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和平利用外层空间委员会

空间科技教育中心

环境评估和自然资源管理方面的能力发展和数据管理

新增订项目文件

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执行摘要

最近召开的联合国环境与发展会议使大家注意到，全世界需要对环境有更大的关注，对发展中国家的需要有更好的认识。早在这许多国家首脑在里约热内卢开会之前，联合国就已经采取步骤通过它的空间应用方案（外层空间事务处），要在发展中国家现行的教育/研究机构成立各个空间科技教育区域中心。这些步骤现已接近展现成果的阶段。这些中心有潜力可以大力帮助里约会议各项建议也即是《21世纪议程》的实施，并且帮助在发展中国家圆满执行用户活动方案。目前，并没有任何先前的或正在进行中的方案，提供如本项目文件所载的这样深入的教育机会。

本项目将通过深入的教育，发展本土在遥感技术、卫星气象学、地理信息系统和数据管理方面的研究和应用能力，作为环境评估和自然资源管理的必要工具的一部分，这是确保持续发展的必要步骤。

项目将由于国民的积极性和支持以及国际合作而激起一种倍增效应，并将导致在以下方面的能力：

㈠ 使每个国家能够增加其知识和经验，尤其是在对每个国家经济和社会发展、包括保持其环境方面有造成更大影响的潜力的应用领域（空气/土地/水）；

㈡ 利用地球观测系统的数据，用于气象预测和监测飓风及其他自然现象，以期可进行适当的灾害管理和减轻方案；

㈢ 使每个国家能够支持其国家机构，特别是有关认识和应用环境信息系统的机构内的研究和发展努力；

㈣ 在每个国家发展可在高中和大学一级方便教学和示范的环境和大气科学

课程，有效地培训教育人员掌握知识，在回到他们原单位时能够教授这方面的课程；

(五) 参加诸如国际地圈-生物圈方案和地球使命这种区域和国际环境方案，对认识和支持关于诸如全球增温和气候变化、臭氧层耗竭、全球森林砍伐、土壤退化和沿岸海洋环境管理等问题的国际行动做出有效贡献。

每个区域中心将设于一个主要的科技为重的大学和研究机构。这样的安排将使中心最佳利用所在机构的现成专业人员和物质基础结构。参与中心方案的人员应能与现成的培训和用户协助中心的结业生协作，进行有利于他们国家的主要研究和应用项目。

为确保这些中心能够长期生存，联合国要求愿担任中心东道主的国家表现出它们对它们所计划接待的中心的经济生存能力的承诺。这些安排将确保东道国表现出比过去区域项目情况中要大得多的保证。本项目文件附件八内载有可能成为东道国的国家所指定的接待机构。本项目文件详述了其他筹资和技术及物质支助、包括要求联合国开发计划署提供的支助的安排。

联合国已开始按区域，组织评价团前往可能的各个东道国及其机构。每个评价团应提出一份正确的资料性报告，协助为每个区域中心挑选出东道国和机构。

本项目文件还探讨参加中心方案的资格要求（即资格和国家一级候选人的甄别）(第十二节)；文件并集中讨论每个参加人员及其国家的义务以及会员国对中心的责任。

一、背景

1. 地球上情况不断变化，部分原因是由于人的行为所造成，这种变化引起了全球关切问题。今天，关切问题集中于诸如全球沙漠化、森林砍伐、土壤受侵蚀、酸雨、空气和水污染及其他等现象；这些问题单独地并且共同地造成了全球变化，其幅度和方向都还大体无从掌握。

2. 政府间一级已经提出了旨在矫正这些环境问题的对应措施，在有些情况中并已取得协议。例如，大会1961年12月20日第1721(XVI)号决议要求研究措施，促进大所科学和技术的程度以改进气候预测能力并对影响气候的基本物理过程有较多的认识。今天，有几个国家和政府间组织和非政府组织正在研究这个问题以期拟订适当的政策。例如，世界气象组织(气象组织)和国际科学联合会协进会(科联协进会)响应了上面所说的大会决议，展开了全球大气研究方案，以密集地观测全球大气并对其进行空前的一整年周期描绘。全球大气研究方案的成就已为人所熟知，包括：(a) 发展新的先进的数据取得和分析方法，(b) 气象预测的显著改进，(c) 由于刺激发展全球模式而加速气象研究方面的进展。

3. 1987年布伦特兰德报告[1]详述了“可持续发展”的概念，并且指出了可持续发展是满足环境要求而同时保持并改善环境的最佳战略。1992年6月间，巴西接待了联合国环境与发展会议(环发会议)[2]，会议形成了合作的、集体的和全球的环境养护和管理战略的出现。除其他外，会议产生了《21世纪议程》体现的基本组成部分。《21世纪议程》代表了出席会议的178国政府的一种高级别政治协议，认为必须加强和支持地方上决定国家发展战略的能力。

4. 在《21世纪议程》方案中，地球观测系统的作用非常具体。例如，《21世纪议程》敦促各国政府进行：

“…全面清点本国土地资源，以便建立土地信息系统，按土地资源的最恰当用途进行土地资源分类，确定环境脆弱或灾害频仍地区，以便采取特殊保护措

施。”[3]

为此及其他目的，

“所有国家特别是发展中国家，或单独地，或结成区域或分区域集团地，应有机会获得现代化土地资源管理技术，如地理信息系统、卫星摄影/图象和其他遥感技术。”[4]

5. 在农业方面，《21世纪议程》强调政府应在适当级别上，在有关国际和区域组织支持下：

“发展数据库和地理信息系统，以存储和显示有关农业的自然、社会和经济资料，以及生态区和发展区的划分”。[5]

6. 《21世纪议程》第17章的核心重点是沿岸和海洋地区，包括专属经济区的问题以及发展人力资源能力和科技手段来处理这些问题。

7. 关于“保护淡水资源的质量和供应：对水资源的开发、管理和利用采用综合性办法”的论题，《21世纪议程》第18章表示：

“开发适合于有效和可持续地管理水资源任务的相互联系的数据库、预报方法和经济规划模型，将需要采用诸如地理信息系统和专家系统等新的方法来收集、吸收、分析和显示多部门信息同时使决策尽可能完善。”[6]

环境信息：从空间勘探地球

8. 过去二十年来，世界经历了从空间观测地球方面的演进，这个过程已在收集地球资源和环境数据方面引进了新的层面。同样重要的是以连贯的方式迅速分析并且有效利用这些数据以期建立起有关不断进行的地方、区域和全球变化的趋向并且拟订出可以应付这种变化的适当政策。

9. 现正将从区域和全球研究工作中所获得的经验应用于一些主要的全球环境和资源发展方案上；地球观测卫星将作为这种活动的必要工具。

10. 具体说来，国际社会现正展开一些长期性的方案，如国际地圈-生物圈方案

和地球使命。地圈-生物圈方案的目的是在于说明和了解管理整个地球系统的相互作用的物理、化学和生物过程，包括在这个系统内发生的变化以及它们受到人类活动的影响的方式。为了便利关于这些全球变化问题的区域协作和研究努力，地圈-生物圈方案的赞助机构科联协进会计划建立一个全世界区域研究中心网络。

11. 地球使命是由大多数进行空间研究的国家所开展的一个方案，通过这个方案，由国际协调的空间平台将探察污染、森林砍伐、温室效应、臭氧层耗竭和其他对地球环境的威胁。1989年7月，在巴黎举行的经济首脑会议的与会者对全球所关注的地球大气状况与地球人类福祉之间相互关系的问题也表示了关切，他们结论说，“为了解和保护地球的生态平衡，迫切需要决定性的行动…。我们敦促所有国家更大力地推动关于环境问题的科学研究，发展必要的技术，并对环境政策的经济成本和效应做出明确的评价。”[7]

12. 由于科技知识境界的不断扩大，包括从空间对地球的观测，因此随着时间的推移，社会和经济发展方案中对环境信息的获取、传送、处理、分析和利用将会有所加强。这方面最新的工作是微波遥感，由于其全天候能力，可以穿透雨层和云层，因而增加从云层密布的未探察地区、尤其是热带取得所需资料的可能性。

13. 今天，许多国家特别是工业化国家正在应用高分辨率卫星数据来更新它们的地球资源和它们环境信息系统的不同方面。这种资料的应用十分广泛，特别是在水资源、森林和作物清查、地质和矿物勘探、环境管理包括气象预测和农业气象学、制图和测绘以及其在发展公路、管道、电线及有关工程应用、土地使用和城市发展、石油污染调查和监测、沿岸/海洋环境和海洋资源的评估和管理、灾害评估和环境对人类活动的影响的监测方面。

14. 今后一段很长的时间，空间探测设备所得的数据将是关于大多数发展中国家境内环境和自然资源的唯一可靠来源，有些情况中还是首次获得的数据。这种数据的获得可以协助这些国家更好地了解如何捍卫它们的环境以及确保它们自然资源的更有效管理和可持续发展。这种资料可做为决策依据以及评估过去决定结果的依

据。

15. 1992年环发会议之前，主要的负责双边援助筹资机构曾对其所资助的项目的执行要求使用这种环境资料。过去几年内，联合国各办事处和专门机构(如联合国环境规划署(环境规划署)、联合国教育、科学及文化组织(教科文组织)、联合国粮食及农业组织(粮农组织)、开发计划署和世界银行)和欧洲共同体委员会已经采用了遥感数据、特别是大地卫星专题成象仪、地球观测实验系统和海洋观测卫星所取得的数据以用于发展中国家境内的方案和项目之中。开发计划署通过一些执行机构正进行遥感数据为其投入的许多项目。在全球环境基金(这是世界银行、环境规划署和开发计划署的一个合办方案)内执行的项目也将利用遥感数据。

二、理由

A. 现有的知识、获得数据和使用信息的水平

16. 虽然所有国家都在制造全球环境问题，不是所有国家都有解决这些问题所需的必要能力。发展中国家在当地一级没有这种能力，因此对诸如《21世纪议程》各方案、对《地球使命》和《国际地球物理生物圈》等其他方案贡献非常有限。

17. 在发展中国家里造成项目执行瓶颈的许多因素包括：(a) 在当地一级缺乏有资格的人力资源；(b) 导致大多数项目依赖外国专家的技术；(c) 缺乏关于政策拟定和有效项目执行的适当信息。

