UNITED NATIONS ENVIRONMENT PROGRAMME
PROGRAMME DES NATIONS UNIES POUR L'ENVIRONNEMENT
UNEP

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Your Reference:

Our Reference: **Date:** 12 January 1998

Dear Mohamed:

I am pleased to enclose the project entitled *"People Land Management and Environmental Change" (PLEC)* approved by the 9th meeting of the Executive Council, held in May 1997.

The project has been revised to address all the concerns raised by the Executive Council Members as reflected in the attached note.

As per paragraph 29 and 30 of the GEF Project Cycle, UNEP is submitting this project to you for circulation to the Executive Council Members for comments and, subsequently, for your final endorsement.

Thank you in advance for expediting the review and approval of this project.

Yours sincerely,

Ahmed Djoghlaf
Executive Coordinator
UNEP/GEF Coordination Office

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Annex 1:

PLEC project: Responses to comments from GEF Council members

General comments about project scope. objectives and activities

1. In response to Council comments, the PLEC project's goals have been reformulated to give greatest emphasis to the demonstration objective. Objectives in the final project document (para. 17) are restated, indicating priorities more clearly and focusing on immediate outputs and tangible results. The method centres on over 20 'demonstration sites' where sustainable and conservationist resource-use strategies are worked out and implemented in participation with stakeholders, and specifically with the farmers themselves. PLEC involves the demonstration and application of proven methodologies developed by farmers and scientists working closely together in different ecological and socio-economic settings. This is an 'immediate result', capable of replication in other ecosystems, as well as forming the basis for policy development and implementation.

2. The advantage of a global project lies in the potential for sharing of lessons across a range of ecosystems, South-South cooperation. North-South twinning, and networks of practitioners and researchers to promote replication. The purpose of the project is to network between different regions of the tropics and subtropics. Already, inter-regional exchange of information and ideas is demonstrably of value to project members, and of assistance in developing their work. The range of target groups is an advantage; inevitably, it varies from country to country according to national conditions.

3. Moreover, during the appraisal UNEP has worked with UNU to determine the feasibility of the project's goals and management structure. As a result, the final Project Document includes sections, or has annexes, addressing the organizational structure and management plan (Project Document, Section 3, paras 28-35; Annex 3); project activities and implementation timetable broken down by cluster (Annex 4), monitoring indicators and the monitoring and evaluation plan (Annex 5); stakeholder participation and dissemination plans (Annex 6); demonstration sites (Annex 7); relationships with existing projects and programmes (Annex 9) and disbursement schedule (Project Document, paras 41-45; Annex 11). The project thus demonstrates that it can sustain its scale and geographic scope.

Involvement of agricultural authorities

4. The final Project Document (para. 16, in which the following statement is part of the text) reflects the abundant involvement of agricultural authorities, which was only briefly described in the Project Brief. In West Africa, the Ghana Ministry of Agriculture is closely involved in demonstration-site work, with inputs of its own resources. In East Africa, coordination is achieved through the Kenya Agricultural Research Institute, the largest agricultural research and implementation agency in sub-Saharan Africa; most team members are agricultural and forestry scientists who work in cooperation with their Ministries of Agriculture. In China, the direct involvement of the Yunnan Provincial Government in demonstration site work includes agricultural and forestry staff of that government. In Papua New Guinea all work is carried out in close association with PNG Department of Agriculture and Livestock, with whom PLEC members are now involved in setting up a National Agricultural Research Institute with a mandate to develop outreach and revitalize extension activity in the Provinces. In Amazonia, there has from the outset been close association with EMBRAPA, and the special adviser to the Cluster is the director of the Centro de Pesquisa Agroflorestal da Amazônia Oriental, a division of EMBRAPA.

Methodology to be used

5. PLEC has up-dated an Annex on Methodology, based on experience to date, and adds a commissioned consultancy paper on appropriate methodologies of biodiversity and agrodiversity assessment, already made available to Clusters when it was written, in 1995 (Annexes 8a, 8b). In practice, methodologies will include the best elements of 'Participatory Learning and Action' (PLA), standard field assessments of biodiversity, mapping, measurement and experiment. The demonstration sites are on farmers' land. PLEC will also use standard monitoring techniques of variables such as labour inputs, soil quality, plant growth, gender participation, rural livelihoods and so on. A methodology matrix prepared by the China Cluster, as an example of the strategies being developed on demonstration Sites, which was placed in Annex 4 in the Project Brief, is now included within Annex 8a.

6. Each Cluster will have its own target variables, appropriate to the local immediate issues. Fully standardized methodologies have been considered, but rejected as too restrictive. A major task for the project in its first year will be the harmonization of demonstration site practices and aims between the different regions.

7. In regard to its scope, the project concentrates upon the analysis and demonstration of successful local (indigenous and adapted) technologies for the management of production, land and biodiversity. Existing practices involve trade-offs between sometimes conflicting objectives. One of PLEC's objectives is to understand these trade-offs, in order to recommend the dissemination of strategies and management practices, and possible uptake in new areas. PLEC is not directly involved in the testing of wholly new strategies, but will participate with its agricultural-support-service partners in devising best-bet strategies and proposing ways in which they may be tested and introduced in the longer term (i.e. beyond project life). However, PLEC is already engaging in the testing and introduction of adapted strategies (in Amazonia, Ghana and China) to show the potential for harmonization of indigenous and externally-verified strategies to support rural livelihoods and biodiversity. PLEC participants plan to initiate replicability trials in close involvement with line agencies to continue their work.

8. In regard to methodological diversity, one of PLEC's strengths is the diversity of regions and cultures involved, enabling analysis of appropriate policy environments, as well as economic and environmental conditions for successful adoption of biodiversity-protective practices. This means, in effect, a diversity of partners. Examples are: in Amazonia with rural unions, in PNG with the national agricultural research institute, in China with the Provincial and local authorities, in Tanzania with the Ministry of Agriculture and the national soil survey, and in Ghana with village chiefs and farmers, NGO and ministry partners (Annexes 6a and 7a).

Project management

9. During appraisal, detailed discussions have been held between UNEP and UNU to ensure all implementation and financial management modalities are put in place. UNU, as the Executing Agency, will manage the network from its Tokyo Headquarters. A full-time Managing Coordinator will be assigned for day-to-day management of the project, and will work in close cooperation in the PLEC Management Group with the regional Cluster Leaders, the Academic Officer (Environment) who has charge of the project, the Scientific Coordinator and two Deputy Coordinators. The Scientific Coordinator and the Deputy Coordinators have both topical responsibilities and responsibilities based on geographical regions, in which they are expected to take a lead in coordinating the project. Effective project management will also require regular supervision missions by UNU personnel, the Coordinators and specially-appointed scientific advisors. This is now described in paragraphs 28 to 32 of the Project Document. Detailed job descriptions, terms of reference and an institutional framework for all collaborating entities are now presented in Annexes 3a, 3b and 3c.

10. UNEP, as implementing agency, will be in charge of overall monitoring and evaluation of the project. Work plans, budget plans and financial statements will be provided by UNU to UNEP for approval. UNEP will also carry out periodical supervision missions of the project. Responsibility for oversight of the project is assigned to a senior staff member in the Dryland Ecosystems and Desertification Control unit, who will serve as Task Manager, with specific terms of reference. As part of project monitoring, specialist representatives of relevant international agencies, as well as other organizations with specialization in related issues will form a project Advisory Group. The purpose and intended composition of this Group are now set out in paragraphs 34-35 of the Project Document.

11. The project is based on long-standing, proven field programmes of UNU and well-established relationships between UNEP and UNU, as well as between UNU and the in-country institutions. These in-country institutions have demonstrated their technical expertise and many are "twinned" with developed country institutions. These management arrangements are now being confirmed in an exchange of letters between UNU and the in-country institutions. PLEC builds on substantial experience in community-based projects, biodiversity and agrobiodiversity work among its participants. Several of its demonstration sites are already established, and there is already some years of accumulated experience. Selection of the demonstration sites was based on availability of qualified and motivated personnel, as well as on ecological and agricultural considerations. Annex 4 of the project brief earlier provided details on the in-country institutions and demonstration sites. This presentation is now expanded in Annexes 3c and 7a, and the biodiversity significance of each site is reviewed in Annex 7b.

Outputs at the policy level

12. The output at policy level lies in the demonstration of effective and sustainable farmers' resource management, from which advice and recommendations will emerge, and which are already being used to develop linkages with policy-makers. The project is highly policy-relevant and works together with governments and non-governmental entities at all levels. These practical policy-oriented associations are present in all Clusters. In addition, Annex 6b to the Project Document describes specific activities to reach out to policy-makers as well as more immediate stakeholders, including dissemination of results, approaches to facilitate dialogue between the scientific, policy economic and local communities, and measures to promote adoption of PLEC's recommendations.

Links to other initiatives

13. Annex 9 to the Project Document describes relationships with existing projects and programmes, including coordination arrangements where these are appropriate.

14. Baseline and GEF-funded components demonstrate the close working relationships with stakeholders and other activities (Annex 6):

WEST AFRICA. The Cluster (the largest in PLEC) includes officials from the three Ministries involved in its work, those of Environment, Agriculture and Forestry. The Cluster also works with members of Centres of the Council for Industrial and Scientific Research (e.g. the Savanna Research Institute), and with NGOs, especially the Ghana Rural Reconstruction Movement which has participated in its work from the outset. The West Africa Cluster regards itself as a continuing body, through and beyond the life of 'international' PLEC, and is negotiating for itself a long-term role in Ghanaian rural development and rehabilitation, with a view to seeking non-GEF support.

EAST AFRICA. The Cluster as a whole, and work in Kenya, are based on the Kenya Agricultural Research Institute. In Tanzania, work is based on a principal Agricultural Research Station. In Uganda, working

relations with policy-makers in the Ministry of Agriculture and the Ministry of Environment have been developed since discussions on GEF operational focal point endorsement of the project.

CHINA (YUNNAN). This Cluster has close association with the Yunnan Provincial Government, and with rural local authorities in the areas in which it works. The Yunnan Provincial Government provides some financial as well as material support. At its Hanlong demonstration site, and in the nearby prefectural centre at Baoshan, PLEC has now run two courses for local administrators and forestry officials, together with villagers, in participatory and conservationist rural development. Project members regularly advise provincial and prefectural committees on agricultural and economic development, and members of legislative bodies have visited project sites.

PAPUA NEW GUINEA. The Cluster has worked closely with the Department of Agriculture and Livestock. The Cluster and the Department have now completed a three-year task preparing a national data base of indigenous agricultural systems. The next stage is to assist development of a National Agricultural Research Institute which will have the purpose of identifying problem areas and useful agrotechnologies, and training a new generation of agricultural extension workers. This will mesh closely with the development of demonstration sites, to be taken over after the project period by the Department of Agriculture and the new Institute.

AMAZONIA. This Cluster works in collaboration with numerous governmental and non-governmental entities. The project members have consulted regularly with state planning agencies in the states of Amapa and Para. Much of their work is done in close cooperation with rural unions, in particular the Sindicato dos Trabalhadores Rurais do Amapa and the Colonia de Pescadores Z-10. Training courses for a broad range of actors, ranging from state legislatures to agricultural extension agents have been carried out. A number of demonstration sites are already in operation. Work is also related to the planning process of the State governments in Amapa and Para. Monitoring of the project will be by the national Ministry of the Environment and the Ministry of the Legal Amazon.

15. Within the CGIAR system, working relations with ICRAF/ASB (and also with IBSRAM) are long in existence, and more recently have been initiated with CIFOR. PLEC has taken note of appropriate elements in the Report on the State of the World's Plant Genetic Resources, and will seek cooperation with the FAO programme on conservation and sustainable use of agricultural biological diversity and agroecosystems as it develops. Through the Advisory Group, collaboration to ensure coordination and avoid duplication will be established with FAO, which has a number of related programmes. There is also collaboration with UNESCO (South-South Cooperation Programme, Man and the Biosphere Programme), and UNDP. Some of the Cluster work receives supplementary funding from a number of bilateral donors, including DFID (Brazil, East Africa), JICA (Papua New Guinea), AUSAID and ACIAR (Papua New Guinea), and CIDA (Guinea). Specialists representing some of these organizations, participating in the project Advisory Group, will have the specific charge of facilitating inter-project cooperation (paragraph 34-35 of the Project Document, also Annex 9).

Consistency with CBD COP guidance

16. The emphasis of the project is on biodiversity and on agro-biodiversity, and the role of management practices in sustaining these. Specifically, it sets out to meet the objectives of the COP3 of the Convention on Biological Diversity, Decision III/11, Conservation and Sustainable Use of Agricultural Biological Diversity, especially the following clauses, which are set out in footnote 1, at paragraph 4, in the Project Document:

> 10. Invites countries to share case-study experiences addressing the conservation and sustainable use of agricultural biological diversity.

15e. Encourage the development of technologies and farming practices that not only increase productivity, but also arrest degradation as well as reclaim, rehabilitate, restore and enhance biological diversity and monitor adverse effects on sustainable agricultural biodiversity.

15f. Empower their indigenous and local communities and build their capacity for in situ conservation and sustainable use and management of agricultural biological diversity, building on the indigenous knowledge systems.

17. Annex 7b describes the global biodiversity significance of demonstration site areas in each Cluster.

Viability of project timeframe

18. Demonstration sites are for work over four years, not one, which provides adequate time to produce demonstrable results. Only the biodiversity inventory is to be completed in the first two years. This is clearly set out in the implementation plan (Annex 4).

Country driven

19. The project responds directly to the countries' interest in the conservation and sustainable use of agro-biodiversity. All the countries have significant on-going activities in the field. The in-country collaborating institutions have the support of their governments and the project has been endorsed by all the GEF operational focal points. These Cluster institutions have been intimately involved in the development of the project over several years. Moreover, there is significant in-kind contribution from all the in-country institutions. Many project elements include participation of government agencies (Annex 6a).

20. The bulk of the project support goes directly to the participants in the developing countries, and the balance to networking. The project contains no element of support to the coordinating agencies, other than minimal reimbursement of administrative expenses. The management group of 10 people includes the five cluster leaders from recipient countries, the four UNU/PLEC principals, and a UNEP staff member, together with the Managing Coordinator as secretary.

21. The two paragraphs on Incremental Costs, as formerly presented in the Project Brief, have been replaced by three paragraphs drawing substantially on Annex 2 of the Project Brief, which was written in January in the GEF Secretariat. They are now paragraphs 23-26 of the draft Project Document. In addition the calculation of Incremental Costs is now included as Annex 2.

22. There follows a list of the material and Annexes now completed:

Project Document, substantially revised from the Project Brief, with new sections on Institutional Framework and Project Implementation, and on Project Costs and Financing.

Annex 1. The Project Matrix

Annex 2. Calculation of Incremental Costs

Annex 3. Personnel and Institutional Arrangements

- 3a. Responsibilities of project staff and Cluster leaders
- 3b. Contract arrangements
- 3c. Summary information on the participating institutions

Annex 4. Implementation and Operational Plan

PROJECT DOCUMENT

PROJECT TITLE:	People, Land Management and Environmental Change (PLEC)
GEOGRAPHIC SCOPE:	Global: Brazil, China, Ghana, Guinea, Kenya, Papua New Guinea, Tanzania, Uganda
GEF FOCAL AREA:	Biological Diversity, with relevance to Land Degradation
COUNTRY ELIGIBILITY:	Dates of ratification of the Convention on Biological Diversity: Brazil (28.2.94), China (5.1.93), Ghana (29.8.94), Guinea (17.5.93), Kenya (26.7.94), Papua New Guinea (16.3.93), Tanzania (8.3.96), Uganda (8.9.93)

TOTAL PROJECT COST:	$US 10,992,900
GEF FINANCING:	$US 6,176,300
CO-FINANCING:	
UNU FUNDING	$US 420,000
CLUSTER SCIENTISTS' TIME AND SERVICES IN KIND	$US 2,066,000
UNU AND UNEP STAFF TIME IN KIND	$US 280,600
NATIONAL CONTRIBUTIONS IN INSTITUTIONAL SUPPORT	$US 2,050,000
TOTAL CO-FINANCING	$US 4,816,600
IMPLEMENTING AGENCY:	United Nations Environment Programme
EXECUTING AGENCY:	United Nations University
ESTIMATED START-UP DATE:	1 January 1998
ESTIMATED END DATE:	31 December 2001
Project Preparation Costs (GEF/PRIF)	$US 100,000

ESTIMATED GEF GRANT DISBURSEMENTS BY YEAR
($US million)

Fiscal Year	Year 1	Year 2	Year 3	Year 4
Annual	1.66	1.67	1.38	1.47
Cumulative	1.66	3.33	4.71	6.18

Biological Diversity and Agro-ecosystems. A GEF-funded project that also addresses these issues is the UNDP/GEF Global Environmental Benefits from Alternatives to Slash-and-Burn Agriculture (ASB Phase II, May, 1996) Project. This project complements the ASB project by using a methodology that focuses upon biodiversity assessment. Secondly, PLEC extends the scope of ASB to other sites of equal importance, such as marginal but permanent lands, intensive and semi-commercialized small farm systems, and wetland areas. PLEC's approach is more multi-disciplinary than that of ASB, specifically combining social science and participatory methods with technical assessments. PLEC also looks forward to collaboration with the UNDP/ICARDA/IPGRI/ACSAD project on 'Conservation and Sustainable Use of Dryland Agro-biodiversity of the Fertile Crescent', with which contacts have been established.

5. The underlying causes of declining biodiversity in agricultural, pastoral, and forest lands are numerous and complex. Some of the factors are direct, such as the conversion of these lands into other uses and the rapid extraction of natural resources through commercialized ventures in forests such as large-scale logging and hunting. In many instances, numerous small-scale exploitations of resources occur due to demands for livelihood and income. UNU/PLEC takes note of the 1996 *Report of the International Technical Conference on Plant Genetic Resources*, especially its chapters 1, 2 and 11, and its emphasis on 'agrodiversity' is directly related to the goal of promoting sustainable agriculture through diversification of crop production and broader diversity in crops.

6. Contributing to exploitation and use of resources are forces that compel populations to accelerate activities, including population growth and distribution, distortions in resource pricing and land allocation policies, unclear property rights, and ill-defined laws governing conservation and protection of resources. In addition, other government-sponsored programmes may inadvertently induce further resource degradation, such as building of roads and other infrastructure that attract migrants into forests, and government settlement schemes, aimed at decongesting cities but opening up frontier sites that are often used for unsustainable cultivation.

7. These underlying causes are important from a general policy and historical perspective, yet are often seldom understood or integrated into conservation programmes. How these forces affect farmer decision making is another area that lacks evaluation. There are few assessments of farmer adaptations to changes introduced through commercialization and population growth, yet there are many examples that may be used as models for replication in other sites within similar environmental and social contexts. The emphasis in PLEC is on biodiversity and on agro-biodiversity, and the role of management practices in sustaining them.

PROJECT ORIGIN AND HISTORY

8. PLEC was initiated in 1992 by the United Nations University as an international collaborative programme of studies on the practices of small farmers in relation to environmental change. 'Clusters' of scientists came together first in Amazonia and Papua New Guinea then, by the end of 1993, in Southeast Asia, West Africa and East Africa. Leadership was assumed from the outset by the present Principal Scientific Coordinator, who was joined by the Associate Scientific Coordinators (until 1995 as scientific advisers) in 1993. Late in 1993, the plans of PLEC were submitted to UNEP which, after a review, decided to sponsor the project to the Global Environmental Facility. A general meeting, held in 1994 at Chiang Mai in Thailand, brought the network together and focused attention on

These demonstration sites are in regions within countries where adaptive conservation technologies have been developed and where socio-economic activities are already ongoing at the community level. The demonstration sites are organized in participation with local communities.

13. Participatory activities have been initiated at demonstration sites where both local villagers and scientists have begun work. Each Cluster has selected its own demonstration sites on the basis of targeted research undertaken during the preparatory phase. The whole PLEC network has expanded to include 106 professionals, 91 of whom are in developing country institutions. All Clusters are multidisciplinary, with members drawn from several institutions, including in most cases at least one member from government, local authorities, and NGOs. Associated participants come from community-based NGOs, farmers' organizations, and other community bodies. To enhance capacity building, participants, farmers and practitioners involved in the project are presently joined by about 20 students.

14. PLEC is an ongoing and stable programme and network. It has a track record of pilot regional experience, most of which is documented in various publications. These publications are available from the UNEP/GEF and UNU offices and include a review of case studies worldwide. The special issue of *Global Environmental Change: Human and Policy Dimensions*[2] and the twice-yearly periodical *PLEC News and Views*, contain descriptions of past PLEC activities and network updates.

15. The Clusters, and their ecosystem contexts, are:

a) West Africa - semi-arid and forest margin ecosystems in Ghana and one mountain area in Guinea;
b) East Africa - one area each in mountain and semi-arid areas, including corridors between mountains in Kenya, Uganda, and Tanzania;
c) China - area forming a corridor from mountain to forest ecosystems in Yunnan province;
d) Papua New Guinea - areas in mountain and forest ecosystems;
e) Amazonia - areas in the wetlands and floodplains along the Amazon river in Brazil.

16. Each Cluster is based in a national organization with major involvement in environmental conservation and agriculture. There is close relationship with national departments of agriculture and sometimes, forestry. In West Africa the Ghana Ministry of Agriculture is closely involved in demonstration-site work, with inputs of its own resources. In East Africa, coordination is achieved through the Kenya Agricultural Research Institute, the largest agricultural research and implementation agency in sub-Saharan Africa; most team members are agricultural and forestry scientists who work in cooperation with their Ministries of Agriculture. In China, the direct involvement of the Yunnan Provincial Government in demonstration site work includes agricultural and forestry staff of that government. In Papua New Guinea all work is carried out in close association with PNG Department of Agriculture and Livestock, with whom PLEC members are now involved in setting up a National Agricultural Research Institute with a mandate to develop outreach and re-vitalize extension activity in the Provinces. In Amazonia, there has from the outset been close association with EMBRAPA, and the special adviser to the Cluster is the director of the Centro de Pesquisa Agroflorestal da Amazônia Oriental, a division of EMBRAPA. These connexions are particularly important to ensure that work on the project's demonstration sites will continue beyond project life, so as to ensure sustainability of the work of PLEC. Further

[2] The list of publications is also available from UNEP/GEF offices.

