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PLEC NEWS AND VIEWS

No. 3 – July 1994

A Newsletter of the United Nations University Project of Collaborative Research on Population, Land Management and Environmental Change (PLEC

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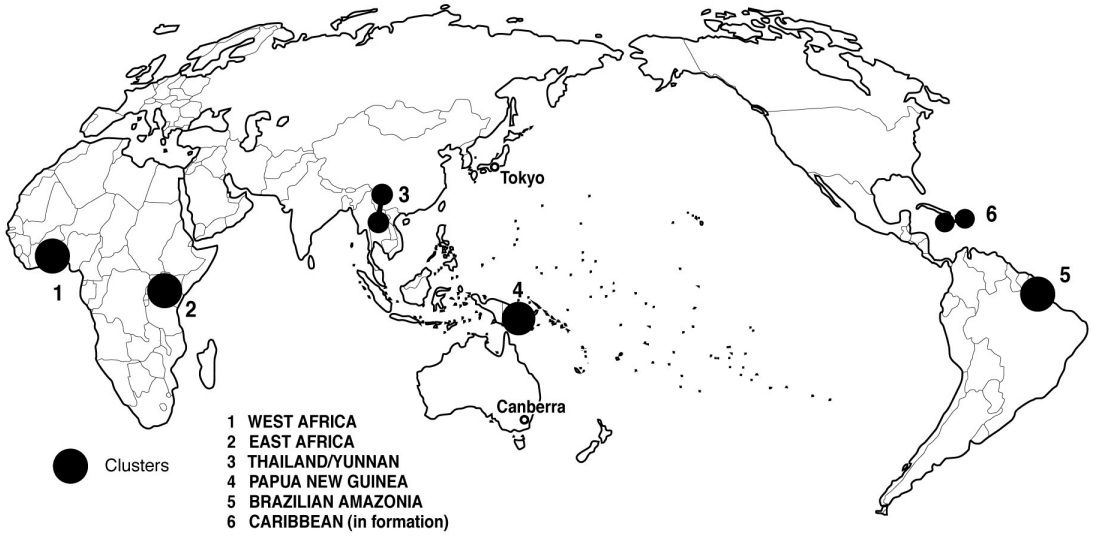

The clusters of PLEC

PLEC NEWS AND VIEWS *NO. 3, JULY 1994*

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P L E C N E W S A N D V I E W S

No.3, JULY 1994

POPULATION, LAND MANAGEMENT AND ENVIRONMENTAL CHANGE (PLEC)

This issue is devoted principally to the Chiang Mai meeting. Most information from the clusters is held over to the following issue. In addition to a report on the meeting, which follows, the text of the 'keynote' paper by Brookfield is also printed in full in this issue.

The group, and the ladies only, at Mae Rid Pagae on 1 June 1994

From top left: 1. Pitakwong, Uitto, Gyasi and Tumuhairwe talking to Karen farmers; 2. Uitto, Guo, Padoch, Shrestha and Brookfield stand against a house clad in *Macaranga* leaves; 3. Looking at wet-rice and swidden fields; 4. A Karen couple weeding a mixed-crop field; 5. Some of us (Stocking, McGrath, Sem and Kiome) went to the field in style.

Photographs on this page and on page 1 are by Juha Uitto and Harold Brookfield, or by others using their cameras. We are amateur photographers, and apologize for the low quality of the few printed here. If other members can supply good and contrasted bromide prints, I will be very pleased to include them (or a selection) in Plec *News and Views* 4, which hopefully will appear before the end of 1994. (HB)

REPORT ON THE CHIANG MAI MEETING BY THE EDITOR

PLEC held its first General Meeting from 30 May to 3 June 1994 in the Faculty of Agriculture at Chiang Mai University, Thailand. Those attending the meeting, plus guests and observers for all or part of the time, are listed at the foot of this report. On the first, open day of the meeting, 38 people were present. All 22 PLEC members who had been invited from outside Thailand, participated, together with potential leaders or members of two possible additional groups, and a representative from the former cluster in Nepal. The full expenses of two members were supported by the United Nations Environment Programme. The fares of three others were paid through their attendance at the Steering Committee meeting on South-South Cooperation on Environmentally Sound Socio-Economic Development in the Humid Tropics, organized by UNESCO in cooperation with UNU and the Third World Academy of Sciences. A short report on that meeting, which immediately preceded the meeting of PLEC, appears below. This assistance, which offered considerable relief to the project budget, is gratefully appreciated.

By universal agreement, the meeting was very successful in advancing the project. With those present including a majority from developing countries, we exchanged ideas and information, and came together socially during the conference, in the field, during evening occasions and, more informally, during several visits to the Chiang Mai 'night market'.

On the Sunday before the meeting began, the Coordinators and the Scientific Advisory Group met to discuss the known 1994-1995 budget and plans for its use, the role of the Scientific Advisors, the information available on cluster research plans, and a number of other issues. It was decided that, while the meaning of 'regional research clusters' needed to be clearly defined, the term 'cluster` was preferred to any alternative. It was also agreed that the advisors should offer advice, but not directives. The intention to review research proposals before the meeting could not be implemented in full, as in some cases only drafts were available, final papers being brought to the meeting by cluster leaders or their representatives. The state of the applications for major funding was discussed, together with fall-back proposals, and the possibility of seeking regional funding from European, American and Japanese sources. It was agreed to present this information to cluster leaders. The meeting closed about 3 p.m. By Sunday evening, all those attending the meeting had arrived.

The First Day

Only the initial session was formal in nature, with welcome addresses by the Dean of Agriculture at Chiang Mai University, Dr Pongsak Angkasith, and the Co-Coordinator, Juha Uitto, for UNU. This was followed by the only formal paper presented at the meeting, by the Scientific Co-Coordinator, Harold Brookfield - an event slightly marred by the loss that day of a large part of his voice. Some controversial remarks led, nonetheless, to a lively discussion, which is reflected in the amended version of this paper which is printed below at p.22. The rest of the first day, until 4 p.m., was spent in short informal presentations on the cluster areas themselves, the work done by each group up to date, and the nature of the central problems perceived by each cluster. The order of presentation was from west to east, beginning in West Africa and ending in Amazonia. One, two or three members from each cluster spoke, and there was lively debate.

At the end of the afternoon the Coordinators and the Scientific Advisory Committee met with cluster and sub-cluster

leaders. The precarious financial situation and prospects were candidly presented and, by agreement, copies of the most recent project statement submitted to UNEP were made for all present. Clusters were urged to develop fall-back positions for funding of their own research, in the event that UNU funding has to be used almost wholly for networking. It was noted that clusters might most appropriately approach foundations and selected bilateral donors.

There was discussion of the need to enhance the training component of PLEC, and to develop a policy in regard to student funding. Sources for fellowships to developing-country students should be identified, including the Third World Academy of Sciences, and the UNU Training and Fellowships Programme. Students linked with PLEC in Universities of the North will, however, mostly have to rely on domestic scholarships. Even the somewhat disquieting financial information failed to dampen spirits seriously, and they were raised again during an excellent reception which followed at the Holiday Garden Hotel, where all participants were staying.

The Second and Third Days

These two days were devoted to a field excursion, to one of the selected sites of the Thailand sub-cluster, the Karen village of Mae Rid Pagae in Mae Hong Son Province, some 170 km from Chiang Mai. Readers will recall a discussion of this village in its wider context by Kanok and Benjavan Rerkasem, in *PLEC News and Views* no.1, at pages 17-18. Leaving soon after 8 a.m., we travelled first to the District centre where the development programme was described to us by local officials, then, in a small fleet of 4-wheel drive vehicles, over the hills to Mae Rid Pagae, where the village and its land use were described to us by the headman and others. Returning to the main road we then continued to the small town of Mae Sariang, where we spent the night and enjoyed an excellent group meal in a local restaurant.

Being very fortunate with the weather, we were able to spend most of the next day at Mae Rid Pagae. An extended stop in a formerly swidden area now under semi-permanent cultivation, with new wet-rice fields, occupied much of the morning. Local guides gave us a great deal of information. After an excellent lunch provided by the village we divided into two groups, some visiting the village and talking with the Karen people, while others returned to a large old-established area of wet rice viewed on the way into the village, crossed this area and entered the secondary bush at the top of a side valley. After the whole group was reluctantly reassembled, we returned to Chiang Mai, arriving just after dark.

Problems of growing population, land-tenure insecurity and also inequality, modernization and commercialization of farming, introduction of craft industry, and the rapid transformations taking place, dominated what we heard and saw. Commercialization is leading to loss of crop diversity, but although farming is now semi-permanent, with only short fallows under grass or *Chromolaena spp.* in the lower areas, there are still swiddens in the uplands. However, yields are reported to have improved in consequence of fertilization and use of clean-weeding. Almost all forest is now modifed by human activity, and there is quite extensive extraction of wood and other products from the secondary bush close to the fields. Soils are not highly sensitive to erosion, even though many fields are on steep slopes. However, rills were seen between up-and-down-slope rows of the recently-introduced cabbages. There are some contour strips of *vetiver* grass, but principally close to the road where they can be seen by visiting officials. We were too large a group to conduct any sort of integrated assessment, however**,** and each specialist saw his or her own view of the village, its lands and its problems. The excursion was excellently organized, and the fine weather enabled us

to see a lot of a very beautiful area. Had we come a week later, when rain spread inland across northern mainland Southeast Asia from a cyclone in the South China Sea, it might have been a different story!

