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**Committee on the Peaceful
Uses of Outer Space**

**Report on the Regional Workshop on Evaluating the Impact
of the 1990-2004 Series of United Nations/Sweden
International Training Courses on Remote Sensing
Education for Educators**

(São José dos Campos, Brazil, 21-25 February 2005)

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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 resolution entitled “The Space Millennium: Vienna Declaration on Space and Human Development”, recommended that activities of the United Nations Programme on Space Applications should promote collaborative participation among Member States at the regional and international levels, emphasizing the development of knowledge and skills in developing countries.¹
2. At its forty-seventh session, in 2004, the Committee on the Peaceful Uses of Outer Space endorsed the programme of conferences, symposiums, training courses and workshops planned for 2005.² Subsequently, the General Assembly, in its resolution 59/116 of 10 December 2004, endorsed the United Nations Programme on Space Applications for 2005.
3. Pursuant to Assembly resolution 59/116 and in accordance with the recommendation of UNISPACE III, the Regional Workshop on Evaluating the Impact of the 1990-2004 Series of United Nations/Sweden International Training Courses on Remote Sensing Education for Educators was held at the Brazil campus of the Regional Centre for Space Science and Technology Education for Latin America and the Caribbean, affiliated to the United Nations, in São José dos Campos, Brazil, from 21 to 25 February 2005. The Workshop was organized by the Office for Outer Space Affairs of the Secretariat in cooperation with the Government of Sweden, as part of its activities carried out in 2005 within the framework of the United Nations Programme on Space Applications.
4. The Workshop was co-sponsored by the Swedish International Development Cooperation Agency (Sida) on behalf of the Government of Sweden and by the Department of Physical Geography and Quaternary Geology of Stockholm University and hosted by the Regional Centre for Space Science and Technology Education for Latin America and the Caribbean, affiliated to the United Nations.
5. The United Nations/Sweden International Training Course on Remote Sensing Education for Educators was first held in 1990 and, since 1992, has been held annually. It is organized by the United Nations, through the Office for Outer Space Affairs and under the auspices of the United Nations Programme on Space Applications, the Government of Sweden, through Sida, and the Department of Physical Geography and Quaternary Geology of Stockholm University.
6. The main objective of the six-week Training Course was to enable educators from developing countries to introduce or to enhance remote sensing courses in their respective academic institutions. By successfully achieving that goal, Course participants would become multiplier factors in the effort to introduce remote sensing as a tool for economic and social development in developing countries.
7. The first Course, held in 1990, was directed exclusively at educators from African universities. Starting from the second Course, held in 1992, representatives from African, Asian and Latin American and Caribbean academic institutions had participated.

8. Approximately 370 educators, representing 53 universities, institutions or agencies in 25 African countries, 45 universities, institutions or agencies in 16 Asian countries and 49 universities, institutions or agencies in 23 Latin American and Caribbean countries, participated in the series of Courses held between 1990 and 2004.

9. The training programme has already been evaluated three times:

(a) In 1994, a survey was carried out among participants of the courses held in 1990, 1992 and 1993 on the impact of the training on their performance and productivity;

(b) In 1998, a workshop was held in Botswana to evaluate the impact of the training on African participants in the courses held from 1990 to 1996;

(c) In 2001, a survey was carried out among participants in the courses held from 1990 to 2000 and their institutional administrators to evaluate the impact of the courses on curriculum development and educational and research programmes at the local level.

10. The 2005 Workshop was held for former participants from the Latin American and Caribbean region of the 1992-2004 series of the United Nations/Sweden training courses. It was organized as part of the fourth evaluation exercise, which also included two joint United Nations/Stockholm University/Sida evaluation missions carried out in 2004 (one to the Asian and Pacific region and the other to the Latin American and Caribbean region) to a number of academic institutions whose staff had participated in the training courses, followed by two regional evaluation workshops in those regions. The first evaluation workshop for the countries covered by the Economic and Social Commission for Asia and the Pacific took place in Pakistan in 2004.