(5) organize, support and participate in the training of farmers, extension workers, local officials and students, creating client and stakeholder involvement which will ensure the sustainability of PLEC actions.

These activities are summarized in matrix form, and placed in the context of objectives, planned outputs and outcomes, in Annex 1.

RATIONALE FOR GEF FINANCING

20. The project meets the eligibility criteria and programme priorities agreed by the Conference of Parties of the Convention on Biological Diversity. Specifically, it meets the guidance provided by COP3 on agro-biodiversity (Decision III/11) and responds to Article 12 of the CBD and is consistent with its provisions.[3] It also gives priority to ecosystems identified by the COP of CBD as needing priority action, i.e., arid and semi-arid lands, mountain ecosystems, and forests, which also correspond to the three GEF Operational Programmes for biodiversity. It addresses the two main operational principles for biodiversity in the GEF Operational Strategy, namely sustainable use and *in situ* conservation. The project meets the local participation guidelines of the GEF. Lessons learned will be disseminated widely through the PLEC network for implementation of best practices, and will be of practical utility both to practitioners and policy-makers. More than 30% of project funding is mobilized from other sources. In addition, over $US2.0 million in grants for related work have already been solicited or are being actively sought.

LESSONS LEARNED AND TECHNICAL REVIEW

21. PLEC draws lessons from its pilot phase, and in relation to the first phase of findings in a related UNDP/GEF project (Global Environmental Benefits from Alternatives to Slash-and-Burn Agriculture). These lessons are: (a) the largely untapped potential of agrodiversity as a contribution to conservation of biodiversity; (b) the variety and scope of farmers' experiences and adaptations in coping with threats to biodiversity, sustainability, and land quality; (c) the role and usefulness of networking as a primary vehicle for capacity strengthening and human resource development in biodiversity conservation; and (d) the expressed demand at all levels for PLEC outputs, especially tested methodologies of assessment of agrodiversity.

22. A Technical Review was undertaken by a STAP roster consultant in early 1996. The review was positive and the suggestions have been fully integrated into this document.

INCREMENTAL COSTS AND GLOBAL BENEFITS

23. The appropriate baseline condition for this project is the current and limited state of knowledge and strategic interventions in the area of agricultural biodiversity. There are numerous communities in which food production and wood collection continue to accelerate at the cost of land degradation and neglect of environmental conservation. At the same time, there are sites where both productivity of the resource for food and other needs are met while preserving the ecosystem's biological diversity. Under existing baseline conditions on a

[3] CBD. 1992. Article 12: 'The contracting parties, taking into account the special needs of developing countries, shall: (a) establish and maintain programmes for scientific and technical education and training in measures for the identification, conservation, and sustainable use of biological diversity and its components, and provide support for such education and training for the specific needs of developing countries; (b) promote and encourage research which contributes to the conservation and sustainable use of biological diversity ... (c) ... promote and cooperate in the use of scientific advances in biological diversity research in developing methods for conservation and sustainable use of biological resources'.

of UNU/PLEC. All reporting will flow from the Clusters and the Scientific Coordinators to UNU, thence to UNEP and the GEF. The Implementing Agency will provide the services of a part-time Task Manager, and of the GEF Biodiversity Focal Point and a Fund Programme Management Officer, to superintend the work of the project. The time of these people will be provided by UNEP as part of its contribution.

UNU COORDINATION

29. Project funding shall be managed by UNU. A PLEC office is to be established at UNU, consisting of the Senior Programme Officer (Environment and Sustainable Development) in charge (part-time)[hereafter the 'Senior Programme Officer'], a full-time UNU/PLEC Managing Coordinator to serve as 'focal point', a part-time Programme Administrative Officer, and a secretary. Except for the Managing Coordinator, whose appointment on contract is wholly funded from the GEF budget, the time of these people will be provided by UNU as part of its contribution. The Managing Coordinator will undertake day-to-day management of PLEC business, and act as 'focal point' for all formal project communication and business. The appointment shall begin as soon as the project begins to be implemented and will continue until the end of the project. Computer support and management of the homepage and the database for the project, to be established during Year 1 and then maintained, will also be undertaken by UNU. UNU Press will manage the publication programme and distribution of all published reports of the project. In the case of scientific reports, the copyright belongs by international convention to the authors.[4] In the case of other reports, UNU and UNEP will jointly hold copyright and the logos of UNU, UNEP and GEF will appear on the cover page. Other services, including personnel, contracts and travel, will be handled through the regular functions of the UNU Administrative Management Division. More detailed job descriptions are presented in Annex 3a, and data on the United Nations University are summarized in Annex 3c.

SCIENTIFIC COORDINATION

30. Scientific coordination, provision of advice to Clusters and within-PLEC monitoring of progress in the project's field areas will be the main responsibilities of the Principal Scientific Coordinator and two Associate Scientific Coordinators [hereafter collectively the Scientific Coordinators]. They will be appointed on renewable annual contracts, supported by contracts with their employing institutions permitting them sufficient free time to devote to UNU/PLEC duties and, especially in the case of the Principal Scientific Coordinator, providing necessary support facilities. The Scientific Coordinators will also advise the Managing Coordinator and Programme Administrative Officer: they will keep in close touch with the Tokyo office, and with one another, principally by e-mail. In addition to formal communication through the focal point, the Scientific Coordinators will communicate directly with Cluster leaders on scientific matters, each having particular topical and geographical areas of responsibility. More detailed job descriptions are presented in Annex 3a. Data on the contracted institutions are summarized in Annex 3c.

CLUSTER ORGANIZATION

31. Project work will be carried out in five national or multi-country regional Clusters; the two regional Clusters include sub-Clusters in associated countries. Clusters will be managed on annual contract with the institutions in which the Cluster leaders are employed, making

[4] Subject to acknowledgement of the source of funds, and the normal caveat that opinions expressed and conclusions drawn do not necessarily reflect the views of UNU, UNEP or the GEF Secretariat.

provision for financial management and reporting while leaving the Cluster leaders responsible for the scientific direction of work and its reporting. Arrangements with the institutions have already been established during the preparatory phase, and a formal exchange of letters is now proceeding and will be complete by the end of 1997. Arrangements include allowance of sufficient time to Cluster leaders to carry out their leadership roles in project work.

32. Each annual contract will have terms of reference based on the outline terms of reference set out in the attached implementation plans in Annex 4. Each contract will require a financial report and short interim progress report each half-year, and a substantive progress report to UNU by the end of the eleventh month, to allow time for collation and summary in the regular project reports to UNEP. They will also provide specific substantive reports as set out in Annex 5. Cluster leaders and the Coordinating leaders of the two multi-country regional Clusters will each receive an annual allowance, payable from UNU after reports are received. Responsibilities of the Cluster leaders are detailed in Annex 3b. Data on the contracted institutions are summarized in Annex 3c.

MANAGEMENT GROUP

33. The Management Group of the project is defined as the leaders of each of the five Clusters (or deputies authorized to speak and act on their behalf), the Senior Programme Officer, the Managing Coordinator, the Scientific Coordinators, and the Implementing Agency Task Manager. The Senior Programme Officer will normally chair the meetings, and the UNU/PLEC Managing Coordinator will act as secretary to the group. The Management Committee is especially charged with coordination of the work of Clusters, reviewing progress, determining forward plans, and advising on the programme of cross-country activities. It will receive all Cluster progress and substantive reports, and will act as a peer group in reviewing progress on the basis of these reports. These items will be the main business of its meetings. The Management Group will meet as a body not less than once in each year; normally at the end or beginning of the year, but its first meeting will take place within 60 days of start-up. More continuously, the group will work by electronic communication. The Senior Programme Officer, the Managing Coordinator and the Scientific Coordinators (the UNU/PLEC Coordinating sub-group [UNU/Coord]) may as necessary meet at other times, to review coordination and management of the project.

ADVISORY GROUP

34. It is proposed to form an Advisory Group the better to assist the project to meet its obligations. This group will be formed within 60 days of start-up and will meet within 120 days. It should meet again early in Year 3, after the mid-term review, and may meet in the final year. Members of the group will be supplied regularly with the consolidated progress reports and substantive reports. Members should be invited without obligation on UNU/PLEC to meet travel costs. The Advisory Group will be given the task of offering non-binding advice to UNU/PLEC on any relevant matter, and of ensuring that UNU/PLEC remains in informative contact with other relevant projects.

35. The Advisory Group should be chaired by the Vice-Rector of UNU and the Managing Coordinator will serve as the secretary. In addition to representatives of UNU/PLEC, UNEP and the GEF Secretariat, it might include relevant specialists drawn from the following technical agencies:

coordination and planning of network activities. The remaining 10 per cent of the grant ($US 588,790) is allocated to project support services and monitoring and evaluation to be undertaken by UNU and UNEP. [Annex 10, Table 2. Project Costs (GEF funding)]

40. A breakdown of the composition of the budget for each activity group is presented in the Detailed Cost Tables in Annex 10, as follows:

Table 3: Demonstration Sites
Table 4: Biodiversity Assessment
Table 5: Participatory Rural Appraisal
Table 6: Outreach and Experimental Work
Table 7: Reports, Workshops on Models
Table 8: Capacity Strengthening (Training)
Table 9: Networking and Dissemination
Table 10: Coordination and Planning

DISBURSEMENT PLAN

41. For the smooth implementation of the project taking into account financial requirements projected on a half-yearly basis, UNEP shall remit funds to UNU, subject to satisfactory project and financial reporting, in an expeditious manner to enable the necessary disbursements to be made. A disbursement plan is made based on estimated costs (projected disbursements) for each six-month period of the four years of project implementation. Disbursements are presented by object of expenditure (Annex 11a), as well as by activity categories (Annex 11b).

42. Funding to research clusters [Annex 12, Procurement (Sub-contracts)] will be managed through contractual agreements issued by the UNU. Other project disbursements will, as appropriate, be made through contractual arrangements or established obligations and authorization of expenditures. In the case of research clusters, the annual budget for each cluster will be placed under an Institutional Contractual Agreement between the key institution/cluster leader (the contractor) and UNU, for activities in accordance with the project plan. It is proposed that one installment (normally a half of the annual budget) will be advanced to the contractor at the beginning of the calendar year. The budgeted amounts for equipment purchase and procurement will be advanced at the start of the project, therefore, a larger proportion of the Year One budget is proposed to be disbursed during the first half-year. The contractor shall submit to UNU reports of expenditures (both expended and committed), by 30 June and 31 December, using established formats and in compliance with the approved budget items and amounts, before the second installment for the year is transferred by UNU to the contractor.

43. Where individual personnel will be engaged, as in the case of the Principal Scientific Coordinator, Associate Scientific Coordinators, and Managing Coordinator, the appropriate UNU Personnel or Special Service Agreements will be used for the relevant periods and work assignments. Payments will be normally made on a quarterly basis upon satisfactory work progress. For the Managing Coordinator who will function out of the UNU Tokyo headquarters, monthly payments are envisaged.

44. For activities involving travel related to coordination/networking/meetings, UNU will issue travel authorizations and payments after receipt and review of specific travel plans. Disbursement for such activities will be on a case-by-case basis.

and adequate insurance for any loss of or damage to equipment, with costs chargeable to and reported against the project budget. The disposal of the equipment upon project completion shall be subject to the decisions of the Local Property Survey Board.

53. *Responsibility for cost overruns*: UNU is authorized to incur expenditures up to a maximum of 20 per cent over and above the annual amount foreseen under any budget sub-line, provided that the appropriations by activity categories are maintained and the total annual budget is not exceeded (Annex 13). A sub-line refers to the object of expenditure classified under codes 1100/1200/1300 and so forth, and where sub-contracts are concerned, a sub-line refers to the budget allocation for each of the clusters. Commitments and expenditures within the 20 per cent flexibility may be made without prior authorization, but once the need for these additional funds becomes apparent, a revised budget request should be submitted to UNEP without delay.

54. Any cost overrun on a specific budget sub-line over and above the 20 per cent flexibility mentioned above should be met by the organization which made the commitment or incurred excess expenditures, unless a revision has been agreed to by UNU on behalf of UNEP through prior authorization in writing. Savings in one budget sub-line may not be applied to overruns of over 20 per cent in other sub-lines, even if the total cost of the project remains unchanged, unless this is specifically authorized by GEF/UNEP upon presentation of the request. In such a case, a revision to the project document amending the budget will be issued by UNEP.

55. *Rate of exchange and responsibility for losses in exchange:* UNEP will provide all cash advances in US dollars and UNU will report all expenditures correspondingly in US dollars. Any funds converted to and expended in another currency will be reported in that currency using the actual rate of exchange prevalent at the time of converting the US dollar cash received or disbursed, or part thereof, into another currency.

56. UNU will be responsible in dealing with any loss in exchange in consultation with UNEP. Should UNU wish to safeguard project funds against losses in exchange, it may, inter alia, instruct UNEP in writing to transfer cash advances to an appropriate US dollar account, or alternatively, negotiate an arrangement with the local UNDP office for this purpose and inform UNEP accordingly in writing.

57. *Rules governing management and administration of the project:* Unless otherwise implied in this project document or other agreements between UNU and UNEP, the administration and management of the project by UNU will be carried out in accordance with the relevant UN regulations applicable to the UNU, including the terms of employment of project personnel, and regulations and rules governing travel and procurement.

LIST OF ANNEXES

ANNEX 1: PROJECT MATRIX

Narrative Summary	Verifiable Indicators	Means of Verification	Assumptions
Project Goal			
To develop sustainable and participatory approaches to biodiversity conservation within agricultural systems, by setting up over 20 demonstration sites where sustainable and conservationist resource-use practices can be developed in participation with farmers and other stakeholders.	By the end of the project, multiple replicable models of agrodiversity management in a variety of ecosystems, landscapes and regions.	Demonstration sites established in five ecologically different regions (West Africa, East Africa, China, Papua New Guinea, and Amazonia);	Government endorsements and commitments of national collaborating institutions are in place;
Project Objectives:			
1. To establish historical and baseline comparative information on agrodiversity at the landscape level in representative diverse regions;	1. By Year 1, database programs in place for cross-country exchanges of information;	1. Primary data gathered by villagers and Plec scientists, assembling social data and identifying successful resource-management patterns, and surveying biodiversity in the following representative countries: Ghana, Guinea, Kenya, Tanzania, Uganda, China, Papua New Guinea, Brazil;	1. Memoranda of Agreements or cooperative arrangements across countries already established;
2. To develop participatory and sustainable models of biodiversity management based on farmers' technologies and knowledge, within agricultural systems at community and landscape level.	2. By Year 2, descriptions and comparisons of management regimes of demonstration sites completed;	2. Jointly with farmers, conduct of experiment and monitoring to analyze, measure and compare resource management methods and technologies, and seek improvements. Outreach and awareness workshops held on *in-situ* agrobiodiversity conservation;	2. Partnerships between community and scientific teams established;
3. To establish national and regional networks for capacity strengthening within participating institutions	3. By Year 4, at least 50 graduate students trained, national networks managed so as to include stakeholders as full participants, and ongoing training programmes established in national institutions.	3. Number of students and technical personnel trained increases from year 1 to year 4, and ongoing programmes established. PLEC becomes sustainable through client and stakeholder involvement.	3. Cooperative arrangements with institutions established within year 1
4. To recommend policies and approaches to sustainable agrodiversity management to key government decision makers, farmers, and field practitioners;	4. By Year 3, initial policies and approaches developed; By Year 4, advice and feedback integrated into final set of recommendations;	4. Integrations of scientific and community social information; multidisciplinary analysis of findings presented at village, national, and cross-country workshops;	4 Cooperative arrangements for field trials and community outreach completed;

Activities:

1. Village outreach and experimental work, including gathering of scientific information by local farmers and scientists in identifying demonstration sites in countries;

2. Scientific assessments of biodiversity in different landscapes;

3. Participatory rural appraisal and social assessment in demonstration sites;

4. Community outreach, experimental work, including collection and analysis of data and comparison of information across landscapes;

5. Reports on models of participatory management of agrodiversity in different landscapes, where findings and recommendations are presented and disseminated to stakeholders, especially local groups, policy makers and NGOs;

6. Capacity strengthening, including training and skilling local scientists and village groups;

7. Networking and dissemination of findings and recommendations;

8. Coordination and planning of network activities;

9. Monitoring and evaluation.

Inputs:

Cross-Country Coordination:

1. Network of scientists from various disciplines providing technical and social expertise;

2. Advice from government and inter-country counterparts;

3. Training and capacity-strengthening compo ents;

4. Equipment and premises;

5. Published materials a other resources.

In-country collaborating institutions:

1. Local scientists in collaborating institutions working closely with residents;

2. Counterpart NGOs and other groups engaging in policy dialogues and in awareness and dissemination;

3. Equipment and premises;

4. Locally-available resources and materials.

ANNEX 2

CALCULATION OF INCREMENTAL COSTS

PROJECT OBJECTIVES

1. The purpose of the project is to provide strategic and timely recommendations to governments and local communities for achieving world food security while protecting global biodiversity and conserving resources. The recommendations will come from an assessment of on-the-ground applications of farmer-based technologies. Several demonstration sites of existing agricultural biodiversity practices will be evaluated and documented with the view towards identification of a set of policy and action-oriented advice. Because the demonstration sites are located in diverse ecosystems such as forest, mountain, semi-arid, freshwater, and wetlands, and in numerous, representative countries in Africa, Asia and the Pacific, and the Americas, knowledge on sustainable techniques will be applicable globally, as well as within country.

BASELINE CONDITIONS REGARDING AGRICULTURAL BIODIVERSITY

2. The appropriate baseline condition for this project is the current and limited state of knowledge and strategic interventions in the area of agricultural biodiversity. Many of the world's critical biodiversity sites are potentially productive sources of food and fiber for many of the world's populations, especially those belonging to the lower income households of developing countries. There are numerous such communities where food production and wood collection activities continue to accelerate at the cost of land degradation and neglect of environmental conservation. At the same time, there are also sites where both productivity of the resource for food and other needs are met while preserving the ecosystem's biological diversity.

3. However, many of these currently practiced sustainable approaches to agricultural biodiversity remain undocumented. Yet, there are numerous lessons to be learned from a cross-country comparison of such approaches. Thus, there is a pressing demand for development of agricultural programs (e.g., extension services; agricultural credit schemes; land settlement projects) that respond to the needs for production and conservation. Currently, governments and NGOs collectively allocate some $2.05 million to village extension and other activities in the demonstration sites, and capacity building in the supporting institutions, including in-kind contributions of labor and materials.

4. Under the existing baseline conditions on a global scale, there would be extremely limited information regarding strategic interventions within the area of agricultural biodiversity. Applications of sustainable technologies, such as those used by indigenous or local communities, will remain as academic studies, or as small-scale initiatives of non-governmental institutions, and there would be very little systematic global comparisons of lessons and best practices.

AN ALTERNATIVE GEF-FUNDED ACTIVITY

5. The PLEC project offers an "on-the-ground" opportunity for a global assessment of currently used sustainable agricultural biodiversity practices and technologies. This will be

Project Activity or Component	Category	Amount (US $000)	Local or Domestic Benefits	Global Benefits
Demonstration Sites	Baseline[1]	500.0	government extension services to sites; some NGO activities	minimal protection of biodiversity due to lack of conscious effort of government and others to protect key endangered species;
	Alternative	3671.1	full documentation of sustainable technologies; greater awareness of biodiversity values; better trained extension workers (including NGOs);	increased recognition of biodiversity and resource conservation values; participatory approaches to agricultural biodiversity and management of land and water resources, especially in the highly threatened sites
	Increment	3171.1		
	GEF	2078.0		
	Co-financing	1093.1		
Biodiversity awareness, capacity building, training	Baseline	1500.0	some government extension and agricultural credit programs reaching sites;	minimal integration of existing agricultural interventions with biodiversity conservation objective and minimal local awareness of biodiversity values;
	Alternative	6317.3	improved capacity to manage agricultural biodiversity; increased dissemination of sustainable technologies; greater awareness in government;	models of sustainable agricultural biodiversity; dissemination of modes to policy makers and stakeholders worldwide through networking;
	Increment	4817.3		
	GEF	3530.8		
	Co-financing	1286.5		
Participatory rural appraisals, outreach	Baseline	50.0	some NGO work in the communities but limited in scope; some government extension and outreach done;	awareness of local practices alerted some government officials to biodiversity values but limited to only a few countries

[1] Baseline figures are estimated in-kind government and other expenditures in the demonstration sites and the supporting institutions, including awareness and capacity building programs of local governments and some NGOs in the demonstration sites.

ANNEX 3
PRINCIPAL CONTRACTED PERSONNEL, AND INSTITUTIONAL ARRANGEMENTS

ANNEX 3a:
RESPONSIBILITIES OF PROJECT STAFF AND CLUSTER LEADERS

IMPLEMENTING AGENCY STAFF

Implementing Agency Task Manager, Mr T. Maukonen, with an associate task manager to be designated by UNEP (Part-time)

1. The Implementing Agency Task Manager will receive all consolidated progress reports, all substantive reports, and all financial reports from the Managing Coordinator in UNU. He will comment on them and through appropriate UNEP processes report to the GEF Secretariat. He will be a member of the Management Group of UNU/PLEC. He shall be particularly responsible for monitoring project progress on behalf of UNEP, in accordance with the Monitoring and Evaluation Plan (Annex 5), and report on this through the UNEP-GEF Unit to the GEF Secretariat. He will pass copies of the financial reports to the UNEP Fund Programme Management Branch Officer.

