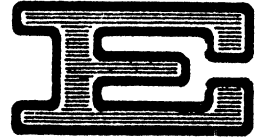




UN ECONOMIC AND SOCIAL COMMISSION  
FOR WESTERN ASIA

ADD 15 7 1992

DOCUMENTS SECTION



# UNITED NATIONS ECONOMIC AND SOCIAL COUNCIL

Distr.  
GENERAL  
E/ESCWA/16/3(Part I)/Add.5/Suppl.1  
6 July 1992  
ORIGINAL: ENGLISH

---

## ECONOMIC AND SOCIAL COMMISSION FOR WESTERN ASIA

Sixteenth session  
30 August - 3 September 1992  
Amman

Item 5(a) of the provisional agenda

### REPORT OF THE EXECUTIVE SECRETARY ON THE ACTIVITIES OF THE COMMISSION

### PROGRESS MADE IN THE IMPLEMENTATION OF THE PROGRAMME OF WORK FOR THE BIENNIUM 1990-1991

#### Report on

Promotion of cooperation among ESCWA countries for  
the setting up of a centre for space science and  
technology education

#### Supplement One\*

---

\* Originally issued as (SAP/90/004), New York, 1990.



Department of Political and Security Council Affairs  
Outer Space Affairs Division

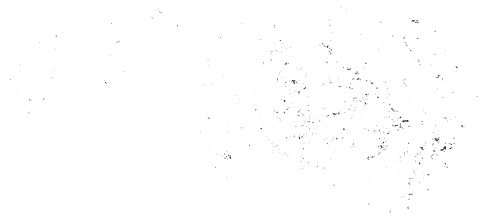
# Centre for Space Science and Technology Education

Western Asia



United Nations  
New York, 1990

THE  
JOURNAL OF THE  
ROYAL ANTHROPOLOGICAL INSTITUTE  
OF GREAT BRITAIN AND IRELAND  
PUBLISHED BY THE INSTITUTE  
LONDON



CONTENTS

	Page
<b>Part I - Summary</b> .....	2
<b>Part II - The Project</b> .....	4 - 17
A. Development Objectives .....	4 - 5
B. Immediate Objectives .....	5 - 6
C. Background and Justification .....	7 - 8
D. Initial Steps .....	8
E. The Programme of the Centre .....	9
F. Output .....	9 - 10
G. Input (Requirements of the Centre) .....	11 - 17
<b>Part III - Work Plan</b> .....	17 - 20
A. The Work Plan.....	17 - 18
B. Institutional Framework.....	18
C. Effective Participation by National and International Staff .....	19
D. Prior Obligation and Prerequisites .....	19
E. Support of Participating Governments .....	19
F. Scheduling for Monitoring, Evaluation and Reports ....	19 - 20
<b>Part IV - Organization of the Project</b> .....	20
A. Legal Framework .....	20
B. Funding for the Establishment and Operation of the Centre .....	20
 <u>Annex I</u> Elements of the Curriculum for the Centre for Space Science and Technology Education .....	 21
<u>Annex II</u> Schedule of Activities of the Centre .....	22
<u>Annex III</u> Suggested Guidelines for Defining/Executing "Pilot Projects" .....	 23
<u>Annex IV</u> Estimated Budget .....	24



PROJECT DOCUMENT

Title: Establishment of the Centre for Space Science and Technology  
Education for the benefit of Member States of the Western Asia  
Region

Initial duration: 4 years

Proposed starting date: 1992

Executing Agency: United Nations Outer Space Affairs Division in cooperation  
with the Economic and Social Commission for Western Asia

---

This Centre will initially assist in developing necessary human resources in remote sensing and related technologies in order to support the environmental management in Western Asia. The Centre will also strengthen the capabilities of institutions of higher learning as well as national/regional centres in the region to assist and train users of remote sensing.

---

## Part I - Summary

1. Remote sensing technology has become operational, and it is being applied to improve the knowledge of the natural resources of many nations, to provide information necessary for the rational exploitation of these resources and to assist in preventing or redressing damage to the Earth's environment. Indeed, it is being amply and continuously demonstrated, through a variety of projects, that remote sensing can contribute significantly to the achievement of the economic and social development goals of a nation. Environmental and natural resources data of different parts of the world are being observed daily by an array of earth-orbiting satellites and manned-space vehicles. These activities will be intensified with the passage of time. For a long time to come, space borne sensors may be the only source of reliable data on the environment and natural resources of most developing countries. The availability of such data can assist these countries to better understand and safeguard their environment as well as ensure a more efficient management and productive harnessing of their natural resources.

2. However, in order that the developing countries can partake in the benefits inherent in remote sensing technology, and can gainfully employ this technology to safeguard the environment, there must be an adequate and long-term investment in the development of skills and knowledge in the discipline at the local level. This is the focus of this Project.

3. This Project proposes to establish a regional Centre for Space Science and Technology Education for the benefit of Member States in Western Asia. The Committee on the Peaceful Uses of Outer Space (COPUOS), at its thirty-third session, in June 1990, recommended to the General Assembly, for its endorsement, during its forty-fifth session in Autumn of 1990 the following:

"... the United Nations should lead, with the active support of its specialized agencies and other international organizations, an international effort to establish regional centres for space science and technology education in existing national/regional educational institutions in the developing countries."