B. 对外国专长的依赖

18. 发展中国家依靠外国专家来执行大多数环境信息系统和其他有关技术的项目。不过，一旦外国专家撤离后，这些项目往往便站不稳。这种失败的主要原因之一是那些国家的对口人员一般不熟识适用的原则/概念的基本原理。他们往往通过在国外接受短期训练或通过在职训练来取得面向应用的知识。这些人学到的技能是专门为具体任务而设计的。在多数情况下，如果不掌握基本知识和不了解所涉原则和

方法，就不可能使这种技能适应其他任务。

19. 只有深入的教育方案才能够提供这种知识和技能。这种当地能力的存在是确保国际社会和国家将投入的资源能够获得有效利用所必不可缺的。

C. 需要：深入的长期教育

20. 目前大多数通过双边援助或由国际供资机构在发展中国家执行的活动是作为“技术转让”一部分而进行的。此外，技术转让能够导致知识的发展，如果当地的科学家和技术人员能够很好地了解正在适用的技术是怎样和为什么如此运作的。

21. 国际社会正在形成的共识是，如果要技术转让获得成功，必须致力于在当地一级发展知识。这种办法应该给参与者提供必要的教育机会，充分考虑到当地的经济、文化和基础结构的情况。

22. 仅仅提供数据并不能确保方案将会成功。分析能力是成功的数据分析和技术转让努力的先决条件。然而，发展中国家许多机构缺乏强大的技术能力，它们因此在灌输技术知识的能力受到限制。那些处于数据管理作业前线的人有必要在一项强化的教育过程中接触到分析和应用环境和自然资源数据的知识。这个办法应该提供适当的吸收所涉基本原则的环境，这是成功发展关于这个学科的知识的关键。

23. 世界银行也审查了通过教育和培训发展当地能力的问题，特别是在非洲的问题。该银行在其1989年题为《撒南非洲：从危机到持续发展》的报告中观察说，“如果非洲要从环境信息系统及有关科技的进展中得到好处，非洲必须改进其科技教育和培训，目的在于让至少一个核心专家小组达到最高的标准。外国援助应该致力于建立优秀和适切的非洲科技，和帮助把各研究所同非洲以外的连接起来。”[8]

24. 1991年4月10至12日世界银行关于撒南非洲环境信息系统方案咨询委员会在德国Heidelberg举行的第三次会议指出，大多数合作方案为了短期目标而采行短期培训课程。[9]关于教育和培训，该委员会又指出：

(一) “如果一个国家需要有效的环境信息系统，它必须有一些能够了解信

息的的应用和所涉问题的决策者和行政人员，和必须有能够发展、改造、应用和教授该项技术的科学家、工程师、技术人员和教员。建立这些技能需要教育和培训；”和

㈡ “教育使人了解问题，而培训则教他执行具体的任务，对于后者，有关整个学科的知识也许并不重要。为了提高认识，适应迅速变化情况需要灵活性和积极性，教育很可能比工作培训更为有效，因为新技术有变化得非常快的特性。”[9]

25. 该委员会在会议结束时提出如下的建议：

㈠ “应该鼓励对环境信息采取专业办法来作为有持续生命力的环境信息系统的基础。必须在短期、中期和长期范围内发展工作人员能力。在短期里，可以通过培训课程和自行训练来满足需要。在较长期里，基本教育和大学课程必须更为透彻地包括环境问题及有关课题，包括信息方面的课题；

㈡ “〔应该〕发展有关环境信息的非洲大学课程，而...这些课程应该同国家环境信息方案结合起来。学生应该有机会在作业中的系统里取得实际经验。〔该委员会〕赞成加强一切有活力的大学资源，并且赞扬设立大学网络；

㈢ “较发达的研究所和非洲研究所（公营和私营的）之间〔应该〕在长期伙伴的基础上建立合作关系，以便确保技术转让的连贯性。这种合作方案应该包括长期的教育和工作人员培训计划。”[10]

26. 欧洲共同体委员会第八总司在最近发布的一份报告中指出，“传统技术转让办法，例如培训课程和在有关国家内的短期示范项目等都是有用的教育工具，但它们本身将不会使遥感技术有效而永久地同各项业务方案相结合。”[11]

27. 在查明在环境监测和自然资源管理方面实际应用所需的若干步骤时，欧洲共同体委员会的报告注意到：(a) “把遥感技术结合进资源管理系统去需要从事研

究与发展工作”(b) “遥感数据处理、分析和判读的研究与发展给技术应用提供科学的基础。”[12]

28. 1987年布伦德兰报告建议说，“一切级别和不同学科的正式教育课程应该包括环境教育--以培养对环境状况的责任感和教导学生如何监测、保护和改善环境。全球意识的培养可以通过鼓励来自不同国家的教员在为此目的而设立的专门中心里进行接触。”[13]

D. 数据的供应、管理和使用

29. 从事国家和区域一级的通盘规划、项目执行、特定资源的利用和监测及评估某一发展方案的环境影响等活动都需要数据。

30. 不过一些国家一直很难获得生物物理数据，特别是空间收集关于地球及其环境的这种数据。对于这些和许多其他国家来说，它们的基线数据不是完全没有就是残缺不全。

31. 在有可用数据时，又往往对可用的数据是什么，有何价值和用处缺乏认识。那些拥有数据的人和那些需要数据来作决策的人之间也极少联系。

32. 有需要设立一个数据管理方案，以便提高发展中国家用户界的技能，使之拥有如下的能力：

㈠ 制定数据收集指导方针；

㈡ 标准化物理和社会经济数据的收集过程；

㈢ 制定从事数据地理参考工作的指导方针；

㈣ 把社会经济数据同生物物理数据结合起来；

㈤ 设立有效而全面的国家基线信息。

三、项目的演变

33. 为了在发展中国家建立所需的能力，后者需要有一个包括下列要素的有高

深教育的核心：(a) 有一些能够在上面提到世界银行布伦德兰报告和环发会议《21世纪议程》报告所建议的各项主要领域从事适当教育工作的专家；(b) 一些能够为解决《21世纪议程》不同方面而开展和执行研究和应用方案的科学家；(c) 有助于执行这些活动的环境信息；和 (d) 便利分析大量为政策拟定和应用所需信息的工具，例如地理信息系统(GIS)。

A. 联合国空间应用方案

34. 1971年，大会在其1971年11月29日第2776(XXVI)号决议中设立联合国空间应用方案，并授权该方案提高各会员国，特别是发展中国家会员国对这项技术的认识，协助它们发展必要的能力(人力资源和基础结构的开发)以便它们能够在其社会和经济发展计划中利用这项技术。

35. 1982年在维也纳举行第二次联合国探索及和平利用外层空间会议(82年外空会议)后，[14]大会在其1982年12月10日第37/90号决议中授权该方案把其注意力集中于：

(1) 发展在当地一级的本国能力；

(2) 提供技术咨询服务；

(3) 提供关于空间科学和技术的信息；

(4) 制定长期的研究学位方案；

(5) 组织关于空间科学和技术的培训课程、讲习班和讨论会；

(6) 促进发达国家和发展中国家，以及发展中国家之间在空间科学和技术方面的更大合作。

36. 本文件的《附件一》载有从82年外空会议结束到1991年的一段期间里由该方案主持下进行的活动。目前，其活动核心是发展当地一级的本国能力。这项努力详情如下。

37. 在1983和1986期间，联合国空间应用方案对各成员国在空间科学和技术不

同方面的需要和要求进行了一项评价，其中包括环境信息系统的各方面。这项评价的结果表明，发展中国家在强化本国能力发展方面有重大的需要，而这只能通过长期教育方案来实现。列在优先项目清单前端的需要包括：(a) 在空间科学和技术涉及自然资源持续开发的不同领域进行深入的基础原理教育，(b) 在研究环境中获得经验的机会 (c) 取得可以在数据处理和分析活动中使用的数据和适当设施。

38. 从1985年起，联合国踏上了促进发展本国空间科学和技术能力的途径，它通过其空间应用方案，为此目的举办了一个国际会议和三个区域会议。这些会议的参加者所得的结论是，为了让发展中国家对解决全球、区域和国家环境和资源管理问题作出有效的贡献，这些国家的教育工作者和研究和应用科学家迫切需要掌握有关学科的高级知识和专门技能。他们进一步指出，这项能力只可能通过长期的强化教育来获得。

B. 空间科学和技术教育中心

39. 在上述建议的基础上，联合国空间应用方案(外层空间事务处)为了在各发展中国家的现有机构(研究所或高等教育机构)中设立空间科学和技术教育区域中心拟定了一项建议(SAP/90/001-004)。

40. 在支持空间应用方案的上述倡议方面，大会第四十五届会议在其1990年12月11日第45/72号决议中认可和平利用外层空间委员会的建议说：

> “在各专门机构和其他国际组织的积极支持下，联合国应该领导一项国际努力，在各发展中国家的现有的国家/区域教育机构里设立空间科学和技术教育区域中心。”[15]

四、短期目标

41. 这些中心将作为教学与研究机构，并能在发展中国家发展和传播知识方面取得较高成就。鉴于全球实际状况和时代的问题，中心将把重点放在遥感技术、卫

星气象学和地理信息系统方面的深入教育、研究和应用方案上，作为环境监测和自然资源管理方面基本手段的一部分，因为这都是持续发展所不可或缺的组成部分。

42. 具体来讲，将在每个区域(非洲经济委员会、欧洲经济委员会、拉丁美洲和加勒比经济委员会、亚洲及太平洋经济社会委员会和西亚经济社会委员会)的高等学府或研究中心的现有有能力的机构中建立空间科技教育中心。每个中心的方案是：

(a) 首先在遥感和相关技术方面发展大学教师、环境研究科学家和项目人员的技能和知识，以便用于国家发展和环境管理方案；

(b) 协助教师编写环境和大气科学课程，用来加强其机构和各国家学生的知识；

(c) 发展环境研究人员和项目人员在自然资源管理和生物多样化保护方面设计、发展和应用遥感技术的技能；

(d) 帮助研究人员和项目人员编写利用空间技术得到的资料，提供给负责国家和区域发展方案的决策人；

(e) 加强空间科技方案、特别是关于环境监测和自然资源管理方案的区域和国际合作，支持并协助每个区域的学校和高等学府的工作和国家/区域的协助与培训遥感用户中心的活动；