The Fourth and Fifth Days

These two days, back in Chiang Mai, were devoted to the presentation of new proposals by cluster groups, discussion of these proposals, and of issues which arose around them. To take advantage of the excursion, we began with the Thailand and Yunnan cluster, discussion of which occupied the whole morning. In the afternoon, we reviewed plans of both West and East African groups, going on next morning to presentations on Papua New Guinea and Brazilian Amazonia. The later presenters had the experience of their predecessors to draw on in presenting integrated plans. Everyone ended with a fairly clear idea of what needs to be done. In a set of free exchanges a number of critical comments were offered to cluster groups. At one point, Brookfield was pressed to define 'agrodiversity' and, eventually, settled for the one provided in the project document, which reads:

> By this term, we mean the very many ways farmers have developed to exploit the dynamic natural diversity of the biosphere, with greater or lesser success, and more specifically the maintenance of both biotic and management diversity within agroecosystems, responding to natural ecosystem diversity and dynamics.[1]

On the final afternoon we first heard a presentation from one of our guests, Professor Elizabeth Thomas-Hope of the Centre for Development and Environment at the University of the West Indies, on a possible cluster based mainly in Jamaica and the Dominican Republic. This was followed by Dr Nani Djuangsih of the Centre for Environmental Studies at Padjajaran University, Bandung, Indonesia, on the potential for a cluster in Java. Third, we had a presentation from Suganda Shrestha of Nepal on the International Centre for Mountain Research and Development (ICIMOD) and its work. There was then a brief concluding discussion in which the fact that this is a research project with an applied purpose was again stressed. A strong invitation to hold the next meeting in Kenya was extended by members of the East African cluster. Thanks were then most warmly offered to the conference organizers and the meeting closed. Some participants had to leave that night, but the 17 of us remaining hosted five of our Thai colleagues at a northern Thai dinner held in a beautifully located restaurant just outside town.

Together with those cluster leaders or representatives who remained, the Coordinators and SAG met again on Saturday morning, to review the next steps to be taken. These have all since been confirmed by fax. The meeting also strongly confirmed the policy that clusters should remain groups of individuals, and that there should be no institutional contracts, with any specific organizations, to conduct research for PLEC. This policy is distinct from agreement that research -support contracts, with the institutions in which principal cluster members are based, will become necessary in many cases. There was further discussion of the search for cluster-specific funding, and an offer by Michael Stocking to contact ODA, SIDA and SAREC was gratefully received.

There was also some discussion of the special number of *Global Environmental Change.* Following several requests received by Brookfield at the meeting an

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[1] Since the meeting a fuller discussion has appeared in print: Harold Brookfield and Christine Padoch, 'Appreciating agrodiversity: a look at the dynamics and diversity of indigenous farming practices', *Environment* 36(5), June 1994:6A 1, 37-45. Complimentary copies or reprints will reach many (but regrettably riot all) members of PLEC as soon as they are available.

ultimate extended deadline was offered, and this has since been confirmed to all authors. Both this and the fourth issue of *PLEC News and Views will* be devoted in large part to the meeting and its outcomes, and this general report by Brookfield in the present issue will, hopefully, be followed by comment from clusters in the next issue.

Some Outcomes of the Meeting

Bringing together of the network was a major outcome of the meeting, and a unanimous wish was expressed to conduct project networking on a more frequent basis than has been proposed in the earlier documents. Thus it was strongly urged that there should be a second, half-way, general meeting in two years' time, rather than only one further general meeting at the end of the project as originally proposed. Also it was urged that the 'field meetings' proposed be largely or wholly replaced by a programme of individual visits occupying two or more weeks, by one or two persons, visiting other clusters. The scale of such a programme clearly depends on funding, but scientific visits by developing country participants to other clusters could, if necessary, very probably also be arranged on the basis of specific grants to clusters themselves. They should clearly form part of any programme of South-South cooperation.

Second, the point that the central aim of the project is the development of a framework for the analysis of sustainability, especially of biodiversity, within agrodiversity, was well accepted, but with the recognition that our aim is a framework rather than any single methodology. The latter would be the antithesis of the diversity which we stress. Analysis of sustainability raises important questions that have to be debated more fully within the project. Different views presently obtain, and this is fruitful. They should become an object for discussion in the pages of this Newsletter. Cluster objectives concern the specific management problems of their own areas, and their explanation. Interchange of results and ideas must be a constant activity of PLEC.

PLEC has therefore now acquired a life of its own, especially as a South-South organization with Northern participation. This will have to be reflected in organizational changes that will need to come about as the project matures. The enthusiasm generated at the meeting clearly cannot survive without more funding than we at present enjoy, but this enthusiasm itself should be an important factor in gathering support for the project.

Participants at the Meeting

(Full addresses, fax, telephone and e-mail numbers, where available, can be obtained from Dr J.I. Uitto, Academic Division, United Nations University, 53-70 Jingumae 5-chome, Shibuya-ku, Tokyo 150, Japan. Fax: +81 - 3 - 3499 2828. E-mail: *program%jpnunu00.bitnet@pucc.princeton.edu* or *program%jpnunu00.bitnet@mitvma.mit.edu;* Telex 61351)

PLEC AS A WHOLE

Dr Juha Uitto, Academic Division, UNU, Tokyo, Japan.
Dr Harold Brookfield, Anthropology, The Australian National University, Canberra, Australia
Dr Janet Momsen, Geography, University of California, Davis, USA
Dr Christine Padoch, Institute of Economic Botany, New York Botanical Garden, Bronx, USA
Dr Michael Stocking, Development Studies, University of East Anglia, Norwich, UK

WEST AFRICA

Dr Edwin Gyasi, Geography, University of Ghana, Ghana
Dr Elizabeth Ardayfio-Schandorf, Geography, University of Ghana, Ghana
Dr Lewis Enu-Kwesi, Botany, University of Ghana, Ghana

EAST AFRICA

Dr Romano Kiome, Soil Science, Kenya Agricultural Research Institute, Kenya
Ms Loise Wambuguh, Socio-Economic Research, Kenya Agricultural Research Institute, Kenya
Mr Francis Kahembwe, Forest Research, Kampala, Uganda
Ms Joy Tumuhairwe, Soil Science, Makerere University, Uganda

THAILAND

Dr Kanok Rerkasem, Agricultural Systems, Chiang Mai University, Thailand
Dr Benjavan Rerkasem, Agricultural Systems, Chiang Mai University, Thailand
Dr Ramphaiphun Apichatpongchai, Agricultural Systems, Chiang Mai University, Thailand
Dr Benchapun Shinawatra, Agricultural Systems, Chiang Mai University, Thailand
Dr Chusri Trisonti, Agricultural Systems, Chiang Mai University, Thailand
Ms Nithi Thaisantad, Highland Coffee Research, Chiang Mai University, Thailand
Ms Laxmi Worachai, Agricultural Systems, Chiang Mai University, Thailand
Ms Jamree Pitakwong, Sociology and Anthropology, Chiang Mai University, Thailand
Mr Nasit Yimyam, Highland Coffee Research, Chiang Mai University, Thailand
Ms Nanako Nakada, Graduate Student in Human Ecology, University of Tokyo, Japan

YUNNAN, CHINA

Mr Guo Huijun, Ethnobotany, Kunming Institute of Botany, CAS, Kunming, China
Mr Dao Zhiling, Ethnobotany, Kunming Institute of Botany, CAS, Kunming, China
Prof. Xu Zaifu, Botany, Xishuangbanna Tropical Botanical Garden, Menglun, Xishuangbanna, China

PAPUA NEW GUINEA

Dr Graham Sem, Biogeography, University of Papua New Guinea, Port Moresby, Papua New Guinea
Dr Geoff Humphreys, Land Management, The Australian National University, Canberra, Australia
Prof. Ryutaro Ohtsuka, Human Ecology, University of Tokyo, Japan
Dr Tsukasa Inaoka, Public Health, Kumamoto University, Kumamoto, Japan

AMAZONIAN BRAZIL

Dr E. Adilson Serrão, Research Agronomy, Empresa Brasiliera de Pesquisa Agropecuária, Belém, Pará, Brazil
Dr David McGrath, Altos Estudos Arnazônicos, Universidade Federal do Pará, Belém, Pará, Brazil
Dr Mario Hiraoka, Geography, Museu Goeldi, Belém, Pará, Brazil and Millersville University, USA

GUESTS AND OBSERVERS

Dr Elizabeth Thomas-Hope, Environment and Development, University of the West Indies, Mona, Kingston, Jamaica
Dr Nani Djuangsih, Institute of Ecology, Padjajaran University, Bandung, Indonesia
Mr Suganda Shrestha, Sustainable Mountain Agriculture, International Centre for Integrated Mountain Development, Kathmandu, Nepal
Dr Miguel Clüsener-Godt, Ecological Sciences, UNESCO, Paris, France
Dr Thomas Enters, Policy Development, Centre for International Forestry Research, Bogor, Indonesia
Dr David Thomas, The Ford Foundation, Bangkok, Thailand

THE SOUTH-SOUTH MEETING

The Steering Committee meeting of the South-South Cooperation Programme for Environmentally Sound Socio-Economic Development in the Humid Tropics took place immediately before the PLEC meeting, and was of significance to us. In addition to Juha Uitto who was co-organizer with Miguel Clüsener-Godt of UNESCO, it was attended by four other members of PLEC, Benjavan Rerkasem as local organizer, Harold Brookfield, Edwin Gyasi and Tsukasa Inaoka. Miguel Clüsener-Godt stayed on to attend the PLEC meeting as a participating observer.

The Programme has obtained a substantial grant from German sources for work on the management of land resources in the buffer zones of, and adjacent to, Biosphere Reserves and other natural reserves not presently within the UNESCO Biosphere Reserve network. Most discussion concerned this project, and its organization. However, some additional topics were also proposed, one of which was 'Wetland Management Systems (e.g. chinampas, camellones, ridged fields, sawah, várzea)'.

The relationship to PLEC was recognized, and in the record of the meeting the second paragraph reads:

> Given the convergence of interests and complementarity of approaches between the South-South Cooperation Programme and the UNU collaborative research programme on Population, Land Management and Environmental Change (PLEC), the two programmes will establish continuous and close collaboration in exchange of experiences, publications and research results. Coordination of meetings will be sought, and organization of joint workshops envisaged.