4. The Centre will be housed in a major science and technology oriented university or a space research institution with an on-going education programme. Such an arrangement will enable the Centre to optimally utilize the existing professional staff and physical infrastructure at the host institution. The Centre's programme during the initial 4-year period will focus on remote sensing technology and its application disciplines. By providing appropriate education to the educators of institutions of higher learning on a long-term basis (9-month period), the Project seeks to achieve the integration of remote sensing and related technologies into existing education curricula in the physical, natural and environmental sciences in those institutions in the Western Asia region.



5. This Centre shall also provide research and development support for national and regional remote sensing user assistance and training centres in the Economic and Social Commission for Western Asia (ESCWA) region. It will complement as well as strengthen the capabilities of these centres. Furthermore, the Centre shall contribute to the development and strengthening of education programmes in remote sensing technology and related disciplines in institutions of higher learning within the ESCWA region.

6. On request, the Centre will also provide consultancy services in remote sensing research and applications to Member States within the ESCWA region.

7. Through the above efforts, the Project should result in many multiplying effects and thereby

- (i) Contribute significantly to indigenous capability development in remote sensing including satellite meteorology and environmental disciplines in each participating country;
- (ii) Enhance scientific and technical education in each participating country and the region;
- (iii) Enhance the quality and quantity of contributions of graduates in the overall development of their respective nations and in the management of their resources and the environment; and
- (iv) Strengthen the capabilities of institutions of higher learning, and national and regional remote sensing user assistance and training centres.
- (v) Assist user agencies in Member States to strengthen their capabilities in the use of remote sensing for the management of their natural resources and environment.

8. The curriculum of the Centre will address environmental and resource development and management problems, and thus equip the participating educators to solve similar problems in their own countries. Through this process, these educators can readily appreciate the significance of their being part of the solution to the problems that confront their respective societies.

9. In order to achieve these objectives, the Project is designed to be implemented in four phases. These are defined in Part III of this document under the title "Work Plan". Phase 1 includes the preparatory activities for the establishment of the Centre; these include identification and negotiation with the Host Government and the host institution, and the selection of project personnel and consultants. Phase 2 includes the inventory of scientific and technical education materials, the hiring of experts and the acquisition of needed equipment and materials, the installation of equipment and laboratory facilities, and the training of support personnel in the use and maintenance of equipment and facilities.

10. Phase 3 is the operational phase of the Project and will focus on the organization and implementation of the programme for the education of natural, physical and environmental science educators, and the organization of workshops for secondary and primary school teachers. Phase 4, which will overlap with phase 3, will be devoted to the implementation of pilot projects through which each participating educator will introduce the acquired knowledge into his/her teaching and research activities at home. Evaluation workshops will also be conducted during this phase in order to evaluate the impact of the Centre's activities.

## **Part II - The Project**

### **A. Development Objectives**

11. The Project has the following main development objectives:

- (a) To design and implement education and training programmes in space science and technology for educators in universities and institutions of higher learning, with a view to developing their skills and knowledge especially in remote sensing technology. Particular emphasis will be placed on fundamental principles, research and applications of remote sensing and related technologies. The Project would also review existing teaching materials in natural, physical and environmental sciences at all levels of education in a number of educational institutions in selected countries, with a view to enhancing these materials through the integration of relevant elements of remote sensing technology and satellite meteorology;
- (b) To assist participating educators to develop skills in the design and development of remote sensing research projects that address Western Asian problems, in their respective disciplines and to encourage them to take advantage of additional education and research opportunities provided by different international space-related organizations/agencies;
- (c) To offer assistance to teachers in integrating space science and technology in their respective existing education curricula, particularly in the natural, physical and environmental sciences;
- (d) Towards these objectives, the Project will develop the skills of participating educators in the design and the development of educational modules, including audio-video materials, computer-aided education, lecture notes, and library and field exercises. In this connection, a group of experts would be organized to undertake an inventory and evaluation of similar programmes and materials that might be available regionally and internationally.

The guidelines for determining the appropriateness of the programmes from these other sources shall include the following: (i) the programmes must be easy to transfer; (ii) the knowledge to be transmitted must be relevant to the level of education of those receiving the knowledge; and (iii) the materials, illustrations, and format must conform to socio-economic and cultural environments;

- (e) To develop a general environmental and atmospheric sciences curriculum that can be easily taught and demonstrated and to prepare the educators to teach courses in these fields on their return to their institutions. Attendance and active participation in such a course should be required of all students, irrespective of their field of interest, particularly in the first year of their university education. An audio-video programme on the environment will also be developed for use at both primary and secondary school levels.
- (f) To support research and development efforts in national and regional remote sensing user assistance and training centres in the ESCWA region. In this manner, the Centre will complement as well as strengthen the capabilities of these centres. Furthermore, the Centre will contribute to the development and strengthening of education programmes in remote sensing technology and related disciplines in institutions of higher learning within the ESCWA region.