(f) 协助让公众了解空间科技在改善其日常生活质量方面的价值。

五、长期目标

43. 每个空间科技教育区域中心将(a)协助可持续发展自然资源(空气/水/土地)和(b)向保存生物多样化和其他有关环境方案提供投入，办法是通过发展环境信息系统中教师与研究应用科学家的深层知识和技能，同时在地方一级强调遥感、卫星气象学和有关技术。

44. 项目将扶植发展中国家的当地能力,使能开始在环境和自然信息系统方面设计实施教育、研究与应用方案。这一进程应使这些国家有能力提供所需的技能和知识,特别是关于设在空间的地球观测系统(包括遥感和卫星气象学)和运用地理信息系统执行国家发展方案(尤其是议程21所列的方案)。

45. 教育和研究与应用方面在强调地球观测系统用于可持续发展的同时并成功设立了各种方案,这一点再加上各国的动机和决心以及国际合作将造成事半功倍的教果,并将:

㈠ 使每个国家能够增加其知识和经验,尤其是在对每个国家经济和社会发展、包括保持其环境方面有造成更大影响的潜力的应用领域(空气/土地/水);

㈡ 利用地球观测系统的数据,用于气象预测和监测飓风及其他自然现象,以期可进行适当的灾害管理和减轻方案;

㈢ 使每个国家能够支持其国家机构、特别是有关认识和应用环境信息系统的机构内的研究和发展努力;

㈣ 在每个国家发展可在高中和大学一级方便教学和示范的环境和大气科学课程,有效地培训教育人员掌握知识,在回到他们原单位时能够教授这方面的课程;

㈤ 参加诸如国际地圈--生物圈方案和地球使命这种区域和国际环境方案,对认识和支持关于诸如全球增温和气候变化、臭氧层耗竭、全球森林砍伐、土壤退化和沿岸海洋环境管理等问题的国际行动做出有效贡献。

六、用户

46. 这些中心的提供能力的潜在用户(受益者)有:

㈠ 国家资源和环境机构(农业部、水资源机构、规划机构、劳工部、地

理普查机构)；

(二) 国家和区域研究所，如拟议中的地球变化研究区域研究所(如地球变化研究拉丁美洲研究所)、国际热带农业研究所(尼日利亚)、国际干旱地区农业研究中心(阿拉伯叙利亚共和国)、国际科学开发地中海委员会(摩洛哥)、国际热带农业中心(哥伦比亚)、国际半干旱热带农作物研究所(印度)、国际农业森林研究理事会(肯尼亚)、国际灌溉管理研究所(斯里兰卡)、国际水稻研究所菲律宾)和中南非洲红蝗虫控制组织(赞比亚)；

(三) 国家一级的大学和学院。

七、每个中心的课程

47. 每个中心的主要功能是：

(a) 教育、研究和应用课程；(b) 数据管理；(c) 示范项目；(d) 通过讲习班和研讨会进行成人教育；和(e) 针对决策人和公众的宣传方案。

A. 教育、研究和应用课程

48. 每个区域中心都将编写执行为从用户中选出的大学教师和研究应用人员编写的年度“教育、研究和应用课程”。每个课程为期9个月。参加工作的专家和咨询人员均是每个区域中各国水准较高的(科技)人员。

49. 每年参加人员开始时限30人。参加者需要其机构/政府的资助，并与联合国成达协议，规定其所学知识在回国后将得到充分利用。中心将协助组织为参加者本国其他教师和地球科学人员安排的国家/地方后续教育课程。

50. 课程重点是环境信息系统中用于教育、环境和经济发展问题的教学方法和方式。将事先利用能够由微机系统处理、分析和储存的遥感和气象卫星数据进行个案研究，以便为(a)具体的自然资源普查和(b)具体的环境监测及评估工作提供直接

的应用示范。

51. 参加者将学到编写(a)教学手册、(b)视听辅助教材、(c)研究和(d)应用项目提议和报告所需的知识和技能。

B. 中小学教师的讲习班

52. 每年学校放假期间,将为区域内的中小学教师举办两期讲习班,每期至少两周时间。参加的教师将接触遥感技术和地球观测系统在国家发展和环境监测中的其他方面以及把这些概念纳入本国中学教材中的方法和教材。

C. 成人教育课程

53. 中心将通过教师、研究与应用科学家讲习班组织成人教育课程。这些教育课程将使参加教育课程者和其他有相同经历的人了解这一学科的进展。

D. 示范项目

54. 中心方案的这一阶段将主要是确保参加者运用上文第48至51段所述活动中所获得的技能和知识。

55. 每个中心将协助学完这一教育课程的学员㈠ 在整整一年时间内进行示范项目,㈡ 把在中心和通过示范项目获得的知识、技能和经验纳入其在本国的教学、研究和应用活动中。学员在中心学习期间编写的模式和手册将在示范项目阶段得到检验。从中获得的经验将用于改进中心的课程。本报告附件二载有确定/执行示范项目的建议性准则。

E. 数据管理

56. 每个空间科技教育中心工作中不可分割的一部分是数据管理单位。通过这个单位,每个中心都将与现有的有关全球数据中心和距离最近的环境规划署/全球资

源信息数据基(焦点)建立直接联系。这种联系将使参加中心方案的人员利用数据中心档案中的数据,特别是在进行可从此联系中获得益处的项目时。

57. 如每个中心的设备清单所示(见附件三),每个中心将配备一台甚高率分辨辐射仪接收站。此外,每个中心还将与距离最近的地球观测地面接收站相联、从接收站收到数据将用在每个中心的活动方面,并在必要时收入中心的档案。

58. 每个中心将设立一个数据管理方案,以提高用户的技能和使用户有能力:

㈠ 为数据收集制订准则;

㈡ 使物理和社会经济数据收集工作标准化;

㈢ 制订地理参考数据准则;

㈣ 通过地球信息系统综合社会经济数据和生物物理数据;

㈤ 建立最新的国家基线资料;

㈥ 组织成人教育活动,让决策者了解数据的重要性和价值及对决策工作的意义。

八、人员、设备、设施和预算

59. 关于人员、设备、设施和其他的需要的详情载于附件三。预算则载于附件六。

60. 每个中心所需筹措经费将不同,即视现有基础结构和地方经济情况而定。在头五年内,各中心将需要$ 600万至$ 750万;这些数据的细目载于预算(附件六)。

九、投入

61. 各中心的支助来源预计将来自(a) 东道国、(b) 该区域其他国家,(c) 捐助国和(d) 国际筹资机构,包括开发计划署。

A. 东道国政府/机构

62. 东道国政府将提供附件二内所述各项设施。

63. 东道国政府/机构将负责提供附件三内指明的支助和安全人员(不包括双语言秘书)及中心的正常业务可能需要的任何其他人员。

64. 东道国政府也将:

(一) 协助中心的人员和参与者寻找合适和不贵的住房;

(二) 提供被派到中心的当地人员的薪金;

(三) 使用主办机构计算中心的设施和专门知识;

(四) 使用中心的音频数据通信线;

(五) 使用中心业务所需要的用水、电力和其他基础结构的各部分;

(六) 促进中心与各当地大学/研究中心/使用机构之间建立体制/工作关系。

东道国政府将免除中心需要的设备和物资的进口费和许可证。

B. 该区域其他参与国政府

65. 中心所在区域的各国政府将:

(一) 对中心人员在参与进行中心的方案并常驻在中心时提供他们在本国内应得的薪金和福利;

(二) 对人员提供健康、意外和人寿保险。

同时,这些政府也应当:

(一) 提供自愿现金捐助以支助中心的各项活动;

(二) 以执行机构与机构/参与国政府之间的换文方式保证使用其教育工作者在中心得到的知识,特别是通过参与国家内试办项目来使用这些知识,并提供在当地成功执行试办项目所需要的一切支助。

C. 主办者/捐助者

66. 各主办者/捐助者将对该项目作出下列捐助：

㈠ 主办者/捐助者将以现金捐助方式支助各中心执行各主办机构、东道国政府和其他参与国政府对中心作出的捐助中未包括的各项方案；

㈡ 主办者/捐助者将与各工业企业作出安排，提供附件三内所列全部或部分的设备。主办者和执行机构将共同就设备的规格和购置问题作出决定；

㈢ 主办/捐助国政府将促进中心及其各自有关的英才中心建立密切的关系。这些关系将加速在中心发展各项方案、加强中心的知识和技能的发展和提高其在地方和国际上的信誉；

㈣ 主办者/捐助者将确定并作出安排，使其专门知识能对中心作出重大贡献的个人在各研究--应用机构(政府和私人以及高等教育机构)从事工作。主办者/捐助者也将确定和提供--各联络员的服务，以便进行协调和确保这些机构作出有效的贡献；

㈤ 主办者/捐助者将任命一名代表作为中心理事局的成员。

D. 联合国开发计划署

67. 目前正在试图通过开发计划署提供下列外部投入：

㈠ 本项目的筹备活动：

(a) 举办三个与中心有关的区域会议：非洲(1993年10月)、亚洲(1993年5月)和中东(1993年11月)(见附件四)。这些区域会议将讨论环境管理和持续发展的问题和该区域各国正在进行的有关方案。同时也将充分讨论各国和各有关机构在确保每个区域的中心的可行性方面所起的作用。目前正在设法要求开发计划署对每个这些区

域会议提供支助；

(b) 在非洲、亚洲和西亚作出安排对其各中心进行评价工作(关于各评价团的目的和职权范围参看附件五)。目前也正在设法要求开发计划署对每个这些评价团提供支助；在拉丁美洲已结束了评价工作。

㈡ 开展和运作各中心的方案所需要的补充财政支助。向开发计划署要求在今后五年内每年提供$ 2 000 000，即1993至1997年各中心每年$ 500 000,(见附件六内的预算)

十、中心的业务和管理

68. 理事局、中心管理当局、执行机构和捐助者/主办者将分担各中心行政工作的责任。关于各个中心的运作方式摘述于附件七。

A. 执行机构

69. 各项目的执行机构为：联合国外层空间事务处，即与各有关区域委员会(非洲经委会、欧洲经委会、拉加经委会、亚太经社会和西非经社会)、各参与专门机构(例如粮农组织、教科文组织和气象组织)和开发计划署合作执行。