UNEP-GEF Biodiversity Focal Point, Dr Cyriaque Sendashonga (Part-time)

2. The particular task of the UNEP-GEF Focal Point is to ensure compatibility between project activities and GEF goals and requirements. She will follow the process of the project for GEF purposes through regular consultation with the Implementing Agency Task Manager. She shall be particularly responsible for identifying issues arising from the PLEC project implementation that are valuable inputs for the GEF yearly project implementation review exercise (PIR).

UNEP-GEF Fund Programme Management Officer, Ms Kati Autere (Part-time)

3. The task of the Fund Programme Management Officer is to scrutinize financial reports and requests from UNU, and ensure a smooth flow of funds according to the Disbursement Schedule.

UNU/PLEC STAFF AND CONTRACTED PERSONNEL

A. STAFF

Senior Programme Officer (Environment and Sustainable Development), Dr J.I. Uitto, UNU, Tokyo (Part-time)

4. The Senior Programme Officer will have the overall responsibility for project execution and coordination between the organizations, units and individuals within the project, as well as externally. He will supervise project management, including issuance of contracts, networking, reporting, publications, etc. He will liaise with the Implementing Agency concerning the overall guidance, monitoring and evaluation of the project. The Senior Programme Officer will also work in close cooperation with the Scientific Coordinators and Cluster Leaders in giving direction to the project. The Senior Programme Officer will chair the meetings of the Management Group, and participate as a member in the meetings of the Advisory Group.

Associate Scientific Coordinator, Dr C. Padoch, NYBG, New York
(On contract, 20% of full time)

8. Will provide advice and support to the Scientific Coordinator on all matters within her purview and especially in regard to biodiversity and anthropological aspects. Will share responsibility for within-PLEC monitoring of project progress with Brookfield and Stocking. Will provide guidance to Clusters as required. Will share particular responsibility for the scientific coordination of work with Stocking in the American region, and with Brookfield in the Asia-Pacific region.

Associate Scientific Coordinator, Prof M. Stocking, UEA, Norwich
(On contract, 20% of full time)

9. Will provides advice and support to the Scientific Coordinator on all matters within his purview and especially in regard to soils and land degradation aspects. Will share responsibility for within-PLEC monitoring of project progress with Brookfield and Padoch. Will provide guidance to Clusters as required. Will share particular responsibility for the scientific coordination of work with Padoch in the American region, and with Brookfield in the African region.

All Cluster leaders

10. Will be responsible through the Managing Coordinator (as focal point) and the Scientific Coordinators for the progress and conduct of project work in their areas. Subject to advice from the Scientific Coordinators, will have responsibility for maintaining a balanced Cluster membership adequate to undertake the contracted tasks, and for carrying out the Cluster work programme according to the terms of reference of each contract. Subject to the Programme Administrative Officer's advice, and final decision on all reallocations exceeding 10% of a budget line, will have full responsibility for determining the allocation of project funds within the terms of contract. Will be responsible through the Managing Coordinator for timely reporting on progress, and for ensuring that accurate financial records are maintained, and regularly reported to the Managing Coordinator by the contracted institution. Will be required promptly to advise the Scientific Coordinators through the Managing Coordinator of difficulties that arise which may impede the progress of work. Will be required to appoint a deputy to act during any periods of absence exceeding about two weeks. Shall keep regularly in touch on progress and plans with the Scientific Coordinators responsible for the region. Shall facilitate authorized visits by Coordinators and Advisers and by visiting project members.

11. Cluster leaders devote varying periods of time to PLEC, averaging 20 per cent of full time. Where they do not already have this, they are provided with support staff. Arrangements will be made, as necessary, to ensure periods of time which can be spent full-time on PLEC.

12. Duties will vary as stated below in the multinational, regional Clusters:

Coordinating Cluster leaders in regional Clusters

Will be responsible to the Managing Coordinator and the Scientific Coordinators for the progress and conduct of project work in their areas. Subject to advice from the Scientific Coordinators, will have responsibility for maintaining a balanced Cluster membership adequate to undertake the contracted tasks, and for carrying out the Cluster work programme according to the terms of reference of each contract. Will be responsible through the Managing Coordinator for timely reporting on progress, and for ensuring that accurate financial records are maintained, and regularly reported to the Managing Coordinator by the contracted institution. Subject to the Programme Administrative Officer's advice,

ANNEX 3b: CONTRACT ARRANGEMENTS [1]

MANAGEMENT COORDINATION

1. The Managing Coordinator, a full-time contract appointee who will be the focal point for project management, is hired on annually-renewable contract by the **United Nations University**, and is stationed in UNU headquarters.

SCIENTIFIC COORDINATION

2. This is the responsibility of the three **Scientific Coordinators**, each of whom is on renewable annual PSA contract with UNU. In addition, support facilities and payment for necessary blocks of time are to be provided through institutional contracts with their institutions, respectively the **Australian National University**, the **New York Botanical Garden**, and the **University of East Anglia**

3. The **Principal Scientific Coordinator** (Dr H. Brookfield) operates from a PLEC project office at the Australian National University, which also has responsibility for editing and publication of the project periodical, for providing a library assistance service to Clusters, and for other editorial work. This office will have a secretary (part-time), an editorial associate (part time) and a research and library service associate (part time). The office and its staff are maintained by institutional contract with the **Australian National University**.

4. The **Associate Scientific Coordinators** (Dr C. Padoch, Prof. M. Stocking) work from offices provided by their employers, respectively the **New York Botanical Garden** and the **University of East Anglia.** Contracts with these institutions, in the case of the University of East Anglia with its **Overseas Development Group,** will ensure blocks of free time to undertake sustained periods of PLEC work and provide part-time support assistance.

CLUSTER ARRANGEMENTS IN GENERAL

5. Cluster leaders are directly contracted by the United Nations University, to manage work as described in Annex 3a. The United Nations University will also maintain contracts with their institutions for thefinancial; management of project work. Each cooperating institution has been working with UNU/PLEC for a period of years during the preparatory phase, and the working arrangements are now being formalized through letters of understanding between UNU and each supporting institution. These letters confirm the institutional commitment to support the work of PLEC, and provide services as appropriate. It is anticipated that the exchange of letters will be complete by the end of 1997.

WEST AFRICA CLUSTER

6. The Regional Coordinating leader is **Prof. E.A. Gyasi**, Department of Geography and Resource Management, University of Ghana, Legon. The deputy Cluster leader for Ghana is Dr L. Enu-Kwesi,

[1] Annex 3c provides selected information on each of theinternational and national institutions which will hold contracts for use of GEF funding.

(Baoshan Division); Gaoligongshan State Nature Reserve; the Provincial Government of Yunnan; and the Baoshan prefectural government.

PAPUA NEW GUINEA CLUSTER

15. The Cluster leader is **Mr T. Nen, National Research Institute (NRI)**, Port Moresby. NRI works with a group in the Land Management Group at the Research School of Pacific and Asian Studies, Australian National University (ANU), and with a group based at the Department of Human Ecology at the University of Tokyo. There are collaborating members in the University of Papua New Guinea (UPNG), in Port Moresby. The Cluster works closely with the Research Division of the PNG Department of **Agriculture and Livestock,** which is in the process of becoming a semi-autonomous National Agricultural Research Institute (NARI).

16. The Cluster will be managed under institutional contract with the National Research Institute in Port Moresby. By agreement between the National Research Institute and the Australian National University, funds for the whole Cluster will be received and handled 'in trust' by the **Australian National University**, which will be responsible for financial reporting according to the schedule.

17. The scientists at the Australian National University and in Papua New Guinea are informally 'twinned'; there are frequent sponsored exchange visits between personnel from the two countries, and there is close involvement with senior PNG public servants setting up the National Agricultural Research Institute, concerned primarily with food-crop agriculture in what is known as the 'semi-subsistence sector'. This Institute will become responsible for policy and management of research in this sector.

AMAZONIA CLUSTER

18. The Cluster leader is **Profa-Dr. Tereza Ximenes-Ponte**, Vice-Coordinator of the Núcleo de Altos Estudos Amazônicos (NAEA) at the Federal University of Pará (UFPa) in Belém (Brazil), with Dr. David McGrath (also of NAEA) as deputy Cluster leader.

19. The Cluster is to be managed under institutional contract with the **Instituto de Pesquisa Ambiental da Amazonia (IPAM)**, based at the Núcleo de Altos Estudos Amazônicos, Universidade Federal do Pará, Belém, Brazil. IPAM will be contracted to manage all work of the Cluster, and handle all funds. IPAM will also be responsible for negotiating the national Brazilian monitoring required by the Brazilian GEF authorities.

20. There are two groups, one presently working in the state of Amapá, near the mouth of the Amazon; and the other in the state of Pará near the city of Santarém on the middle Amazon. The Amapá group works closely with the Sindicato dos Trabalhadores Rurais do Amapá. The Santarém group is a collaborative programme involving NAEA, IPAM, and the Colónia de Pescadores Z-10, the principal fishermen's union of Santarém. Other bodies involved in Brazil include the Museu Paraense Emílio Goeldi. There are connections with EMBRAPA (Empresa Brasileira de Pesquisa Agropecuária).

research at the highest levels and setting new standards for research in Australia. There were four initial Research Schools, later expanded to seven. Since creation of an undergraduate programme in 1960 the university has two distinct parts: the Institute of Advanced Studies, comprising the research schools with research and graduate training responsibilities; and the Faculties with undergraduate and graduate teaching and research responsibilities. The mission of the University has evolved to reflect these changes. It includes (*inter alia*) responsibilities to: engage in research, scholarship and teaching at the highest international standards; sustain international links, and encourage collaborations which enable Australia to benefit from research in other countries; and contribute to education, culture, welfare and economic development within Australia generally.

Funding
In 1995 the regular budget of the University was approximately US$309 million.

Personnel
The 1995 Annual Report lists 1,264 academic staff, 764 technical staff, 1,661 general and administrative staff, with the total of 3,689.

UN funded projects in recent years have included:
UNEP: Preparation of GEF Project on People, Land Management and Environmental Change
UNU: Critical Zones in Global Environmental Change; Canberra office costs of the project 'People, Land Management and Environmental Change', and implementation of part of the work of the Papua New Guinea Cluster of PLEC; East Asian Trade Policy Strategies and the Asia Pacific Economic Cooperation Initiative
UNESCO: Endangered Languages Project; Koln Institute of the Arts dictionary project; Systematic study endangered languages of Indonesia; Study of the endangered language Mussau in the St Mathias Islands, Papua New Guinea .
UNDP: Deregulation of Foreign Exchange and Capital Transactions and Implications for Macroeconomic Management

3. UNIVERSITY OF EAST ANGLIA

History and Mandate
The University of East Anglia (UEA) was established by Royal Charter in 1963. Currently it has a student population of nearly 10,000 in 13 multidisciplinary schools of study. UEA is amongst the top twenty UK universities in research and advisory work. Founded in 1973, the School of Development Studies (DEV) at UEA, together with its research and advisory arm, the Overseas Development Group (ODG), is a leading institution for teaching and research in development studies in the United Kingdom. 30 members of Faculty, across three broad groupings in economics, social studies and natural science, provide a comprehensive programme of undergraduate and postgraduate tuition and training.

Funding
For the fiscal year 1995-6 the budget of the University was approximately US$136 million.

The Overseas Development Group
Within the School (DEV), the Overseas Development Group (ODG) is a charitable company, wholly owned by UEA, which handles consultancy and research work undertaken by members of faculty of DEV. Since its foundation in 1967, ODG has completed over 600 assignments in more than 70 countries. It has undertaken projects across the broad range of development topics for national and

Personnel

Personnel include 30 scientific research staff, 90 technical support staff, and 360 non-science support staff.

Funded projects

Over the past several years, the NYBG has conducted numerous projects with national donors (e.g., Rockefeller Foundation, Ford Foundation, John D. and Catherine T. MacArthur Foundation, the Tinker Foundation, Inc., USAID, etc.) and with national government bodies (e.g., national academies of science, national park services, state-run universities and research institutes, etc.). UN activities centre around those of Dr. Christine Padoch, Senior Curator in the NYBG's Institute of Economic Botany, who has been closely involved with the UNU PLEC (People, Land Management, and Environmental Change) programme since 1993. Dr Padoch and several other NYBG curators took an active role in the writing of the Global Biodiversity Assessment (UNEP).

In-country Institutions

1. THE UNIVERSITY OF GHANA

History and Mandate

Ghana's premier and largest university, was created in 1961 from the University College of the Gold Coast (now Ghana) established in 1948 to train local professionals through a liberal arts oriented programme under supervision of the University of London. Since then, the University has placed increasing emphasis on science-oriented teaching and research. The institution comprises 5 Faculties (Agriculture, Arts, Law, Science and Social Science), 5 Institutes, 4 Schools, over 40 Departments, and various other teaching and research units, involving 8,500 undergraduate and postgraduate students.

The 1992 Strategic Plan's vision of the University by the year 2000 and beyond, is 'a centre of excellence in research, teaching and delivery of extension services and a world-class institution of higher learning [having a] a unique appeal to students and scholars world-wide in search of Africa's creative and innovative approach to scholarship'. Research work is increasingly development-oriented and carried out on an interdisciplinary and consultancy basis. The focus is on science and technology, food security, human health, population dynamics, natural resources conservation, environmental management, and outreach activities.

Funding

The budget was over US$7 million in 1997. Major donors include the World Bank, USAID, DANIDA, ADB (African Development Bank) and VALCO (Volta Aluminium Co.).

Personnel

There are 640 academic staff and 2,625 support staff.

Project Experience

UN institutions with which the University is conducting projects include UNU/Institute for Natural Resources in Africa (INRA), UN RIPS (Regional Institute of Population Studies) and UNU/PLEC, including a major involvement with UNU since 1993.

was re-organized to absorb the Agricultural Research, and the Veterinary Research Divisions of the Ministry of Agriculture. By 1991 KARI had been re-organized as the main agricultural research institute in the Republic of Kenya. KARI has the mandate for all agricultural research including crops, livestock, natural resources and environmental conservation.

KARI comprises Headquarters as the base for institutional research planning, management, financing and accounting, and research centres as the homes of research programmes. The day to day management of the Institute is the responsibility of the Director assisted by three Deputies and 9 Assistant Directors.

Personnel

In June 1997 KARI research staff includes 113 PhD graduates, 408 with Masters and 65 research staff with Bachelors. Including all technical, logistic and management support staff, KARI has currently 5,337 personnel.

Funding and Project Experience

KARI as an institution is funded by the GoK and several donors including the World Bank, the Government of the Netherlands, Department For International Development (DFID, formerly ODA) of the United Kingdom, the USAID, ACIAR, SIDA, Rockefeller Foundation, UNDP, CIDA, GTZ and JICA, to conduct its research and undertake planned development. The second phase of the National Agricultural Research Programme, being implemented by KARI, has funding of over US$190 million, donors providing about US$109.6 million while GoK contributes US$80.8 million. Through Dr Kiome as Cluster leader, KARI has supported the work of UNU-PLEC since 1993.

4. UKIRIGURU AGRICULTURAL RESEARCH INSTITUTE, TANZANIA

History and Mandate

Ukiriguru Research Station, the oldest in Tanzania, was opened in 1930 by the Native Authority of Mwanza as a seed farm. In 1932 it was acquired by the government and established as an experimental farm, with 2 agricultural officers. Formal training of junior staff was introduced. Cotton research was taken over by the Cotton Research Corporation in 1939. Cotton breeding and agronomy of food and pasture crops expanded. In 1969 with reorganization of research and training services Ukiriguru, known then as the Western Research Centre, became an Agricultural and Training Institute (UARTI). This reorganization included change from expatriate to local administration. In 1974 research and training became independent administrations. The Institute has the mandate to conduct research for the major crops in the Lake zone, soil and water management, agricultural economics, agroforestry, crop protection and post-harvest technology. Research is targeted to different farming systems zones and farmer categories.

Personnel

At the Ukiriguru research centre there are 23 research staff, 8 technical staff and 7 support staff, and at the Lake zone centre there are 33 research staff, 12 technical and 12 support staff.

Funding

The recurrent budget for 1997/98 is approximately $US6 million.

agencies. Currently, CAS/KM administers all institutions of CAS in southwest China including the Kunming Institute of Botany (KIB), the Kunming Institute of Zoology (KIZ), the Guiyang Institute of Geochemistry (GIG), the Xishuangbanna Tropical Botanic Garden, Guiling Botanic Garden, the Yunnan Observatory of Astronomy, Centre for Resource, Environment and Development (CRED) and Centre for Biodiversity Research and Conservation.

Personnel

CAS/KM currently has 1,870 staff. Among the research fellows of the Kunming Branch, there are 1 academician of the CAS, and 218 senior researchers (professors and associate professors). There are 14 advisers with the authority to offer PhD degree study and 84 the Master of sciences degree study.

Funding

The budget of CAS/KM was US$601 million in 1996. Of this, US$112 million were special grants and US$165 million were an operational budget from CAS. US$191 million were cooperation project grants and the balance comprised project grants from various organizations.

Project Experience

The Kunming Branch has established scientific relationships and cooperation with more than 30 countries and regions such as the United States, Britain, Japan, Germany, Australia. The institutes have received nearly 50 cooperative research projects, which are financially supported by the corresponding international organizations. CAS/KM also cooperates with UN organizations and collaborates with Chiang Mai University, Thailand. The China Cluster of PLEC was formed in the Kunming Institute of Botany in 1993, with management moved to the Chinese Academy of Sciences, Kunming Branch, on the appointment of the Cluster leader, Mr Guo Huijun, as an Assistant President of the Academy in 1996.

7. National Research Institute, Papua New Guinea

History and Mandate

The National Research Institute (NRI) was established in 1987, by reorganization of the former Papua New Guinea Institute of Social and Economic Research (IASER). IASER, initially set up in 1963 as the New Guinea Research Unit of the Australian National University, was transferred to national control after Independence in 1975. It is now a semi-autonomous government research unit, reporting to the Minister of Finance and National Planning. NRI has a mandate to conduct research of national importance in the areas of social and economic development, education, political and legal studies, and cultural studies. Work is also undertaken in regional planning, and in the fields of conservation and sustainable development. NRI houses the PNG Centre of the Asia-Pacific Economic Cooperation Organization.

Personnel

There are 19 scientific staff, 16 technical staff, with six support staff.

Funding

The research budget of NRI is Kina 1.2 million (approximately US$ 900,000).

Project Experience

Cooperation with UN organizations has included work in the UNU Mountain Research Programme, the UNU Project on People, Land Management and Environmental Change, and a UNDP programme

ANNEX 4

IMPLEMENTATION AND OPERATIONAL PLAN

1. Implementation of the project will be by its Clusters, supported by its networking. The five Clusters and their organization are described in the draft Project Document and in Annex 1. Networking has two main elements, those of Management and of Scientific Coordination which will operate in close liaison, although largely separate in role and function. Scientific coordinators will have regional as well as topical division of responsibility (Annex 3a). On a year-by-year basis, Table 4.1 sets out a draft activity plan for project-wide activities, distinguishing those that are the responsibility of Management, and those of Scientific Coordination, and indicating areas in which both have a role.

2. Project-wide activities, and especially those of scientific coordination, need to be responsive to changing needs. Their purpose is to advance the objectives of the project, to harmonize methodology and progress between its geographically-separate parts, and ensure a high level of quality in project work. The draft activity plan for scientific coordination thus contains a number of 'provisional' elements included in order to facilitate the flexibility that is essential for success. Planning for management activities has less scope for flexibility, and most of its tasks can be scheduled fairly precisely.

3. The implementation plan at Cluster level is set out in tabular form in Table 4.2. Activities are here grouped according to the types of output to which they will lead, rather than according to objectives. This facilitates clearer presentation, and will also facilitate clearer terms of reference for practical use. Activities are presented in the form of draft terms of reference for annual contracts with Cluster leaders, less only the specific reporting requirements that are set out in Annex 5, Table 5.5. The table should be read in conjunction with the outputs column of Table 5.2, and the list of substantive reports in Table 5.6, both in Annex 5 (Monitoring and Evaluation Plan), and also in conjunction with Annex 6 (Stakeholder Involvement and Information Dissemination Plan).

4. The activities in and around the demonstration sites form one clear group of tasks, to be carried out in the field. Those to do with training, workshops and capacity building will be partly in the field and partly away from it. Those dealing with meetings, wider networking and formulation of policy recommendations will principally be away from the field.

5. The interrelation needed between implementation at Cluster level, and whole-project level, will be achieved partly through the Management Group, and partly by the work of the scientific coordinators and advisers. The main input of the scientific advisers to be contracted on limited-term PSA contract is expected to be in the first two and a half project years.