While much of PLEC research is remote from natural reserve areas, except those mainly-small areas forming part of community resource-management systems, some of the proposed work discussed at the PLEC meeting was quite close to the South-South Programme proposals. A particular case in point was the proposal for research on the margins of the Mount Elgon reserve in Uganda, described to us by Francis Kahembwe. There were also others. Clearly, we shall build on these connexions, which could become very productive.

Also of importance was discussion on training activities, in collaboration with the Third World Academy of Sciences. Possibilities included the exchange of researchers between project areas. More significantly, some fellowships exist for Third World exchange of postgraduate students of environmental resource management, for exchange of expertise, including visiting professors and scholars. In the discussion, particular mention was made of international environmental programmes already offered, or planned, in the Agricultural Systems Programme at Chiang Mai University, in the Universidade Federal do Pará, Belém, through UNU/INRA at the University of Ghana. It was agreed that, starting with *PLEC News and Views* no.4, about a page in each issue will be offered to the UNESCO-based programme, and they will reciprocate in their own proposed Newsletter. A statement on PLEC will also be offered to an early number of the Man-and-the-Biosphere Programme newsletter, INFOMAB.

It was agreed also that members of both projects will be supplied with copies of the Newsletters of each. Those readers wishing to know more immediately about the South-South Cooperation Programme should write to Dr Miguel Clüsener-Godt, Division of Ecological Sciences (MAB), UNESCO, 11 Rue Miollis, Paris 75015, France.

OTHER NEWS AND ANNOUNCEMENTS

THE SEARCH FOR FUNDING

A good deal has been happening in this area during and since the Chiang Mai meeting. While we were in Chiang Mai, UNEP put the revised project document which cluster leaders saw to the Inter-Agency Implementation Committee of the GEF. They endorsed it for further consideration, and forwarded the endorsement to the GEF Council, which met in Washington on 13-15 July 1994. The Council endorsed UNEP's proposal that PLEC be given Feasibility Study Funding, to prepare a full Project Document for submission to the GEF Council at its meeting either in January or April 1995. The funding is in the sum of US$100 000 and is specifically for this purpose, including general and cluster meetings, travel and meetings by the Coordination group and some cluster leaders, and work on preparation of the report.

This money will come from UNDP, and there is a reasonable chance that it will be available in early September. Clearly, therefore, the Ghana regional meeting described in the next item will become an important planning meeting. I shall now attend this meeting, and will go on to Nairobi after it. The Coordinators and SAG have already had an exchange to decide what could be done if we received this go-ahead, so we have some idea of how the necessary meetings can be arranged. A schedule will be set up as soon as possible. I am, however, awaiting more detail on the nature of the document that we must provide.

There will be a lot of work for all concerned, especially the Coordinators, SAG, and for cluster leaders. This is our big chance of major GEF funding, and is worth a lot of effort. All have now been informed. However, I go to Europe (the Czech Republic, the Netherlands, England) and briefly USA, on a mixed conference-work-family affairs-vacation trip from 15 August returning on 15 September, and back in the office on 16 September. This has all been arranged for some time, and cannot be changed. Hopefully, it will not cause serious delay.

At the same time, we have also made a pre-proposal for co-funding to the MacArthur Foundation, and a response is awaited.

ENLARGEMENT OF PLEC

An enlargement of the West African cluster is likely to follow the meeting below, which will be reported in the next issue. Meanwhile, there have been two further developments since the Chiang Mai meeting.

The Caribbean

Following the exciting presentation given by Elizabeth Thomas-Hope on the final afternoon, the Coordinators and SAG agreed unanimously that she should be asked to form a sixth cluster, based in Jamaica and the Dominican Republic as she proposed. A preliminary contract has been offered, and she plans to form a cluster and an outline programme during the coming few months. This will give us a second cluster in the western hemisphere region and will provide a case area among densely-populated island states. Hopefully, there will be some preliminary material for report in the next issue.

Montane Mainland Southeast Asia

The Thailand sub-cluster, which has an active international MSc (Agricultural Systems) programme, is receiving a growing number of students from Vietnam. This has led them to propose that this cluster, presently operating in northern Thailand and Yunnan, extend its work into Vietnam, and probably form a third sub-cluster in that

country. They have been given the green light to go ahead. At the same time they propose a new name for the whole cluster, shown at the head of this paragraph.

A REGIONAL MEETING IN GHANA, 25-27 OCTOBER

Environment, Biodiversity and Agricultural Change in West Africa

In association with UNU/INRA (Institute for Natural Resources in Africa), a meeting will be held from 25 to 27 October 1994, at the University of Ghana, Legon. The first objective is to disseminate and discuss the findings of the PLEC pilot project of the Ghana cluster. Then, more importantly, the meeting will identify possible strategies for extending PLEC research to other agro-ecological zones in West Africa, and of integrating farmers' groups and other environmental actors and parties into an extended research programme, in a quest for sustainable systems of managing the environment by small farmers under conditions of population and other forms of pressure. It is hoped to be able to sponsor the attendance of about 30 participants from West Africa (Ghana, Burkina Faso, Nigeria, Côte d'Ivoire and Togo), and one member from the East African PLEC cluster. Farmers' representatives from the research sites, and representatives of Government agencies and NG0s will be invited to the meeting. Special funding is being sought for this purpose.

A MEETING IN AMAZONIA

Diversity, Development, and Conservation of the Amazon Floodplain

This is not a PLEC meeting, but a conference that will, however, be attended by all members of the Amazon cluster. It is sponsored by the Conselho Nacional de Pesquisas (CNPq) (National Research Council of Brazil), The New York Botanical Garden and the Wildlife Conservation Society. It will be held from 12-15 December 1994 in Macapá, Amapá, Brazil. All papers being presented by invitation. Anyone seeking further information should write to Christine Padoch, IEB, New York Botanical Garden, Fax: 1-718 220 1029.

AN ENLARGED SAG MEETING IN JAPAN

Before the latest developments arose, Juha Uitto had proposed that the 1995 annual UNU Global Environmental Forum, be devoted to PLEC, and entitled 'Population, Land Management and Environmental Change'. It will be held in Osaka, Japan, on 18 or 19 January 1995. The invited speakers include members of SAG, three cluster leaders or joint leaders from the Asian-Pacific region, and myself. There will therefore be an opportunity for an enlarged SAG meeting to follow it. How this business meeting will now be related to the GEF application remains to be determined.

NEWS ABOUT PEOPLE

Edwin Gyasi, leader of the Ghana cluster, has been promoted to Associate Professor in the University of Ghana, backdated to 1993. Warm congratulations on a well-deserved advance. He returns from New Zealand to Ghana in August, and is visiting Canberra and England on the way.

Geoff Humphreys, of the Papua New Guinea cluster, has moved from Canberra to a Senior Lectureship in Earth Sciences at Macquarie University, Sydney, Australia, and will also become a member of the Montane Mainland Southeast Asia Cluster when there. Recently he attended the 15th World Congress of Soil Science in Acapulco, Mexico (also attended by Romano Kiome), where he presented a paper by Brookfield and himself on 'Evaluating sustainable land management: are we on the right track?' Copies of this paper are being sent to some members of the project.

(cont. on p.32)

PROFILES OF CLUSTER LEADERS

Responses to requests for profiles to print in this Newsletter have consisted more of promises than delivery. Two have been provided, and are printed below. Hopefully, others will provide information by next time!

Amazonian Cluster

E. Adilson Serrão is Principal Leader of this cluster. Born in 1941 at Belterra, Pará Brazil, he is a true Amazonian. After training first in Brazil he received his MSc from the University of Wisconsin in 1968 and his PhD from the University of Florida in 1976, in both cases in agronomy with concentration on pasture development. He has conducted research in Brazil on pasture and animal production, and agroforestry, for some 20 years and is presently the Director of the Centre for Agroforestry Research for the Eastern Amazon (Centre de Pesquisa Agroflorestal da Amazônia Oriental, CPATU), of EMBRAPA (Empresa Brasiliera de Pesquisa Agropecuária), in Belém, Pará, Brazil. He has had wide international involvement in tropical agricultural research, especially in grassland development, and also as a member of a scientific committee of the US National Research Council, for sustainable agriculture and environment in the humid tropics. He is the author or joint author of more than 100 publications in Portuguese, Spanish and English, with growing concentration on agro-silvo-pastoral development. His address is: Director of Research, CPATU/EMBRAPA, Caixa Postal 48, 66000 Belém, Pará Brazil. Fax: +55 91 226 9845/9680.

West African Cluster

Edwin Akonno Gyasi, born in Ghana in 1943, who is leader of the cluster, studied in Ghana and the United States, obtaining his PhD in geography from the University of Wisconsin. He has taught in the University of Ghana, the University of Port Harcourt, Nigeria, and more recently again in the University of Ghana, Legon, where he has recently been appointed Associate Professor. His research interests centre on agricultural change, rural development and sustainable environmental use. He has carried out field work in all the major agro-ecological zones of Ghana, and in the humid forest of southern Nigeria. He has been involved in the Ghana Rural Reconstruction Movement (an NGO) as chairman of its research committee, and led the preparation of an agroforestry baseline and evaluation survey report in 1989-90. He has undertaken work for the World Bank, Unesco, UN Habitat, and Ghana's Environmental Protection Council. During February-August 1994 he has held a Visiting Centennial Fellowship at the University of Canterbury, New Zealand. He has authored more than 30 scientific papers, book chapters and reports. Address: Department of Geography and Resource Development, University of Ghana, Legon, Ghana. Fax: +233 21 775 3061774 338/ 772 621.

The PLEC Special Number of Global Environmental Change, due for appearance in June 1995, must be completed editorially by December. To this end, an extended deadline of 8 August was given to authors for delivery of their Ms. in a form suitable for sending to referees (who have been chosen, and have agreed to act). At the time of going to press not all papers have been received. While every effort will be made to accommodate real difficulties, papers not completed by early-August will not be able to be handled in time.