70. 执行机构将负责监督该项目。在这方面，执行机构将经常与各主办者协商。执行机构将负责：

㈠ 略述阶段2(见下面第十一B节)内所指专家小组的职权范围；

㈡ 与各主办者咨询，拟订执行机构与东道国政府/机构之间的协定。此项协定将详细说明各方面应作出的捐款和它们的义务，包括解决争端的程序和在证明有必要时解除该协定。联合国法律事务厅将是该协定内与方案无关的方面的最后权威；

㈢ 确定设备和物资供应的职权范围、这些职权范围将包括说明微计算机

系统(硬件/软件) 及其配件和维修的情况；提供摄影实验室设备和用品；和制定所有其他必要设备和物资的规格；

(四) 与中心合作保证所有应提出的报告业已编制并提交有关各方；

(五) 探讨在国际社会范围内为中心的设立和业务筹措必要资金的可能办法；

(六) 帮助中心逐渐独立从事其业务和行政的工作

B. 中心

71. 各中心的责任如下：

(一) 中心将完全负责其所有活动(包括教育、研究和应用方案)的发展、管理和执行；

(二) 中心将就如何制定和组织第55段内所指的试办项目对研究生提供咨询意见。这项工作将包括确定试办项目的范围和制定评价项目结果的必要准则；

(三) 中心与执行机构合作将负责举办实习班，目的在于评价中心的教育方案和试办项目的结果。这项活动将包括制定实习班方案、邀请参与者参加实习班和评价实习班的结果。 主办者/捐助者将被邀请参加这些工作；

(四) 中心将与该区域高等学院合作以及在国家和区域遥感用户的协助下与各训练中心负责制定方案。

C. 理事局

72. 理事局的责任包括下列：

(一) 理事局将拟订与中心在方案、 人员和财政方面的活动有关的广泛政策；

(二) 在中心运作的头四年内,理事局交设立一个捐赠基金以确保中心有充沛的资金;

(三) 理事局的成员将包括两名照顾到该区域所有国家的利益并轮流担任的代表,和下列各机构的代表:

-- 东道国/机构;

-- 各主办者/捐助者;

-- 中心(其主任);

-- 执行机构,它在理事局内至多有四个席位(外空事务处、有关的区域委员会和开发计划署各一个常设席位,粮农组织、教科文组织和气象组织则在一个每年轮流的席位);

(四) 理事局将邀请最多再四个合格专家以个人身分作为理事局的正式成员;

(五) 理事局将选出其主席并根据标准国际程序确定其所有成员的任期;

(六) 除其管理职责外,理事局也将作为科学委员会,其责任将包括对中心的工作方案经常进行评估以保证使中心致力于有杰出的表现。

D. 咨询委员会

73. 咨询委员会的职责将是在科学、技术和教育问题方面向主任提供咨询意见,并包括下列职责:

(一) 咨询委员会将时常向中心、执行机构和理事局提供咨询意见;

(二) 委员会成员将作为中心的巡回大使,并将进行各项有助于增加中心的信誉和财政地位的活动;

(三) 委员会成员将是政府、私人工业、学术界和科学界的知名人士;

(四) 咨询委员会成员将由理事局提名和选举,任期则由理事局决定。

十一、执行的战略

74. 为了实现上面所述的目标,每个中心的设立将分四个阶段执行。

A. 第一阶段(筹备活动)

75. 筹备活动包括:

㈠ 确定东道国政府/机构(五个区域中表示愿意担任这些中心的东道国的23个国家名单见附件八);

㈡ 筹措必要的资金和取得建立中心的技术支助(可能的东道国名单见附件八, 这些国家已经表明如果中心设在他们的领土他们每年准备向中心提供的经费);

㈢ 此外外空事务司已访问了11个工业化国家和两个国际组织, 要求它们对中心的设立和运作提供财政和技术支助;

㈣ 应当评价每个可能的东道国政府和机构所提供的设施和资源。在这方面,1992年5月向拉丁美洲(阿根廷、巴西、智利和墨西哥)派遣了一项评价特派团。加拿大和西班牙政府赞助的专家、拉丁美洲和加勒比经济委员会总部; 驻墨西哥的开发计划署、外空事务司和外空事务司聘用的一名顾问参与了这个特派团;

㈤ 计划在1993年底以前向非洲和亚洲派遣其他的评价特派团。德国政府已正式向联合国证实它准备参加前往非洲的特派团。

B. 第二阶段(发展活动)

76. 这个阶段的第一项活动是设立理事会。理事会的立即任务将包括下列:

㈠ 为每个中心选择地点,建立设施和巩固财政安排;

㈡ 确定和征聘各中心的主任和其他专业人员, 包括区域内和来自国际社

会的访问学者(见附件三);

㈢ (理事会)雇用一群专家,这些专家在执行机构的合作下,将有下列任务:

(a) 评价每个区域的教育水平(例如现有的大学课程和研究计划,视听材料等);

(b) 根据上面㈠的评价制订每个中心的课程;附件九载有一个课程模式;

(c) 确定、获取和发展适用于每个区域中心的科学和技术教育材料;

(d) 为设备和实验室设施(见附件三)制定规格并获取和安装这些设备和设施,雇用和训练使用和维修这些设备和设施的支助人员。

C. 第三阶段(业务阶段)

77. 这个阶段将会把注意力集中在中心的业务方面,并将包括下列:

㈠ 中心将组织和执行为自然科学、物理科学和环境科学教育人员和研究及应用科学人员而设的教育、研究和应用计划;

㈡ 中心将组织为中小学教师举办的讲习班;

㈢ 中心将为国家和区域机构提供研究、教育和应用支助服务;

㈣ 中心将为教育人员和研究及应用科学人员,包括中心的研究生在每个中心举办成人教育计划;

㈤ 中心将请各会员国从它们的学术和研究机构以及用户机构提名合格的候选人参加每个中心的各种计划。

D. 第四阶段(目标的实际落实)

78. 各中心的毕业生将:

㈠ 回到本国执行试验性项目;

(二) 利用在每个中心编制的材料，将所学到的知识纳入本国、本区域、本机构和其他机构的教育课程和研究及应用活动。

每个中心将举办评价讲习班，以评价每个参与者的试验项目，并就每个中心的教育、研究和应用计划的功效提供反馈资料。

十二、参与：规定和义务

A. 关于参与的规定

79. 资格 提名合格的候选人来参加每个中心的计划的责任在于每个国家及其机构。由于每个中心最初的着重点将放在发展和加强参与者在自然资源管理和环境评价方面的知识和技能，这些候选人应当是在这些领域的任何公认学科获得大学和研究院教育的个人。来自偏向应用的机构的候选人应当在上述学科至少有相当于学士学位的教育，并在本国公认的用户机构中具有至少五年的大学后实际经验。来自研究和教育机构的候选人应当在自然科学、物理科学和/或环境科学获得硕士学位，并且在其大学毕业后至少在本国的机构有五年的实际工作经验。拥有博士学位的候选人应当在本国的机构至少拥有在自然科学、物理科学或环境科学的三年实际工作经验。

80. 在国家一级筛选候选人 为了提出供考虑参加每个中心的计划的候选人，每个国家需要制订一个本国的筛选申请人的办法。每个国家有责任确定被提名参加每个中心的方案的候选人具备规定的先决条件。每个中心保留接受或拒绝任何国家提交其审议的任何候选人的申请的权利。虽然具有遥感/卫星气象学的基本知识是适宜的，但不是必须要有的。

B. 每个参与者及其国家的义务

81. 每个中心的各项计划的总目标是本报告附

件九中 所 列空间科学和技术的有关方面协助成员国发展和加强其公民的知识和技能。因此,在每个中心成立时,各会员国将与联合国及各中心的理事会交换《了解备忘录》。除别的以外,这种备忘录将规定下列事项:

㈠ 在参与者参加中心的计划的期间,提名机构/国家继续给予参与者在被中心接纳之前所享有的权利;

㈡ 在参与者完成了参与中心的计划后,应当回到其本国。在本国,参与者应获得协助,通过参与者对教学、研究和执行应用项目和大众教育方案作出贡献的方式有效使用其在中心所获得的知识和技能。这种方法应当导致建立上面第45段中所列的能力;

㈢ 上述参与者将至少在将有每个中心的理事会决定的服务期间内保持这样的地位,并享有与此地位相符的并逐步增加的报酬和其他权利;

㈣ 每个参与者的国家将承诺在参与者完成中心的计划后支持参与者在本国的专业活动。这种支持将包括但不限于提供:

(a) 必要的基本设施,包括必要的办公室和实验室空间和设备;

(b) 支助人员;

(c) 必要的业务费用,包括购取可消耗的货物和必要的文献的费用、交通费用和参与地方、区域和国际专业会议等的费用。

C. 每个区域会员国的责任

82. 为了确保每个中心具有必要的经费,在每一个空间科学和技术教育中心业务所涉地域范围内的所有国家应当认为他们有责任对其区域的中心的捐助基金(见上面第72段㈡)每年作出财政捐助。

十三、过去的或目前正在进行的区域方案

83. 目前没有任何过去的或现在正在进行方案提供本项目建议中所载列的有深

度教育机会。

84. 目前设在非洲(内罗毕、Ile-Ife (尼日利亚)、瓦加杜古)、拉丁美洲(哥伦比亚圣菲波哥大)和亚洲(曼谷)存在的区域遥感训练中心的目的是为了提供下列服务给会员国：(a) 勘探、制图和遥感服务；(b) 为低级和中级技术人员提供勘探、制图和遥感训练；和(c) 散发这些中心进行的调查；研究和实验的数据和结果。大部分这些中心为来自其所服务的国家的用户机构中上面(a) 所述的人员提供短期训练课程(见上面第46段(一))。总的来说，参加这些活动的大部分人都已获得学士学位；其他的人则有技术文凭。

85. 现有训练和用户协助中心的毕业生和计划成立的中心的毕业生可以在主要的研究和应用项目进行合作从而为其国家谋取福利。计划成立的中心的毕业生由于具有较高的分析技能，应当可以加强高等学院和现有国家和区域遥感用户协助和训练中心的能力，从而提高其所服务的国家的能力，最后对国家、区域和国际环境监测和自然资源管理方案作出有效的贡献。