11. The objectives of the 2005 Workshop were:

(a) To evaluate the impact of the United Nations/Sweden training course series in terms of course objectives met and to identify factors favouring or hampering the attainment of those objectives;

(b) To review the current course content and format with a view to making necessary changes, based on the experience and needs of the participants;

(c) To estimate the need for supporting projects developed by former participants and for possible technical assistance to their institutions;

(d) To upgrade participants' knowledge of current remote sensing techniques and teaching methods;

(e) To provide former participants with an opportunity to meet and exchange experiences with other course participants from their region.

12. The present report includes the background and objectives of the Workshop, as well as a summary of the observations and recommendations of the participants. It has been prepared for submission to the Committee on the Peaceful Uses of Outer Space at its forty-ninth session and to its Scientific and Technical Subcommittee at its forty-third session, both in 2006.

B. Organization and programme

13. The programme of the Workshop was developed jointly by the Office for Outer Space Affairs and the Department of Physical Geography and Quaternary Geology of Stockholm University. A substantial contribution to the development of the programme was also made by the Regional Centre for Space Science and Technology Education for Latin America and the Caribbean, affiliated to the United Nations.

14. The Workshop consisted of a series of technical presentations, followed by discussions leading to the formulation of recommendations. The open discussions focused on evaluation of the series of courses and provided an opportunity for participants to voice their opinions.

15. In order to refresh the knowledge of former participants and keep them abreast of the latest developments in related space technology, all the morning sessions were devoted to presentations and practical exercises on advanced topics related to remote sensing and geographic information systems (GIS), new techniques, instruments and platforms, new software for data processing and new teaching methods.

16. The afternoon sessions were devoted to presentations by former participants and to discussions of their experience in the application of their knowledge in their respective institutions, the impact on curriculum development, their needs and possible changes to the course programme, as well as to developing the recommendations of the Workshop.

17. The speakers and instructors for the technical sessions and practical exercises of the Workshop came from the Office for Outer Space Affairs, Stockholm University, the Regional Centre for Space Science and Technology Education for Latin America and the Caribbean, affiliated to the United Nations, the Instituto Nacional de Pesquisas Espaciais of Brazil, the Inter-American Institute for Global Change Research (Brazil) and the Federal University of Maranhão (Brazil). All Workshop participants prepared and delivered presentations on topics related to the evaluation of the impact of the training course. Some participants also had an opportunity to deliver presentations of a technical nature during the technical sessions.

18. The Workshop was conducted in English. A total of 57 papers were delivered at the Workshop by invited speakers and former participants of the course. After the closing session, all the participants of the Workshop received CD-ROMs containing the presentations made at the Workshop and other supporting materials.

C. Attendance and financial support

19. Since the objective of the Workshop was to evaluate the impact of the series of training courses, former participants in the courses who were active educators working in research and academic institutions or with relevant governmental organizations on programmes and projects using remote sensing technology or GIS were invited to attend the meeting.

20. The Workshop was attended by 36 former participants of the course, including 19 females, from the following 16 countries in the Latin American and Caribbean region: Argentina, Barbados, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Guyana, Haiti, Nicaragua, Panama, Peru, Uruguay and Venezuela (Bolivarian Republic of). In addition, six Brazilian educators participated.

21. Funds for the international round trip air travel of 21 participants were provided from the fellowship budget of the Office for Outer Space Affairs. Sida provided air travel for a further 10 participants, as well as hotel accommodation and per diem for 35 participants. Sida also covered the costs of training materials and local transportation for all participants. Conference facilities and secretarial and technical support were provided by the Regional Centre for Space Science and Technology Education for Latin America and the Caribbean, affiliated to the United Nations.