NEWS FROM THE CLUSTERS

Only two cluster reports, taking the form of planned work over the coming three years, can be printed in this number. Appropriately, the first chosen is the Thailand/Yunnan cluster which hosted the Chiang Mai meeting. The second is the report of the youngest cluster, in East Africa.

THAILAND-YUNNAN CLUSTER

Sustainable Land Use in the Montane Region of Mainland Southeast Asia: the Role of Agrodiversity in Conservation

This is a collaborative research project involving two national interdisciplinary teams. Joint leaders are Kanok Rerkasem (Agroecology, Chiang Mai University), and Guo Huijun (Botany, Kunming Institute of Botany).

Currently there are 6 other members of the Thailand sub-cluster, representing the disciplines of ethnobotany, social science, resource economics, plant nutrition and rural sociology (4 females, 2 males). There are 9 other members of the Yunnan sub-cluster, representing the disciplines of botany, forestry, geography, ecology (7 males, 2 females). Members are drawn from the following institutions: Chiang Mai University and Hilltribe Welfare Division (Thailand); Kunming Institute of Botany, Yunnan Academy of Forestry Science, Xishuangbanna. Botanical Garden, Yunnan Institute of Geography (Yunnan). There is one foreign member, a soil erosion specialist/ geomorphologist from Macquarie University, Sydney, Australia (G.S. Humphreys). A second foreign member may be added. Student members participate in the research.

Background

More than 10 million people live in the montane region of mainland Southeast Asia which extends from the Yunnan Province of China to the Northern Region of Thailand. Ethnic minorities form most of this population, many of which (e.g. Hmong, Yao, Lisu, Lahu, and Akha), have moved from China to settle in Thailand within the last century. Villages and communities have settled on relatively marginal land on slopes at elevations varying from 400 m to 2,000 m. The long history of movement within the region, close to a thousand years, has given a number of shared characteristics between the groups in Yunnan and Northern Thailand. However, certain significant differences have also resulted from major political and economic changes in China and Thailand in the last 50 years.

A list of the similarities would include:

1. a number of common ethnic groups;
2. some parallel agricultural development, notably reduction of shifting cultivation, and expansion of the irrigated wetland rice system;
3. the historical isolation of the area from their respective governments;
4. the marginal nature of mountain resource for agricultural production;
5. policy in both countries designed to integrate the montane region in national economies and social structures.

Major differences are as follows:

1. in Thailand citizenship has been granted to the mountain population only since 1960s. Even now only about half of them have legal status of citizens, whereas the PRC government has long recognized the legal status of the minority groups and set up autonomous ethnic prefectures and counties;
2. in Yunnan different forms of land use right are recognized by the government. The occupation and land use in the mountain of Thailand are actually prohibited by law;
3. population growth is now declining in Yunnan, but in Thailand high rates of increase still prevail;

4. there was a vast difference in political, social and economic changes in the two countries over the last 50 years, with critical implications for development in the montane region.

Although policy changes have been greater in China, with first elimination of landlordism in 1949, then collectivization in 1958, followed by progressive introduction of 'responsibility' approaching individual title between 1978 and 1983, and with substantial immigration of Han people to cultivate rubber on state farms since the 1950s, there have also been major changes in Thailand. In the latter country attempts were first made to resettle shifting cultivators, then there has been a series of projects designed to substitute new cash crops and conservationst practices for opium cultivation and swidden. Large areas are claimed by the Royal Forest Department which has continued sporadic tree planting on cultivated land.

In China, a series of conservationist regulations has been enacted since the early 1980s, restricting access to forest, but there has not been similar insecurity in tenure of cultivated land since the end of the 1970s. In both countries, however, farmers still feel considerable insecurity in regard to possible future changes in policy.

Montane agricultural systems in both countries have had to adapt and adjust to cope with the rapid pace of commercially-induced changes, during the last 30 years in Northern Thailand and 15 years in Yunnan. Most communities in both regions are now within reach of road systems (sometimes through relocation of villages from hill to valley sites). Cash cropping, both of annual and tree crops, has increasingly become a central part of the rural economies, and this trend continues to accelerate and to affect areas that are still remote.

In both countries there is considerable pressure (and assistance) to enlarge the area of wet rice in order to reduce swiddening, but in neither country is there sufficient irrigable land to cope with the needs of the stillgrowing populations. In both cases, farmers' innovations, deriving from traditional as well as modern knowledge, have been instrumental in change.

A first round of collaborative study has shown that the use of traditional knowledge, especially in agroforestry, is more prevalent, and more significant in adaptation, in Yunnan than in Northern Thailand. In Northern Thailand, although farmers and communities have long depended on the forest for a significant part of their livelihood, this appears to be on the basis of simple extraction. There is little evidence of an element of management, either by individual farmers or communally. In the Yunnan villages, on the other hand a range of agroforestry types, including cultivation within forest and the planting of trees in swidden fields, is a particularly marked characteristic, and the greater part of these practices is indigenous rather than introduced.

There has been great reduction in the forest area in both regions, and efforts are now being made to preserve what remains. However, much if not most of the remaining forest is worked over extractively. In Thailand, continued immigration, and more rapid population growth, put greater pressure on the forest resource. Evidence of land degradation is very variable from area to area within both countries, with severe erosion evident on some hill areas of northern Thailand, but not others.

While degradation of land and biota is often assumed to be taking place everywhere in the hills, there is a serious need for research which will identify where it is actually serious, and where remaining biodiversity continues rapidly to be eroded. There is also urgent need to examine those systems which are successful in controlling degradation, and distinguish them from still-continuing practices which promote destruction of resources.

Provisionally, we hypothesize that stability of population, and security of land tenure are principal factors which lead farmers to adopt conservationist practices,

particularly agroforestry . However, the role of information transmission is also important, and this calls for detailed investigation.

Research Aims and Plans

In this proposed study, we aim to

1. study in detail the resource use pattern of six highland villages, three in each country;
2. develop guidelines for evaluating mountain land use sustainability, and to use these to
3. evaluate sustainability and unsustainability of each pattern of resource use;
4. identify conditions conducive to resource conservation and/or exploitation by individual farmers and communities.

On the basis of extensive previous work, and after reconnaissance, three villages have been selected in each country (the name of the village ethnic group is in italics after each village name):

Northern Thailand

Tissa, *(Karen,* rotational shifting agriculture, little commercialization)

Mae Rid Pagae, *(Karen,* commercialized, heavy land use but limited evidence of degradation; both old-established and recent wet rice; innovative management)

Mae Salap, *(Akha,* heavily commercialized, evidence of severe degradation)

Yunnan

Baka, (*Jinuo*, limited land in a mountainous region; a declared forest reserve immediately adjacent limits; possibilities of expansion)

Mansuoxin, *(Dai,* highly developed home gardens, and old-established wet rice)

Manmuo, *(Akha,* access to remaining primary forest, and substantial commercialization but still poor)

In addition to the focus on these six villages, the hierarchical structure and organization of the agroecosystem into which each village fits will be analyzed to acertain that all crucial ecological, social and economic processes have been covered.

The methodology will be based principally on an agroecosystem perspective. In evaluating land use systems we will attempt to cover all of their agronomic, social, economic and ecological processes. Explicit recognition will be made of the hierachical structure and organization of the agroecosystem at levels of field, farm, community, watershed, county, province, country and region, to allow an analysis that is sufficiently 'adaptive' to follow functional relationships to any level that is necessary.

Explicit recognition of the dynamic nature of agroecosystems will be pursued by attempting to determine changes over time, including long term trends from the past, as well as evaluating prospects for the future.

For data gathering we will use Rapid Appraisal, long-term field survey (especially with student participation), farmer interview, group discussions with community representatives, plant identification, actual field assessments including any chemical analyses. Research method will also include consultations with farmers, community representatives, local field workers of government agencies as well as non-government agencies, and various people who influence public policy.

Expected outputs include:

1. patterns of resource use by mountain farmers will be described in a detail not previously attempted;
2. conditions for resource conservation behaviour by individual farmers and communitites will be identified;
3. a set of field tested criteria and guidelines for evaluating mountain land use sustainability will be developed.

Kanok Rerkasem and Guo Huijun

EAST AFRICAN CLUSTER

Development of Sustainable Agriculture in Diverse and Dynamic Socio-economic, Demographic and Biophysical Environments of East Africa

CORE MEMBERS: R.M. Kiome (Kenya Agricultural Research Institute) [Cluster Leader], A.O. Ayiemba (University of Nairobi), D.N. Mungai (University of Nairobi), L. Wambuguh (Kenya Agricultural Research Institute), F. Kaihura (Agricultural Research Institute, Milingano, Tanzania), F. Kahembwe (Forest Research Institute, Nakawa, Uganda), J. Tumuhairwe (Makerere University, Uganda), M. Stocking (University of East Anglia, U.K.) [Advisory member].

Background

The East Africa region is characterized by high population growth rates and mobility caused by conflicts, famines and differential economic opportunities. It also has extremely diverse biophysical and farming systems as well as human environment. The region has climates that range from the humid tropical forests with annual rainfalls of more than 2000 mm to ecological deserts with less than 250 mm; some of the best tropical soils (nitisols) alongside the worst (solonetz); extremely intensive small-scale farming close to extensive pastoral systems; strongly differentiated adoption of soil and water management technologies; and so on. Generally the region has a predominantly agrarian society in a set of complex and diverse agro-ecosystems.

Demographic change and associated factors have for a long time suggested severe environmental degradation and loss of biodiversity, including agrodiversity. Ever since early colonial times, predictions of severe population pressure causing erosion and consequent declines in productivity and famines have regularly been made. This implies that the land use systems, the basis of welfare, are unsustainable under these conditions. Yet from as early as the 1920s and 1930s adaptation and change have been noted in small-scale agriculture. Some recent studies have underlined the ability of communities and whole societies to adapt in the face of environmental change and population pressure while at the same time increasing crop production and taking environmental protection measures. Others have shown that soil and water management technologies are capable of not only maintaining, but also restoring, the productivity of the land.