注

[1] 世界环境发展委员会报告，“我们的共同财产”。(A/42/427，附件。也载于世界环境和发展委员会，《我们的共同未来》(牛津大学出版社，1987)。

[2] 参看《联合国环境和发展会议的报告》(里约热内卢，1992年6月3日至14日)(A/CONF.151/26)。

[3] 同上，第一.1章，附件二，第一节，第7.29段。

[4] 同上，第7.33段。

[5] 同上，第二节，第14.41(a)段。

[6] 同上，第18.14段。

[7] A/C.2/44/11，附件。第33和34段。

[8] 《撒哈拉南部非洲的环境资料系统方案：方案的现况》第三次咨询委员会会议，德国海德堡1991年4月10日至12日。环境司、非洲技术司、世界银行，1991年8月，第7页。

[9] 同上。

[10] 同上，第2和3页。

[11] 欧洲共同体委员会第八司，联合研究中心，伊斯普拉机构。《对萨赫勒环境进行遥感：审查目前状况和今后前景》S.D.Prince, C.O. Justice 和S.O.Los 著。CTA/CEE，1990，第12页。

[12] 同上，第69和70页。

[13] A/42/427，附件，第四章，第68和69段。

[14] 参看《第二次联合国探索及和平利用外层空间会议的报告，维也纳，1982年8月9日至21日》(A/CONF.101/10和Corr.1和2)第一部分。

[15] A/AC.105/456，附件二，第4(n)段。

Annex I

ACTIVITIES CONDUCTED BY THE UNITED NATIONS SPACE APPLICATIONS PROGRAMME IN THE PERIOD 1983-1991 FOLLOWING UNISPACE 82 RECOMMENDATIONS AND GENERAL ASSEMBLY RESOLUTION 37/90

UNISPACE 82 RECOMMENDATIONS MANDATED THROUGH RES 37/90	NUMBER OF ACTIVITIES	NUMBER OF PARTICIPANTS FROM DEVELOPING COUNTRIES	NUMBER OF APPLICANTS
(1) PROMOTION OF GREATER EXCHANGE OF ACTUAL EXPERIENCE IN SPACE SCIENCE AND TECHNOLOGY	10	375 CO-SPONSORSHIP OF COSPAR, IAF & ISPRS MEETINGS AND CONGRESSES	BY INVITATION
(2) PROMOTION OF GREATER CO-OPERATION IN SPACE SCIENCE AND TECHNOLOGY	14	345 MEETINGS OF EXPERTS	752
(3) FELLOWSHIP PROGRAMMES FOR IN-DEPTH TRAINING	10 TYPES OF PROGRAMMES /YR	102 LONG-TERM FELLOWSHIPS (AUSTRIA, BRAZIL, CHINA, ESA, USSR)	675
(4) ORGANIZATION OF COURSES/WORKSHOPS ON ADVANCED SPACE APPLICATIONS AND NEW SYSTEM DEVELOPMENTS FOR SPECIALISTS, MANAGERS AND DECISION MAKERS	32	535 COURSES, SEMINARS & WORKSHOPS, 1-5 WEEKS IN DURATION	1531
(5) STIMULATION OF THE GROWTH OF INDIGENOUS NUCLEI AND AN AUTONOMOUS TECHNOLOGICAL BASE IN SPACE TECHNOLOGY	4	183 MEETINGS OF EXPERTS; EDUCATION TOPICS (INDIA, MEXICO, NIGERIA, UK)	355
(6) ACQUISITION AND DISSEMINATION OF INFORMATION IN SPACE SCIENCE AND TECHNOLOGY AND ITS APPLICATIONS	2*	95 (FROM BOTH INDUSTRIALIZED AND DEVELOPING COUNTRIES)	BY INVITATION
(7) TECHNICAL ADVISORY SERVICES IN SPACE APPLICATIONS PROJECTS	7	13 COUNTRIES VISITED, 7 CONSULTANCIES PROVIDED	ON REQUEST

* As follow-up to the recommendations of these meetings, the programme has published the following documents: (a) "Education, Training, Research and Fellowship Opportunities - A Directory" (A/AC.105/366 and A/AC.105/366/Add.1; The latest edition in this series is A/AC:105/522); (b) Information Systems on Space Science and Technology: A Directory (A/AC.105/397; The latest edition in this series is A/AC.105/517).

Annex II

Suggested Guidelines for Defining/Executing "Pilot Projects"

1. Pilot projects should emphasize the theory and applications of Earth Observation Systems (remote sensing and satellite meteorology), enhanced whenever possible with both research and applications experiences.

2. Each educator or research/application scientist 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. The pilot projects will be either of an educational or research/applications nature.

4. Participants whose main activity in their countries is teaching will submit a pilot project proposal containing an outline of the specific courses which they teach and identify the areas in which, in their a priori understanding, they would be able to introduce their acquired remote sensing skills and knowledge.

5. During the nine-month programme, the Centre will assist these participants to refine their proposal, prepare teaching guides and educational materials. The materials that these participants will develop at the Centre will include audio-visual materials, practical exercises and demonstrations of analogue and digital image processing and analysis as well as instruction in the use of geographic information systems for applications in the specific subject area being taught.

6. 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.

7. 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.

8. The proposals from the PIs will be reviewed and approved by the Centre's personnel assisted by external assessor(s).

9. The Centre will:

- review, suggest modifications to, and accept the proposals;
- monitor the progress of the execution phase of the project;
- 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.

10. The PIs of pilot projects which extend beyond one year duration should submit annual progress reports to the Centre.

11. 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 III

PERSONNEL, EQUIPMENT AND FACILITIES

A. Personnel

1. Specialists and experts who are capable of contributing to the implementation of the programmes of the Centres will be drawn from the academic, research and applications communities, both locally and abroad.

2. Each Centre shall be headed by a Director. The resident staff of each Centre will be small and will be complemented by visiting scientists both locally and from abroad. Because each Centre will be housed in a major science and technology oriented university or research institution, such an arrangement will enable the Centres to optimally utilize the existing professional staff and the physical infrastructure at their respective host institutions. The responsibilities of all these individuals are described below.

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

The Centre will be directed by a senior highly qualified scientist with extensive experience in the development and use of environmental information systems, particularly remote sensing, satellite meteorology and geographical information systems. This individual should also have wide experience in research, teaching and applications in these fields, and should be familiar with institutions and organizations of higher education in the region and internationally.

(ii) Scientific/Technical Personnel:

(a) The programme of each Centre will require the services of an adequate number of scientific/technical environmental information system experts with experience in research, teaching, application programmes, curriculum development and education administration.

(b) In addition, each of the countries of the region as well as sponsoring countries/agencies of each Centre, shall identify and make arrangements for participation by individuals in their education, research and applications institutions (both governmental and private), whose expertise including education, research and practical experience in remote sensing and related application technologies e.g. GIS, and who can contribute to the programmes of the Centre

concerned. The sponsors will also identify and provide the services of a liaison officer to coordinate and ensure the effective contributions of these institutions and individuals.

The responsibilities of the experts in (ii) above will include:

(a) the development of methodologies for integrating the elements of environmental information systems (such as remote sensing, satellite meteorology and GIS) into the education curricula at the primary, secondary and university levels;

(b) conducting an inventory and an evaluation of educational materials related to environmental information system in each region; and

(c) teaching and research activities at the Centre.

(iii) Technical Personnel (Three):

The main tasks of the technical officers will include:

(a) Maintenance and supervision of field equipment and laboratory facilities;

(b) provision of logistical support for meetings, research work and field exercises; and

(c) provision of photographic and darkroom services.

(iv) Administrative Personnel:

The responsibilities of the administrative section will include the following:

(a) administration and management of the finances of the Centre;

(b) supervision of purchases and control of inventory of supplies (stationery, audio-video materials and equipment, etc); and

(c) air travel/hotel arrangements.

(v) Support Staff:

(a) Two secretaries with international work experience; one of them shall be bilingual in this case, the language requirement shall be determined by each Centre.

(b) The Host Government/institution will provide, at

its own expense, two additional full-time secretaries for the use of each Centre.

(c) Two full-time drivers/mechanics.

(vi) Security:

The Host Government/institution will make security arrangements for the Centre and shall provide necessary personnel for this purpose. Such personnel shall report to the Director of the Centre.

B. **Facilities**:

3. The following facilities are required for each Centre:

(i) Classrooms, computer room, working areas, and a conference room with facilities for audio-video presentations, as well as access to the libraries of the host institution for all Centre personnel, consultants and visiting scientists;

(ii) 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;

(iii) Secure storage areas for equipment, general supplies, documents, maps and other materials;

(iv) Adequate accommodation for two technical/education laboratories;

(v) One dark room for photographic processing;

(vi) 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; and

(vii) Access to international and national communication networks.

C. **Equipment**:

4. The following are the equipment requirements of each Centre:

(i) Twenty microcomputer systems; six of these should have the potential for handling geographic information systems and relevant computer software for image analysis

(ii) 2 multi-channel radiometers for ground surveys

(iii) Photographic cameras (2) 35 mm

(iv) 35 mm slide-projectors (3)

(v) Overhead projectors (3)

(vi) Video cassette recorders (2); colour T.V. set (2)

(vii) Office supplies

(viii) Projection screens (2)

(ix) Photographic supplies

(x) Drafting supplies and lettering equipment

(xi) Voltage regulators

(xii) Dark room equipment

(xiii) Audio cassette tape recorders (2)

(xiv) A photo-copying machine

(xv) Office furnishings

(xvi) A small scale meteorological satellite receiving station

(xvii) Satellite remote sensing images and air photographs

(xviii) Three vehicles (2 field vehicles (Jeeps) and a car)

(xix) Laboratory stereoscopes (17)

(xx) Portable independent communication equipment for voice and data transmission/reception

(xxi) Replacement parts, and other consumables, for the equipment listed above.

Annex IV

Information Sheet

UNITED NATIONS REGIONAL CONFERENCES ON ENVIRONMENTAL AND NATURAL RESOURCES INFORMATION AND MANAGEMENT NEEDS

A. Objective

1. The objectives of these Conferences are to evaluate and develop plans that would focus on how relevant aspects of space science and technology with particular emphasis on environmental and resource information systems, can be directed towards the solution of regional resource management problems, the safeguarding of the environment, and regional social and economic development. In this context, each Conference will review the recommendations of the United Nations Conference on Environment and Development (UNCED) held in Rio in June 1992 and its Agenda 21, including the initiatives to implement those elements that are relevant to each region. Specifically, each Conference shall, among other things,

(i) assess the social and economic impact and implications of current and future developments in space science and technology;

(ii) assess each region's environmental and natural resources information needs that can be met from a variety of sources including those from space platforms;

(iii) assess each region's readiness, through its regional/national institutions, to meet the challenges of (i) and (ii) above, and develop programmes that can enhance the capabilities of these and any other viable institution(s);

(iv) examine current space application initiatives, particularly in environmental and natural resources information systems that are being developed for each region, and evolve a plan that will ensure the region's participation in those activities that offer realistic benefits for its Member States, including such global programmes as Mission to Planet Earth, International Geosphere-Biosphere Programme and Landsat Pathfinder Tropical Deforestation Project which could provide a better understanding of problems such as desertification, changing climate, deforestation, ocean productivity; and

(v) develop a coherent programme, with due consideration being given to the recommendations of UNCED, including its Agenda 21.