II. Observations and recommendations

22. The major observations made during the Workshop discussions and in presentations made by former participants of the training courses can be summarized as follows:

(a) All the former participants appreciated the sustained efforts that had been made by the United Nations, Sida and Stockholm University over the previous 13 years to promote remote sensing and GIS education in higher institutions in countries in the Latin American and Caribbean region by delivering the United Nations/Sweden International Training Course on Remote Sensing Education for Educators. They also noted the relevance of the course to national capacity-building programmes in their countries;

(b) It was emphasized that the courses had had a very positive impact on the establishment or enhancement of remote sensing and GIS-oriented academic programmes of high quality offered by universities and higher education institutions in countries that had participated in the training course in Sweden, as well as on the initiation of research projects related to sustainable development programmes both at the national and regional levels;

(c) It was noted that the course had had a multiplier effect on the dissemination of knowledge and skills in remote sensing and GIS in developing countries of the region, as former participants had been able to transmit the knowledge and skills gained in Sweden to a large number of students. It was calculated that, on average, each Workshop participant had been able to transmit that knowledge to 48 students per year, and that in total about 22,500 students had benefited from the knowledge gained during the training courses over the previous 13 years;

(d) In addition to the direct impact on universities, knowledge and skills gained in Sweden had been transferred by former participants to policy- and decision makers, thus enabling them to make evidence-based decisions and plans concerning coastal and geological studies and the management of natural and water resources, natural disasters and risks. With the contribution of former participants of

the course, basic remote sensing and GIS education had also trickled down to education curricula in secondary schools;

(e) It was also noted that the course was faced with a number of educational and institutional challenges related to recent developments at universities and other higher education institutions in the region.

23. During discussions at the Workshop, the participants made a number of recommendations that can be summarized as follows:

(a) The series of United Nations/Sweden international training courses on remote sensing education for educators should be continued;

(b) A refresher or advanced training programme in remote sensing and GIS applications for former participants and educators in general should be considered by the co-sponsors, for periodic organization at the regional level;

(c) Certain modifications should be made to the existing course programme, primarily to the digital image processing and GIS elements, to reflect and respond effectively to the educational needs and new goals and objectives of participating institutions;

(d) Stockholm University and other relevant institutions should establish bilateral agreements with the academic institutions of former participants to ensure the relevance, cohesion and continuity of advanced training opportunities;

(e) The Office for Outer Space Affairs, Sida and Stockholm University should be encouraged to conduct evaluation exercises and to visit the educational institutions of former participants on a periodic basis in order to ensure continued support to participants;

(f) An Internet-based network should be established in order to facilitate the exchange of information, knowledge, experiences and case studies among regional educators and former participants of the course. That network could be the nucleus for the establishment of a regional association of remote sensing and GIS educators;

(g) The Office for Outer Space Affairs and other relevant institutions and organizations should support the training needs of educators in developing countries by providing them with opportunities for participation in regional and international conferences, training courses and workshops on remote sensing and GIS applications;

(h) Activities carried out by the Regional Centre for Space Science and Technology Education for Latin America and the Caribbean, affiliated to the United Nations, at its Brazil Campus should be encouraged and supported, as its nine-month training programme in remote sensing and GIS complemented the United Nations/Sweden course, and educators in Latin America and the Caribbean should benefit from this opportunity.

24. As an immediate action to implement one of the above recommendations, participants at the Workshop appointed persons responsible for setting up the Internet-based network in the Latin American and Caribbean region.

III. Follow-up actions

25. Observations and recommendations made by the Workshop participants, along with input received from evaluation missions to Asia and the Pacific and Latin America and the Caribbean, and from the evaluation workshop in Pakistan (A/AC.105/831), had been used by the Office for Outer Space Affairs and Stockholm University for the preparation of an evaluation report. That report had been submitted to Sida and to the Office for Outer Space Affairs in May 2005 and would assist the organizers of the training course series to determine the future of the course.