Research Plan

The East Africa cluster will address the apparent paradox that environmental protection and sustainable land use systems can be achieved despite (or even because of) large demographic changes. It will examine a number of indicators of change primarily at the household, farm and district level. By comparing the situation in several districts, and different agro-ecological zones, the research cluster hopes to define in the East Africa context:

(i) a set of production pressures that induce lasting changes in land use;
(ii) important demographic variables that can be linked to both sustainability and unsustain ability;
(iii) the diversity of adaptations, introduced and indigenous farming systems ('agrodiversity'), with trigger points and causative factors; and
(iv) a number of recommendations to measure sustainability and to promote sustainable development.

The East African cluster research postulates that sustainable agriculture has rich agrodiversity and is achievable in different agro-ecological environments under diverse population dynamics and economies.

The main objectives of the cluster are to examine a number of environmental and land qualities and land management against the production pressures and responses in order to analyse their linkages and identity conditions of sustainability or unsustainability and possible remedial interventions.

This will be done through specific case studies focused on priority issues related to the main theme of the development of sustainable land use systems under different demographic, economic and ecological conditions.

The most important factors the cluster will endeavour to analyze in the diverse agro-environmental zones (AEZs) are:

(a) land quality and biophysical factors (soils, soil and water management (SWM) technologies, productivity/-output, intensification capability, micro-climate).
(b) land use factors (crop diversity/-changes, kinds of land uses).
(c) demographic factors (population growth rates, birth/death rates, migration household population dynamics).
(d) production pressure factors (markets, policies, institutions).

Sub-projects and the Whole Project

The project will be undertaken through relevant disciplinary sub-projects with an endeavour to blend these into an interdisciplinary approach. These case studies/subprojects, will be conducted in selected agro-ecological zones in different regions of East Africa (Kenya, Uganda and Tanzania) and focus on priority research issues in each specific pilot study area but encompassing the overall EAPLEC research theme. In all three countries the specific studies will endeavour to sample a range of agro-ecological zones, identified to differ in land use intensification and management, population dynamics and production pressures. These differing attributes will be studies in carefully selected transects.

In Kenya the research theme Population, Land Management and Sustainable Agriculture in different agroecosystems of Kiambu, Embu and Laikipia Districts, will comprise four specific studies on:

(i) climatic variability and agricultural production;
(ii) land quality and management options;
(iii) inter-relationships between demographic characteristics and land use; and
(iv) production pressure and responses at household level.

All the four topical studies will be conducted in an interdisciplinary manner with full interaction of the principal investigators in each topic.

In Tanzania, studies will focus on farming system response and adaption to conservation development project approaches in mountain areas of northern Tanzania. This study will also be conducted by a team comprising at least three differing but topically relevant disciplines.

In Uganda, studies will focus on:

(i) the influence of demography, government policy on land use and biodiversity and the response of the local community around Mt. Elgon; and
(ii) an analysis of the environmental and social factors of adoption and non-adoption of soil and water conservation technologies and sustainable agriculture in western Uganda.

General

The East African Cluster is co-ordinated by the cluster leader in Nairobi. Frequent meetings, conferences and visits among the core cluster members will form part of the multi-disciplinary approach to research. The cluster currently comprises 7 core members with four members in Kenya, two in Uganda and one in Tanzania. These core members are of a varied disciplinary mix including soil science, climatology, demography, forestry and socio-economics. The core members are responsible for the organization of interdisciplinary teams to conduct research in their specific regions. The cluster has gone through an exercise of research project scoping to identify the key research issues and begin development of a common methodology for research. It will now focus on fine-tuning of research methodology, workplans and implementation of the formulated research activities.

R.M. Kiome

PAPERS AND NOTES

ASSESSING EROSION QUICKLY AND (HOPEFULLY) CLEANLY

Michael Stocking
Scientific Advisor to PLEC
School of Development Studies, University of East Anglia

Our Scientific Coordinator, Harold Brookfield, suggested to me that I should share with readers of *PLEC News and Views* some experiences I have had over the years in (1) erosion modelling on a limited budget and (2) trying to make realistic estimates of the danger of erosion under field conditions that are available to the field-worker. Most of us work in areas where there are no long-term experiments on erosion rates, where field data on the factors that cause erosion are extremely scanty, where we can only dream about sophisticated computer modelling of erosion dynamics, but where we know that current 'off-the-shelf' erosion models such as the Americans' 'Universal' Soil Loss Equation will likely give us spurious results. What do we do? Is there any alternative to highly selective and possibly biased observations of rills in farmers/fields and bare eroded-looking patches on steep lands? Can we develop any field-friendly approximations of the hazard of erosion that will give us an idea of the order of magnitude of the processes and the likely changes that may result from a change in land use such as natural forest to shifting cultivation? I think we can.

This article combines some ten years' experience of developing a relatively simple erosion model for conditions in Southern Rhodesia (now Zimbabwe) with a recent consultancy assignment I did for Britain's Overseas Development Administration in the hill lands of Sri Lanka where the Forestry Department needed to know what were the likely implications of converting degraded and sometimes abandoned tea estates to pine plantations andlor other land uses. The foresters had neither the time nor inclination to go into lengthy experiments. Many of them just wanted to assume that pines would be good for the environment and go right ahead and plant them; others urged caution, citing examples where they knew that tree plantations had caused problems. It was a classic case of wanting definitive answers today to a potential problem of land degradation; failure to provide an appropriate response; and in the vacuum of knowledge, pressing on with the development regardless of consequences. Maybe there is a simple methodology we can develop for our own circumstances - a rapid appraisal procedure for soil resources.

Rapid Field Assessment of Erosion

Although the primary purpose of this short article is to address erosion hazard, many field-workers ask for guidance on rapid field assessments of actual (contemporary) erosion rates. Direct field observation and simple monitoring devices are available. Details will have to await a future *PLEC News and Views* (if there is demand for the information!).

One can gain semi-quantitative assessments of net soil loss from

- tree root exposure;
- height of soil pedestals under small stones;
- pedestals below bunch grasses;
- stem exposure on some annual crops (tobacco, for example, has a well-defined mark on its stem for the soil

level when it started to grow);
- soil height differences above and below a barrier (wall, bund, grass strip, large tree etc.).

In addition look for the layer of stones left behind after erosion. By comparing the depth of these stones with the approximate percentage of stones in the body of the soil, you can gain an idea of the amount of soil that needed to be removed to obtain that depth of stones. It is a simple and effective technique on arable lands when you know when the soil was last ploughed.

I have dwelt on sheet erosion purposely because it is by far the commonest, it is the most difficult to observe, yet it is potentially the most serious in its impact on crop productivity. Rills and gullies are easy to see – hence they tend to get far too much attention.

A good recent guide to field techniques is that produced by FAO in their Soils Bulletin series and written by Norman Hudson (1993) – but beware he still has far more space devoted to erosion plots, sediment samplers, radio-active tracers and the like, which for many of us are techniques we cannot use while under pressure for quick results.

Erosion Modelling on a Limited Budget

For many researchers the answer to not being able to measure erosion is to model it instead; that is, construct a theoretical set of relationships between the factors in erosion and erosion rate. So, when you want to predict erosion rates, you just have to put in the correct factor values and out pops a neat answer of erosion in tonnes per hectare per year. An appealing idea but not so simple to develop, I am sorry to say.

My colleague Henry Elwell and I spent many years trying to develop an appropriate and usable model for tropical conditions. In the most easily accessible paper on it (Elwell and Stocking 1982) we argued the case. To use an empirical model such as the USLE would have needed a huge number of experimental plots: several replicates for each major crop, each reproduced for a number of slope steepnesses, different major soils and climatic zones. Each field plot back in 1982 would have cost us US$1000 to install and instrument and then at least $100 per year for maintenance and collection of samples over a minimum 10-year period of monitoring. But we had only $8000 per year budget. A different approach to modelling would be needed.

To cut a long story short we developed SLEMSA, the Soil Loss Estimation Model for Southern Africa (Figure 1). The soil erosion process in the model is divided into four physical systems: climate, soil, crop and topography. Within each system the major dominant factors controlling variations in soil loss in the erosive sub-tropical environment of Zimbabwe were identified. These control variables should be rational and easy to measure or simple to gain from existing data sources. Rationality, we argued, was particularly important because it leads to logical explanations and the possibility of extrapolation to other sites with even less data, provided we knew the major interactions which affected erosion rates. For example, the seasonal energy (E) offers a rational explanation of sheet erosion as a work process, leading to the idea of modelling the role of crop cover as the interception of E by a growing crop over a season (i%). Further details and worked examples of the use of SLEMSA can be obtained by writing to me.

SLEMSA, however, purported to provide absolute figures of soil loss in tonnes per hectare per year. At the time of developing the model, I thought that was a good idea and worth doing. Now, I am not so sure.