6. The Monitoring and Evaluation Plan (Annex 5) follows directly from this presentation.

Year 2 (1999)

MANAGEMENT	SCIENTIFIC COORDINATORS AND ADVISERS
1. Draw up Year 2 contracts for Clusters [programme administrative officer in collaboration with managing coordinator and with advice from scientific coordinators]	1. Continue 1998 Activities 1, 2 and 3 as necessary
2. Continue monitoring of Cluster progress [senior academic officer, managing coordinator]	2. Monitor the progress of each Cluster by coordination visits, including discussion with national officials [scientific coordinators]
3. If necessary, the senior academic officer, managing coordinator and scientific coordinators may meet about half-way through the year to evaluate progress, discuss any problems, and plan corrective action [any of senior academic officer, managing coordinator, scientific coordinators to initiate]	3. If necessary, the senior academic officer, managing coordinator and scientific coordinators may meet about half-way through the year to evaluate progress, discuss any problems, and plan corrective action [any of senior academic officer, managing coordinator, scientific coordinators to initiate]
4. Ensure that Cluster half-yearly and year-end reports are furnished. Closely follow up any Clusters that lag in progress, financial or substantive reporting [managing coordinator]	4. Continue publishing the project periodical (2 issues) [Canberra office]
5. Edit revised database information provided by Clusters, and make this widely available [Tokyo office via managing coordinator]	5. Continue library assistance service to Clusters [Canberra office]
6. Review the budget and make proposals for changes in allocation of the 2000 and 2001 budgets to UNEP, for the GEF Secretariat and the mid-term reviewer [programme administrative officer, managing coordinator, scientific coordinators, senior academic officer]	6. Advise the managing coordinator, programme administrative officer and senior academic officer on proposed changes to budget allocations in 2000 and 2001, and document reasons [scientific coordinators]
7. Hold a further project general meeting late in the year, and collaborate with UNEP to associate with this a mid-term review of progress by an appointed STAP consultant or consultants [managing coordinator]	7. On the initiative of regionally-responsible scientific coordinators, in collaboration with Cluster leaders, and with assistance from the managing coordinator, arrange any regional meetings desired (in African, Asia-Pacific, American regions) involving PLEC and collaborating groups and projects, stakeholders and decision-makers [scientific coordinators, assisted by managing coordinator]
8. Provide information to the reviewers as required [managing coordinator]	
9. Assemble mid-term accounts for audit [programme administrative officer]	

Year 4 (2001)

MANAGEMENT	SCIENTIFIC COORDINATORS AND ADVISERS
1. Draw up Year 4 contracts for Clusters [programme administrative officer in collaboration with managing coordinator and with advice from scientific coordinators]	1. Continue monitoring of Cluster achievements through coordination visits [scientific coordinators]
2. Assist Clusters to set up and hold regional meetings to present their results and recommendations, and receive feedback [managing coordinator to assist scientific coordinators]	2. Assist Clusters to set up and hold regional meetings involving PLEC and collaborating groups and projects, stakeholders and decision-makers, to present their results and recommendations, and receive feedback [scientific coordinators, assisted by managing coordinator]
3. Assemble reports and recommendations from Clusters [managing coordinator]	3. Assemble reports and recommendations from Clusters. Coordination visits to Clusters to discuss these reports [scientific coordinators, managing coordinator]
4. Hold a further meeting of the Advisory Group if desired, to assist with final reporting and outreach of project results and impacts [senior academic officer, managing coordinator]	4. Assist Clusters to arrange for continuation of monitoring at demonstration sites, and continuation of field trials beyond the life of the project [scientific coordinators, managing coordinator]
5. Ensure that Cluster half-yearly and year-end reports are furnished. Closely follow up any Clusters that lag in progress, financial or substantive reporting [managing coordinator]	5. Collate and edit a final report, as the basis for an end-of-project evaluation [scientific coordinators and managing coordinator]
6. Hold a final general meeting at which advice and feedback will be integrated into a final set of recommendations [managing and scientific coordinators, Cluster leaders]	6. Continue library assistance service to Clusters [Canberra office]
7. In conjunction with the final general meeting, hold a fourth meeting of the full Management Group to evaluate results, and review plans for post-GEF work [managing coordinator]	7. Assist with editing of final specialized reports [scientific coordinators, desk consultants]
8. Assemble final accounts for audit [programme administrative officer]	8. Continue publishing the project periodical (2 final issues) [Canberra office]
9. Provide information as required to the evaluation group [managers, scientific coordinators, Cluster leaders]	9. Assemble and publish a single integrated book to report on the project to a wide audience. Use also other means of information dissemination [scientific coordinators, Tokyo office via senior academic officer]
10. Assemble and publish a single integrated book to report on the project to a wide audience. Use also other means of information dissemination [scientific coordinators, Tokyo office via senior academic officer]	

Demonstration sites and areas (Outputs 1 and 2, 'Tested models', 'data on biodiversity' etc.)	Training activities and workshops (Output 5, 'networks', 'capacity building' etc.)	Meetings, networking and policy (Outputs 3 and 4, 'Policy recommendations', 'information exchange' etc.)
Year 3 (2000)		
3-1. Integrate scientific and community social and resource information (REPORT 6)	3-5. Continue and develop training programmes	3-7. Drawing on 3-2 and 3-3, outline technical and policy recommendations, and discuss with relevant policy-makers
3-2. With farmers, continue measurement and experimental work, and evaluate preliminary results (REPORT 7)	3-6. Hold workshops at demonstration sites reporting activities 3-1 and 3-2 to farmers and other stakeholders; include decision-makers in at least some workshops	3-8. End of year general Cluster meeting to review progress and plan Year 4 (2001) activities
3-3. Analyse findings across sites, and develop initial policies and approaches for discussion with decision-makers		
3-4. Using both GIS and field methods, investigate potential sites for replication of demonstration site agrotechnology		
Year 4 (2001)		
4-1. Conclude measurement and experimental work and present results (REPORT 8); with farmers and agricultural officers, arrange for continuation beyond life of project	4-2. Hold enlarged workshops, including decision-makers, at demonstration sites to sustain the PLEC approach beyond project life	4-4. Complete technical and policy recommendations and present to policy-makers (REPORT 9)
	4-3. Continue training programmes, ensure continuation beyond project life. Report on training programmes (REPORT 11)	4-5. Report on extrapolation possibilities, and include review in 4-6 (REPORT 10)
		4-6. Hold West African regional meeting to review results and recommendations
		4-7. Contribute to PLEC-wide Year 4 (2001) reporting and activities (REPORT 12)

Demonstration sites and areas (Outputs 1 and 2, 'Tested models', 'data on biodiversity' etc.)	**Training activities and workshops** (Output 5, 'networks', 'capacity building' etc.)	**Meetings, networking and policy** (Outputs 3 and 4, 'Policy recommendations', 'information exchange' etc.)
Year 3 (2000)		
3-1. Integrate scientific and community social information (REPORT 6) 3-2. With farmers, continue measurement and experimental work, and evaluate preliminary results (REPORT 7) 3-3. Analyse findings across sites, and develop initial policies and approaches 3-4. Using both GIS and field methods, investigate potential sites for replication of demonstration site agrotechnology	3-5. Hold workshops at demonstration sites reporting activities 3-1 and 3-2 to farmers and other stakeholders; include decision-makers in at least some workshops 3-6. Continue training programmes with participating universities	3-7. Drawing on 3.2 and 3-3, outline technical and policy recommendations and discuss with relevant policy-makers 3-8. End of year general Cluster meeting to review progress and plan Year 4 (2001) activities
Year 4 (2001)		
4-1. Conclude measurement and experimental work and present results (REPORT 8). With farmers and agricultural officers, arrange for continuation beyond life of project	4-2. Hold enlarged workshops, including decision-makers, at demonstration sites to sustain the PLEC approach beyond project life 4-3. Continue training programmes and ensure continuation beyond project life. Report on training programmes (REPORT 11)	4-4. Complete technical and policy recommendations and present to policy-makers (REPORT 9) 4-5. Report on extrapolation possibilities, and include review in 4-6 (REPORT 10) 4-6. Hold East African regional meeting to review results and recommendations 4-7. Contribute to PLEC-wide Year 4 (2001) reporting and activities (REPORT 12)

Demonstration sites and areas (Outputs 1 and 2, 'Tested models', 'data on biodiversity' etc.)	Training activities and workshops (Output 5, 'networks', 'capacity building' etc.)	Meetings, networking and policy (Outputs 3 and 4, 'Policy recommendations', 'information exchange' etc.)
Year 3 (2000)		
3-1. Integrate scientific and community social and resource information (REPORT 6) 3-2. With farmers, continue measurement and evaluate preliminary results (REPORT 7) 3-3. Analyse findings across sites and develop initial policies and approaches 3-4. Using both GIS and field methods, investigate potential sites for replication of demonstration site agrotechnology	3-5. Continue training programmes as in 1-7 and 1-8 3-6. Hold workshops in each demonstration site reporting progress to farmers and other stakeholders; include decision-makers in at least some workshops	3-7. Drawing on 3-2 and 3-3, outline technical and policy recommendations and discuss with relevant policy-makers 3-8. End of year general Cluster meeting to review progress and plan Year 4 (2001) activities
ear 4 (2001)		
4-1. Conclude measurement and experimental work and present results (REPORT 8). With farmers and agricultural or provincial authorities, arrange for continuation beyond project life	4-2. Hold enlarged workshops, including decision-makers, at demonstration sites to sustain the PLEC approach beyond project life 4-3. Continue training programmes and ensure continuation beyond project life. Report on training programmes (REPORT 11)	4-4. Complete technical and policy recommendations and present to decision-makers (REPORT 9) 4-5. Report on extrapolation possibilities, and include in review in 4-6 (REPORT 10) 4-6. Hold a montane mainland Southeast Asia regional meeting to review results and recommendations 4-7. Contribute to PLEC-wide Year 4 (2001) reporting and activities (REPORT 12)

Demonstration sites and areas (Outputs 1 and 2, 'Tested models', 'data on biodiversity' etc.)	Training activities and workshops (Output 5, 'networks', 'capacity building' etc.)	Meetings, networking and policy (Outputs 3 and 4, 'Policy recommendations', 'information exchange' etc.)
Year 3 (2000)		
3-1. Integrate scientific and community social and resource information (REPORT 6)	3-5. Continue training programmes initiated in 1-7 and 1-8	3-7. Drawing on 3-2 and 3-3, outline technical and policy recommendations and discuss with relevant policy-makers
3-2. With farmers, continue measurement and experimental work, and evaluate preliminary results (REPORT 7)	3-6. Hold workshops at demonstration sites reporting on activities 3-1 and 3-2 to farmers and other stakeholders; include decision-makers in at least some workshops	3-8. End of year general Cluster meeting to review progress and plan Year 4 (2001) activities
3-3. Analyse findings across sites and develop initial policies and approaches		
3.4. Using both GIS and field methods, investigate potential sites for replication of demonstration site agrotechnology		
Year 4 (2001)		
4-1. Conclude measurement and experimental work and present results (REPORT 8). With farmers, NARI staff and agricultural officers, arrange for continuation beyond life of project	4-2. Hold enlarged workshops, including decision-makers, at demonstration sites, to sustain the PLEC approach beyond project life	4-4. Complete technical and policy recommendations and present to policy-makers (REPORT 9)
	4-3. Continue training programmes and transfer the training of agricultural specialists to NARI, to ensure continuity beyond project life. Report on training programmes (REPORT 11)	4-5. Report on extrapolation possibilities, and include review in 4-6 (REPORT 10)
		4-6. Hold Melanesian regional meeting to review results and recommendations
		4-7. Contribute to PLEC-wide Year 4 (2001) reporting and activities (REPORT 12)

Demonstration sites and areas (Outputs 1 and 2, 'Tested models', 'data on biodiversity' etc.)	Training activities and workshops (Output 5, 'networks', 'capacity building' etc.)	Meetings, networking and policy (Outputs 3 and 4, 'Policy recommendations', 'information exchange' etc.)
Year 3 (2000)		
3-1. Integrate scientific and community social and resource information (REPORT 6)	3-5. Continue the training programmes under 1-6 and 1-7	**3-7.** Drawing on 3-2 and 3-3, outline technical and policy recommendations and discuss with relevant policy-makers
3-2. With farmers, continue measurement and experimental work, and evaluate preliminary results (REPORT 7)	3-6. Continue feedback discussions or workshops with farmers' organizations and other stakeholders to review progress and plans; include decision-makers in at least some workshops	**3-8.** End of year general Cluster meeting to review progress and plan Year 4 (2001) activities
3-3. Analyse findings across sites and develop initial policies and approaches		
3-4. Using both GIS and field methods, investigate potential sites for replication of demonstration site agrotechnology		
Year 4 (2001)		
4-1. Conclude measurement and experimental work and present results (REPORT 8). With farmers, local scientists and agricultural officers, arrange for continuation beyond life of project	4-2. Hold enlarged workshops, including decision-makers, at demonstration sites, to sustain the PLEC approach beyond project life	4-4. Complete technical and policy recommendations and present to decision-makers (REPORT 9)
	4-3. Continue training programmes and make arrangement with collaborating institutions to ensure continuity beyond project life. Report on training programmes (REPORT 11)	4-5. Report on extrapolation possibilities, and include review in 4-6 (REPORT 10)
		4-6. Hold an Amazonian regional meeting to review results and recommendations
		4-7. Contribute to PLEC-wide Year 4 (2001) reporting and activities (REPORT 12)

ANNEX 5

MONITORING AND EVALUATION PLAN

OBJECTIVES

1. The objective of monitoring and evaluation is to assist all project participants in assessing project performance and impact, with a view to maximizing both. Monitoring is the continuous or periodic review and surveillance by management of the implementation of an activity to ensure that all required actions are proceeding according to plan. Evaluation is a process for determining systematically and objectively the relevance, efficiency, effectiveness and impact of the activities in light of their objectives. Ongoing evaluation is the analysis, during the implementation phase, of continuing relevance, efficiency and effectiveness and the present and likely future outputs, effects and impact.

2. The general and specific objectives of the project, and the list of its planned outputs, have provided the basis for this M&E plan. The specific project objectives are: (a) to establish historical and baseline comparative information on agrodiversity and biodiversity at the landscape level in representative diverse regions; (b) to develop participatory and sustainable models of biodiversity management based on farmers' technologies and knowledge within agricultural systems at community and landscape levels; and (c) to recommend policies for and approaches to sustainable agrodiversity management to key government decision makers, farmers and field practitioners.

3. The project will be evaluated on the basis of:

1. **Execution performance.** Monitoring will concentrate on the management and supervision of project activities, seeking to increase the efficiency and effectiveness of project implementation. It is a continuous process which will collect information about the execution of activities programmed in the annual workplan (Annex 4, Table 4.2), advise on improvements in method and performance, and compare accomplished with programme tasks. This activity will be the direct responsibility of the Managing Coordinator, under the supervision of the Senior Academic Officer, with advice from the Scientific Coordinators. See Table 5.1 for the execution performance indicators.

2. **Delivered outputs.** Ongoing evaluation will assess the project's success in producing each of the programmed outputs, both in quantity and quality. Internal assessment will be continuously provided by the Scientific Coordinators, and mid-term and final evaluation of outputs will be carried out by external consultants contracted by UNEP in consultation with UNU, and by consultants contracted by STAP. See Table 5.2 for a summary of expected outputs by project objectives, and Annex 4 for a detailed list of project activities and corresponding outputs on a Cluster-by-Cluster basis.

3. **Project impacts.** Impact evaluation will assess the project's success in achieving the third of its objectives (above). Monitored internally through reports and meetings, especially of the Management Group (MG), and by the project Advisory Group (AG), success will be evaluated at mid-term and at the end by external consultants contracted by UNEP in consultation with UNU. See Table 5.3 for a summary of the project impact indicators.

Table 5.2 Description and timing of expected outputs by project objectives
(SEE ALSO TABLES 4.2 AND 5.5; 'BEGUN' MEANS WORK COMMENCED DURING THE PREPARATORY PHASE)

Objectives and inputs	Outputs	Start	Finish	Outcomes
1. Historical and baseline information on agrodiversity and biodiversity Participatory inventory in and around each demonstration site area Scientific advisers and specialist training as required	Preliminary database	Begun	10/98	Data base assembled in Tokyo and available through computer network
	Report on biodiversity and agrodiversity inventory and on causes of resource degradation	Begun	8/99	Five Cluster reports available, and synthesis to be prepared
Plant identification and laboratory analysis; GIS Ongoing revision	Revised and completed database to accompany report	Begun	7/99	Tokyo database revised
2. Participatory and sustainable models of biodiversity management based on farmers' technologies Demonstration sites developed with farmers, and their management regimes anlaysed Social analysis of site populations Measurement, innovation and experimental work on farmers' land Coordinators, scientific advisers, specialist training as required Participation of stakeholders, officials Field analysis and GIS	Report on social analysis of populations	Begun	8/99	Five Cluster reports available, and synthesis to be prepared
	Report on comparison of management regimes across sites	Begun	10/99	Five Cluster reports available , and synthesis to be prepared
	Farmers develop new sustainable agrotechnologies	Begun	12/01	Successful demonstration sites available as examples for local and regional dissemination of information
	Report on integration of scientific and community social and resource information	Begun	4/00	Five Cluster reports available and synthesis to be prepared
	Report on evaluation of preliminary results from measurement and experimental work	Begun	6/00	Five Cluster reports available for workshop discussion with stakeholders, officials, practitioners and policy makers.
	Report on final results of project measurement and experimental work	7/00	6/01	Practitioners and policy makers agree to use results and continue work beyond project life. Five Cluster reports available and synthesis to be prepared
	Report on potential sites for replication of demonstrated agrotechnology	7/00	9/01	Reports available for stakeholders, officials and decision-makers, and for discussion at regional meetings

Table 5.3 Indicators of project impact

(SEE ALSO ANNEX 6)

Indicators of improved knowledge

1 Systematic data collection and observation, according to project methodology, are effectively done.
2 Regular reviews are made of the adequacy of the measurement and experimental methods, and the data sets used, and appropriate actions are taken to improve the design of data collection and presentation.
3 Useful project information, especially on agrodiversity, biodiversity and comparative management methods, are included in global databases.
4 The technical soundness of reported and synthesized results is confirmed in independent reviews.

Indicators of capacity building

1 The number of students and practitioners-in-training skilled in PLEC methods increases year by year in all Clusters.
2 The responsibility of junior participants, and the quantity and quality of their reported work, is enhanced year-by-year in all Clusters.
3 Participating farmers adopt effective management strategies, and spontaneously experiment with appropriate agrotechnological methods.
4 Technical results, reports on models and experiments are used in national agricultural and environmental decision-making.
5 Researchers, policy-makers and other stakeholders are able to access all relevant technical information, methodologies and data in a useful format.
6 Specific training courses and workshops are successfully completed in collaborating institutions.

Indicators of stakeholder involvement

1 Governments and their institutions, farmers' groups, NGOs and other stakeholders are involved in the development of demonstration sites and in the conduct of the work.
2 National and regional resources are allocated or leveraged to support and continue PLEC activities.
3 Interest is generated in other countries in the development of work along the lines of PLEC.

Indicators of project continuity/sustainability

1 PLEC methodology and objectives continue to be followed by Cluster participants beyond the conclusion of the project.
2 Each Cluster has plans for the continuation of its activities, in collaboration with national authorities and other stakeholders, beyond the end of the project.
3 The technical and policy recommendations of PLEC are integrated into national development and conservation planning processes.
4 Appropriate sources of funding are identified for the continuation of PLEC work.

Table 5.5 Monitoring and evaluation reports

Report	Format and Content	Timing	Responsibility
Activity and Progress Reports	(Reports will use a standard format to be developed following the UNEP Progress Report model)		
Document the completion of planned activities, and describe progress in relation to the annual operating plan Review any problems or decisions with an impact on performance Provide adequate substantive data on methods and outcomes for inclusion in consolidated project half-yearly and annual progress reports	Person reporting and Date **Activity name and accomplishments** within each activity this half-year Targets for the next half-year Comment on performance, progress toward project goals, and problems/constraints Report on any unanticipated results and opportunities, and on any checks to project progress Any highlights	Half-yearly	Cluster leaders, to Managing Coordinator for **use as described in Table** 5.4
The Project Implementation Review (PIR) reports		Yearly	UNEP-GEF Coordination Office to GEF Secretariat
Scientific Coordinators' Half-yearly Reports	(No standardized format)		
	Person reporting and date Activities during the period Comment on progress within the Cluster areas for which the Scientific Coordinators have special responsibility Distinguish any comments 'in confidence' that should not be included in reports forwarded to MG or in consolidated reports	Half-yearly	Scientific Coordinators, to Managing Coordinator for use as described in Table 5.4
Consolidated Half-yearly Progress Reports	(Reports will use a standard format to be developed following the UNEP Progress Report model)		
Provide a summary of half-yearly reports of progress, for UNEP monitoring and transmission	Summary of Cluster and Scientific Coordinators' reports Report on progress in each project activity, within each Cluster and in the project as a whole Activities of scientific advisers and specialized training programmes Summary of problems and proposed action Highlights	Half-yearly, within 30 days of end of each reporting period, but not required where a Consolidated Annual Summary Report is due	Senior Academic Officer **and Managing Coordinator** with input from Scientific Coordinators, for forwarding to UNEP and AG

Table 5.6 Principal Reports by title, number, timing and responsibility

Report, number and title	Format and Content	Expected date	Responsibility
Reports on particular aspects as listed in the workplan, Table 4.2	Content will follow guidelines provided by UNU-COORD. There will be no standardized format.	Periodic. Expected dates as below	Cluster leaders to Managing Coordinator (Consolidated project-wide reports by the scientific coordinators will follow certain reports, for forwarding to UNEP and AG, with dates approximately four months after Cluster dates)
1. Bio/agrodiversity database	As above	October 1998	As above
2. Biodiversity and agrodiversity inventory, with review of causes of land degradation	As above	July 1999	As above
3. Social analysis of demonstration site populations	As above	August 1999	As above
4. Comparative information on management regimes at demonstration sites with revisions to database	As above	October 1999	As above
5. Mid-term report on training programmes	Summary of outcomes and progress, with plans for the balance of the project period	November 1999	As above
6. Integration of scientific with community information on resources	Content to follow guidelines provided by UNU-COORD	April 2000	As above
7. Preliminary results from measurement and experimental programmes	As above	June 2000	As above
8. Final results of measurement and experimental programme	As above	June 2001	As above
9. Technical and policy recommendations	As above	June 2001	As above
10. Potential sites for replication of demonstrated agrotechnology	As above	September 2001	As above
11. Final report on training programmes	Detailed statement on output of training programmes	November 2001	As above
12. Final Cluster reports	Summary of Cluster results and achievements	November 2001	As above
13. Final Project report	Summary and internal evaluation of project results and achievements	Within 4 months of end of project	Senior Academic Officer, Scientific Coordinators

ANNEX 6

STAKEHOLDER INVOLVEMENT AND INFORMATION DISSEMINATION PLAN

ANNEX 6a: STAKEHOLDER INVOLVEMENT

INVOLVEMENT AT THE PRESENT TIME

1. In each Cluster region stakeholders have been involved in the development of PLEC from the outset. The initial stakeholders are the in-country institutions in which PLEC participants are employed; they have been intimately involved in the development of the project over several years, and offer significant in-kind contributions. There was early participation by government agencies, especially in Ministries of Agriculture, Forestry and the Environment. Stakeholder involvement at the more local level has evolved in line with progress toward the setting up of demonstration sites. It is therefore greater in those Clusters in which demonstration sites are already in operation, than in Clusters where demonstration sites are still at the planning stage.