B. Immediate Objectives

12. This Project has the following immediate goals:

- (a) To create a Centre for Space Science and Technology Education at an established and viable institution of higher learning or research in the Western Asia region in order to provide an intensive education programme for university educators. Although the participants in the programme of the Centre will be educators at the higher education level, the activities of the Centre will also include sub-programme elements that will address educators at the primary and secondary education levels (see para. 18 (d)). The university educators trained through this programme will be expected to assist in broadening the interest of primary and secondary school teachers in their countries.
- (b) To develop the intensive education programme indicated above. The programme will provide education, research and applications opportunities in the physical principles of remote sensing and atmospheric behaviour, principles of satellite data acquisition, the integration of data into geographic information systems (GIS) and in the use of GIS to monitor the environment. Emphasis will be placed on illustrating the use of GIS for impact assessment studies and for project management by simulating the effects of different policy decisions. The curriculum would also include pedagogical principles appropriate for the introduction of the above subjects; it will also

focus on the development and use of audio-video systems and related software packages in education programmes. Participating educators will undertake a critique of the programme at the completion of their education. A detailed curriculum for the programme of the Centre will be developed by a panel of remote sensing education experts (herein referred to as the Panel of Experts) now being organized by the United Nations. This Panel of Experts shall take into consideration the elements of the curriculum outlined in Annex I.

- (c) To conduct a national and regional inventory and to evaluate the appropriateness of existing scientific and technical educational materials (textbooks, lecture notes, audio-video aids, laboratory and classroom demonstration equipment, etc.).
- (d) To develop educational modules based on the applications of remote sensing technology for each of the education levels indicated in (a) above. This effort will include the production of "kits" for distribution to schools that participate in the pilot projects described in (f) below.
- (e) To acquire adequate reference materials for educational and research purposes at the Centre.
- (f) To assist educators who have completed this education programme to conduct pilot projects, over a full school year, and to introduce the knowledge and skills acquired at the Centre in their teaching and research activities in their countries. The modules and manuals developed under item (d) above will be tested at the pilot project(s) phase. The experience gained will be used to improve the programme in (b) and the modules in (d) above.
- (g) At the completion of the pilot projects (item (f)), a workshop will be organized at the Centre, for the purpose of evaluating the impact and effectiveness of the entire Project. Educators and education administrators and other professionals who have participated in the various phases of this Project would be invited to share their experiences and to recommend improvements.
- (h) To organize "hands-on" opportunities at existing national and regional remote sensing centres for graduates of this programme so that they can improve their practical application skills, as well as contribute to on-going projects at these national and regional centres.
- (i) To organize a "continuing education" programme at the Centre through workshops for educators and researchers associated with remote sensing education. Such a programme would enable individuals who have participated in this education programme to keep abreast of advances in the discipline.

### C. Background and Justification

13. Remote sensing technology is a multi-disciplinary tool with potential applications in Earth resources disciplines, particularly water resources survey, geological and mineral exploration, forest and crop inventories; environmental management including weather forecasting; cartography and mapping and their subsequent use in the development of roads, pipelines, power lines and related engineering applications; land use and urban development; oil pollution survey and monitoring; assessment and management of coastal/marine environment and ocean resources; disaster assessment and the monitoring of the environmental impact of human activities.

14. As a result of the shortage of qualified human resources at the local level, many national and local authorities are often not able to use the abundant satellite data and information derived from such data. Another major problem is the lack of direct application and use of these data by government agencies and by personnel responsible for extension services, for environmental management, agricultural development and related issues. Thus, many of the on-going activities and projects in Western Asia are being undertaken by foreign contractors or by foreign institutions. Thus, opportunities that could have materialized at the local level and which could have contributed to indigenous capability development are lost.

15. Within the global community, short-term training courses are being organized, and fellowships are being provided for education and training in institutions in industrialized countries to meet these needs. However, the demands far exceed current capabilities. In addition, the short term courses are mostly application-oriented; they are generally conducted abroad, thus they allow only very few individuals from a given developing country to participate in them. In the Western Asia region, there are a number of on-going remote sensing projects sponsored by different entities to address immediate needs. In most cases, local talents cannot effectively participate in them because of their limited knowledge of the technology that is being applied.

16. Programmes such as Mission to Planet Earth, which are to be internationally co-ordinated and are being developed to use space-based platforms, will chart pollution, deforestation, global warming, depletion of the ozone layer and other threats to the environment. If the Western Asian countries are to effectively participate in the management of their resources and contribute to the safeguarding of the environment, they will need more than rudimentary exposures to this technology, exposures which currently manifest themselves through seminars, workshops and short-term courses. An effective contribution from all Western Asian countries to solutions of their economic and social problems can only be attained with skilled and knowledgeable specialists. The present imbalance between the human impact on the environment and measures to safeguard the environment for future generations can be addressed, in part, through a proper understanding and utilization of remote sensing technology. An in-depth long-term education in the technology is a requisite solution.

17. This Project has taken into consideration the observations and recommendations of the United Nations regional meetings on space education, organized under the auspices of the United Nations Space Applications Programme, and conducted in India (1985), Mexico (1986) and Nigeria (1987) and of the international meeting on the development of skills and knowledge in remote sensing, organized in the United Kingdom in 1989. The observations and recommendations of these meetings specifically focused on the need for the United Nations to play a major and an active role in promoting the necessary educational opportunities, particularly in the developing countries, for the integration of space science and technology into national educational programmes.