The data base for SLEMSA is field erosion plots. In our case the size was 10 metres long by 3 metres wide - about as large as we could manage in catching the run-off and sediment of erosive storms. These were bounded plots: i.e., they had boundaries across which, especially at the

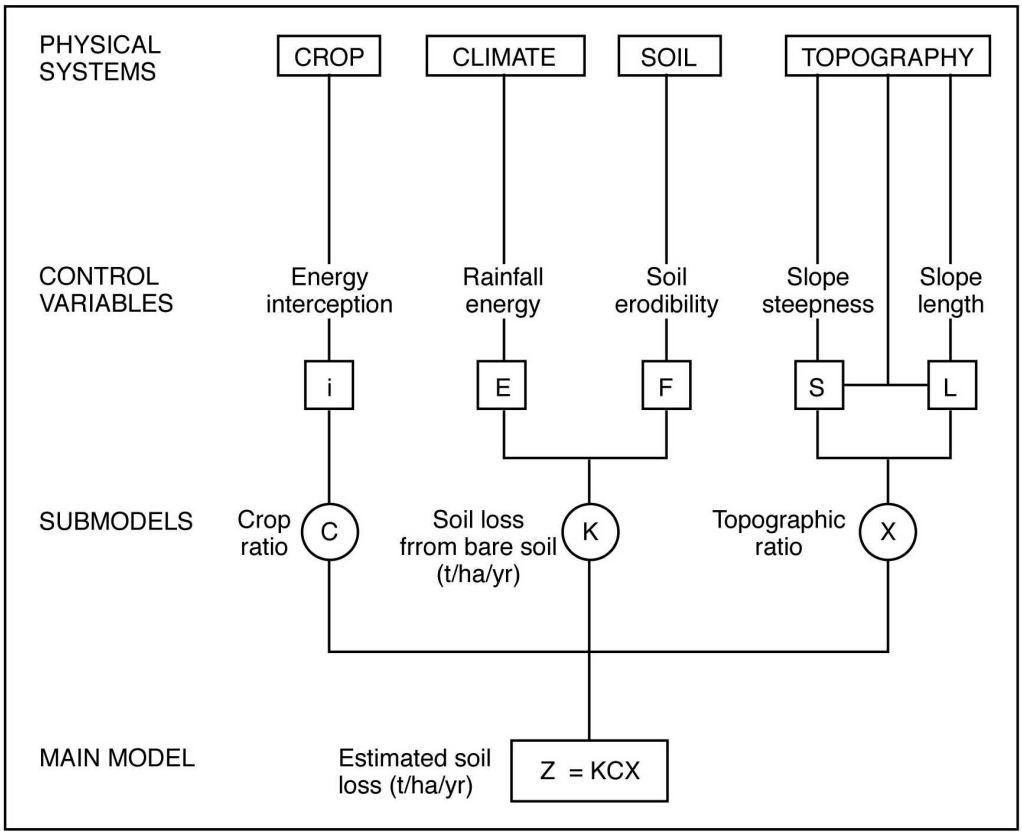

Figure 1: SLEMSA Design Model

upper end, no soil or water could pass. They thus represented artificial conditions. On a real slope there would be continual movement down the slope consisting of soil loss and soil deposition. I now believe that many of our field plots grossly overestimate actual erosion on a slope. Hence, any model derived from the data would also tend to give us misleadingly high rates of soil loss.

Be that as it may (and I cannot prove my contention here without going into the literature in detail), our real need in the field is to:

- be able to say that one land use is more hazardous than another;
- give a scale of magnitude of how much greater; say, ten times greater;
- assess the hazard for any possible combination of circumstances;
- estimate the impact of erosion on soil quality and hence on crop yields.

In other words, even it soil loss models which give absolute figures are accurate (they are not!), we really do not need that information for land use planning purposes. With the exception of the last of the bulleted points above, we can get all the information we need from a simple erosion hazard assessment.

Erosion Hazard Assessment

Erosion hazard is not an estimate of actual erosion; rather, it is the potential erosion that may happen on a site according to the value of a number of simplified erosion factors, usually topography, soil type, climate and vegetation. These are the very same factors that are used in the SLEMSA erosion model (abbreviated to EHR in Table 1)

Table 1: Erosion Hazard Ratings for the Upper Mahaweli Catchment

Land use			L.U. code	EHR
A. TEA				
	A 1	*Vegetatively-propagated*	*VP*	
		A.1.1 80+% cover VP	VP1	1
		A.1.2 60-80% cover VP	VP2	2
		A. 1.3 40-60% cover VP	VP3	4
		A. 1.4 less than 40% cover VP	VP4	32
	A.2	*Seedling*		
		A.2.1 80+ % cover seedling	T1	1
		A.2.2 60-80% cover seedling	T2	2
		A.2.3 40-60% cover seedling	T3	4
		A.2.4 less than 40% cover seedling	T4	32
	A.3	*New plantings - average over* 6 yrs	NP	12
		- first year	NP1	30
	A.4	*Diversified tea*	DT	
		A.4.1 Newly-diversified, based on T4	DT4	28
		A.4.2 diversified; good cover	DT2	2
B. PERENNIAL CROPS				
	B.1	*Kandyan Forest Gardens*	Gar	0.1
	B.2	*Minor export crops*	MEC	2
	B.3	*Other plantation perennials*		1
		- if with smallholder upland annual crops		30
C. ANNUAL CROPS				
	C.1	*Paddy*	P	0
	C.2	*Chena - one* year in 5 cultivation	Ch	6
	C.3	*Upland annual (rainfed crops)*	UAC	
		- in a cultivation year		40
		- in a weed fallow year		2
	C.4	*Vegetables*	Veg	
		C.4.1 on slope; no conservation	Veg4	40
		C.4.2 with drains at angle to contour	Veg3	20
		C.4.3 on bench terraces	Veg1	0.2
	C.5	*Tobacco*	Tob	
		C.5.1 on uplands	Tob4	40
		C.5.2 on paddylands	Tobl	0
D. PLANTATIONS (all with good year-round ground cover - see multiplier factor if poor ground cover)				
	D.1	*Eucalyptus*	PLE	1.5
	D.2	*Pine*	PL12	2
	D.3	*Other species*	PLO	1.5
		- site preparation & establishment year for D1-3		30
E. VEGETATION				
	E.1	*Natural woodland (open)*	OWL	0.1
	E.2	*Natural woodland (dense)*	DWL	0
	E.3	*Scrub*	*Sc*	1
	E.4	*Grassland*	Grl	
		E.4.1 dense; good cover	Grl1	1
		E.4.2 poor; <40% cover	Grl4	10

Therefore, in the Sri Lankan example introduced at the beginning of this article, the opportunity was taken to adopt the model to give approximate Erosion Hazard Ratings (EHRs) of the major land uses. Because I was anxious not to ascribe absolute values of soil loss, lest they be misconstrued for reality, EHRs were designed to give a 'rating magnitude' so that it was possible to compare upland annual rainfed crops, say, with a good cover of tea bushes. The standard EHR (EHR=1) was taken to be vegetatively-propagated tea with more than 80 per cent cover.

EHRs were calculated according to the SLEMSA design curves with particular emphasis on the crop cover curve which is the single most sensitive variable affecting erosion rate (Table 1). Standard soil and slope conditions were taken for Sri Lanka's hill lands. On other sites, a simple sub-division into major typical land units could be used and the EHRs structured accordingly.

Field experience and guesswork will still be needed. The model serves only to put the variables into a formal framework to give what are semi-quantitative estimates of relative hazard of erosion. Again, if readers of *PLEC News and Views* wish to receive the full account of how EHRs were estimated in Table 1, I can copy part of my Sri Lankan report for them.

Conclusion

Rapid Rural Appraisal (RRA) and Participatory Rural Appraisal (PRA) are very much in vogue today, and generally for socioeconomic studies we are relatively well served as to suggestions for techniques to carry out in the field. However, for changes in the quality of the environment and the dynamics of natural resource processes, there are a dearth of suggestions. Part of the problem is that most field-workers see the challenge as technical and scientific, requiring specialist knowledge and expertise. Some variables obviously do need the employment of specialists: e.g. soil nutrient analysis. But, using a keen eye, field observation and a little inventive modelling, along with the acceptance of relative rather than absolute measures, much can be gained as to environmental changes that are thought to be induced by land use.

Why not give it a try? Erosion hazard assessments provide a quick and relatively clean estimate of what might be currently happening in your field site and what may happen under any number of scenarios you may invent. It's fun, and I would like to hear from you if you do try it.

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THE AGENDA AND METHODS OF PLEC

Harold Brookfield (Scientific Coordinator of PLEC)

The Background of this Paper

This paper is a modified version of a keynote paper delivered at the Chiang Mai conference. The UNU Programme of Collaborative Research on Population, Land Management and Environmental Change (PLEC) has evolved and changed over several stages since its inception as a project in 1992. The most recent published statement is that prepared by the Scientific Advisory Group (J. Momsen, C. Padoch and M. Stocking) and Brookfield in San Francisco at New Year, 1994, and presented *in PLEC News and Views* no.2, in February 1994. In this it was stated *(inter* alia) that:

> PLEC seeks to examine and disaggregate the processes of adaptation of indigenous resource management and land use through a series of field-based research projects in key agro-ecological zones of tropical and sub-tropical environments ... Effective management systems do not have to be invented only by modern science. They exist, and have been continuously developed by the world's farmers.

These ideas were further elaborated in a short document about the project prepared for a small workshop on PLEC, sponsored and convened by the GEF Unit of UNEP, in Washington in March 1994. In that document, emphasis was placed on the role of diverse small-farming agroecosystems in conservation of the structural and trophic as well as species biodiversity that is central to biophysical sustainability. In the light of advice received at that workshop, some significant changes have been made in the stated aims and agenda of the project. The present paper draws on a recent revision to present a more clearly directed agenda than in earlier project presentations, and thereby to raise a number of issues for discussion within PLEC.

Redefining the Agenda

However the objectives are phrased, the core of the project lies in:

(1) the analysis of diverse small-farmer agroecosystems adapting to environmental dynamics and to pressures of change;
(2) discovering and assessing methods and conditions which are conducive to biophysical sustainability in such systems;
(3) explaining why some farmers successfully conserve, while others do not;
(4) in this latter process, taking account of a growing body of evidence showing the absence of any simple relationship between population growth and degradation.

A distinction is now made between the global objectives of the project, which are primarily methodological, and the objectives within each region, which embrace explanation of the actual dynamic situation encountered. Globally, we are concerned with generating a methodological framework for the analysis of sustainability, and especially of a sustainability that embraces biodiversity conservation. This is well in accordance with our initial and continuing argument that diversity of and within agroecosystems, which is what we term 'agrodiversity', has a major role in creating the conditions of sustainability. Biophysical sustainability involves two main elements: (a) management of soil and water; (b) maintenance of structural and trophic as well as genetic biodiversity. However, conservationist management can only be achieved under socio-economic conditions that permit and encourage good

management, and are themselves sustainable. Both biodiversity conservation, especially in farmed areas, and sustainability, are more fundamentally societal problems than they are technical. Moreover, they are societal problems that focus on the resource manager, the farmer. Our purpose is to develop and demonstrate a replicable method whereby these considerations can be put into an operational form.