STAKEHOLDERS AT THE NATIONAL LEVEL

2. At national level, present stakeholder involvement in each Cluster is as follows:

West Africa. The Cluster (the largest in PLEC) includes staff from three universities, the University of Ghana, the University of Science and Technology, and the University of Development Studies. In **Ghana**, officials from three Ministries are involved in its work, those of Environment, Agriculture and Forestry. The Cluster also works with members of Centres of the Council for Industrial and Scientific Research (e.g. the Savanna Research Institute), and with NGOs, especially the Ghana Rural Reconstruction Movement (which has participated in Cluster work from the outset), and the Ghana Association for the Conservation of Nature. The Cluster is increasingly involved in national land-development activities. Examples of widening involvement include the association of the PLEC West Africa Cluster as a whole with the Volta River Authority. In **Guinea**, stakeholders at national level include the Direction Nationale de l'Environnement and the Direction Nationale de l'Agriculture, de l'Elevage, des Forêts et des Faunes.

East Africa. The Cluster as a whole is based on the **Kenya** Agricultural Research Institute which, while primarily having a national mandate, is also the remaining core of the former East African Agricultural and Forestry Research Organization. With regional cooperation now growing, KARI is a key stakeholder for the region and will be influential in guiding agricultural recommendations across national boundaries. PLEC's links in KARI are through its directorate in soil and water management, which is the main GoK recipient of externally-funded support to conservation. In Kenya, the other main participant is the University of Nairobi, the premier higher-education institution with particularly important functions in agriculture and environment. In **Tanzania**, work is based at Ukuriguru Agricultural Research Station, Mwanza, which has a long history of involvement in agriculture and environmental change in the so-called 'cultivation steppe' south of Lake Victoria. It is projected to become the primary focal point for advice to national Government on sustainable agriculture in most of northern Tanzania. Through the sub-Cluster leader's programme direction, the National Soil Service at Tanga, Tanzania, has an important support role in PLEC work in Arameru. In addition, PLEC stakeholders centrally involved in the Tanzanian work include the University of Dar es Salaam (the main higher education institution), the Sokoine University of Agriculture, and the

stakeholders include the Direction Préfectorale del'Agriculture, Environment et de l'Elevage at Pita and Kouroussa, the Antenne Préfectorale du Génie Rural de Pita, marketing groups at Kollagui and Bantighel, and the Président du Comité de Gestion du Terroir de Kollagui. Also associated is the Pita branch of an NGO, the Asociation des Volontaires pour le Développement et Protection de l'Environnement. There is collaboration with local farmers at Kollagui in measurement of inputs into an intensive farming system employed on part of the land, and in determining understanding of environmental change.

East Africa. In **Kenya**, local contact with land users is strongest in Embu where, in conjunction with an associated KARI project on indigenous soil and water conservation, two PRAs have been undertaken involving 150 farmers and 9 researchers. >From these, 20 farmers (9 poor, 7 medium and 4 rich in the wealth-ranking exercise) are cooperating in keeping farm-based records of all activities related to conservation, especially biologically-based soil and weed management. Land users have also undertaken farmer-led evaluations of on-station trials. At the other potential demonstration site, local stakeholders are less well-developed but it is planned that the method used at Embu will be reproduced. In **Uganda**, following interaction with World Vision field workers at Kamwezi, a distinctive interaction with local stakeholders has been developed, where farmers have been encouraged to keep their own records, undertake measurements and evaluate results. Close local links have been fostered between the Uganda Soil Conservation and Agriculture Pilot Project (located near Lake Mburo), funded by SIDA, which, with the support of the Commissioner for Land Resources and Development, Ministry of Agriculture, Animal Industries and Fisheries (Entebbe) has requested PLEC's sub-Cluster leader to advise on soils, biodiversity and related matters. At the main PLEC site near Mbarara, the local branch of the Uganda National Farmers' Association and the District Development Committee have been intimately involved with surveys to date. Three local councils at Mwizi have declared a stakeholder interest. In **Tanzania** the site on the eastern slopes of Mt Meru in Arameru District has also had close local involvement. Up to 20 farmers in each village (Ngiresi/Oldadai, Baraa and Kiserian on the windward side; and Engorika/Olkokola and Lengijave on the leeward side) have undertaken PRAs. PLEC investigators, assisted by the locally-based Soil Conservation and Agroforestry Project in Arameru, have used group interviews, participatory mapping, time-line histories and transect walking with villagers. The local district councils and village development committees are fully involved.

China. At the first demonstration site at Hanlong community, Baihualing village, the core of a Farmers' Association for Biodiversity Conservation in Gaoligongshan was formed in 1995, and it is being enlarged as the main instrument for local stakeholder collaboration with PLEC. In January 1997 it has 87 members. Its activities include farmer training, biodiversity conservation education, organization of agroforestry experimentation, and establishment of a farmers' library. The Baoshan Nature Reserve Administrative Division, the local offices of the Forestry and Agriculture Departments, and the prefectural governments of Baoshan and Tencong have been closely involved, as also have the rural local authorities in the areas in which PLEC works. At its Hanlong demonstration site, PLEC has now run two courses, reaching 92 villagers, in conservationist rural development, biodiversity assessment and practical agroforestry technology. Textbooks have been edited for use in discussions with farmers. Both at Hanolong and in Baoshan, two training workshops have been held for 26 local officials in the prefectural agencies, the reserve administration, and village administration, covering the same range of topics. These activities are now being extended to a new area in Tencong prefecture, on the western side of the Gaoligong mountain range. In Xishuangbanna, parallel relationships are long-established from and through Xishuangbanna Tropical Botanic Garden, a branch of the Chinese Academy of Sciences/Kunming. Relationships, with the Xishuangbanna Nature Reserve Administrative Bureau, the Xishuangbanna Forestry Bureau, and the administrations of Mengla and Jinghong prefectures, will form the core of stakeholder involvement in Xishuangbanna.

Africa the participation of chiefs is everywhere important, while in Brazil the farmers' unions or syndicates are the focal points for local participation. With their sponsorship, PLEC has been instrumental in setting up more informal associations of farmers at village or community level. In Papua New Guinea there are few enduring local organizations. The local government councils are the main avenues through which to reach the more prominent rural people. In East Africa, the three PLEC countries have somewhat different rural local administrative and development structures, as well as local NGOs. In Tanzania, a complex hierarchical structure which organizes small groups of villagers has already been intimately involved, and links will continue to be fostered through the village development committees and the local political organization. In Uganda, local commodity associations and farmers' groups are important. In the demonstration site areas of Kenya, farmers are more independent, but the present trend toward their stakeholder involvement will be further developed. In China official involvement is of importance at all levels from the Province to the Administrative Village (an assemblage of two to as many as twenty 'natural' villages), but the PLEC initiative of setting up a farmers' association (in effect, a local NGO) has been successful and will be replicated elsewhere. Models for stakeholder involvement have to be adapted to these contrasted experiences.

agriculture, agroforestry and forestry techniques. In China, the local farmers' association has been employed in the way described in Annex 6a, paragraph 3 , to link farmers' own activities directly to PLEC and to other farmers. The purpose is to reach as many farmers as is possible, by using the more expert as principal collaborators and teachers, and thus to make possible the 'client-led participatory evaluations' of project work described in the work plan (Annex 4, Table 4.2). These models are being brought to the attention of all Clusters which are urged to develop variants suited to their own national and regional conditions. It is necessary to recognize that no one model is applicable in all regions.

PLANS FOR DISSEMINATION AT THE INTERNATIONAL LEVEL

7. Dissemination at the international level will combine a variety of media and meetings. The meetings of the Advisory Group will serve to disseminate PLEC work to the organizations involved and beyond. Similarly, the general and regional meetings of the project will be important for disseminating the progress in analytical and demonstration work, methodological development, and other issues throughout the project networks. The project participants will also continue to take part in scientific and professional meetings outside of the project framework where information about PLEC can be disseminated and interaction with other parties can be initiated.

8. At the heart of the dissemination effort is the project periodical, *PLEC News and Views*, which is produced about twice yearly by the project office at the Australian National University. The periodical contains news and information items on the project, as well as communications about methodological developments, progress reports, and discussion on issues related to PLEC work.. It features short articles by project members. *PLEC News and Views* will be distributed to all project participants, including members of the Advisory Group, and other key contact groups. *PLEC News and Views* already reaches a readership about four times the size of PLEC's own participating membership, and requests to be added to the mailing list are constantly received.

9. Publications by project participants through scientific and professional journals is encouraged and several articles and a special issue of the journal, *Global Environmental Change: Human and Policy Dimensions*, have already appeared. The United Nations University Press will form the principal publishing venue for books, reports and proceedings emanating from PLEC work and meetings.

10. With the ever extending frontier of electronic communications and the Internet, it is expected that the extensive use of these technologies will provide PLEC with the widest outreach into the international community. Possible dissemination formats include publishing in summary form on the World Wide Web (WWW), automatic e-mail list service (listserve), virtual WWW and listserve conferencing, and remote database access. These technologies would be tied together through the WWW, where a PLEC 'home-page' will be established and maintained from UNU in Tokyo. This will be linked to the PLEC database, where Cluster members, project administrators, and the cyber public will be able to exchange ideas and retrieve information on such areas as project news, activity updates, project descriptions, contact information, publications, and project data. The virtual conferencing feature would provide anybody with WWW or e-mail access, a means of obtaining the opinions and suggestions of PLEC members on areas which concern PLEC. Any subsequent changes could be forwarded to e-mail subscribers, providing those with no WWW access the same level of information as those who do have access. All this will be managed from UNU in Tokyo.

11. It is anticipated that the project work will also be disseminated through videos that will be produced by project participants themselves, assisted by UNU dissemination personnel. These videos may be of more general nature, or focus on specific topics and issues. They will serve the project

ANNEX 7
RELATIONSHIPS WITH EXISTING PROJECTS AND PROGRAMMES

NATIONAL AND REGIONAL PROJECTS AND PROGRAMMES

1. Each PLEC Cluster has working relationships with national and regional projects and programmes, whether as groups or by the involvement of individual members. In some cases this involvement meshes into international programmes, where PLEC members are involved as local participants. The following selection of information illustrates the linkages which already exist, and which are constantly growing larger. There is overlap here with stakeholder involvement, since certain of these national projects and programmes become stakeholders in PLEC.

WEST AFRICA

2. The Cluster in Ghana is involved as a whole with the the Volta River Authority in an environmental impact study aimed at mitigating problems associated with the damming of the Volta river. Significant work has already been done, and reports have appeared. One member of the group is involved in a current UNESCO Man and the Biosphere biodiversity and biosphere reserve project. UNFPA supports 'Family and Development Project' managed by another Cluster member, and a 'Ghana Population Agenda' project managed by a third. The latter also directs a 'Population Impact Project' in collaboration with Futures Group International, Washington DC, funded by USAID. A fourth member of the Cluster directs a remote-sensing applications unit, operating under the Ghana Environmental Resource Management Project of the Environmental Protection Agency of the Ministry of Environment, Science and Technology, funded by the governments of Ghana and Denmark, and IDA of the World Bank. The World Bank also supports soil science work by a fifth Cluster member under a 'Pineapple Research Project' within the National Agricultural Research Project of the Council for Scientific and Industrial Research.. The Cluster principals have been involved as collaborators in a two-year three-country project of the Institute of Development Studies at Brighton, England, on 'Environmental Entitlements, the Institutional Dynamics of Environmental Change', funded by the UK Economic and Social Research Council. A junior member of the Cluster was seconded to undertake the Ghana field work of this latter project.

EAST AFRICA

3. The Cluster leader, as Deputy Director (Soil and Water Research) at KARI, has responsibility for many externally-funded projects including core World Bank funding to KARI/HQ, the ICRISAT/UNEP 'Desert Margins Programme', European Union support to drylands research and the multiple-funded 'East African Highlands Initiative'. He is directly involved in two DFID projects based at Embu (one of the PLEC demonstration site areas): the 'Drylands Agricultural Research and Extension Project' (DAREP); and an East Africa-wide programme on investigating the performance and rationality of indigenous methods of soil and water conservation by small farmers. Cluster members at the University of Nairobi are also core staff in a WMO project on agro-climatology, and UNFPA/UNESCO projects on demographic change. ICRAF scientists, based in Nairobi, have interacted with PLEC members in all three East African countries. Members of the sub-Cluster in Uganda are involved in the 'Trees and People Programme' of the Community Forestry Unit of FAO, in the African Land Management network of IBSRAM, the Uganda Soil Conservation and Agroforestry pilot project of SIDA, with the Natural Resources Systems Programme of DFID, and an IUCN project on biodiversity conservation on Mt Elgon. Nationally, there is involvement with National Environmental Management Authority, setting up environmental management committees at local level (one of which will be in the first demonstration site area), with the Southwestern Uganda Agricultural Rehabilitation Project, and with the national arms of ACCORD and CARE. In Tanzania, the sub-Clusrter

conservation and development project implemented by an international disciplinary team in Rio Capim, Pará, funded by USAID and Woods Hole Institute. Cluster members are also involved in a WCS, DFID, CNPq project in conservation of the Mamiraua area of the upper Amazon; in a WWF-supported project of the National Council of Rubber Tappers, on extractive reserves in the Rio Cajari reserve (Plano de Manejo e Desenvolvimento Sustenable da Reservas Extractivas de Maracá); in Projeto Communidades, focusing on providing geographical and biological information to villages along the Tapajós river, in which PLEC members give advice on mapping and natural-resource inventory techniques. PLEC members advise Projeto Control de Fogo, a research and extension project funded by USAID and implemented by a team of Brazilian researchers in the south of Pará, and Projeto de Promocão de Sistemas e Técnicas Tradicionales Agrícolas e Agroflorestal in Zona Bragantina, Pará. They also provide advice to three projects in Peru, on Estudios Socio-bilológicos para Propuestas de Manejo y Desarollo Sustenable de la Reserva Pacaya-Samiria; on Estudio de Sistemas y Técnicas Agrícolas, Agroflorestales y de Manejo Florestal de Zonas Inundables in the region of Iquitos; and on Estudio de Lagos de Reserva y Su Importancia en la Conservacion de Recursos Pesqueros en la Amazonia Peruana. Other projects with which members of the Cluster have association include: Amazon Restoration (funded by USAID); Fire in Amazonia (CESE); Advocacy on sustainable land in the Amazon (Ford Foundation). The Lake Management Project and Participatory Strategic Planning in Santarém is funded by WWF/UK as well as UNU/PLEC.

INTERNATIONAL PROJECTS AND PROGRAMMES

7. The Cluster-level associations with international programmes, described above, link into certain project-wide associations. Among the oldest of these is association with IBSRAM, for which several members of PLEC have undertaken tasks both in the field and in the office, so that there is mutual awareness of activities and approaches in distinct areas. This is similar to relations with the Alternatives to Slash and Burn Project of ICRAF (ICRAF/ASB). Both in Africa and Asia the working sites of ICRAF/ASB are quite separate from those of PLEC, but each party keeps the other informed. At one ICRAF meeting in Indonesia, the PLEC principal scientific coordinator was invited to give the keynote paper. PLEC as a whole has from 1992 had links with the 'South-South Cooperation Programme' of UNESCO, UNU and the Third World Academy of Sciences, and four joint meetings have been held. All three of PLEC's scientific coordinators have had personal involvement in international projects, some of them described in the institutional Annex 2c, and have presented PLEC at meetings held by these projects, including projects of DFID, FAO, CIFOR, UNEP and the British Council. Two scientific coordinators have evaluated GEF biodiversity projects for UNEP and UNDP. One scientific coordinator is a member of a team appointed by the World Bank to evaluate CIFOR in December-March 1997-98.

8. Particular areas of thematic overlap (but usually geographic complementarity) between PLEC and other projects include drylands research and rehabilitation (ICRISAT/UNEP 'Desert Margins Programme', ICARDA/UNDP 'Fertile Crescent' project; DFID's 'Renewable Natural Resources Research Strategy', WWF's 'Biodiversity Conservation and Participatory Management' projects at a number of sites funded by the Dutch Directorate General of International Cooperation; IIED's 'Sustainable Agriculture Programme'; ILEIA's general programme on ecologically-sound agriculture.

9. There are several projects of the Food and Agriculture Organization of the United Nations (FAO) which have potential links to PLEC, and these linkages are now being explored. One such is the 'Farmer-centred Agricultural Resource Management Programme', jointly with UNDP and UNIDO. This programme works in seven Asian countries, all sites complementary to PLEC work, and includes demonstration sites in farmers' fields. There are other relevant projects in the Soil Resources,

ANNEX 7

THE DEMONSTRATION SITES

ANNEX 7a: DEMONSTRATION SITES AND THEIR ECOSYSTEM CONTEXTS

GENERAL

1. Information on the demonstration sites and their biodiversity significance has been provided by the Clusters, and is lightly edited only. All the PLEC demonstration sites are in areas used by farmers; some have substantial areas of natural biodiversity nearby, and in some instances these are declared protected areas. In others, there is no large nearby area of natural forest. All the sites exhibit crop-plant biodiversity, a central element in agrodiversity, in a high degree. Biodiversity significance of sites is described in Annex 7b.

WEST AFRICA

ECOSYSTEM CONTEXT

2. The modern distribution of forest, savanna and Sahel vegetation zones in West Africa is greatly influenced by changing human impact over a long historical period. Within a larger region of some 200 million people, the Cluster concentrates its work in two countries, Ghana and Guinea; especially in the forest-savanna transition zone, and in the savanna, including the montane savanna of the Fouta Djallon Plateau in Guinea. Even in the historical period, there has been great dynamism in the status of soil and vegetation in these regions, and commercialization of the economy ranges from very small to almost complete in different parts of the two areas. Although relief exceeds 1,500 m, all areas are geologically old and deeply weathered. However, the quality of the soils varies as much as in most other parts of the tropics. Over large areas the forest has been cleared, and remnants are mostly sacred sites or groves, most of which are important for the conservation of rare plant and animal species.

ESTABLISHED AND OPERATIONAL DEMONSTRATION SITES

Gyamfiase-Adenya (southeastern Ghana)

3. Two adjacent villages, with a combined population of 850, are within a 100 km^2 region of 16,000 Akuapem and tenant people, living in a relatively dry area of semi-deciduous forest-savanna transition, about 70 km northeast of Accra. Settled since the 18th century, this became a cocoa-growing area around 1900, then a food-crop area from 1940 onward. Severe degradation of both vegetation and soil is now evident, especially in tenant-farmed areas. At Gyamfiase is a conserved grove of closed-canopy forest with continued practice of traditional agroforestry in its vicinity, now unique in the immediate region. Treating these as respectively core area and its buffer, a 'Collaborative Agroecosystems Management Project' aims to use traditional agroforestry to rehabilitate the peripheral area and then extend its results more widely. A management committee comprises the Chief of Gyamfiase as chair, headmen and senior women from Gyamfiase, Adenya and other nearby communities, and three tenant farmers.

Jachie (central Ghana)

4. A PLEC sub-group has been in existence at Kumasi since 1995. It moved quickly and spontaneously into outreach work. The focus has been on remaining sacred groves and the agriculture around them: soil erosion, drought and poverty are widespread. With high male absenteeism, most active farmers are women. At Jachie, southeast of Kumasi, a demonstration site has been set up to

EAST AFRICA

ECOSYSTEM CONTEXT

9. Groups in each of Uganda, Kenya and Tanzania have undertaken basic investigation along transects from higher to lower, and wetter to drier areas. East Africa has a remarkable range of agro-ecological zones, closely spaced. There is severe degradation in many areas, but in others farmers have been able to adapt to environmental change and population growth while even increasing production and accepting new natural-resource management methods.

ESTABLISHED DEMONSTRATION SITE

Mwizi, Mbarara District (southwestern Uganda)

10. Southwestern Uganda is an area of notable demographic dynamism is characterized by 'farming systems domains' (broadly homogenous areas of population, land use and environment) within a context of great physical and biological diversity. These have been studied by participatory rural appraisal and transect methods. Pastoral areas are included. Local knowledge of plants, soils, and ecology in general is extensive. The area has experienced a variety of interventions by projects, government extensionists and NGOs. The reasons for acceptance or non-acceptance of conservation measures have been a focus for discussions with farmers, leading toward the participatory work now initiated at Mwizi. Cooperating farmers have been selected, and are commencing work in collaboration with PLEC scientists; the Agriculture Department at Mbarara is also involved.

PLANNED DEMONSTRATION SITES

11. The following sites are being initiated in 1997.

Embu (Kenya)

12. Substantial preliminary work based at KARI's Regional Research Station has led to the identification of a large diversity of indigenous management practices in this difficult semi-arid environment. Demonstration sites are planned using the existing network of cooperating farmers who employ trashlines, stone bunds and various intricate weed and crop-management practices. Sites are also planned at Laikipia, a highland dry environment where agroforestry practices are particularly well developed, and a Swiss-funded project has undertaken useful preliminary documentation and analysis.