#### D. Initial Steps

18. The Centre for Space Science and Technology Education will provide guidance and assistance in the design, co-ordination and introduction of appropriate education and training programmes in space science and technology and related environmental sciences into the existing curricula of established institutions of higher learning in each participating country. As part of its contribution to the planning and directing the programme, the Panel of Experts identified in para. 12 (b) shall undertake the following:

- (a) Investigate the structure of scientific and technical education in the Western Asia region;
- (b) Develop appropriate space science and technology education and training programmes with emphasis on remote sensing and environmental science;
- (c) Recommend ways and means of introducing the programmes in (b) above into existing education curricula;
- (d) Develop procedures and techniques for updating the contents of courses;
- (e) Develop recommendations for the review and evaluation of education and training programmes;
- (f) Prepare a directory of literature and information sources in space science and technology focusing, in particular, on educational literature;
- (g) Search for and develop a package of teaching materials and methods in remote sensing technology and applications (e.g. lectures, books, audio-video materials, laboratory equipment and related materials and facilities for computer-based education, tele-education, TV/radio educational courses);
- (h) Provide input into the programmes of the workshops to be organized for primary and secondary level educators (see para. 10);
- (i) Encourage qualified Western Asian scientists and research workers to participate in the education and training activities of the Centre.

E. The Programme of the Centre

19. (a) The Centre will prepare and carry out annual research, education and training programmes in space science and technology, with initial emphasis on remote sensing, for university level educators in the Western Asia region. The duration of each programme would be for a period of 9 months; the programmes will be offered in English and French on an alternating basis, for the duration of this phase of the Project (i.e. 4 years);
- (b) The number of participants in each of these programmes in each academic year will be limited to thirty (30); these participants would need the endorsement of their institutions/Governments. Assistance will be provided to organize follow-up national/local education programmes for other educators and earth science professionals in the participants' own countries;
- (c) The programmes will focus on teaching techniques and methods in space science and technology, particularly remote sensing technology as applied to educational, environmental and economic development issues. Case studies using remote sensing and meteorological satellite data that can be processed, analyzed and stored on micro-computer systems will be prepared in advance to provide "hands-on" illustrations of applications to (i) specific natural resource surveys; and (ii) to specific environmental monitoring and assessment exercises;
- (d) During the 9-month period of each educational programme, two (2) workshops (in English) each lasting a minimum period of two-weeks would be organized for thirty (30) primary and secondary school teachers in each instance. Participants in these workshops would be exposed to the relevance of space sciences, particularly remote sensing technology in national development and environmental monitoring and to the means and materials through which they could introduce these concepts into the secondary education curricula in their countries.
- (e) The Centre will work with institutions of higher learning in Western Asia as well as with national and regional remote sensing user assistance and training centres in order to achieve its objectives.

F. Output

20. The main output of the Project includes the following:
- (a) Through this Project, a Centre for Space Science and Technology Education devoted to the enhancement of scientific and technical education, initially focusing on remote sensing technology and environmental sciences, will be established. This institution will provide in-depth educational opportunities for natural, physical and environmental science educators as well as other earth science professionals.

- (b) At the end of the first four years of the Project, a total of 120 scientific and technical educators (at the university level) and other earth science professionals at the rate of 30 per year from all participating countries would have received in-depth and relevant education at the Centre. Such an educational opportunity will enhance the contents of their in-country educational curricula and equip them with skills to conduct appropriate research activities and undertake application projects which could have perceptible impact on national development and environmental management activities. Participating university educators will be able to impart to their students the use of new tools, such as geographic information systems, in the management of natural resources and in preparing environmental impact studies.
- (c) The scientific and technical contents of physical and natural science education curricula will be enhanced, and the ability of educators to contribute to their nation's development by assisting in solving some of the problems of their societies, would be strengthened; one channel for accomplishing the latter is the association of their education with the primary and secondary level educational systems in their countries. These educators will be able to stimulate interest in the technology at the local level and thus promote a wide spread of knowledge in the discipline.
- (d) A survey and evaluation of existing scientific and technical educational materials with a view to determining their remote sensing technology content will be conducted. The results of this survey will be made available to all governments and appropriate educational establishments in the Western Asia region. An element of the evaluation will include recommendations on the process of enhancing these educational materials in space science and technology, particularly in remote sensing and environmental sciences.
- (e) Educational modules for each educational level will be developed by the Centre for use by participating institutions. Each of these modules will consist of lectures on cassette tapes illustrated with view graphs, slides and other audio-video packages and complemented with instructors' training manuals and students' workbooks. In addition, a periodic bulletin on the Centre's activities will be distributed to all interested parties.
- (f) Pilot projects will be organized in requesting countries in co-operation with the national graduates of the Centre in order to (i) enhance the contributions of the Centre and its graduates to national development; (ii) test the effectiveness of both the education programme conducted and the educational materials prepared by the Centre; and (iii) strengthen the scientific and technical education programmes at the national level.
- (g) Strengthen the capabilities of institutions of higher learning and national/regional remote sensing user assistance and training centres.



G. Input (Requirements of the Centre)

21. Project Personnel

(a) The Role of the Executing Agency:

The Executing Agency will provide the services (part time) of two of its staff to co-ordinate the Project. The Executing Agency, in collaboration with the Project's sponsor(s) will establish the aforementioned Panel of Experts to advise on the Centre's programme as well as assist in the evaluation workshops. In consultation with the host country and the sponsors, the Executing Agency will prepare the terms of reference and select all project personnel.