Our regional research groups, which we term 'clusters', will realistically retain greater autonomy in research design under this framework than under earlier proposals to seek comparability between the actual area-specific findings of research. This is not to say that there will be no comparability, but it is to say that three to five years is too short a period in which to analyse it in a systematic way. Although all our research areas are characterized by significant agrodiversity, they are very unlike in other respects. Each has its distinctive environment, society, polity and history. There are common forces, increasingly trans-national, that affect all, but they do not operate everywhere in the same way. In so far as we find that they do operate in parallel ways, this will be interesting, but we cannot assume that this will be the case in the basic research design.

Some Corollaries

There is a number of corollaries which follow from this re-statement of objectives, and which indicate the type of methodology that must be employed, with differences which accord with the varied biophysical conditions of each research area, its population and its history.

• **The need for relevance and simplicity** Although the project has scientific value in its own right, and the network of scientists that it will create is likely to have enduring value, ours are practical goals which demand the achievement of demonstrable results within limited time. Moreover, they must be communicated in places where they will have effect, including the cooperating farmers and regional authorities themselves as well as national and international researchers and policy makers. In order to do this we need to evolve elements of common methodology so far as is possible and, without ignoring complexity among the interactions that we study, seek 'quick and not too dirty' methods and indicators. These should be governing considerations in our planning.

• **Moving between scales of resolution** There must be similarity in the scale and depth of resolution of research in different areas. We would, I think, mostly agree that work must focus on specific areas rather than wide regions, and especially on agroecosystems defined at the level of a community or a small region occupied and used by a modest number of farmers who can be associated with the research. This is the only level at which farmers' decision-making and innovation can be understood and at which the effects of human activity on biodiversity and the land can be measured. Such work must, however, be put in context for we are describing agrodiversity, sustainability and the conservation of biodiversity, and their causes within regions, not only at sites. This demands that the hierarchical sequence from site, through agroecosystem, to region and nation, must be incorporated into our methods. Figure 1, adapted from an illustration used in earlier presentations, suggests there is a central area of 'agroecosystem and agrarian society', within which the farm and field are units that manage the biophysical system. This 'central' system can itself be viewed at several scales, from village to region, and the biophysical environment changes in scale as we do so. However, management takes place under societal conditions which in modem times are in large measure determined from the state and the world economy, and which at all times have been

determined by a regional political economy. A simplified listing of elements to be taken into account is presented, though by no means complete. So also are some of the main paths via which stresses impinge on the system, and the two outstanding sources of largely unpredictable external variability.

• **Trends and changes through time** We deal with dynamic management of dynamic environments, and the conditions change greatly through time. Earlier, we described the time frame of the project as 'near-contemporary', but everyone has disregarded this limitation and now is the time to reject it. On the contrary, the more we can learn about the past, the better we can understand the present and project the future. We are not going to observe much in the way of innovation and adaptation over a period of only three or four years, and may not see too much in the way of change in societal conditions over so short a time. Interpretation and prognostication on the basis only of contemporary observations can very readily be erroneous, as many studies have demonstrated. Detailed investigation over time has, in several areas, demonstrated that supposed unilinear trends toward environmental degradation under human pressure are simply wrong. Yet, in most of the areas that we study, reliable information on conditions in even the quite recent past is scanty, and it everywhere deteriorates in quality as we go backward in time. This cannot be overcome, but if we are to understand adaptation to changing conditions we need to penetrate as far back into the past as we can, using all possible sources.[1]

• **Farmers's knowledge and Its value** Closely related to the above corollaries is the need to work with the farmers, to understand the problems of management and adaptation as they see them, and to pay close attention to their understanding of both natural and societal conditions within which their decision-making takes place. Although the limits of folk memory and 'ethnohistory' need to be fully appreciated, and memories of change are inevitably selective, the farmers and older members of their families are an important source of information concerning change, both agricultural and environmental, in the recent past. Their scientific understanding of their own environments, and knowledge of the biota which it contains, or formerly contained, need to be treated as major sources of information. They, moreover, are the people who feel the direct and local impact of changes in national (and international) policy, however much or little they appreciate the reasons. The value of this data source is rather clearly demonstrated in the preliminary report of the Ghanaian group, summarized in the second issue of *PLEC News and Views* (Gyasi et al. 1994).

Considerations of Methodology: Basic Elements

Figure 1 is also useful in defining some parts of our methodological task. The nature of the farming system changes the weighting given to different elements throughout the diagram. A farm producing mainly for the subsistence of its own people is far less affected by the wider system than is a mainly commercial farm, and the pressures on it coming from that wider

[1] The splendid modern tools of remote sensing and even air photography, together with reliable population and production numbers, take us back only a limited way in providing a hard-data base for the softer data that come from other sources. However, an excellent example of what can be done through historical reconstruction in elucidating environmental history comes from work on the forest-savanna interface in Guinea, West Africa, where common supposition of a deteriorating trend is overturned by use of sources that, *inter alia,* include air photography previously misinterpreted (Fairhead and Leach, forthcoming).

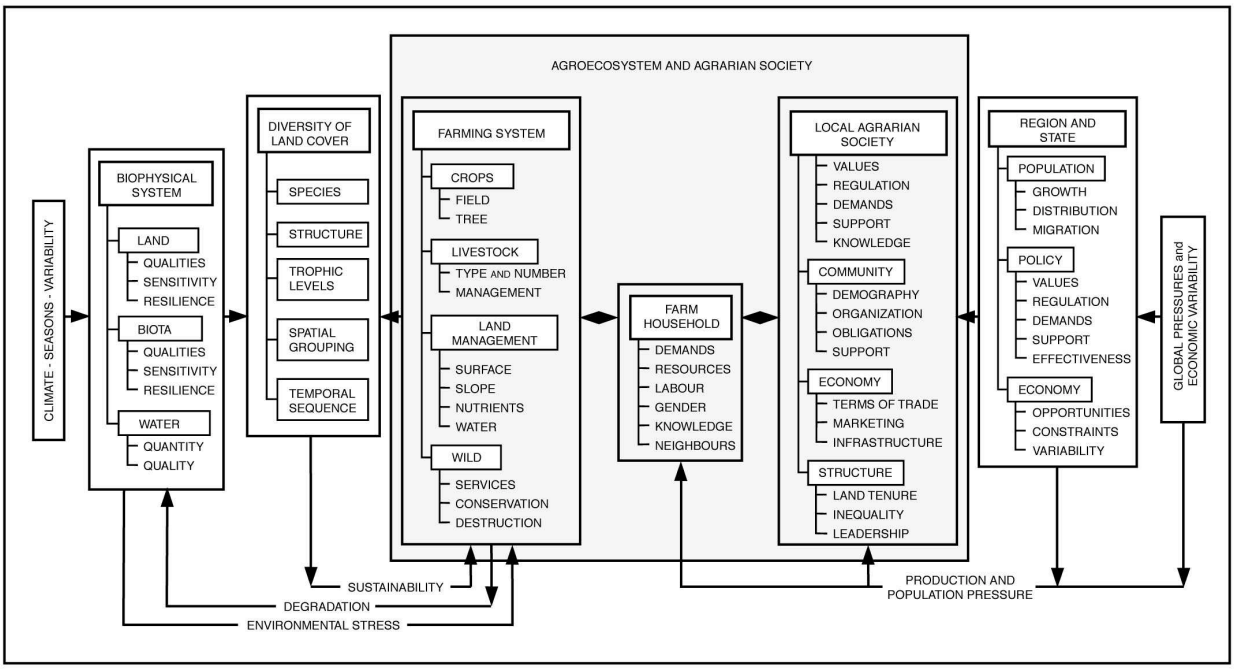

Figure 1

system are different in nature. Even within the biophysical environment, there are major differences between the weighting of elements in areas respectively of high or low, or secure or variable, rainfall. All this is self-evident, but it underscores the need for methods that will enable us to achieve results around the central project questions, and to move fairly readily between scales. Scale and societal considerations change the weight given to different elements. The critical aspects of land tenure, rights of access to environmental resources, class, gender and age, migration and off-farm opportunities, are all important at the level of agrarian society and its resource management.

Also prominent in Figure 1 is the place of biodiversity. Although the quantities attached to each element are essentially products of the farming system, they also relate closely to the natural biophysical system, which in large measure determines what is possible. Coupled with the management of land and biota varying in sensitivity to interference, and in resilience or recovery capacity after interference, biodiversity is central in maintaining biophysical sustainability, especially through its consequences for soil fauna and flora. Poor management of the land and biodiversity lead to degradation, which in turn imposes environmental stresses on the management system, requiring adaptations that may or may not take place. This central question can then only be answered by reference to the management capacity of the farm households, within agrarian society as a whole, in turn greatly influenced by the forces emanating from the higher levels of regional, state and global economy and polity. What really happens is a constant reshaping of local strategies in the context of opportunities, pressures and environmental dynamics, with external forces in continuous interaction with local

systems, structures, abilities and perceptions of reality. This basic and simplified structure thus helps isolate what we need to analyse and explain.

Methods for the Field

Not only do members of different disciplines have their own sets of methods, but distinctive ranges of field methods are called for in contrasted environments. The field study of agrodiversity, its environmental consequences and societal correlates, is not an area that would gain from uniformity in approach. The diversity of methodological experience brought into PLEC is a strength in this connexion. None the less, we can learn from one another, and the lessons of greatest general value concern simple methods that can be widely applied, and which are sparing in their use of data.