B. Background

2. At present, most countries routinely receive analogue data (through Automatic Picture Transmission stations (APT)) and digital data (through Weather Facsimile (WEFAX) stations) of their specific geographical area from polar-orbiting and geostationary meteorological satellites.

3. Today, an array of Earth observation satellites for meteorological and marine observations, as well as for earth resources surveys, provide copious environmental and natural resources information. The need for Member States to participate in the application of such information for their social and economic development have resulted in the establishment of a number of regional remote sensing programmes/centres such as the Regional Remote Sensing Programme at ESCAP Headquarters in Bangkok, the Indian Remote Sensing Institute in Dehra Dun, the Regional User Assistance and Training Centres in Nairobi (Kenya), Ouagadougou, (Burkina Faso) and Ile-Ife (Nigeria) and the Instituto Geográfico Agustin Codazzi (IGAC) in Bogota, Colombia.

C. Justification for the proposed Conference

4. 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 sustainable development of these resources and to assist in preventing or redressing damages to the Earth's environment. Indeed, it is being amply and continuously demonstrated, through a variety of projects, that it 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. This process will continue to be intensified. And for a long time to come, space borne sensors may be the main source of reliable data on the environment and natural resources of most countries. The availability of such data sets 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. Although earth receiving stations are located in many parts of the world, however, Earth observation data from extensive areas (over 70%) of Africa, all of the Caribbean, and significant portions of the Pacific remain unrecorded daily since these areas are not covered by any stations and most of the operating Earth observation satellites have no on-board recording systems.

5. Today, the pace of remote sensing development and utilization in several developing countries lags far behind similar efforts in any other region of the world. Because of the absence of qualified human resources at the local level, many national/local authorities are often not capable to deal with the very abundant digitized

satellite-derived data and information from existing space-borne sensor systems. Thus, many of the on-going activities and projects in these countries are being undertaken through foreign consultants/contractors. Accordingly, opportunities that could have contributed to indigenous capability development within the continent are lost. A major attendant problem is the lack of direct application and use of these data by government agencies and by personnel responsible for extension services and for environmental management, agricultural development and related issues. Remote sensing science should be integrated into the educational and research programmes of the institutions in these countries.

6. In a recent analysis that focused specifically on Africa, the World Bank concluded "that if Africa is to benefit from advances in information systems and other sciences and technologies, including remote sensing and its environmental application potentials, it must improve its science and technology training and aim at the highest standards for at least a minimum core of specialists. Foreign aid should go towards building excellence and relevance in science and technology and helping to link institutions to others outside Africa. Such new institutions should match science and technology with economic and social development by establishing effective relationship between teaching, research and delivery services." Within varying degrees the same can be said of other regions in the developing world.

7. Within the global community, fellowships are being provided and short-term training courses are being organized for education and training in relevant institutions, particularly in the industrialized countries, to meet these needs. However, the needs of many developing countries far exceed current capabilities. In addition, the short term courses are mostly application-oriented; they are generally conducted abroad, thus only very few individuals from a given developing country can participate in them. In these countries, there are a number of on-going remote sensing projects that are being sponsored by different entities to address immediate needs. By their very nature, these projects are supply-driven, application-oriented, and external assistance dependent; local talents cannot readily participate in them because of their limited knowledge of the technology that is being applied. The development of indigenous capability in any discipline certainly requires the marshalling of well-educated human resources at the local level. Given the several entities involved in these supply-driven proposals and programmes, and the potential impact of the latter on each region's social and economic development, one is forced to ask a multitude of questions such as: The need for consultation with beneficiaries? Consolidation and coordination of these activities?

8. Globally and on each passing day, the inter-relationship between the state of the Earth's atmosphere and the welfare of mankind here on Earth is causing concern. There are many major

global environmental and resource development issues that are now being planned and in which remote sensing technology would serve as a significant and necessary tool. Specifically, the international community is now embarking on long-term programmes such as Mission to Planet Earth whose objective is to understand how our planet Earth works and what its future might be as a result of human activities that are altering the natural balances within the planet. Also receiving global attention is the International Geosphere-Biosphere Programme, whose objective is to describe and understand at least within a fifteen year period, beginning in 1990, the interactive processes influenced by human activities. These programmes and others such as the Landsat Pathfinder Tropical Deforestation, will rely heavily on Earth's environmental data being acquired by a variety of space sensor systems. The global community including the developing countries continues to experience major environmental problems (such as locust infestation, deforestation, flooding, soil erosion, drought and desert encroachment and pollution of the environment); the developing countries would need to contribute its share to the solution of these problems and related global programmes.

9. The manner in which each country/region could contribute to the solution of the issues and problems identified above and others that are regional and/or country specific will be addressed explicitly by each Conference. One main source of such contributions is the planned **Centres for Space Science and Technology Education.**

10. In this connection, on 11 December 1990, in its resolution 45/72, the United Nations General Assembly, in recognition of the above situation, endorsed the recommendation of its Committee on the Peaceful Uses of Outer Space (COPUOS) that "... 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." Twenty-three countries have officially informed the United Nations of their intention to host these Centres; these are: Africa (Ghana, Kenya, Morocco, Nigeria, Senegal and Zimbabwe), Latin America (Argentina, Brazil, Chile and Mexico), Asia (China, India, Indonesia, Iran, Malaysia, Pakistan, Sri Lanka and Thailand), Middle East (Jordan, Syria, United Arab Emirates and Oman), and Europe (Greece).

11. Each Conference will be fully briefed about the roles of the planned Centres for Space Science and Technology Education in addressing environmental and natural resources information and management needs in each region, and the efforts undertaken to-date to ensure its establishment in that particular region. The Conference will also address the roles of all the Member States in each region and their related institutions in ensuring the viability of the Centre.

D. The organization of, and participation in the Conference (sponsorship, location, time, duration and participation)

12. Time and Duration: These Conferences are proposed to be held in 1993, each for a five-day working period (one week). The planned Second Space Conference of the Americas to be held in Santiago, Chile (26-30 April), and the planned United Nations Regional Conferences to be held in Bandung, Indonesia (17-21 May 1993), Africa (October 1993) and Middle East (November 1993) shall be venues for implementing the contents of this annex.

13. Organization: The organization of this Conference shall be jointly undertaken by the host country, the concerned Regional Economic Commission, the United Nations (OOSA) and interested multilateral and bilateral donor agencies.

14. Level of Participation: Participation in this Conference shall be limited to (a) representatives at the highest managerial (i.e. Permanent Secretaries) and national advisers level. Such representatives shall be from (i) science and technology, (ii) natural resources and environment, and (iii) national planning communities.

15. Those invited: Invitations for participation in this Conference shall be extended to (i) all Member States of each region, (ii) appropriate international and regional organizations, (iii) relevant departments and agencies within the UN system, (iv) relevant private corporations and companies, (v) specific individuals who can contribute to the deliberations of the Conference.

E. Conference Programme

16. Upon consultation with the concerned Regional Economic Commission and the host country, the Office for Outer Space Affairs of the United Nations shall propose a conference programme for the consideration of these and other interested parties. The Conference programme shall address, inter alia, Agenda 21 of UNCED, current and future trends in Earth observation sciences with particular emphasis on environmental and natural information systems as essential tools for promoting socio-economic development and for enhancing national/regional cohesion. Applications of such information to the management of agriculture, water, coastal and marine, and forest resources, weather forecasting, land use and soil erosion will receive special attention. The Conference will also address possible programmes and space-related opportunities for mitigating natural disasters such as those that have ravaged each region in recent decades. Needed capabilities including educational infrastructure should be an essential part of the programme. Analysis of on-going projects and pending initiatives, and the possibilities of their consolidation will be examined. The need to establish cooperation and coordination within each region

and among its Member States particularly within the framework of UNCED and other related regional mandates shall be a priority of the Conference.

F. Funding

17. Each regional economic commission, the host country, and the United Nations (OOSA) shall jointly plan the fund-raising campaign. Funding for this Conference shall be sought from sources jointly identified by these three parties.

G. Exhibits

18. The international community shall be invited to mount exhibits that are in conformity with the objectives of each Conference.

H. Follow-up

19. The host country, the concerned Regional Economic Commission and the United Nations (Office for Outer Space Affairs) and other appropriate entities agreed to at the Conference shall constitute a committee that would oversee the implementation of the recommendations of this Conference.

Annex V (a)

CENTRES FOR SPACE SCIENCE AND TECHNOLOGY EDUCATION

Terms of Reference for Evaluation Missions

Mission objective:

The purpose of this mission (one mission to each regional Economic Commission) is to provide an accurate and informative report that could assist in the selection of the host institution(s) for the regional Centre. The report of the mission should contain sufficient indications of whether the governments and host institutions visited will provide the support necessary for the Centre's successful establishment and sustained operation.

Duration of the mission: 2-3 days for each country

Starting date: To be determined following confirmation of participation by potential donors.

Pre-mission requirements:

Prior to the commencement of the mission, members of the mission team should familiarize themselves with the contents of the project document, general background information on each country, and other relevant materials to be provided by the United Nations Office for Outer Space Affairs. On arrival in each country, the mission should visit the UNDP Resident Representative for appropriate briefings on the potential host country.

Output of the mission and indication of the elements or items to be covered:

A. National level

A.1 Economic and social aspects

1. The overall current economic and social situation of the country should be reviewed. Subsequently, the sectors related to the Centre (environment, science and technology, agriculture, natural resources and education) should be analyzed in terms of their socio-economic status and priority in the national development plan. The role of the Centre within these sectors should be discussed.

2. The economic and social analysis should include a consideration of the present and future functions of the Centre and an analysis of the economic benefits such as employment or stimulation of other industries in the countries of the region.