(b) Centre's Director: (Research and Education Expert):

The Centre will be directed by a senior renowned scientist who has had extensive experience in space science and technology, particularly remote sensing and related technologies. This individual should also have had wide experience in research, teaching and applications of the technology, and should be familiar with institutions and organizations of higher education in the Western Asia region.

(c) Scientific/Technical Education Curricula Experts (Three):

The programme of the Centre will require the services of three scientific/technical education experts with experience in curriculum development and education administration. These individuals should also have both research and practical experience in remote sensing and related application disciplines.

The responsibility of these experts will include:

- (i) the development of a methodology for integrating the elements of space science and technology into the education curricula at the primary, secondary and university levels;
- (ii) conducting an inventory and an evaluation of educational materials related to space science and technology in the Western Asia region or abroad; and
- (iii) teaching and research activities at the Centre.

(d) Technical Officers (Two):

The main tasks of the technical officers will include:

- (i) overseeing the upkeep of field equipment and laboratory facilities;
- (ii) provision of logistical support for meetings, research work and field exercises; and
- (iii) provision of photographic and darkroom services.

(e) Administrative Manager and Assistant:

The responsibilities of the administrative manager will include the following:

- (i) administration and management of the finances of the Centre;
- (ii) supervision of purchases and control of inventory of supplies (stationery, audio-video materials and equipment, etc); and
- (iii) air travel/hotel arrangements.

This officer will be assisted by an Administrative Assistant.

(f) Support Staff:

- (i) Two secretaries with international work experience; one of them shall be bilingual (English and French);
- (ii) The Host Government/institution will provide, at its own expense, two additional full-time secretaries for the duration of the Project.
- (iii) Two full-time drivers/mechanics for the duration of the Project.

(g) Security:

The Host Government/institution will make security arrangements for the Centre and provide personnel for this purpose.

22. Facilities:

The following facilities are required for the Centre:

- (a) Classrooms, computer room, working areas, and a conference room with facilities for audio-video presentations, as well as access to the library of the host institution for all Centre personnel, consultants and visiting educators.
- (b) Office space for each of the permanent Centre personnel and consultants. The host institution shall also provide reasonable office space for use by visiting educators.
- (c) Secure storage areas for equipment, general supplies, documents, maps and other materials.
- (d) Adequate accommodation for two technical/education laboratories.
- (e) One dark room for photographic processing.
- (f) Adequate space to be used as the Centre's library; the latter shall contain books, audio-video teaching aids, selected journals, etc. The Centre will operate bibliographic referral services and provide, where possible, limited copies of materials on a "cost" basis.
- (g) Access to international and national communication networks

### 23. Equipment:

The following are the equipment requirements of the Centre:

- (i) Twenty microcomputer systems; three of these should have the potential for handling geographic information systems and relevant computer software
- (ii) Photographic cameras (2) 35 mm
- (iii) 35 mm slide-projectors (3)
- (iv) Overhead projectors (3)
- (v) Video cassette recorders (2); colour T.V. set (2)
- (vi) Office supplies
- (vii) Projection screens (2)
- (viii) Photographic supplies
- (ix) Drafting supplies and lettering equipment
- (x) Voltage regulators
- (xi) Dark room equipment
- (xii) Audio cassette tape recorders (2)
- (xiii) A photo-copying machine
- (xiv) Office furnishings
- (xv) A small scale meteorological satellite receiving station
- (xvi) Satellite remote sensing images and air photographs
- (xvii) Three vehicles (2 field vehicles (Jeeps) and a car)
- (xviii) Laboratory stereoscopes (17)
- (xix) Portable independent communication equipment for voice and data transmission/reception
- (xx) Replacement parts, and other consumables, for the equipment listed above.

### 24. Contributions of and Responsibilities by the Parties to the Project:

#### (a) Host Government/institution

- (i) The Host Government will provide the facilities described in para. 22;
- (ii) The Host Government/institution will be responsible for the personnel identified in paras. 21 (f) (ii) and (g), and any other personnel that may be needed for the normal operation of the Centre; and
- (iii) The Host Government/institution will also provide the following:
  - (1) offer assistance to Centre personnel and participants to locate reasonable and affordable housing;
  - (2) salary of local personnel assigned to the Centre;
  - (3) access to the facilities and expertise of the host institution's computing centre;

- (4) access to voice and data telecommunication lines within the premises of the Centre;
- (5) access, within the premises of the Centre, to running water, electricity and other infrastructural elements necessary for the operation of the Centre; and
- (6) facilitate the establishment of institutional/working relationship between the Centre and local universities/research centres/user agencies.
- (7) The Host Government shall waive import fees, licenses for equipment and materials required by the Centre.

(b) Other Participating Governments in the ESCWA Region

The governments of the participants will provide (i) the salaries and benefits to which their personnel are entitled in their home country while they participate in the programme at the Centre, and (ii) health, accident and life insurance for their personnel. These governments will also be requested to make (i) voluntary cash contributions to support the activities of the Centre; and (ii) a commitment in the form of an exchange of letters, between the United Nations and the institution/participating government, to make use of the knowledge acquired by their educator(s) at the Centre, particularly through their participation in the in-country pilot project(s), and to provide all the necessary local support for the successful implementation of the pilot project(s).