Communities on Mt Meru (Tanzania)

13. Transect studies on both windward and leeward sides of Mt Meru, Arameru District, running from the limits of cultivation at 1,950 m onto the semi-arid plains below 1,700 m, have led to identification of two village communities, occupied at population density of respectively 200 and 60-80 per km^2 (Ngiresi and Kiserian). Discussions with farmers there have laid the foundations for demonstration site work.

14. Further sites are planned at Kiambu and Laikipia in Kenya, and at Rubare, an area characterized by considerable land degradation, in southwestern Uganda.

CHINA

ECOSYSTEM CONTEXT

15. The eastern Himalayan mountains extend into Yunnan, where they are deeply dissected by south-flowing rivers. Mountains rise above 4,000 metres. The initial work of the Cluster has

altitude, species diversity falls progressively through lower-montane, upper-montane and sub-alpine forests. Most, but not all, of the intensive farming systems are in the Mountain Ecosystem. Within the Forest Ecosystem there is considerable variation among shifting systems, some people making use of fire, others cultivating without fire. There are major contrasts in population density, degree of commercialization, and land-management methods. Well over one-quarter of the total forested area in the country is the successional component of fallow-based cultivation systems.

PLANNED DEMONSTRATION SITES

21. To date, the Cluster has concentrated on creating a national database of agricultural systems, linked to a database on natural resources. The next stage of the work is to define both agro-ecological zones and farming systems. From within these frameworks, representative sites are being selected. Two initial sites are now chosen. One will be in the Dreikikir area on the southern side of the Torricelli range in East Sepik Province, in which population densities range from over 130 per km^2 to under 20 per km^2. The other will be in the Tari basin of the Southern Highlands Province. In the centre of the basin, land use is permanent and many areas have been cropped continuously for up to 100 years. Soil fertility is maintained by soil mounding and composting. On the Paijaka Plateau on the edge of the basin, significant areas have been degraded by agriculture so that they are no longer useable. There is substantial information drawing on earlier work by Cluster members in both areas. Within the chosen areas selection of specific communities will be undertaken in close cooperation with both the National Agricultural Research Institute and provincial staff, and local organizations, especially local government councils and church organizations.

AMAZONIA

ECOSYSTEM CONTEXT

22. Work of the Cluster concentrates on the *várzea* of the Amazon River. The *várzea* floodplain can be defined as the area that is periodically inundated by the lateral overflow of the sediment-rich waters of the major white-water rivers of Amazonia. Reflecting stages in the evolution of the river, the *várzea* undergoes continuous change as the river winds its way across the continent. In the Upper Amazon, flood amplitude is greater, flood peaks are usually of shorter duration, sediment loads are higher, and landforms are less stable. Topography is more complex than is the case in the *várzea* of the middle and lower portions of the basin. In the delta and estuary zone, daily tidal fluctuation can exceed the amplitude of the seasonal flood regime. Close integration of terrestrial and aquatic environments is characteristic of the ecosystem.

23. With fertile soils and abundant aquatic resources, floodplain economic activities (farming, forestry and agroforestry, animal husbandry and fisheries) have sustained the highest Amazonian population densities since the pre-Columbian period. Over generations, *ribeirinhos*, the current majority residents of the *várzea*, maintained the productivity, resilience and biodiversity of the floodplain ecosystems. In the last three decades, new land-use pressures and intensification of resource exploitation have begun to threaten the terrestrial and aquatic components of the ecosystem. Increasingly, large-scale logging, commercial fishing and water buffalo ranching are coming to dominate *várzea* resource use. These uses have potentially serious consequences for the biodiversity and long-term productivity of *várzea* ecosystems, as well as the economic viability of diverse resource management and productive systems. The nature and extent of these pressures varies considerably over the 3,000 km distance separating headwater and estuary regions of the floodplain. In this regard, the management systems devised by *ribeirinhos* in response to distinctive local conditions, represent a storehouse of valuable information in devising more productive and sustainable systems for all parts of the Amazon *várzea*.

ANNEX 7b: BIODIVERSITY SIGNIFICANCE OF THE DEMONSTRATION SITES

WEST AFRICA

GHANA

1. The significance of the forest grove close to the site at Gyamfiase lies in its uniqueness as one of few relicts of once extensive humid and semi-humid forest ecosystems in Ghana, and as a potential site for experimentation and demonstration in community-based participatory biodiversity conservation. Gyamfiase village is located in the southern sector of the forest-savanna transition zone. Until mid-century, the vegetation in this zone was characterized by a closed forest canopy having *Antiaris africana/toxicaria* (Fam. *Moraceae*) and *Chlorophora/Milicia excelsa* as the most common tree species. Increased production activities have reduced the original thick forest to derived parkland or savanna woodland, with a few remnant forest groves including the sacred one at Gyamfiase, a focal point of PLEC biodiversity conservation and rural development initiatives.

2. Recent surveys in the approximately 100 km^2 area centred on Gyamfiase, showed that outside the grove, and especially in tenant-farm localities, most *Chlorophora/Milicia excelsa*, *Triplochiton scleroxylon*, *Antiaris africana/toxicaria*, *Millettia thonninngii*, and other tree species of economic and agro-ecological use, have become rare and are being replaced by opportunistic and invasive herbaceous species such as: *Chromolaena odorata*; *Canna indica*; *Coccinia grandis*; *Commelina capitula*; *Acanthospermum hispidium*; *Ageratum conyzoides*; *Bidens pilosa*; *Lactuca taraxacifolia*; *Tridax procumbens*; *Digitaria diagonalis*; *Eleusine indica*; *Paspalum orbiculare*; and *Sporobolus pyramidalis*.

3. The PLEC-assisted community-based 'Collaborative Agroecosystems Management Project', is an attempt to develop the conserved Gyamfiase forest grove together with its surrounding zone of traditional agroforestry as a model *in situ* genebank for endangered species. The project will draw on proven local environmental management values and practices, that promote biodiversity, vegetative cover, natural ecological integrity, and enhance food security.

4. A second existing site at Jachie in central Ghana is located in the humid semi-deciduous forest zone, originally covered by closed forest canopy typified by a species-association similar to that of the forest-savanna zone. Agricultural production has resulted in severe deforestation and biodiversity loss in the humid semi-deciduous forest zone, except for isolated groves including the well preserved one around Jachie. It has survived only because it serves as a sacred burial ground for royals. As in the case of Gyamfiase grove, PLEC seeks to encourage, through participatory approaches, the conservation and development of the Jachie grove as an *in situ* genebank from where germplasm and propagules of important species could be collected, multiplied and used for reclamation purposes to counter deforestation, enhance species diversity, and ecological integrity.[1]

GUINEA

5. The evolving demonstration site of the Guinea sub-Cluster in the Kollangui sub-basin of the Fouta Djallon plateau has been occupied by agricultural and pastoral people for a thousand years.

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[1] The Deputy Cluster Leader (Ghana) has extensive involvement in biodiversity activity, including 1. a current UNESCO Man and the Biosphere biodiversity and biosphere reserve project called: 'Biosphere Reserves for Sustainable Development in Anglophone Africa (BRAAF)'; 2. a recently completed Biodiversity Support Programme (BSP) project on: 'Effects of Logging and Different Methods of Harvesting of NTFPs on Biodiversity in Selected High Forest Ecosystems in Ghana'; 3. a completed UNESCO Co-operative Integrated Project on Savanna Ecosystems in Northern Ghana - CIPSEG (1995); 4. a Third World Academy of Sciences awarded project for Forest Capacity Building on the Biodiversity of the Bia National Park in Ghana (1992/93).

high degree of biological diversity over short distances, but also considerable farming and population pressure. Laikipia is one of the few semi-arid highland parts of East Africa, in the lee of Mount Kenya, with a completely different set of habitats and vegetation. Soil degradation and overgrazing are much in evidence.

China

10. Yunnan includes both montane forests of the eastern Himalaya at altitudes up to 3,600 m and, at lower altitudes, one of the very few regions of remaining tropical-margin rain forest between latitudes 21° to 23° N anywhere in the world. Demonstration sites are in two areas, Baoshan and Xishuangbanna prefectures, respectively at high and low altitudes. Both demonstration sites are close or adjacent to the buffer zones of large remaining forest reserves (Gaoligongshan National Nature Reserve, and Xishuangbanna UNESCO Biosphere Reserve). Areas around these reserves have lost forest cover at a very high rate since 1950 as pressure on the land has increased. The Xishuangbanna reserve now consists of five units covering 241,776 ha, of which some are themselves composed of several separate forest blocks, often degraded. 'Holy hills', and other religiously-protected forest, cover a further 30,000 ha spread over Xishuangbanna prefecture. The Gaoligongshan reserve, protected by altitude, is a single block of 123,900 ha with 93 per cent forest cover. Xishuangbanna has more than 5,000 species of flowering plants and 427 species of birds. Biodiversity is richest at lower altitudes. Gaoligongshan has over 1,700 species of higher plants belonging to 715 genera and 166 families; nine vegetation zones, ranging from sub-tropical to alpine cold temperate, are recognized. One hundred and fifteen species of mammals and 343 species of birds have been enumerated. Many of the 389 state-protected plant species are found in these two reserves.

11. Also important is the managed biodiversity of the farmlands, especially in Xishuangbanna. In eight of Yunnan's prefectures, 220 agroforestry associations have been recognized, involving over 200 species of perennial and annual plants. The population around both reserve areas includes large numbers of minority-group people, whose diverse resource-management systems offer many opportunities for selection of conservationist practices.[2]

Papua New Guinea

12. The first site will be on the southern fall of the Torricelli Mountains in the East Sepik Province. The Torricelli Mountains are a young, actively rising coastal range of Miocene, Pliocene and Pleistocene sediments. The highest point is 1800 m asl, but the majority of the range is lower at around 1000 m asl. The ranges form the northern side of the highly significant Sepik watershed. Siltstones and mudstones are the dominant rock types. The ranges are heavily faulted and tilted, such that a large variation in landforms occurs. Local relief is moderately high and the terrain rough. Tall rain forest with an average height of 30 m covers 33 per cent of the area and has been classed in to 10 types. Low to mid-height forest covers 22 per cent of the area. 157 species of forest trees have been identified by botanical survey. The northern part of the study area is identified by the PNG Country Study on Biological Diversity (UNEP) as an area of highly significant terrestrial biodiversity, including two endemic species of large mammals (the Giant Glider and Scott's Tree Kangaroo) and a number of isolated and taxonomically distinct bird populations. To the south the mountains merge

[2] Work has also been supported by the Ford Foundation, the MacArthur Foundation and the Yunnan provincial government, and there is collaboration with ICIMOD, the Netherlands Forest Conservation Programme, the World-wide Fund for Nature (WWF), especially in Xishuangbanna, and most recently with the GEF-supported ICRAF Alternatives to Slash and Burn Programme, through its IDRC-supported initiative on indigenous fallow management.

species like the samaumeira (*Ceiba pentandra*) and cedro (*Cedrela odorata*) have already been greatly reduced by selective logging. Logging activities destroy not only trees but may be a major threat to the regional fauna. Many species, especially the arboreal animals and fish, depend on fruits or seeds of these trees for their nourishment. Despite losses to logging, there are still substantial populations of these and other valuable hardwoods in PLEC's *várzea* sites.

17. The *várzea* is, and has been for centuries, an important area of resource extraction, agriculture, and settlement. The diversity of environments has led to the development of a great variety of agricultural and forest management patterns. The alluvial soils, replenished every year by floods, are highly fertile. However, the same annual floods that make these lands agriculturally desirable, also make them difficult to exploit by modern agricultural methods. The accessibility and relatively high human population densities greatly increase the risk of overexploitation of biological and physical resources. The diversity and functional complexity of ecosystems require that any plans for improved exploitation or conservation of *várzea* resources be based on a broad interdisciplinary approach. Despite its many unique characteristics, until recently very little scientific research was directed at the *várzea.*

ANNEX 8

METHODOLOGY

ANNEX 8a: THE PROJECT AS A WHOLE, AND DEMONSTRATION SITES

METHODOLOGY IN AN INTEGRATED CROSS-NATIONAL PROJECT

1. PLEC brings together the work of five 'Clusters' of scientists, field technicians and farmers for the common aim of evaluating, improving and disseminating locally-developed conservationist and sustainable resource-management practices. Added to this is a capacity-building role, to equip professionals and stakeholders with the tools they need to deal with increasingly complex issues. These now involve sustainable development and environmental protection, as well as longer-term conservation and biodiversity issues. The latter issues, in the context of sustainable welfare for small-farming populations, are the principal area in which PLEC methodology is applied. The five PLEC Clusters all include experienced as well as more junior scientists, technicians and students. Teams are multidisciplinary, with experts in anthropology, botany and ethnobotany, soil science, agricultural science, geography, resource economics, and sociology working with each other as well as with groups of expert farmers.

2. Each Cluster has its special strengths. The analysis of biodiversity in an agricultural context is strongly developed in Yunnan (China), West Africa (Ghana, Guinea) and Amazonia (Brazil). The Papua New Guinea group has gone further than others in the quantitative analysis and mapping of agricultural systems using diagnostic characteristics. The East African Cluster has particular strength in the dynamics of soil and water conservation in diverse and sensitive environments. Promotion of interchange across the network is one important strategy to share expertise. Principally, networking in support of Cluster attainment of their objectives relies on the three Scientific Coordinators who keep in close touch with Clusters, and on Scientific Advisers appointed on limited-term contracts to provide particular expertise in areas such as, for example, biodiversity measurement, soil-degradation assessment, GIS applications, or experimental method.[1] The Coordinators visit Clusters from time to time, and Scientific Advisers will be specifically charged with missions, and provision of specialized training courses, to particular Clusters.

3. Networking is also achieved by correspondence, and by regional and general meetings.[2] The project periodical *PLEC News and Views*, a newsletter with substantive articles, is of major importance, being made available to all PLEC members as well as being a vehicle for wider

[1] The speciality of the Scientific Coordinator (Dr H. Brookfield, Anthropology, Division of Society and Environment, Research School of Pacific and Asian Studies, Australian National University, Canberra) is in small farmers' resource use and general environmental management. The specialties of the Associate Scientific Coordinators are: soil erosion and general environmental management (Professor M. A. Stocking, School of Development Studies, University of East Anglia, U.K.); ecological anthropology and analysis of agrodiversity (Dr Christine Padoch, Senior Curator, New York Botanical Garden, U.S.A.). While most Scientific Advisers will be specially contracted, two regional advisers have a longer-term role. These are (in Africa) Dr Uzo Mokwunye, Director, UNU Institute for Natural Resources in Africa, Legon, Ghana, and (in the American region) Dr E. Adilson de S. Serrão, Chefe, Centro de Pesquisa Agroflorestal da Amazônia Oriental, Empresa Brasiliera de Pesquisa Agropecuária, Belém, Pará, Brazil.

[2] During the preparatory phase, regional meetings were held in Amazonia in 1993, in West Africa and Amazonia in 1994, in West Africa and Southeast Asia in 1995, in West Africa and East Africa in 1996, and in China (for Southeast Asia and Papua New Guinea) in 1997. A general meeting was held in Thailand in 1994 and a second, which will focus on demonstration-site methodology, will be held in East Africa in early 1998. Two further general meetings are planned during the life of the project.

and most likely to be sustainable. Farmers have to cope with many problems, in economic, political and environmental fields, and also respond to new opportunities. Experimentation is constant, leading to adoption or rejection of new crops and practices, and to restructuring of the use of 'farming space' in response to changing needs and opportunities. Where they are faced with declining rewards for their efforts, farmers often experiment with ways to manage the consequences and reverse the trend. PLEC's most basic hypothesis is that farmers' adaptations to environmental and socio-economic change can often be successful if the conditions of wider society provide encouragement.

9. PLEC puts its primary emphasis on what farmers do. The local knowledge that underlies these practices is unequally distributed among farmers of both sexes and is not always shared. Moreover, it cannot be understood outside the social and cultural context in which knowledge is handed on, and in which new information and experience are interpreted. Scientists' interpretations of information they gather on local knowledge have to be drawn up in relation to farmers' own perceptions, best first approached through close observation of the practices that are followed. PLEC views 'local knowledge' not as a fixed or traditional pool, but as constantly changing and being renewed by information and experience. This in turn is the basis of dynamism in peoples' farming systems which PLEC observes and on which it also relies for success in extracting best elements from peoples' own resource management practices.

10. One example of Cluster methodology is provided, in tabular form, by the China Cluster:

Activities	Contents	Output
1. Joint Inventory of resources and their utilization	By scientists and village people, paying particular attention to local resource-using practices and knowledge	1. Policy papers, technical reports and recommendations 2. Resource mapping through GIS; 3. Inventory booklet of local resource management
2. Participatory appraisals	Through focus group and individual meetings, on social, cultural, economic and political factors that influence selection of farming strategies, paying particular attention to access and property rights	1. Policy papers and recommendations for sustainable resource management, both for the local government and community 2. Understanding between the local community, nature reserve administration, and the authorities
3. Participatory resource-use planning	The central objective is to participate with local people in the design of their own projects for sustainable resource management	1. Conservationist community development planning guidelines and community rules 2. Community project proposals
4. Alternatives to swidden cultivation through agroforestry or plantation	The objective is to seek and experiment with potentially successful market-oriented agroforestry or mixed plantations of native species on the sloping upland. These will reduce forest invasion for food cropping, cash cropping, timber or fuel wood plantation	1. Increase of cash income with high productivity 2. Technical guidelines (Some trials have been done in Hanlong village, using MacArthur funds)
5. Conservation of existing Community Forest (including swidden fallow forest)	The objective is to reduce fragmentation in community forest (which disturbs the gene flow) through building corridors , using both institutional and technical approaches	1. Methodology formulation on recovery of fragmentation 2. Understanding the impacts of fragmentation on biodiversity
6. Training in practical technology and participatory appraisal, and setting up Participatory Farmers' Associations	The objective is to build the local community capacity for conservation, introduction of new crops favouring conservationist technology, and building the framework of participatory strategies	1. One farmers association has been set up in Baihualing village (Hanlong). This framework has been accepted and popularized in the province; it could be extended to all related sites 2. Participatory framework popularized among policy makers and in communities

photographs, remote-sensing imagery, experiments and evidence of travellers and officials. Demonstration sites will be a useful focus for assembling local people and gaining their knowledge and understanding of changes in the environment, and attributable causes. Farmers' adaptations to constraining conditions are instructive in contributing to improved policy responses. Without a proper understanding of causes, no intervention is likely to be successful.

The systematic approach outlined below calls for several scales of analysis. These are in order:

1) regional;

2) site;

3) intensive study area;

4) air-photograph interpretation (API) or remote-sensing-imagery-defined ecological landscape unit;

5) investigator- or population- defined resource management type.

All of these should be mapped, at least in a preliminary fashion, before the initiation of intensive field sampling. That exercise will allow an initial assessment of resource management type diversity, and will determine the placement of sampling plots for species density and landscape complexity studies.

Any assessment of biodiversity must be able to relate the results of on-site investigations to broader spatial scales. Experience has shown that such an exercise is a highly worthwhile endeavour even when undertaken after sites have been selected, because it allows scaling up of research results and can provide information about related sites which may be otherwise inaccessible.

Efforts at scaling up must recognize and attempt to assess the limitations imposed by the scale of variation, germane to the study sites and within the region. In some areas fine-grain variation in resource management systems may be the most interesting determinant of on-site differences in species composition. Where such variation is present at very small spatial intervals, interpretation of remotely-sensed imagery is unlikely to provide a sufficiently informative representation of the true situation on the ground. The simple fact that an enormous amount of variation in resource management systems (agrodiversity) may be unaccounted for even by API is itself interesting, and overlaying resource management maps of the intensive study areas with the remote-sensing-defined landscape designations will permit some quantification of that loss of information.

The approach outlined below emphasizes quantitative estimation of several measures of diversity on a per unit area basis. This approach is a response to questions which are spatially bound. How large an area is represented by site A in Cluster tract B? How many different resource management types are contained within landscape X? How many species are contained within a hectare of resource management type Y? How much between and within resource management type variation in species is present within the Z number of resource management types present in landscape X?

Additional techniques which emphasize the population unit (e.g. individual, family, village) as the basis of measurement may also be appropriate for pursuing related questions. The knowledge of biota among rural people is usually profound and comprehensive, and can be used as a major source of information.

A PRACTICAL, EMPIRICAL APPROACH

1. **Location of Cluster sites using available interpretive geographical information systems (GIS) maps, especially biome or plant-community classification schemes.**

   The principal question to be addressed here is: *What does the study area represent?*

This is a fundamental question which must be addressed if the data collected and analysed are to have any meaning outside of the context of the specific study sites. Even if detailed site selection

images. Such phenomena, by our definition, do not represent landscape units, but may represent distinct investigator- or population- defined resource management types. The landscape unit, therefore, is obviously sensitive to the scale applicable to the remote-sensing imagery utilized by each cluster. Nonetheless, inclusion of this unit of study is necessary because, while many analyses of natural resources and their management are made based upon remotely-sensed data, the ability of that data to tell us useful things about landscapes within complex management systems is largely untested. Collecting and analysing data across several scales of analysis will permit quantitative assessment of the amount of information gained and/or lost at each level.

PRODUCTS : *(1) a map of the sites delineating remote-sensing-or API- defined landscape units; (2) a map of the intensive study areas, delineating remotely-defined landscape units and investigator- or population- defined resource management types.*

III. **Field measurement of replicate plots within each landscape unit type.**

The principal question here: *How diverse is each landscape unit type*?