A.2 Policy aspects

1. An analysis of the policy aspects should focus on the policies of the potential host institution or country which may affect the feasibility of the Centre. Specifically, such an analysis should address legislative, institutional and administrative measures needed for the successful establishment and operation of the Centre.

2. In consideration of the multinational characteristics and regional functions of the Centre, the Government's foreign policy toward other countries, particularly within the region, a situation which might affect the ultimate feasibility of the project, should be taken into account.

3. The relevant sector policy papers which are included in the national development plan should be studied in order to analyze the host country's strategies in these areas. (Background papers will be obtained and circulated to all members of the mission before the visit).

B. Institution Level

B.1 Financial aspects

1. The necessary financial information on the host institution should be obtained; this should include annual capital budget, operating budget and annual revenues, sources of financing and general conditions governing availability of funds from sources of finance.

2. Furthermore, the financial support that the host institution is capable of providing for the sustained operation of the Centre will be analyzed and discussed, taking into account the expected development of the Centre.

3. In-kind support: the mission should determine the availability of in-kind support for the establishment and sustained operation of the Centre.

B.2 Professional and technical aspects

1. The mission should obtain detailed information on the professional and technical background and characteristics of the host institution, including the type and scope of academic programmes, academic level of teaching staff, their accumulated experience in remote sensing education, professional background of

the technical supporting staff, specifications of equipment available, communication facilities and layout of buildings and other infra-structure, etc.

2. The availability of space-related facilities, equipment and technical support necessary for, or complementary to the operation of the Centre will be evaluated in accordance with the requirements described in the project document (SAP/90/001-004).

B.3 Managerial aspects

The mission should address the administrative and financial management issues of the Centre, and the relationship that should evolve between the host institution and the Centre. The degree of autonomy of the Centre should be fully addressed.

B.4 Organizational aspects

The mission should also focus attention on the internal administrative structure of the host institution. The analysis of the latter should cover such questions as organizational set-up, the expediency with which the Centre would be able to conduct its day-to-day operations, its relationship to relevant ministries or other collaborating agencies, lines of command and delegation of authority.

B.5 Operational aspects

The mission should obtain detailed information on the local availability and adequacy of such elements as materials (consumables and non-consumables), utilities, labour and services.

Annex V (b)

Centre for Space Science and Technology Education

EVALUATION MISSION

Agenda

1. Introductory presentation by the mission on the concept of the Centre; this would be followed by the views of the local authorities and a general discussion.

2. Visit to the facilities proposed to house the Centre as well as those to be used by the Centre.

3. Detailed discussions on the issues that follow,

   (a) Institutional support

      (i) The commitments that would be made and agreements that could be entered into, regarding the physical areas, equipment and furnishings that would be provided for the Centre; these would include both those for exclusive use of the Centre and those to which the Centre would have access in conducting its activities;

      (ii) The professional and technical support that could be provided or available in support of the educational activities of the Centre. This would include the possibilities of local visiting professors and technical support for the operation and maintenance of laboratory and computing equipment;

      (iii) Budgetary support for the Centre including its source(s) and possible mechanisms for its allocation and exercise; and

      (iv) Hospitality, counselling and other support to be provided for participants, foreign staff and visiting professors.

   (b) Governmental support

      (i) Facilities for foreign staff and visiting professors to legally work in the Centre;

      (ii) Facilities for visas for participants in the education programme;

      (iii) Facilities to import equipment, supplies and consumable materials that may be necessary for the establishment and operation of the Centre; and

(iv) Budgetary support for the Centre including its source(s) and possible mechanisms for its allocation and exercise.

(c) Establishment of the Centre; funding and legal structure

(i) Character and legal status of the Centre;

(ii) Creation of a trust fund to receive and administer the funds for the establishment of the Centre;

(iii) Mechanism for transfer of funds and authority to the Centre for its eventual autonomous administrative functioning;

(iv) Establishment of Governing and Advisory Boards for the Centre;

(v) Discussion of appropriate salary levels for the staff and visiting professors of the Centre in order to determine an approximate operating budget for the Centre;

(vi) Possible funding sources for the establishment and operation of the Centre (local, regional, potential donors and international organizations).

(d) Practical matters

(i) Availability and range of rents for one- to three-bedroom housing for foreign staff and visiting professors;

(ii) Local availability of equipment, supplies and repair and maintenance services.

The above proposal by the United Nations is an open agenda containing the issues that the mission would highlight. It is intended that this proposal serve as guide for the potential host Governments and institutions in preparation for the visit of the mission and the subsequent discussions. The specific schedule of visits, interviews with various authorities and schedule of discussion meetings would be prepared by the local authorities.

The work of the mission in each country should begin and end with a meeting that would be attended by representatives of all entities which could play a role in the establishment of the Centre in the country being visited. In a similar spirit, the mission will be prepared to include in its discussions other issues that may be proposed by the local authorities in connection with the establishment of the Centre.

Annex VI(a)

Estimated Budget

Africa

	Year 1	Year 2	Year 3	Year 4	Year 5	Subtotals
Preliminary Activities	(72,000)	(9,000)	(0)	(0)	(0)	(81,000)
Implement Phase I activities	60,000					60,000
Regional inventory	12,000	9,000				21,000
Infrastructure	(300,000)	(93,600)	(33,600)	(33,600)	(33,600)	(494,400)
Equipment/Laboratories	207,600	66,000	6,000	6,000	6,000	291,600
Office/Classroom furnishing	48,000	6,000	6,000	6,000	6,000	72,000
Library	14,400	4,800	4,800	4,800	4,800	33,600
Consumables	24,000	10,800	10,800	10,800	10,800	67,200
Service and maintenance	6,000	6,000	6,000	6,000	6,000	30,000
Staff	(364,800)	(549,000)	(544,000)	(539,000)	(534,000)	(2,530,800)
Consultants	55,200	45,000	40,000	35,000	30,000	205,200
Project personnel (full-time)	194,400 (6 months)	388,800	388,800	388,800 -	388,800	1,749,600
Instructors	115,200	115,200	115,200	115,200	115,200	576,000
Participants	(328,000)	(400,000)	(400,000)	(400,000)	(400,000)	(1,928,000)
Air travel	72,000	72,000	72,000	72,000	72,000	360,000
Living expenses	256,000	256,800	256,000	256,000	256,000	1,280,000
Pilot project support		72,000	72,000	72,000	72,000	288,000
Associated activities	(18,000)	(108,000)	(90,000)	(90,000)	(90,000)	(396,000)
Development of educational modules	18,000	24,000	6,000	6,000	6,000	60,000
Workshop (primary/ secondary level)		84,000	84,000	84,000	84,000	336,000
Internal activities	(48,000)	(144,000)	(48,000)	(144,000)	(48,000)	(432,000)
Evaluation Workshops		96,000		96,000		192,000
Review Board sessions	48,000	48,000	48,000	48,000	48,000	240,000
Data Management Unit		(170,000)	(120,000)	(120,000)	(120,000)	(530,000)
Equipment/Communications		100,000	50,000	50,000	50,000	250,000
Data and Operation		70,000	70,000	70,000	70,000	280,000
	1,130,800	1,473,600	1,235,600	1,326,600	1,225,600	6,392,200

Annex VI(b)

Estimated Budget

Asia and the Pacific

	Year 1	Year 2	Year 3	Year 4	Year 5	Subtotals
Preliminary Activities	(72,000)	(9,000)	(0)	(0)	(0)	(81,000)
Implement Phase I activities	60,000					
Regional inventory	12,000	9,000				
Infrastructure	(300,000)	(93,600)	(33,600)	(33,600)	(33,600)	(494,400)
Equipment/Laboratories	207,600	66,000	6,000	6,000	6,000	291,600
Office/Classroom furnishing	48,000	6,000	6,000	6,000	6,000	72,000
Library	14,400	4,800	4,800	4,800	4,800	33,600
Consumables	24,000	10,800	10,800	10,800	10,800	67,200
Service and maintenance	6,000	6,000	6,000	6,000	6,000	30,000
Staff	(367,800)	(552,000)	(547,000)	(542,000)	(537,000)	(2,545,800)
Consultants	55,200	45,000	40,000	35,000	30,000	205,200
Project personnel (full-time)	194,400 (6 months)	388,800	388,800	388,800	388,800	1,749,600
Instructors	118,200	118,200	118,200	118,200	118,200	591,000
Participants	(376,800)	(448,800)	(448,800)	(448,800)	(448,800)	(2,172,000)
Air travel	54,000	54,000	54,000	54,000	54,000	270,000
Living expenses	322,800	322,800	322,800	322,800	322,800	1,614,000
Pilot project support		72,000	72,000	72,000	72,000	288,000
Associated activities	(18,000)	(84,000)	(66,000)	(66,000)	(66,000)	(300,000)
Development of educational modules	18,000	24,000	6,000	6,000	6,000	60,000
Workshop (primary/ secondary level)		60,000	60,000	60,000	60,000	240,000
Internal activities	(36,000)	(108,000)	(36,000)	(108,000)	(108,000)	(396,000)
Evaluation Workshops		72,000		72,000	72,000	216,000
Review Board sessions	36,000	36,000	36,000	36,000	36,000	180,000
Data Management Unit		(170,000)	(120,000)	(120,000)	(120,000)	(530,000)
Equipment/Communications		100,000	50,000	50,000	50,000	250,000
Data and Operation		70,000	70,000	70,000	70,000	280,000
	1,170,600	1,465,400	1,251,400	1,318,400	1,313,400	6,519,200

Annex VI(c)