(c) The Sponsor(s)

The sponsor(s) will make the following contributions to the Project:

- (i) The sponsor(s) will provide the funds necessary for the implementation of the Project that are not covered by the contributions made to the Project by the host institution, the Host Government, other participating governments and the Executing Agency.
- (ii) The sponsor(s) shall make arrangements with its/their industrial establishments to provide all or part of the equipment listed in para. 23 above. In such a case, the sponsor(s) and the Executing Agency will jointly decide on the identification and acquisition of the equipment.
- (iii) A sponsoring government will facilitate the establishment of close relationships between the Centre and its own relevant centre(s) of excellence. Such relationships will accelerate the development of the programmes at the Centre, will enrich knowledge and skill development at the Centre, and enhance its credibility locally and globally.

- (iv) The sponsor(s) will identify and make arrangements for individuals in their research and applications institutions (both governmental and private, as well as institutions of higher education), whose expertise can make significant contributions to the Project. The sponsor(s) will also identify and provide the services of a liaison officer to co-ordinate and ensure the effective contributions of these institutions.
- (v) A sponsor will appoint a representative to serve on the Governing Board of the Centre.

(d) Executing Agency

The Executing Agency will have responsibility for the supervision of this Project. In this regard, the Executing Agency shall consult with the sponsor(s) on a regular basis. The Executing Agency will be responsible for the following:

- (i) Terms of reference for the Panel of Experts referred to in para. 17 who will provide guidance for the educational programmes of the Centre. These terms of reference will also include the job description of each of the Centre's personnel.
- (ii) Terms of the agreement between the Executing Agency and the Host Government/institution with the advice of the sponsor(s). This agreement will detail the contributions to be made by each party and their respective obligations, including the procedure for settlement of disputes and termination of the agreement should it prove necessary.
- (iii) Terms of reference for the supply of equipment and materials. These terms of reference will include a description of the microcomputer systems (hardware/software) and their spare parts and maintenance; photographic laboratory equipment and supplies; and specifications of all other essential equipment and materials.
- (iv) The Executing Agency, in consultation with the Panel of Experts, shall develop the guidelines for conducting the inventories referred to in para. 12 (c). The Panel of Experts will also recommend to the Executing Agency appropriate individuals (see para. 11 (d)) that can carry out these tasks.
- (v) The Executing Agency, in co-operation with the Centre, will ensure that all reports identified in para. 33 are prepared and are forwarded to concerned parties.
- (vi) The Executing Agency shall explore possible avenues within the international community to raise necessary funds for the establishment and operation of this Centre.
- (vii) The Executing Agency shall assist the Centre to gradually become independent in its operations and administration.

(e) The Centre:

- (i) The Centre shall have full responsibility for the management and implementation of the activities associated with the Project.
- (ii) The Centre will advise its graduates in organizing the pilot projects referred to in para. 12 (f) above. This effort will include the determination of the scope of the pilot projects, the selection of the participating countries and the establishment of the criteria for the evaluation of the results.
- (iii) The Centre, in co-operation with the Executing Agency, will take responsibility for organizing the workshops aimed at evaluating the education programme at the Centre and the results of the pilot projects. This activity will include establishing the workshops' programmes, issuing invitations to participants for the workshop and evaluating the workshops' results. The sponsor(s) will be invited to participate in these exercises.
- (iv) The Centre shall take responsibility for developing necessary programmes that would ensure adequate collaboration with institutions of higher learning in the region, as well as with national and regional remote sensing user assistance and training centres.

(f) The Governing Board:

- (i) The Governing Board will formulate the broad policies that will govern the activities of the Centre.
- (ii) Such policies will include the designation of individuals or group of individuals to carry out specific tasks such as the periodic evaluation of the Centre and its activities.
- (iii) Within the first four years of the Centre's operation, the Governing Board shall establish an Endowment Fund in order to ensure the financial solvency of the Centre.
- (iv) The composition of the Governing Board shall include two representatives who shall serve the interests of all the participating countries, an observer from the Panel of Experts, and a representative from each of the following:
  - The Host Country/Institution;
  - Each Sponsor/Donor;
  - The Centre (its Director); and
  - The Executing Agency
- (v) The Board shall invite up to a maximum of four additional individuals to serve, in their own capacities, as full members of the Board.

- (vi) Each Board Member shall serve for a period of two years in the first instance, and shall be eligible for reappointment for no more than an additional period of two years.
- (vii) The Board shall elect its Chairman and affix the tenure under which he/she shall serve.

(g) The Advisory Board

- (i) The Advisory Board shall provide advice to the Centre, the Executing Agency and the Governing Board from time to time.
- (ii) Members of the Board shall function as ambassadors-at-large for the Centre and shall undertake activities that can enhance the credibility and the financial status of the Centre.
- (iii) Members of the Board shall be prominent individuals in government, private industries and in the academic and scientific communities.

**Part III - Work Plan**

**A. The Work Plan**

25. The work plan for this Project consists of the following phases (Annex II):

(a) Phase 1: Project Definition

The Executing Agency will take necessary steps, as indicated in para. 12 (b), to develop a full education programme for the Centre. Other activities that will be carried out within this phase include (a) the aforementioned Panel of Experts shall also define the scope of and approach to the inventory of national and regional existing educational materials; (b) visits to potential host institutions by the Executing Agency for an on-site inspection of the available facilities and detailed negotiations with the authorities and the government(s) concerned, with a view to selecting a host institution for the Centre, and the formalization of the necessary agreements with the Host Government; and (c) selection of project personnel and consultants for the Project. The organization of a fund raising campaign for the Centre is now in progress.