This applies whether we are looking at the land and its cover, at farming systems, at the social relations of production, or inquiring into the changing pool of farmers' knowledge on which management is based. In teasing out the real essentials of an agricultural system and its problems, many of us would argue from our experience that this is a job that demands research spread over years. But we do not have such time, and the necessary full baseline historical information that might substitute is rarely available. The classic long period of intensive field research in anthropology and some related disciplines is a feasible alternative for our students, and this is one reason why PLEC clusters should make early efforts to involve and train students. Long-period field-work is, however, an option rarely open for the rest of us. We therefore need to take account of the short-cut methods of Rapid Rural Appraisal that have evolved since the late 1970s and, within the Southeast Asian region, have been the subject of one important meeting (Khon Kaen University 1987). I am not suggesting that we simply take as given the handbook methods of RRA and PRA (Chambers 1992) that are widely available in the literature, but a good deal of our work will have to be accomplished during the limited periods which principal researchers are able to spend in the field, and our methods must, adaptively, reflect this limitation.

Our membership provides us with a number of examples of quick ways in which to undertake large jobs. For example, our Australian-Papua New Guinea group has developed a methodology for the classification of land-use (or agriculture) systems over large areas that was on display in poster form at Chiang Mai, and will be written up in a forthcoming number of *PLEC News and Views.* In view of the need to 'scale down' the findings of detailed local research to regional level, this has particular significance. While specific to a certain, though wide, range of agroecosystems, it contains elements that can be applied throughout several of our research areas.

In mainland Southeast Asia, our Thai colleagues and their collaborators in the Southeast Asian Universities' Agroecosystem Network (SUAN), have developed the agroecosystem method of Conway (1985, 1987), together with RRA, and applied it in a range of situations and to a number of specific problems. While others in other parts of the world also write of agroecosystems, they do not use the same approach. Our colleagues who are members of SUAN will, again in the newsletter as well as in the special number of *Global Environmental Change,* discuss the utility of the Conway/SUAN approaches for our benefit.

There are also specific techniques on which we can draw. This number of *PLEC News and Views* carries a discussion by Stocking of a simple method for soil loss estimation developed in southern Africa by Elwell and Stocking (1982), and more recently applied by him in Sri Lanka. For the analysis of biodiversity, there is probably no real substitute for the classic methods of botanical inventory, including quadrat sampling supplemented by transects,

though if the sampling is good this can be quite rapid. Transect method is important, and the next number of *PLEC News and* Views will contain a paper by Lewis Enu-Kwesi and two of his colleagues on the collaborative transect methods that were used in the pioneer survey in Ghana.

It is relevant that, drawing on old-fashioned methods for micro-regional analysis of landscapes, especially in land-resource surveys, landscape ecologists have developed the useful generalizing concept which they call the 'ecotope', being the smallest uniform 'building blocks' of total landscape, including both biosphere and geosphere elements. This concept is applicable both to natural and created landscape elements, such as a floodplain-segment, a distinctive plant habitat, a woodland or a group of fields sharing a common set of ecological characteristics.[1] Most of us will probably prefer to think and write in terms of 'land-use units', more relevant for our purposes, but we should note the contribution of the landscape ecologists in defining such units. It is the repetition in combination of such essentially similar complexes across a single agroecosystem, and its neighbouring wilderness, that distinguishes such a system from others. Within agroecosystems, these complexes provide units from which samples may be drawn for more detailed analysis of species content, earth-surface process, and management sustainability. Moreover, there are useful proxy indicators of trophic biodiversity that can be applied at the level of such complexes. One, for example, is the abundance and diversity of birds at their commonest feeding time in early morning and late afternoon. An intriguing use of this method, from an unpublished doctoral thesis, was brought to the attention of the Chiang Mai meeting (Nuberg 1994).

The question of sustainability is more complex. Unless we can date a system effectively, as Humphreys (1994) did in *PLEC News and* Views no. 2, it is difficult in the extreme to be certain that what we observe is sustainable. Our problem is enhanced by the fact that an agroecosystem contains a range of methods, some of which may be sustainable while others are not, and the sustainability of the whole depends on possibilities for substitution. Attempting to combine too much in a single indicator, a current 'Framework for the Evaluation of Sustainable Land Management', based on the FAO Land Evaluation, experiences enormous problems in determining a time period for 'sustainability' (Dumanski and Smyth 1993).[2] Commenting on this approach, Humphreys and I conclude in a forthcoming paper that what is more readily observable is the absence of clear evidence of biophysical unsustainability. If this much can be established, then the possibility exists that a system may be sustainable while remaining in its present form. On the other hand, we must recognize that collapse may be just around the corner.

The question of how to determine sustainability is a critical one for PLEC. At Chiang Mai, most participants urged that a system must be sustainable economically and socially, as well as biophysically, if it is to have continued life. Without disagreeing with this view, I there advanced a view

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[1] Naveh and Lieberman 1990:76-84. A range of terms has been suggested to describe these ecologically-uniform vegetation complexes in a literature extending back to the 1950s. The term 'ecotope' has the advantage of neutrality between natural and human-use complexes, and of encompassing a wider range of elements than such terms as 'land unit' or 'land use'. At the same time, h describes a specific minimal element in landscape, whereas the wider term .ecosystem' is applicable over a range of scales. Agroecosystems may therefore contain several 'ecotopes'.

[2] The system requires determination of indicators in four domains, physical, biological, social and economic, to produce a single indicator of sustainability. For this reason, about 25 years is regarded as the limit of prediction; and the dividing line between 'sustainable' and 'unsustainable' is placed as low as five years.

which I reiterate here that biophysical and socioeconomic sustainability are interrelated but separate questions. The latter is a necessary condition for achievement of the former, and the former is necessary if the latter is itself to be sustained. However, the nature, time-scale and reversibility of the processes involved are so different, that they need to be approached in tandem but in different ways. We had a lively discussion on this topic in Chiang Mai, and the question is certainly far from closed.

At this stage, I offer the principle that, while detailed and long-term scientific analysis must remain the essential basis for sound conclusions, we also need to seek out useful indicator methods that are sparing in their data requirements, and to try them out. In this way we are much more likely to contribute to a replicable and adoptable methodology for the study of agroecosystem biodiversity and sustainability in developing countries.

Method for Explanation

The complexity of the forces bearing on land management, and the task of explaining why conservationist practices are adopted or are not adopted, is daunting. Taken in conjunction with the biosphysical diversity of the areas we are studying, it has been rightly argued that controlled comparisons across regions are unattainable within the time span available to us. None the less, there are similarities in these forces everywhere in the world, and they everywhere range in scale of operation from the global to the local scales. A common methodology for analysis can therefore be proposed, different though the subsequent details of explanation may be.

One such methodology was proposed by Blaikie and Brookfield (1987:27-48), and termed the 'chain of explanation'. It was elaborated by demonstration in explanation of the ecological problems of Nepal. The 'chain of explanation' was further developed by Blaikie (1989), but in a purely contemporary context without the historical dimension prominent in the original case study. The following summarizes the original presentation

> the approach follows a chain of explanation. It starts with the land managers and their direct relations with the land (crop rotations, fuelwood use, stocking densities, capital investments and so on). The next link concerns their relations with each other, other land users, and groups in the wider society who affect them in any way, which in turn determines land management. The state and the world economy constitute the last links of the chain (Blaikie and Brookfield 1987:27).

If, as in that book, the explicandum was degradation at the farm level, the points along the chain each provide an hypothesis or – in the case of population pressure outstandingly – a group of hypotheses.[3] From among these, some are clearly potentially more powerful than others, but all can be treated as multiple working hypotheses, each of which may hold some part of the truth. Moreover, causes interact. From the point of view of PLEC, interactions within the agroecosystem and agrarian society are part of adaptation, and the principal disturbing forces are external, that is from the right hand side of Figure 1.

Thus the major threats to agrodiversity in the Amazon floodplain seem to come from commercial forces and national policy.[4] In East Africa, population growth and commercialization may have differential effects depending on location and local response, but seem to be the principal contemporary forces. In Thailand, we have seen that commercialization has led to reduction of crop biodiversity. Dealing with

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[3] See the partial review of hypotheses offering explanation of land management questions offered in *PLEC News and Views* No.l. The principal conflict lies between 'NeoMalthusian' and 'Boserup-type' explanations, but a range of behavioural explanations is also important.

[4] Serrão 1994.

these self-evident leading hypotheses, it is probably a more cost-effective strategy to reverse the Blaikie-Brookfield chain, and first determine - through time - the powerful external forces. These then provide multiple working hypotheses for the analysis of local-level adaptation. In this way, too, we might even reach some useful comparative conclusions of more than local domain.

Conclusion

These are among the considerations that require discussion in PLEC. There is more that could and should be said, but this is already a longish paper. I conclude therefore with one central consideration. PLEC is at work in a field where our task entails the questioning of conventional wisdom about environment, population and development - not excluding questioning of our own conventional wisdom. In our present form, at least, we have to operate within a limited time frame, and obtain results that will be of service in the countries in which we work, and in the wider biodiversity and agricultural development communities, within that time. In order to achieve these we must design our work, within PLEC, parsimoniously. This does not mean 'cutting corners', but it does mean finding clear paths, comparable across the project, toward common goals.

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OTHER NEWS AND ANNOUNCEMENTS
(continued from page 10)

A Chinese student in the Msc (Agricultural Systems) programme at Chiang Mai

University, **Ms Cai Kui**, will participate in the work of the cluster, working in one or more of the Xishuangbanna villages in Yunnan as her thesis topic.

Items of news about other members will be welcome, for inclusion in the next number of *PLEC News and Views.*

Some lastpage photographs:-
from top left clockwise : 1. Stocking and Momsen; 2. Ohtsuka and Nakada; 3. One of our Karen hosts at Mae Rid Pagae

ABOUT THIS NEWSLETTER

PLEC NEWS AND VIEWS is the main means of general communication within PLEC, and at the same time a principal means of telling others about PLEC. It will appear about twice a year (but not at exact intervals) through the life of the project. The first issue, published in July 1993, presented basic information about the project that will not appear again. This volume differs slightly from the standard format.

Editor

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