26. The major conclusions reached by the evaluation team, which consisted of representatives of the Office for Outer Space Affairs and Stockholm University, with input from the local expert who had participated in the evaluation mission in Latin America and the Caribbean, can be summarized as follows:

(a) The training course series had been a very successful effort that had gained a high profile and excellent reputation among academic institutions in developing countries over a 14-year period;

(b) The organizers of the courses had succeeded in training a large group of highly-motivated and active professionals, capable of developing sustainable educational programmes in remote sensing and GIS at the local level, as well as of using remote sensing and GIS in projects that supported development programmes in the participants' respective countries;

(c) The former participants of the training course series were active in applying the knowledge received in Sweden to enhance existing educational programmes in remote sensing and GIS or to introduce new ones in their respective academic institutions. In many cases, the knowledge gained had also been used in research or applications projects;

(d) The course had had a significant multiplier effect on the dissemination of knowledge and skills in remote sensing and GIS in developing countries, as former participants were able to transmit the knowledge and skills gained in Sweden to a large audience consisting not only of students at various levels, but also of policy- and decision makers. In some instances, former participants were involved in developing remote sensing and GIS education curricula for secondary schools;

(e) In most cases, the efforts of former participants had been appreciated and well received by the administrations of their departments or institutions and they had been able to obtain support, mostly in administrative and teaching or instructional form, from their supervisors in order to apply the knowledge gained in Sweden;

(f) Greater success had been achieved at institutions that had had several individuals who had benefited from participation in the course. The training course series had therefore contributed to building a human base or "critical mass" of well-trained and motivated educators who, as a group, were able to develop sustainable educational programmes in remote sensing and GIS at the local level;

(g) Many former participants had noted that, upon returning to their respective countries after training in Sweden, they had felt unsupported, as they had

experienced a lack of resources (financial, technical and human) and had badly needed advice and support to initiate educational programmes or research projects in remote sensing and GIS.

27. The major problems or obstacles preventing former participants from applying the knowledge received in Sweden can be summarized as follows:

(a) Lack of funding for the acquisition of satellite images and ancillary data, computer hardware and software, as well as of the requisite training and reference materials for the successful and effective teaching of remote sensing and GIS;

(b) The extremely limited opportunities for obtaining either supplementary training in advanced disciplines (such as digital data processing, GIS, the global positioning system, the application of high resolution data, and so forth) or refresher training for former participants in order to keep them abreast of the latest developments in technology;

(c) Fragmentation of resources (computer laboratories, teaching staff, equipment) or inadequate infrastructure in some universities, which resulted in the diffusion of limited technical and human assets that could be concentrated in a centralized remote sensing and GIS facility at the institutions;

(d) Inadequate access to the Internet;

(e) Insufficient networking, cooperation and collaboration among former participants of the Course;

(f) Limited access to information on training, research and funding opportunities.

28. During the evaluation exercise, representatives of the Office for Outer Space Affairs and Stockholm University addressed the above issues and provided the former participants with advice and information on how to obtain free-of-charge or low-cost satellite images and software. The evaluation workshops also provided an excellent opportunity for refresher training for former participants, as well as for the formation of an Internet-based network of remote sensing and GIS educators that would assist participants to share their experiences, teaching materials, information on funding opportunities, and so forth.

29. Taking into account all of the above, the evaluation team made the following recommendations for consideration by the co-sponsors of the series of international training courses on remote sensing education for educators:

(a) The series of training courses should be continued, as it had proved to be of relevance to national capacity-building programmes in developing countries;

(b) Consideration should be given to the possibility of substituting the current basic course every second year with refresher or more advanced and applications-oriented workshops for former participants, which could be organized on a regional basis (for instance, at the regional centres for space science and technology education, affiliated to the United Nations) and have a duration of one or two weeks;

(c) Initiatives put forward by the participants of the evaluation workshops should be supported, in particular that relating to regional Internet-based networks (through the provision of information, teaching materials, and so forth), and papers

prepared by former participants and the regional disaster management task force should be published;

(d) The co-sponsors of the course should discuss the possibility of providing participants with technical support in order to ensure that initiatives establish firm roots within the educational communities in developing countries.

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, sect. I, para. 1 (e) (ii), and chap. II, para. 409 (d) (i).

² *Official Records of the General Assembly, Fifty-ninth session, Supplement No. 20 (A/59/20)*, para. 71.