After making a map of the study area delineating the boundaries of the various landscape unit types, appropriate field measurement methods can be selected. Here, a great deal of local adaptation will be necessary because some Cluster areas may be characterized by a large number of small landscape units and others by a smaller number of larger landscape units. The latter case presents a more straightforward sampling problem.

Number, size and type of sample plot will necessarily depend upon number and size of landscape units, and the type of vegetation present. Equal-sized plots should be used for all landscape units, although nested sub-sampling may be used for certain vegetation types as necessary (e.g. grasses, shrubs, saplings). No landscape unit type should be represented by only one plot. All plots and sub-plots should be randomly located within the landscape units leaving a buffer-strip at unit edges, which require separate measurement.

Kenkel et al. (1989), among others, have forcefully argued that there are no generally applicable principles for making sampling decisions in ecological studies. All decisions must be specific to the objectives and, for practical purposes, tailored to the realities present at any given research site. Nonetheless, there are a few rules which must be observed if valid intra- and inter- site comparisons are to be made about diversity.

- Plots to be compared must be the same size and shape;
- Plots must be replicated;
- There must be a random component to plot location;
- Plots must be well-marked for data validation and future re-sampling.

There is no standard plot size. Forest ecologists, among others, have noted that the number of species always increases with plot size, up to a point where the 'species area curve' flattens out. The location of that point on the curve is impossible to determine a priori. At one end of the spectrum, conventionally planted monocultural fields require selection of small plots for accurate estimation of the number of individuals present in the larger population; a few square metres may be all that is necessary to predict accurately the density of rice in a large pond field. At the other end, in a complex agroforest, it may not be possible to record all the plant species present unless the entire area of the agroforest is inventoried. Common quadrat (plot) sizes to consider in relation to requirements and

Figure 2

SAMPLE DATA SHEET

Locality _____

Investigator's name _____ Date _____

Landscape Unit Type _____ Landscape Unit No. _____

Plot No. _____ Plot Area (m x m) _____

Subplot area (each m x m) _____

species	within subplot occurrence sp1	sp2	sp3	sp4	sp5	sp total	occurrence outside subplots

PRODUCTS: *(1) permanently marked inventory plots within the intensive study areas; (2) archived data on number of individuals of each species recorded for each plot measured.*

IV. Data analysis

Data collection methods, outlined above, will permit determination of a wide variety of diversity indices, which focus on the number of species present (species richness or species abundance) and the evenness with which individuals are distributed among those species (relative abundance). One major reason for the diversity of diversity indices is the absence of any objective method for determining the relative weight which should be given to each of those variables (Hurlburt 1971; Cousins 1991; Wayne and Bazzaz 1991).

Nonetheless, PLEC field data should be collected and archived in an accessible computer database available to other investigators who may wish to use it for purposes other than those with which the current proposal is principally concerned, namely agrodiversity, species density, and landscape complexity. Analytical methods are suggested below for each in turn.

AGRODIVERSITY

Brookfield and Padoch (1994) define agrodiversity, *inter alia*, as the variety of resource management practices. One measure of agrodiversity is simply a count of the number of different resource management types identified by the investigators at each study area. This is a site-specific measure, e.g. 'The inhabitants of the village we studied practiced 12 kinds of agriculture'. As such, the measure is perhaps most useful for inter-village comparisons (e.g. Padoch 1987) but does not

Table 1

Sample 1		Sample 2	
species	no. of individuals	species	no. of individuals
1	37	1	94
2	24		
3	62	3	31
4	41	4	23
5	12		
6	3		
7	49	7	12
8	118	8	87
9	1		
10	74	10	42
		11	3
		12	31
		13	25
		14	9
		15	16

Summary Analysis

	common species	#	Species unique to sample 1	#	species unique to sample 2	#	
	1	131	2	24	11	3	
	3	93	5	12	12	31	
	4	64	6	3	13	25	
	7	61	9	1	14	9	
	8	205			15	16	
	10	116					

Comments: This type of simple analysis allows for straightforward, quantitative assessment of which species are common and which are rare both within each sample and between the samples. In this example the samples share their most common species, yet are differentiated by a significant number of species which are unique to one sample or the other.

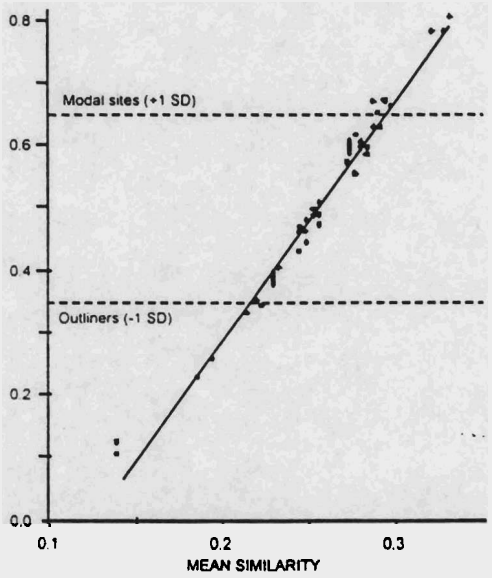
PRODUCTS: *(1) species density estimates on a per plot, per landscape unit and per landscape unit type basis; (2) estimates of within landscape unit, within landscape unit-type and between landscape unit-type variability in species density; 3) lists of species distributions.*

LANDSCAPE COMPLEXITY

Scheiner (1992) has introduced the use of affinity analysis to compare pattern diversity between ecological communities. This type of analysis allows quantitative identification of common versus rare types of species compositions within the cluster sites. Dimensionless estimates of the mean similarity and mosaic diversity of sample plots and/or landscape units can be objectively assessed and compared with other sites within PLEC or with any other data set. Mosaic diversity is a function of the existence of common and rare species, the extent to which sites differ in species

Figure 3

Sites in the upper right hand corner of the graph have high mean similarities and high mean affinities. These...'modal sites' ...are rich in species that are common throughout the landscape, even though they do not necessarily have the greatest total number of species. In contrast, sites in the lower left hand corner of the graph have low mean similarities and low mean affinities. These ...'outlier sites' ... are either species poor, or rich in rare species ..... mean affinities of 0.5 ± 1 standard deviation objectively define those sites that are either modal or outlier. The floristic differences between modal and outlier sites determine the variance in affinity values and the slope of the line. Thus, mosaic diversity is affected by the variation in species richness among communities, the variation in commonness or rarity among species, and how those factors interact to create an overall amount of complexity [Quotation and Figure from Scheiner (1992)].



Affinity analysis graph for presence/absence data on vascular plants from 42 sites in northern lower Michigan. The slope of the line estimates mosaic diversity ($m = 3.96 \pm 0.05$, $r^2 = 0.97$) Sites with affinity values > 1 SD above the mean (which equals 0.5) are defined as modal; sites with affinity values < 1 SD below the mean are defined as outliers. (Data from S. M. Scheiner and C. A. Istock, unpublished manuscript). Reproduced with permission of the Ecological Society of America

ADDENDUM

PLEC's approach to diversity measurement, outlined above, is deeply rooted in biodiversity theory, at least since Whittaker (1965) suggested the division of diversity into *alpha*, *beta* and *gamma* components. *Alpha* (species) diversity is the diversity within a specific habitat. *Beta* (habitat) diversity is the diversity between habitats. *Gamma* (landscape) diversity is the total diversity of a landscape or region. This proposal represents a potential application of those basic ecological principles, in the context of a quantitative approach, to the assessment of diversity in anthropogenic ecosystems subject to long-term management by indigenous populations.

ANNEX 9

RELATIONSHIPS WITH EXISTING PROJECTS AND PROGRAMMES

NATIONAL AND REGIONAL PROJECTS AND PROGRAMMES

1. Each PLEC Cluster has working relationships with national and regional projects and programmes, whether as groups or by the involvement of individual members. In some cases this involvement meshes into international programmes, where PLEC members are involved as local participants. The following selection of information illustrates the linkages which already exist, and which are constantly growing larger. There is overlap here with stakeholder involvement, since certain of these national projects and programmes become stakeholders in PLEC.

WEST AFRICA

2. The Cluster in Ghana is involved as a whole with the Volta River Authority in an environmental impact study aimed at mitigating problems associated with the damming of the Volta river. Significant work has already been done, and reports have appeared. One member of the group is involved in a current UNESCO Man and the Biosphere biodiversity and biosphere reserve project. UNFPA supports 'Family and Development Project' managed by another Cluster member, and a 'Ghana Population Agenda' project managed by a third. The latter also directs a 'Population Impact Project' in collaboration with Futures Group International, Washington DC, funded by USAID. A fourth member of the Cluster directs a remote-sensing applications unit, operating under the Ghana Environmental Resource Management Project of the Environmental Protection Agency of the Ministry of Environment, Science and Technology, funded by the governments of Ghana and Denmark, and IDA of the World Bank. The World Bank also supports soil science work by a fifth Cluster member under a 'Pineapple Research Project' within the National Agricultural Research Project of the Council for Scientific and Industrial Research.. The Cluster principals have been involved as collaborators in a two-year three-country project of the Institute of Development Studies at Brighton, England, on 'Environmental Entitlements, the Institutional Dynamics of Environmental Change', funded by the UK Economic and Social Research Council. A junior member of the Cluster was seconded to undertake the Ghana field work of this latter project.

EAST AFRICA

3. The Cluster leader, as Deputy Director (Soil and Water Research) at KARI, has responsibility for many externally-funded projects including core World Bank funding to KARI/HQ, the ICRISAT/UNEP 'Desert Margins Programme', European Union support to drylands research and the multiple-funded 'East African Highlands Initiative'. He is directly involved in two DFID projects based at Embu (one of the PLEC demonstration site areas): the 'Drylands Agricultural Research and Extension Project' (DAREP); and an East Africa-wide programme on investigating the performance and rationality of indigenous methods of soil and water conservation by small farmers. Cluster members at the University of Nairobi are also core staff in a WMO project on agro-climatology, and UNFPA/UNESCO projects on demographic change. ICRAF scientists, based in Nairobi, have interacted with PLEC members in all three East African countries. Members of the sub-Cluster in Uganda are involved in the 'Trees and People Programme' of the Community Forestry Unit of FAO, in the African Land Management network of IBSRAM, the Uganda Soil Conservation and Agroforestry pilot project of SIDA, with the Natural Resources Systems Programme of DFID, and an IUCN project on biodiversity conservation on Mt Elgon. Nationally, there is involvement with the National Environmental Management Authority, setting up environmental management committees at local level (one of which will be in the first demonstration site

World Bank. He is also head of a team conducting Projeto Floresta do Futuro, a long-term integrated conservation and development project implemented by an international disciplinary team in Rio Capim, Pará, funded by USAID and Woods Hole Institute. Cluster members are also involved in a WCS, DFID, CNPq project in conservation of the Mamiraua area of the upper Amazon; in a WWF-supported project of the National Council of Rubber Tappers, on extractive reserves in the Rio Cajari reserve (Plano de Manejo e Desenvolvimento Sustenable da Reservas Extractivas de Maracá); in Projeto Communidades, focusing on providing geographical and biological information to villages along the Tapajós river, in which PLEC members give advice on mapping and natural-resource inventory techniques. PLEC members advise Projeto Control de Fogo, a research and extension project funded by USAID and implemented by a team of Brazilian researchers in the south of Pará, and Projeto de Promocão de Sistemas e Técnicas Tradicionales Agrícolas e Agroflorestal in Zona Bragantina, Pará. They also provide advice to three projects in Peru, on Estudios Socio-bilológicos para Propuestas de Manejo y Desarollo Sustenable de la Reserva Pacaya-Samiria; on Estudio de Sistemas y Técnicas Agrícolas, Agroflorestales y de Manejo Florestal de Zonas Inundables in the region of Iquitos; and on Estudio de Lagos de Reserva y Su Importancia en la Conservacion de Recursos Pesqueros en la Amazonia Peruana. Other projects with which members of the Cluster have association include: Amazon Restoration (funded by USAID); Fire in Amazonia (CESE); Advocacy on sustainable land in the Amazon (Ford Foundation). The Lake Management Project and Participatory Strategic Planning in Santarém, an element of the work of Amazonia-PLEC, is funded by WWF/UK as well as UNU/PLEC.

INTERNATIONAL PROJECTS AND PROGRAMMES

7. The Cluster-level associations with international programmes, described above, link into certain project-wide associations. Among the oldest of these is association with IBSRAM, for which several members of PLEC have undertaken tasks both in the field and in the office, so that there is mutual awareness of activities and approaches in distinct areas. This is similar to relations with the Alternatives to Slash and Burn Project of ICRAF (ICRAF/ASB). Both in Africa and Asia the working sites of ICRAF/ASB are quite separate from those of PLEC, but each party keeps the other informed. At one ICRAF meeting in Indonesia in 1997, the PLEC principal scientific coordinator was invited to give the keynote paper. PLEC as a whole has from 1992 had links with the 'South-South Cooperation Programme' of UNESCO, UNU and the Third World Academy of Sciences, and four joint meetings have been held. All three of PLEC's scientific coordinators have had personal involvement in international projects, some of them described in the institutional Annex 3c, and have presented PLEC at meetings held by these projects, including projects of DFID, FAO, CIFOR, UNEP and the British Council. Two scientific coordinators have evaluated GEF biodiversity projects for UNEP and UNDP. One scientific coordinator is a member of a team appointed by the World Bank to evaluate CIFOR in December-March 1997-98.

8. Particular areas where thematic synergy exists with PLEC include a number of projects, for example the 'Desert Margins Programme' for Sub-Saharan Africa, in which the regional coordinating Cluster leader of East Africa-PLEC is directly involved.. There is also complementarity with DFID's 'Renewable Natural Resources Research Strategy', WWF's 'Biodiversity Conservation and Participatory Management' projects at a number of sites funded by the Dutch Directorate General of International Cooperation; IIED's 'Sustainable Agriculture Programme'; and ILEIA's general programme on ecologically-sound agriculture. Scientific coordinators are in on-going communication with the two latter programmes.

People, Land Management and Environmental Change

Project Costs by Years
(US dollars)

	1998	1999	2000	2001	Total
A. Project Costs (GEF financing)					
1. Regional Cluster Activities					
Demonstration sites	207,160	213,160	167,860	141,820	730,000
Biodiversity assessment	140,360	129,360	11,870	2,610	284,200
Participatory rural appraisal	113,260	100,260	11,160	2,420	227,100
Outreach and experimental work	148,393	137,394	115,543	97,970	499,300
Reports, workshops on models	29,500	25,550	17,650	26,900	99,600
Capacity strengthening (training)	143,150	143,150	134,450	120,950	541,700
Networking and dissemination	121,225	107,225	93,875	96,875	419,200
Coordination and planning	122,050	82,550	52,950	50,650	308,200
Subtotal Regional Cluster Activities	1,025,098	938,649	605,358	540,195	3,109,300
2. Centrally organized/Cross-country Activities					
Demonstration sites	25,000	28,000	80,000	65,000	198,000
Biodiversity assessment	20,000	13,000	25,200	10,000	68,200
Participatory rural appraisal	22,000	20,000	18,000	8,000	68,000
Outreach and experimental work	21,000	21,000	16,000	10,200	68,200
Reports, workshops on models	6,000	26,000	74,000	76,000	182,000
Capacity strengthening (training)	67,600	67,600	136,600	97,300	369,100
Networking and dissemination	130,000	205,000	116,500	245,000	696,500
Coordination and planning	223,500	205,300	200,910	198,500	828,210
Subtotal Centrally org./Cross-country Activities	515,100	585,900	667,210	710,000	2,478,210
3. Monitoring, Evaluation, and Project Support	119,700	144,000	108,000	217,090	588,790
Total Project Costs (GEF financing)	1,659,898	1,668,549	1,380,568	1,467,285	6,176,300

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(US dollars)

		Amazonia	China	E.Africa	PNG	W. Africa	Cr-Country	UNU	UNEP	M&E	Total
1998	Demonstration sites	35,900	39,050	44,600	28,250	59,360	25,000				232,160
	Biodiversity assessment	19,500	31,000	38,250	18,000	33,610	20,000				160,360
	Participatory rural appraisal	14,500	28,400	21,750	17,500	31,110	22,000				135,260
	Outreach and experimental work	45,600	24,750	32,700	18,333	27,010	21,000				169,393
	Reports, workshops on models	3,000	3,000	1,750	12,250	9,500	6,000				35,500
	Capacity strengthening (training)	55,250	21,800	16,200	15,900	34,000	67,600				210,750
	Networking and dissemination	37,700	20,700	24,700	16,125	22,000	130,000				251,225
	Coordination and planning	17,100	22,000	37,000	11,700	34,250	223,500				345,550
	Subtotal Clusters/Cr.Cnty.	228,550	190,700	216,950	138,058	250,840	515,100				1,540,198
	Monitoring and Evaluation									0	0
	Project Support							87,000	32,700		119,700
	Project Costs (1998)										**1,659,898**
1999	Demonstration sites	35,900	39,050	44,600	48,250	45,360	28,000				241,160
	Biodiversity assessment	**19,500**	**31,000**	**35,250**	**22,000**	**21,610**	**13,000**				142,360
	Participatory rural appraisal	14,500	28,400	21,750	17,500	18,110	20,000				120,260
	Outreach and experimental work	45,600	23,750	32,700	18,334	17,010	21,000				158,394
	Reports, workshops on models	3,000	3,300	2,500	7,250	9,500	26,000				51,550
	Capacity strengthening (training)	55,250	21,800	16,200	15,900	34,000	67,600				210,750
	Networking and dissemination	23,700	20,700	24,700	16,125	22,000	205,000				312,225
	Coordination and planning	17,100	14,000	21,500	11,700	18,250	205,300				287,850
	Subtotal Clusters/Cr.Cnty.	214,550	182,000	199,200	157,059	185,840	585,900				1,524,549
	Monitoring and Evaluation									15,000	15,000
	Project Support							96,000	33,000		129,000
	Project Costs (1999)										**1,668,549**

People, Land Management and Environmental Change

Table 3. Demonstration Sites
Detailed Costs
(US dollars)

UNEP codes		1998	1999	2000	2001	Total
	A. Project Costs					
2100	**1. Regional Clusters Sub-contracts**					
2110	Amazonia	35,900	35,900	32,800	31,400	136,000
2120	China	39,050	39,050	29,950	28,750	136,800
2130	East Africa	44,600	44,600	32,000	28,900	150,100
2140	Papua New Guinea	28,250	48,250	45,750	29,750	152,000
2150	West Africa	59,360	45,360	27,360	23,020	155,100
	Subtotal Regional Clusters	207,160	213,160	167,860	141,820	730,000
	2. Cross-country					
1201	Consultants (Scientific advisors)	5,000	3,000	3,000	2,000	13,000
1601	Travel	20,000	15,000	15,000	8,000	58,000
5500	Contingency/reserve	0	10,000	62,000	55,000	127,000
	Subtotal Cross-country	25,000	28,000	80,000	65,000	198,000
	Total	232,160	241,160	247,860	206,820	928,000

People, Land Management and Environmental Change

Table 5. Participatory Rural Appraisal
Detailed Costs
(US dollars)

UNEP codes		1998	1999	2000	2001	Total
	A. Project Costs					
2100	**1. Regional Clusters Sub-contracts**					
2110	Amazonia	14,500	14,500	0	0	29,000
2120	China	28,400	28,400	7,800	800	65,400
2130	East Africa	21,750	21,750	750	250	44,500
2140	Papua New Guinea	17,500	17,500	1,000	0	36,000
2150	West Africa	31,110	18,110	1,610	1,370	52,200
	Subtotal Regional Clusters	113,260	100,260	11,160	2,420	227,100
	2. Cross-country					
1201	Consultants (Scientific advisors)	10,000	10,000	10,000	8,000	38,000
1601	Travel	12,000	10,000	8,000	0	30,000
	Subtotal Cross-country	22,000	20,000	18,000	8,000	68,000
	Total	135,260	120,260	29,160	10,420	295,100

People, Land Management and Environmental Change

Table 7. Reports, Workshops on Models
Detailed Costs
(US dollars)

UNEP codes		1998	1999	2000	2001	Total
	A. Project Costs					
2100	**1. Regional Clusters Sub-contracts**					
2110	Amazonia	3,000	3,000	2,900	2,900	11,800
2120	China	3,000	3,300	3,000	6,500	15,800
2130	East Africa	1,750	2,500	1,750	5,700	11,700
2140	Papua New Guinea	12,250	7,250	4,000	5,000	28,500
2150	West Africa	9,500	9,500	6,000	6,800	31,800
	Subtotal Regional Clusters	29,500	25,550	17,650	26,900	99,600
	2. Cross-country					
1203	Scientific advisors/specialists	6,000	6,000	6,000	0	18,000
1204	Desk consultancies (analysis)	0	0	0	6,000	6,000
3201	Specialist cluster training	0	10,000	10,000	10,000	30,000
5300	Contingency/reserve	0	10,000	58,000	60,000	128,000
	Subtotal Cross-country	6,000	26,000	74,000	76,000	182,000
	Total	35,500	51,550	91,650	102,900	281,600

People, Land Management and Environmental Change

Table 9. Networking and Dissemination Detailed Costs

(US dollars)

UNEP codes		1998	1999	2000	2001	Total
	A. Project Costs					
2100	**1. Regional Clusters Sub-contracts**					
2110	Amazonia	37,700	23,700	21,700	21,600	104,700
2120	China	20,700	20,700	11,350	11,350	64,100
2130	East Africa	24,700	24,700	22,700	22,500	94,600
2140	Papua New Guinea	16,125	16,125	16,125	19,625	68,000
2150	West Africa	22,000	22,000	22,000	21,800	87,800
	Subtotal Regional Clusters	121,225	107,225	93,875	96,875	419,200
	2. Cross-country					
1603	Mission travel (general meeting)	20,000	20,000	20,000	20,000	80,000
3301	Project meetings	50,000	125,000	0	165,000	340,000
3302	Management group meetings	60,000	60,000	60,000	60,000	240,000
5300	Contingency/reserve	0	0	36,500	0	36,500
	Subtotal Cross-country	130,000	205,000	116,500	245,000	696,500
	Total	251,225	312,225	210,375	341,875	1,115,700

