. In response to the question on the actions or projects that they would initiate as follow-up to the Workshop, respondents indicated that they would contact experts and/or network (22 replies); define new projects (16 replies); undertake additional education or training (9 replies); procure equipment or technologies (7 replies); and seek funding support for projects (13 replies).

25. The survey also showed that no funded respondents would have been able to attend the Workshop or the International Astronautical Congress without the financial support provided by the organizers.

## **III. Observations and recommendations**

26. Two working groups were established by the participants of the Workshop to discuss in depth and summarize ideas and proposals put forward in the participants' presentations and during the discussions. The first working group focused on space-related technologies applied to water resources management, and the second one

considered issues related to education, training and public awareness activities for addressing water management.

27. The results of the deliberations of the working groups were summarized and presented by the groups' chairpersons at the closing session, when a final discussion was held and the conclusions of the Workshop were adopted.

28. Workshop participants recognized that space-related technologies could play an important role in the efficient management of water resources, especially due to their capability to deliver timely and accurate information. They noted that remote sensing and geographic information systems could serve as powerful applications and tools to support planners and decision makers in charge of water resources management.

29. Participants noted that many developing countries had started integrating space technology tools and applications, primarily remote sensing, in national development programmes, in particular in water resources management projects. Participants recognized the need to strengthen regional and international cooperation in that area and to enhance links between national organizations responsible for water management and space-related organizations.

30. Participants noted the need to increase awareness among decision makers of the benefits of using space technology for identifying, mapping and monitoring water resources, forecasting and monitoring floods, implementing integrated water resources management, exploring groundwater reserves and predicting and mitigating water-related disasters.

31. Participants recognized the importance of appropriate education at various levels, training and public awareness activities to address water-related challenges effectively. Participants further noted the positive impact of a number of capacity-building initiatives undertaken by international and national organizations, including various workshops and symposiums organized by the Office for Outer Space Affairs within the framework of the United Nations Programme on Space Applications, activities of the regional centres for space science and technology education, affiliated to the United Nations, programmes offered by the Victorian Space Science Education Centre in Australia and a project in Viet Nam to educate local communities about water management.

32. The observations made at the session on the working groups provided the basis for a number of recommendations to be carried out by Workshop participants and, where appropriate, by their institutions and other relevant national and international organizations. Workshop participants made the following recommendations:

(a) Timely access to affordable Earth observation data for organizations involved in water management projects in developing countries should be promoted;

(b) Increased cooperation should be encouraged among the relevant national, regional and international institutions engaged in water resources management;

(c) Remote sensing data and derived information should be presented to decision makers and end-users in an understandable format. Institutional mechanisms should be established to follow up the use of products delivered by space-related organizations at various levels;

(d) Efforts should be promoted to raise awareness among decision makers about the role played by space technology in the integrated management of water resources. More workshops and symposiums for that target group should be organized by the United Nations and other relevant national and international organizations;

(e) Regional centres for space science and technology education, affiliated to the United Nations, should consider organizing short-term programmes to raise the awareness of decision makers and policymakers;

(f) Regional interaction involving policymakers, such as the Space Conference of the Americas, should be encouraged;

(g) Public awareness activities organized by non-governmental organizations and national and international organizations should be encouraged and supported. The broader participation of mass media and professional associations in such events should be promoted;

(h) Greater efforts should be made to promote educational programmes on the use of space technology for water management at various levels, including in schools and universities, and through teacher training and professional development. Tele-education and e-learning should be used more actively;

(i) Collaboration among universities, as well as between universities and industry, on projects related to the application of space science and technology to water resources management should be encouraged;

(j) Efforts should be made to provide local communities, through village resources centres or other channels, with relevant information on water resources and to pursue projects aimed at educating local communities in that area.

#### **IV. Follow-up action**

33. At the meeting of the IAF Committee for Liaison with International Organisations and Developing Nations, held following the Workshop and with participation of representatives of the Office for Outer Space Affairs, it was suggested that the seventeenth United Nations/International Astronautical Federation Workshop should be held in Hyderabad, India, from 21 to 23 September 2007, as an associated event of and in conjunction with the 58th International Astronautical Congress, to be held in Hyderabad from 24 to 28 September 2007.

34. The suggested theme of the seventeenth United Nations/International Astronautical Federation Workshop was "Space technology for sustainable development: towards food security". Discussion on the objectives and programme of the next workshop will be continued at a planning meeting, to be held during the forty-fourth session of the Scientific and Technical Subcommittee, in 2007.