(b) Phase 2: Baseline Activities

During this phase, the following activities will be executed concurrently: (a) organization of the regional inventory of scientific and technical educational materials (para. 12 (c)); (b) acquisition of equipment and materials, and establishment of maintenance and user procedures; (c) installation and testing of equipment and laboratory facilities; and (d) training of local support personnel in the use of equipment and laboratory facilities.

(c) Phase 3: Development and Execution of Programme Activities

During this phase, the following activities will be executed concurrently:

- (a) organization of training programmes for educators at the university level and of workshop programmes for the primary and secondary school levels; (b) recruitment of teaching staff, invitations to governments to provide nominees, arrangements for travel and accommodation, etc.; and (c) development of educational modules.

(d) Phase 4: Pilot Projects and Evaluation Workshops

The pilot projects will include the education and training of each group of participants. Details of the pilot projects including their scope and support from participating countries will be carried out during this phase. The success of this programme depends on the success of the pilot projects which are the main instruments for achieving direct social and economic impacts at the national level. Two evaluation workshops are scheduled to be held during the Project life; the first will take place following the conclusion of the first set of pilot projects. The results of the first evaluation exercise will be used to enhance the content of the education programme at the Centre and the subsequent series of pilot projects (see guidelines for pilot projects in Annex III).

B. Institutional Framework

26. (a) The Project will be housed at the \_\_\_\_\_\*.  
The day-to-day implementation of the programme of the Center will be the responsibility of the Centre's Director and will be reviewed as set out in para. 24 (f) (ii) of this document.
- (b) The Host Government/institution will make the necessary administrative arrangements regarding the local personnel (paras. 21 (f) (ii) and (g)) which it will provide, at its own expense, for the implementation of the Project at the Centre. The Host Government/institution will assign a senior officer who will act as liaison officer between the Centre and local institutions.
- (c) Where appropriate, the Centre, in consultation with the Executing Agency, may provide an honorarium to consultants and other supporting personnel that are participating in the Project.

---

\* Consultations are in progress between the United Nations Secretariat and the Economic and Social Commission for Western Asia for the purpose of identifying a Member State that can adequately serve as a host country for the Centre.



C. Effective Participation by National and International Staff

27. All Centre activities will be conducted co-operatively by national and international staff in accordance with the policies of the Executing Agency and under the direction of the Director of the Centre. The roles and duties of each individual national/international staff, including those of the Centre's Director, will be described in the staff booklet to be prepared by the Executing Agency.

D. Prior Obligation and Prerequisites

28. In addition to providing the facilities and personnel described above, the Host Government/institution will (i) ensure that the participating national staff salaries are adequate, (ii) ensure that official overtime activities by national support staff are remunerated; and (iii) assist the Centre's Director, invited experts, the support staff or visiting educators in the quick resolution of any grievances.

29. Governments/institutions that sponsor educators to the Centre will ensure that these individuals are academically and professionally qualified. In addition, these governments/institutions will ensure that their candidates will effectively apply the knowledge acquired at the Centre once they return to their institutions and countries. Each participating government/institution will enter into a Memorandum of Understanding with the Executing Agency including a commitment to organize national pilot projects as described herein.

E. Support of Participating Governments

30. To achieve its goal, this Project will require substantive and active support of participating governments in order to ensure that the programmes established at the national levels, under the auspices of the Centre, have a lasting impact.

F. Scheduling for Monitoring, Evaluation and Reports

31. Monitoring and Evaluation

As indicated in para. 24 (f) (ii), the Governing Board will establish policies and procedures for monitoring and evaluating the implementation of this Project. The findings and recommendations of these reviews will be incorporated, as may be necessary, into future work plan of the Centre. In addition, two evaluation workshops are planned as outlined in para. 12 (g).

## 32. Progress and Final Reports

The following reports will be issued as indicated below:

- (a) Annual progress reports (the Centre)
- (b) Interim reports, review of educational programmes at the Centre, including those on the development of educational modules (The Centre)
- (c) Report on the inventory of existing scientific/technical educational materials (The Executing Agency)
- (d) Report describing results from the pilot projects (The Centre)
- (e) Evaluation reports (The Governing Board)
- (f) Report on the Centre's contributions to the development and strengthening of remote sensing programmes in the institutions of higher learning in the region and in the national/regional remote sensing user assistance and training centres (the Centre)
- (g) Final reports including recommendations for future activities (Executing Agency).

These reports will be circulated to the host country, Member States in the ESCWA region, regional organizations and to the sponsor(s).

## **Part IV - Organization of the Project**

### A. Legal framework

33. The necessary legal framework will need to be established prior to the establishment of the Center. Thus, this framework and all other legal arrangements for the execution of this Project will be defined by the Executing Agency and will be submitted to the Host Government for its concurrence.

### B. Funding for the Establishment and Operation of the Centre

34. The estimated budget for the establishment and operation of the Centre, for its first four years, is presented in Annex IV.

35. The Executing Agency shall explore possible avenues within the international community to raise necessary funds for the establishment and operation of this Centre. Within the first four years of operation of the Centre, the Governing Board shall establish an Endowment Fund in order to ensure the financial solvency of the Centre.