Annex 11 a.
Disbursement Plan (six-monthly) by Object of Expenditure

People, Land Management and Environmental Change

Disbursement Plan (six-monthly)
(US Dollars)

Project No.:
Executing Agency: United Nations University
Project commencing: 1 January 1998
Project ending: 31 December 2001

Amounts presented by Object of Expenditure

Codes	Object of Expenditure	1998 Jan-Jun	1998 Jul-Dec	1999 Jan-Jun	1999 Jul-Dec	2000 Jan-Jun	2000 Jul-Dec	2001 Jan-Jun	2001 Jul-Dec	Total for four years
Estimated costs by six-month periods										
1100	Project personnel	52,000	52,000	52,000	52,000	52,000	52,000	52,000	52,000	416,000
1200	Consultants	16,000	16,000	14,000	14,000	14,000	14,000	9,100	9,100	106,200
1300	Administrative support (UNU)	3,000	3,000	3,250	3,250	3,000	3,000	3,250	3,240	24,990
1600	Travel	62,400	41,600	54,600	36,400	46,800	31,200	43,200	28,800	345,000
2100	Sub-contracts									
2110	Amazonia	128,275	100,275	107,275	107,275	87,675	87,675	104,010	69,340	791,800
2120	China	102,350	88,350	91,000	91,000	49,950	49,950	53,820	35,880	562,300
2130	East Africa	132,975	83,975	99,600	99,600	48,775	48,775	56,160	37,440	607,300
2140	Papua New Guinea	74,029	64,029	78,530	78,530	58,054	58,054	52,665	35,110	499,000
2150	West Africa	183,920	66,920	92,920	92,920	58,225	58,225	57,462	38,308	648,900
2160	ANU, NYBG, UEA	72,550	72,550	72,550	72,550	72,550	72,550	72,550	72,550	580,400
3100	Fellowships	8,750	8,750	8,750	8,750	8,750	8,750	10,500	7,000	70,000
3200	Group training	5,000	5,000	10,000	10,000	10,000	10,000	12,000	8,000	70,000
3300	Meetings/Conferences	55,000	55,000	92,500	92,500	36,000	24,000	157,500	67,500	580,000
4100	Expendable equipment	4,500	0	4,500	0	2,000	0	0	0	11,000
4200	Non-expendable equipment	20,500	0	2,000	0	0	0	0	0	22,500
5200	Reporting costs	2,500	2,500	7,250	7,250	2,500	2,500	3,950	33,950	62,400
5300	Contingency/reserve	21,750	21,750	31,900	31,900	140,805	140,805	94,100	94,100	577,110
	Managed by UNU, half-yearly:	945,499	681,699	822,625	797,925	691,084	661,484	782,267	592,318	5,974,900
	Annual		1,627,198		1,620,549		1,352,568		1,374,585	5,974,900
6000	Project support (UNEP)	16,350	16,350	16,500	16,500	14,000	14,000	21,350	21,350	136,400
6500	Evaluation costs	0	0	0	15,000	0	0	0	50,000	65,000
	Managed by UNEP :	16,350	16,350	16,500	31,500	14,000	14,000	21,350	71,350	201,400

Annex 11b.
Disbursement Plan (six-monthly) by Activity Groups

b. **People, Land Management and Environmental Change**

Disbursement Plan (six-monthly)
(US dollars)

Project No.:
Executing Agency: United Nations University
Project commencing: 1 January 1998
Project ending: 31 December 2001

Amounts presented by Activity Categories

Estimated costs by	1998		1999		2000		2001		Total for
six-month periods	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	four years
Activity categories									
Demonstration sites	139,485	92,675	120,580	120,580	123,930	123,930	117,592	89,228	928,000
Biodiversity assessment	95,248	65,112	71,180	71,180	18,535	18,535	6,566	6,044	352,400
Participatory rural appraisal	79,884	55,376	60,130	60,130	14,580	14,580	5,452	4,968	295,100
Outreach & experimental work	98,965	70,428	79,197	79,197	65,772	65,772	63,882	44,288	567,500
Reports, workshops on models	20,918	14,582	25,775	25,775	45,825	45,825	54,140	48,760	281,600
Capacity strengthening	119,800	90,950	105,375	105,375	135,525	135,525	121,220	97,030	910,800
Networking and dissemination	137,125	114,100	156,113	156,112	105,188	105,188	180,625	161,250	1,115,700
Coordination and planning	187,095	158,455	143,925	143,925	126,930	126,930	129,640	119,510	1,136,410
Subtotal :	878,520	661,678	762,275	762,274	636,284	636,284	679,117	571,078	5,587,510
Project support (UNU)	66,979	20,021	60,350	35,650	54,800	25,200	103,150	21,240	387,390
Managed by UNU, half-yearly:	945,499	681,699	822,625	797,924	691,084	661,484	782,267	592,318	5,974,900
Annual :		1,627,198		1,620,549		1,352,568		1,374,585	
Monitoring and evaluation	0	0	0	15,000	0	0	0	50,000	65,000
Project support (UNEP)	16,350	16,350	16,500	16,500	14,000	14,000	21,350	21,350	136,400
Total managed by UNEP :	16,350	16,350	16,500	31,500	14,000	14,000	21,350	71,350	201,400
Grand total, half-yearly :	961,849	698,049	839,125	829,424	705,084	675,484	803,617	663,668	6,176,300
Annual :		1,659,898		1,668,549		1,380,568		1,467,285	

People, Land Management and Environmental Change

	Amazonia		China		E. Africa		PNG		W. Africa		Cr. Country		Total		UNU		Grand Total	
	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec
1998																		
Demonstration sites	20,104	15,796	21,087	17,963	27,206	17,394	15,255	12,995	43,333	16,027	12,500	12,500	139,485	92,675				
Biodiversity assessment	10,920	8,580	16,740	14,260	23,333	14,918	9,720	8,280	24,535	9,075	10,000	10,000	95,248	65,112				
Participatory rural appraisal	8,120	6,380	15,336	13,064	13,268	8,483	9,450	8,050	22,710	8,400	11,000	11,000	79,884	55,376				
Outreach and experimental wor	25,536	20,064	13,365	11,385	19,947	12,753	9,900	8,433	19,717	7,293	10,500	10,500	98,965	70,428				
Reports, workshops on models	1,680	1,320	1,620	1,380	1,068	683	6,615	5,635	6,935	2,565	3,000	3,000	20,918	14,583				
Capacity strengthening (training	30,940	24,310	11,772	10,028	9,682	6,318	8,586	7,314	24,820	9,180	33,800	33,800	119,800	90,950				
Networking and dissemination	21,112	16,588	11,178	9,522	15,067	9,633	8,708	7,418	16,060	5,940	65,000	65,000	137,125	114,101				
Coordination and planning	9,576	7,524	11,880	10,120	22,570	14,430	6,318	5,382	25,003	9,248	111,750	111,750	187,097	158,454				
	127,988	100,562	102,978	87,722	132,340	84,611	74,551	63,507	183,113	67,727	257,550	257,550	878,520	661,678	66,979	20,021	945,499	681,699
Total		228,550		190,700		216,950		138,058		250,840		515,100		1,540,198		87,000		1,627,198
1999																		
Demonstration sites	17,950	17,950	19,525	19,525	22,300	22,300	24,125	24,125	22,680	22,680	14,000	14,000	120,580	120,580				
Biodiversity assessment	9,750	9,750	15,500	15,500	17,625	17,625	11,000	11,000	10,805	10,805	6,500	6,500	71,180	71,180				
Participatory rural appraisal	7,250	7,250	14,200	14,200	10,875	10,875	8,750	8,750	9,055	9,055	10,000	10,000	60,130	60,130				
Outreach and experimental wor	22,800	22,800	11,875	11,875	16,350	16,350	9,167	9,167	8,505	8,505	10,500	10,500	79,197	79,197				
Reports, workshops on models	1,500	1,500	1,650	1,650	1,250	1,250	3,625	3,625	4,750	4,750	13,000	13,000	25,775	25,775				
Capacity strengthening (training	27,625	27,625	10,900	10,900	8,100	8,100	7,950	7,950	17,000	17,000	33,800	33,800	105,375	105,375				
Networking and dissemination	11,850	11,850	10,350	10,350	12,350	12,350	8,063	8,063	11,000	11,000	102,500	102,500	156,113	156,113				
Coordination and planning	8,550	8,550	7,000	7,000	10,750	10,750	5,850	5,850	9,125	9,125	102,650	102,650	143,925	143,925				
	107,275	107,275	91,000	91,000	99,600	99,600	78,530	78,530	92,920	92,920	292,950	292,950	762,275	762,275	60,350	35,650	822,625	797,925
Total		214,550		182,000		199,200		157,059		185,840		585,900		1,524,549		96,000		1,620,549
2000																		
Demonstration sites	16,400	16,400	14,975	14,975	16,000	16,000	22,875	22,875	13,680	13,680	40,000	40,000	123,930	123,930				
Biodiversity assessment	0		1,875	1,875	375	375	2,350	2,350	1,335	1,335	12,600	12,600	18,535	18,535				
Participatory rural appraisal	0		3,900	3,900	375	375	500	500	805	805	9,000	9,000	14,580	14,580				
Outreach and experimental wor	22,800	22,800	8,625	8,625	10,850	10,850	9,167	9,167	6,330	6,330	8,000	8,000	65,772	65,772				
Reports, workshops on models	1,450	1,450	1,500	1,500	875	875	2,000	2,000	3,000	3,000	37,000	37,000	45,825	45,825				
Capacity strengthening (training	27,625	27,625	10,850	10,850	5,550	5,550	7,250	7,250	15,950	15,950	68,300	68,300	135,525	135,525				
Networking and dissemination	10,850	10,850	5,675	5,675	11,350	11,350	8,063	8,063	11,000	11,000	58,250	58,250	105,188	105,188				
Coordination and planning	8,550	8,550	2,550	2,550	3,400	3,400	5,850	5,850	6,125	6,125	100,455	100,455	126,930	126,930				
	87,675	87,675	49,950	49,950	48,775	48,775	58,054	58,054	58,225	58,225	333,605	333,605	636,284	636,284	54,800	25,200	691,084	661,484
Total		175,350		99,900		97,550		116,108		116,450		667,210		1,272,568		80,000		1,352,568

People, Land Management and Environmental Change

Procurement (Sub-contracts)

(US dollars)

Codes	Sub-contracts	1998	1999	2000	2001	Total
2110	**Amazonia**					
	Demonstration sites	35,900	35,900	32,800	31,400	136,000
	Biodiversity assessment	19,500	19,500	0	0	39,000
	Participatory rural appraisal	14,500	14,500	0	0	29,000
	Outreach and experimental work	45,600	45,600	45,600	45,500	182,300
	Reports, workshops on models	3,000	3,000	2,900	2,900	11,800
	Capacity strengthening (training)	55,250	55,250	55,250	55,250	221,000
	Networking and dissemination *	37,700	23,700	21,700	21,600	104,700
	Coordination and plannin	17,100	17,100	17,100	16,700	68,000
	Sub-total Amazonia	228,550	214,550	175,350	173,350	791,800
	* Procurement: Computing equipment valued 14,000					
2120	**China**					
	Demonstration sites	39,050	39,050	29,950	28,750	136,800
	Biodiversity assessment	31,000	31,000	3,750	450	66,200
	Participatory rural appraisal	28,400	28,400	7,800	800	65,400
	Outreach and experimental work	24,750	23,750	17,250	15,150	80,900
	Reports, workshops on models	3,000	3,300	3,000	6,500	15,800
	Capacity strengthening (training)	21,800	21,800	21,700	21,700	87,000
	Networking and dissemination	20,700	20,700	11,350	11,350	64,100
	Coordination and planning *	22,000	14,000	5,100	5,000	46,100
	Sub-total China	190,700	182,000	99,900	89,700	562,300
	* Procurement: Office and laboratory equipment valued 7,000					
2130	**East Africa**					
	Demonstration sites	44,600	44,600	32,000	28,900	150,100
	Biodiversity assessment	38,250	35,250	750	550	74,800
	Participatory rural appraisal	21,750	21,750	750	250	44,500
	Outreach and experimental work	32,700	32,700	21,700	19,600	106,700
	Reports, workshops on models	1,750	2,500	1,750	5,700	11,700
	Capacity strengthening (training) *	16,200	16,200	11,100	11,100	54,600
	Networking and dissemination	24,700	24,700	22,700	22,500	94,600
	Coordination and planning *	37,000	21,500	6,800	5,000	70,300
	Sub-total East Africa	216,950	199,200	97,550	93,600	607,300
	* Procurement: Minor field and lab/office uipment valued 24,500					

People, Land Management and Environmental Change

Budget Allocations - GEF Funds

(US dollars)

		Calendar Year				
		1998	1999	2000	2001	Total
A. Budget allocations, by object of expenditure						
1100	Project personnel	104,000	104,000	104,000	104,000	416,000
1200	Consultants	32,000	28,000	28,000	18,200	106,200
1300	Administrative support	6,000	6,500	6,000	6,490	24,990
1600	Travel	104,000	91,000	78,000	72,000	345,000
2100	Sub-contracts (regional clusters)					
2110	Amazonia	228,550	214,550	175,350	173,350	791,800
2120	China	190,700	182,000	99,900	89,700	562,300
2130	East Africa	216,950	199,200	97,550	93,600	607,300
2140	Papua New Guinea	138,058	157,059	116,108	87,775	499,000
2150	West Africa	250,840	185,840	116,450	95,770	648,900
2160	ANU, NYBG, UEA (cross-country coord.	145,100	145,100	145,100	145,100	580,400
3100	Fellowships	17,500	17,500	17,500	17,500	70,000
3200	Group training	10,000	20,000	20,000	20,000	70,000
3300	Meetings/Conferences	110,000	185,000	60,000	225,000	580,000
4100	Expendable equipment	4,500	4,500	2,000	0	11,000
4200	Non-expendable equipment	20,500	2,000	0	0	22,500
5200	Reporting costs	5,000	14,500	5,000	37,900	62,400
5300	Contingency/reserve	43,500	63,800	281,610	188,200	577,110
6000	UNEP participation costs	32,700	33,000	28,000	42,700	136,400
6500	Evaluation costs	0	15,000	0	50,000	65,000
TOTAL, by object of expenditure		**1,659,898**	**1,668,549**	**1,380,568**	**1,467,285**	**6,176,300**
B. Budget allocations, by activity categories						
Demonstration sites		232,160	241,160	247,860	206,820	928,000
Biodiversity assessment		160,360	142,360	37,070	12,610	352,400
Participatory rural appraisal		135,260	120,260	29,160	10,420	295,100
Outreach and experimental work		169,393	158,394	131,543	108,170	567,500

SIX-MONTHLY PROJECT EXPENDITURE ACCOUNTS FOR THE YEAR _____
presented by Object of Expenditure

Six-monthly project statement of budget allocation, expenditure and balance (expressed in US$)
covering the period from _____ to _____

Project No.: Agency name: United Nations University

Project title: People, Land Management and Environmental Change (PLEC)

Project commencing: 1 January 1998 Project ending: 31 December 2001

	Project budget allocation for year ----	Total disbursed for ---- (six months)	Total unliquidated obligations *	Cumulative expenditure for year ----	Unspent balance of bdgt allocation for year ----
Object of expenditure	(1)	(2)	(3)	(4)	(1) - (4)
1100 Project personnel					
1200 Consultants					
1300 Administrative support					
1600 Travel					
2100 Sub-contracts					
2110 Amazonia					
2120 China					
2130 East Africa					
2140 Papua New Guinea					
2150 West Africa					
2160 ANU, NYBG, UEA					
3100 Fellowships					
3200 Group training					
3300 Meetings/Conferences					
4100 Expendable equipment					
4200 Non-expendable equipment					
5200 Reporting costs					
5300 Contingency/reserve					
TOTAL					

* See breakdown of unliquidated obligations in Annex 13, Appendix 2.

Signed: _____
Director of Administration
United Nations University

SIX-MONTHLY FINANCIAL STATEMENTS REPORTING UNLIQUIDATED OBLIGATIONS

Project title: People, Land Management and Environmental Change (PLEC)

Agency name: United Nations University

Unliquidated obligations during _____
(period covered)

Expressed in US$

UNEP	Abbreviated	Period	UNEP	Object of expenditure codes																
project No	Title	covered	allocation	1100	1200	1300	1600	2110	2120	2130	2140	2150	2160	3100	3200	3300	4100	4200	5200	5300	6500	Total
xxxxx	PLEC	Jan-Jun 1998																				
		Jul-Dec 1998																				
		Jan-Jun 1999																				
		Jul-Dec 1999																				
		Jan-Jun 2000																				
		Jul-Dec 2000																				
		Jan-Jun 2001																				
		Jul-Dec 2001																				
TOTAL				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

Methodology to be used

5. PLEC has up-dated an Annex on Methodology, based on experience to date, and adds a commissioned consultancy paper on appropriate methodologies of biodiversity and agrodiversity assessment, already made available to Clusters when it was written, in 1995 (Annexes 8a, 8b). In practice, methodologies will include the best elements of 'Participatory Learning and Action' (PLA), standard field assessments of biodiversity, mapping, measurement and experiment. The demonstration sites are on farmers' land. PLEC will also use standard monitoring techniques of variables such as labour inputs, soil quality, plant growth, gender participation, rural livelihoods and so on. A methodology matrix prepared by the China Cluster, as an example of the strategies being developed on demonstration Sites, which was placed in Annex 4 in the Project Brief, is now included within Annex 8a.

6. Each Cluster will have its own target variables, appropriate to the local immediate issues. Fully standardized methodologies have been considered, but rejected as too restrictive. A major task for the project in its first year will be the harmonization of demonstration site practices and aims between the different regions.

7. In regard to its scope, the project concentrates upon the analysis and demonstration of successful local (indigenous and adapted) technologies for the management of production, land and biodiversity. Existing practices involve trade-offs between sometimes conflicting objectives. One of PLEC's objectives is to understand these trade-offs, in order to recommend the dissemination of strategies and management practices, and possible uptake in new areas. PLEC is not directly involved in the testing of wholly new strategies, but will participate with its agricultural-support-service partners in devising best-bet strategies and proposing ways in which they may be tested and introduced in the longer term (i.e. beyond project life). However, PLEC is already engaging in the testing and introduction of adapted strategies (in Amazonia, Ghana and China) to show the potential for harmonization of indigenous and externally-verified strategies to support rural livelihoods and biodiversity. PLEC participants plan to initiate replicability trials in close involvement with line agencies to continue their work.

8. In regard to methodological diversity, one of PLEC's strengths is the diversity of regions and cultures involved, enabling analysis of appropriate policy environments, as well as economic and environmental conditions for successful adoption of biodiversity-protective practices. This means, in effect, a diversity of partners. Examples are: in Amazonia with rural unions, in PNG with the national agricultural research institute, in China with the Provincial and local authorities, in Tanzania with the Ministry of Agriculture and the national soil survey, and in Ghana with village chiefs and farmers, NGO and ministry partners (Annexes 6a and 7a).

Project management.

9. During appraisal, detailed discussions have been held between UNEP and UNU to ensure all implementation and financial management modalities are put in place. UNU, as the Executing Agency, will manage the network from its Tokyo Headquarters. A full-time Managing Coordinator will be assigned for day-to-day management of the project, and will work in close cooperation in the PLEC Management Group with the regional Cluster Leaders, the Academic Officer (Environment) who has charge of the project, the Scientific Coordinator and two Deputy Coordinators. The Scientific Coordinator and the Deputy Coordinators have both topical responsibilities and responsibilities based on geographical regions, in which they are expected to take a lead in coordinating the project. Effective project management will also require regular supervision missions by UNU personnel, the Coordinators and specially-appointed scientific advisors. This is now described in paragraphs 28 to 32 of the Project Document. Detailed job descriptions, terms of reference and an institutional framework for all collaborating entities are now presented in Annexes 3a, 3b and 3c.

Japan

Comments on the Proposed Intersessional Work Program 1/31/97

A5 People, Land Management and Environment Change (PLEC)

PLEC is a unique multidisciplinary project based on the network of researchers and, in part, administrators from both developed and developing countries and we appreciate that this project is consciously designed in accordance with the intent of the Biodiversity Convention.

We strongly hope that utmost care will be taken in the executing process to ensure that the project is aimed to address itself to the preservation of biodiversity, building on the mandates of the Convention, and that it would not be too biased towards research in the area of agriculture *per se*, let alone specializing in promotion of agriculture.

B7 Egypt:Energy Efficiency Improvements and Greenhouse Gas Reduction

We have the following inquiry with regard to the baseline calculation of incremental cost (para.3 of Annex 1). That is, why would Egypt's energy consumption per unit of GNP be assumed to remain constant ("roughly double that of comparable economies in the region"), when *dual* pricing adjustments of the domestic fuel prices (to the import parity prices) and of the wholesale prices of the electricity (to the LRMC) have taken place in recent years.

Two kinds of economic adjustments should be distinguished in response to such pricing changes, i.e., almost *instant* decreases in excessive consumption and *gradual* adjustment associated with adjustments in relevant machines and equipment over years. The latter effect has yet to be exhausted, which would presumably decrease the Egyptian energy consumption per unit of GNP. This effect should be properly taken into consideration:Otherwise, the effect of the GEF project might be overestimated in, e.g., subsequent monitoring and assessment exercises.