Estimated Budget

Latin America and the Caribbean

	Year 1	Year 2	Year 3	Year 4	Year 5	Subtotals
Preliminary Activities	(72,000)	(9,000)	(0)	(0)	(0)	(81,000)
Implement Phase I activities	60,000					60,000
Regional inventory	12,000	9,000				21,000
Infrastructure	(300,000)	(93,600)	(33,600)	(33,600)	(33,600)	(494,400)
Equipment/Laboratories	207,600	66,000	6,000	6,000	6,000	291,600
Office/Classroom furnishing	48,000	6,000	6,000	6,000	6,000	72,000
Library	14,400	4,800	4,800	4,800	4,800	33,600
Consumables	24,000	10,800	10,800	10,800	10,800	67,200
Service and maintenance	6,000	6,000	6,000	6,000	6,000	30,000
Staff	(366,600)	(505,800)	(505,800)	(505,800)	(505,800)	(2,389,800)
Consultants	55,200	45,000	40,000	35,000	30,000	205,200
Project personnel (full-time)	194,400 (6 months)	388,800	388,800	388,800	388,800	1,749,600
Instructors	117,000	117,000	117,000	117,000	117,000	585,000
Participants	(358,800)	(430,800)	(430,800)	(430,800)	(430,800)	(2,082,000)
Air travel	54,000	54,000	54,000	54,000	54,000	270,000
Living expenses	304,800	304,800	304,800	304,800	304,800	1,524,000
Pilot project support		72,000	72,000	72,000	72,000	288,000
Associated activities	(18,000)	(84,000)	(66,000)	(66,000)	(66,000)	(300,000)
Development of educational modules	18,000	24,000	6,000	6,000	6,000	60,000
Workshop (primary/ secondary level)		60,000	60,000	60,000	60,000	240,000
Internal activities	(36,000)	(108,000)	(36,000)	(108,000)	(36,000)	(324,000)
Evaluation Workshops		72,000		72,000		144,000
Review Board sessions	36,000	36,000	36,000	36,000	36,000	180,000
Data Management Unit		(170,000)	(120,000)	(120,000)	(120,000)	(530,000)
Equipment/Communications		100,000	50,000	50,000	50,000	250,000
Data and Operation		70,000	70,000	70,000	70,000	280,000
	1,151,400	1,401,200	1,192,200	1,264,200	1,192,200	6,351,200

Annex VI(d)

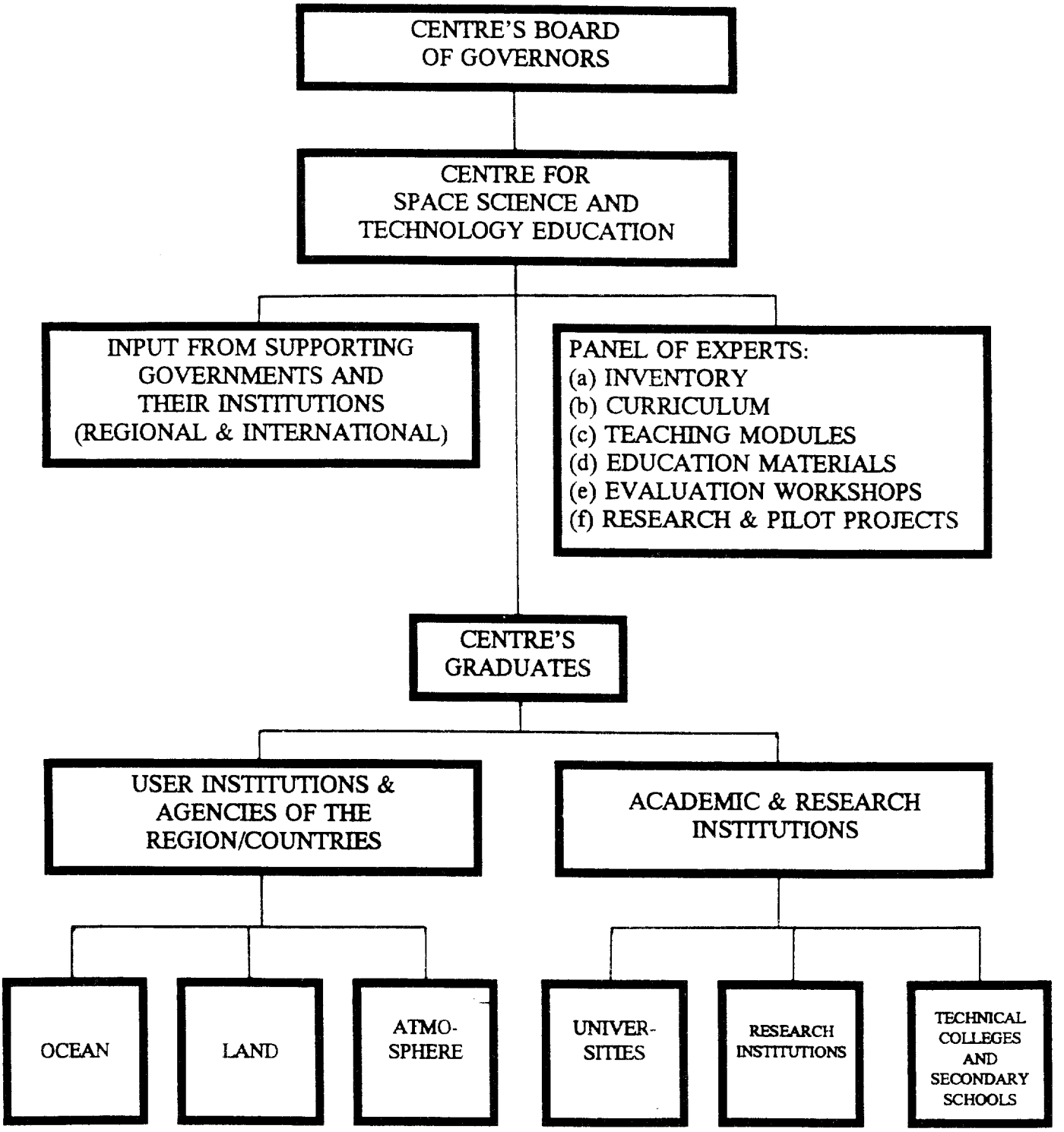
Estimated Budget

Western Asia

	Year 1	Year 2	Year 3	Year 4	Year 5	Subtotals
Preliminary Activities	(72,000)	(9,000)	(0)	(0)	(0)	(81,000)
Implement Phase I activities	60,000					60,000
Regional inventory	12,000	9,000				21,000
Infrastructure	(300,000)	(93,600)	(33,600)	(33,600)	(33,600)	(494,400)
Equipment/Laboratories	207,600	66,000	6,000	6,000	6,000	291,600
Office/Classroom furnishing	48,000	6,000	6,000	6,000	6,000	72,000
Library	14,400	4,800	4,800	4,800	4,800	33,600
Consumables	24,000	10,800	10,800	10,800	10,800	67,200
Service and maintenance	6,000	6,000	6,000	6,000	6,000	30,000
Staff	(390,600)	(574,800)	(569,800)	(564,800)	(559,800)	(2,659,800)
Consultants	55,200	45,000	40,000	35,000	30,000	205,200
Project personnel (full-time)	194,400 (6 months)	388,800	388,800	388,800 -	388,800	1,749,600
Instructors	141,000	141,000	141,000	141,000	141,000	705,000
Participants	(505,000)	(577,000)	(577,000)	(577,000)	(577,000)	(2,813,000)
Air travel	30,000	30,000	30,000	30,000	30,000	150,000
Living expenses	475,000	475,000	475,000	475,000	475,000	2,375,000
Pilot project support		72,000	72,000	72,000	72,000	288,000
Associated activities	(18,000)	(84,000)	(66,000)	(66,000)	(66,000)	(300,000)
Development of educational modules	18,000	24,000	6,000	6,000	6,000	60,000
Workshop (primary/ secondary level)		60,000	60,000	60,000	60,000	140,000
Internal activities	(36,000)	(108,000)	(36,000)	(108,000)	(36,000)	(324,000)
Evaluation Workshops		72,000		72,000		144,000
Review Board sessions	36,000	36,000	36,000	36,000	36,000	180,000
Data Management Unit		(170,000)	(120,000)	(120,000)	(120,000)	(530,000)
Equipment/Communications		100,000	50,000	50,000	50,000	250,000
Data and Operation		70,000	70,000	70,000	70,000	280,000
	1,321,600	1,616,400	1,402,400	1,469,400	1,392,400	7,202,200

Annex VII

THE FUNCTIONING OF THE CENTRE



Annex VIII

CENTRES FOR SPACE SCIENCE AND TECHNOLOGY EDUCATION

Potential host countries/host institutions

Region	N	Country	Institution
ECA	1.	Ghana	University of Ghana
	2.	Kenya	Collaboration of 5 national institutions & RCSSMRS
	3.	Nigeria	University of Nigeria and Obafemi Awolowo University & RECTAS
	4.	Morocco	Université Mohamed V. Ecole Mohammadia d'Ingénieurs
	5.	Senegal	Le Centre de Suivi Ecologique pour la Gestion des Ressources Naturelles (CSE)
	6.	Zimbabwe	Scientific Industrial Research Development Centre and University of Zimbabwe
ECLAC	1.	Argentina	Comision Nacional de Actividades Espaciales (in collaboration with several universities)
	2.	Brazil	Instituto Nacional de Pesquisas Espaciais (in collaboration with two universities)
	3.	Chile	Universidad de Chile (in collaboration with several universities)
	4.	Mexico	Instituto Mexicano de Comunicaciones (in collaboration with three universities)
ESCAP	1.	China	Awaiting institution's nomination
	2.	India	Indian Institute of Remote Sensing
	3.	Indonesia	Bandung Institute of Technology and LAPAN
	4.	Islamic Republic of Iran	Telecommunications University of PTT
	5.	Malaysia	MACRES and University of Malaysia
	6.	Pakistan	SUPARCO
	7.	Sri Lanka	University of Moratuwa
	8.	Thailand	King Mongkut Institute of Technology Laid Krabang
ESCWA	1.	Jordan	Royal Jordanian Geographic Centre
	2.	Oman	Sultan Qaboos University
	3.	Syrian Arab Republic	General Organization of Remote Sensing
	4.	United Arab Emirates	United Arab Emirates University
EUROPE	1.	Greece	Awaiting institution's nomination

Annex IX

OUTLINE OF PROPOSED CURRICULUM

(a) Development of analytical skills (physics, mathematics, computer science, photogrammetry and cartography)

(b) Basic radiometry

(c) Fundamentals of meteorology

(d) Physics of imaging, including the principles of data acquisition, transmission and reception

(e) Principles of photo-interpretation (analogue and digital)

(f) Skills and knowledge development in remote sensing technology, including geographical information systems (GIS)

(g) Development of skills in applying remote sensing technology and GIS to specific application projects

(h) Development of research programmes

(i) Development and design of education and demonstration materials

(j) Curriculum development

(k) Development of skills and knowledge in computer-aided education

(l) Establishment and management of information systems

(m) Execution of research and application projects

(n) Weekly seminars on special topics on space technology