Annex IElements of the Curriculum for the Centre for Space Science  
and Technology Education

The following are some of the elements on which the detailed curriculum of the above Centres shall be based; the detailed curriculum shall be developed by a Panel of Experts who shall take into consideration the following:

- (i) Development of analytical skills; physics, mathematics, computer science, photogrammetry and cartography (theory and practice)
- (ii) Basic radiometry
- (iii) Physics of imaging including colour theory for imaging systems
- (iv) Principles of photo-interpretation (analogue and digital) - theory and practice
- (v) Skills and knowledge development in remote sensing technology, and atmospheric sciences including geographical information systems
- (vi) Development of skills in applying remote sensing technology and GIS to specific application projects including environmental monitoring
- (vii) Development of research programmes (including scientific methods, systems development and integration, selecting and defining research areas, project execution, evaluation and presentation of results)
- (viii) Development and design of education and demonstration materials
- (ix) Curriculum development, including development of pedagogical methods, lecture notes, workbooks, teachers' manuals, preparation of case studies
- (x) Development of skills and knowledge in computer-aided education, including the use of interactive video, and the production of thematic maps
- (xi) Establishment and management of information systems and reference facilities
- (xii) Execution of research and application projects
- (xiii) Weekly seminars on special topics on space technology (with emphasis on new developments, on-going research, (future trends), application potentials of remote sensing systems and economic impact)

Annex II

Timetable

Activities	1992	1993	1994	1995
<u>Phase 1</u>				
1. Establish Panel of Experts	x			
2. Define project details	x			
3. Develop education curriculum	x			
4. Select host institutions	x			
5. Develop consultant/Equipment requirements	x			
6. Select Project personnel	x			
<u>Phase 2</u>				
7. Orientation for education experts	x			
8. Conduct educational materials inventory	x	x		
9. Develop, purchase, test and install equipment		x		
<u>Phase 3</u>				
10. Development of instructional materials	x	x		
11. Development and organization of education programmes	x	x		
12. Development of educational modules for use by trainees in their countries		x	x	x
13. Installation and training in the use of equipment	x	x		
14. Execution of education programmes		x	x	x
<u>Phase 4</u>				
15. Pilot projects: development and execution		x	x	x
16. Exposure to practical training			x	x
17. Evaluation workshop			x	x
18. Final reports				x

Annex III

Suggested Guidelines for Defining/Executing "Pilot Projects"

1. Pilot projects should stress education through classroom presentations of the theory and applications of remote sensing, enhanced whenever possible with both research and applications experiences.
2. Each educator participating in the programme of the Centre will be a Principal Investigator (PI). Prior to the beginning of the pilot project, each PI will submit to the Centre a project proposal identifying the project objectives, methods, materials to be used and their associated costs, schedule of work, and co-operating individuals and agencies.
3. When the projects include a research/applications component, existing (archive) data should be utilized where possible in order to reduce cost and technological risk as well as expedite the data acquisition process.
4. Only manageable, discrete test sites should be used; these should be of sufficient area needed to establish the "proof-of-concept", but without placing undue demand on the image analysis equipment, staff and other resources.
5. The proposals from the PIs will be reviewed and approved by the Centre's personnel assisted by external assessor(s).
6. The Centre will:
  - review, suggest modifications, and accept the proposals;
  - monitor the progress of the work;
  - provide technical consultative advice to the PIs;
  - act as a "peer review" for the final reports as well as provide guidelines on the format of the final reports;
  - make recommendations to improve the project administration process.
7. The PIs of pilot projects which extend beyond one year's duration should submit annual progress reports to the Centre.
8. The Centre shall act as an intermediary between the PIs (and their "operational" results), and the various government departments who can potentially use the demonstrated technology.

Annex IVEstimated BudgetWestern Asia

	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Subtotals</u>
<u>Preliminary Activities</u>					
Implement Phase I activities	\$ 50,000				\$ 50,000
Regional inventory	\$ 10,000	\$ 7,500			\$ 17,500
<u>Infrastructure</u>					
Equipment/Laboratories	\$173,000	\$ 55,000	\$ 5,000	\$ 5,000	\$ 238,000
Office/Classroom furnishings	\$ 40,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 55,000
Library	\$ 12,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 24,000
Consumables	\$ 20,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 47,000
Service and maintenance	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 20,000
<u>Staff</u>					
Consultants	\$ 46,000				\$ 46,000
Project personnel (full-time)	\$162,000 (six months)	\$324,000	\$324,000	\$324,000 162,000 (Year 5)	\$1,296,000
Instructors	\$117,500	\$117,500	\$117,500	\$117,500	\$ 470,000
<u>Participants</u>					
Air travel	\$ 45,000	\$ 45,000	\$ 45,000	\$ 45,000	\$ 180,000
Living expenses	\$574,200	\$574,200	\$574,200	\$574,200	\$2,296,800
Pilot Project support		\$ 60,000	\$ 60,000	\$ 60,000	\$ 180,000
<u>Associated activities</u>					
Development of educational modules	\$ 15,000	\$ 20,000	\$ 5,000	\$ 5,000	\$ 45,000
Workshop (primary/secondary level)		\$ 50,000	\$ 50,000	\$ 50,000	\$ 150,000
<u>Internal Activities</u>					
Evaluation Workshops		\$ 60,000		\$ 60,000	\$ 120,000
Review board sessions	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 120,000
					<u>\$5,555,300</u> =====