

PLEC NEWS AND VIEWS

No. 10 – May 1998

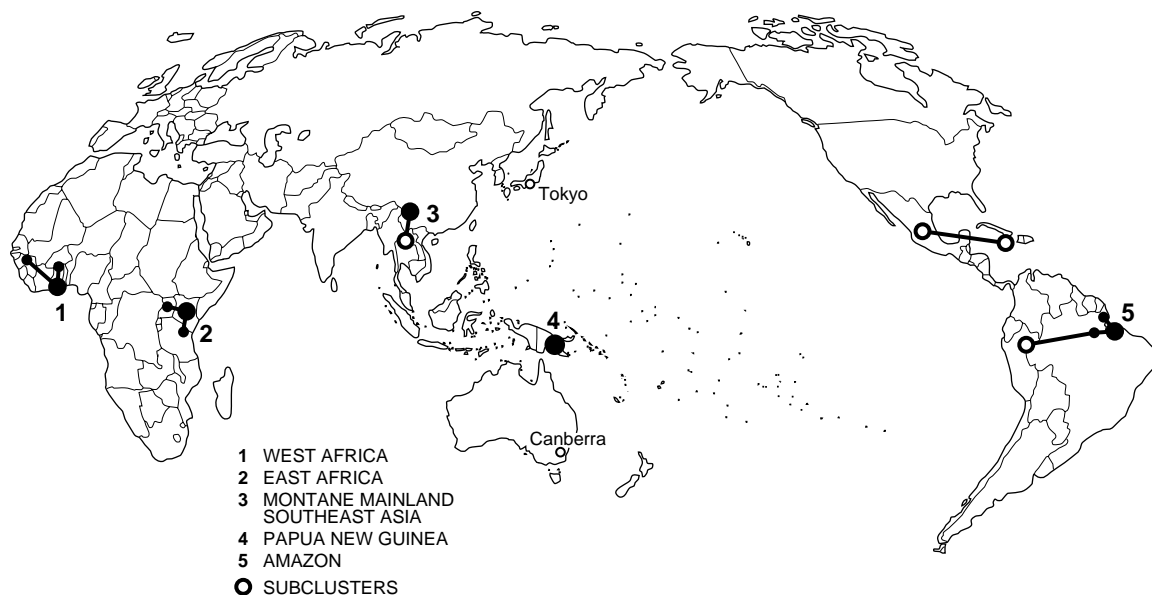
A Periodical of the United Nations University Project of Collaborative Research on People, Land Management and Environmental Change (PLEC)



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The Clusters of PLEC

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PLEC NEWS AND VIEWS

No. 10, MAY 1998

GUEST EDITORIAL

Dr. Juha I. Uitto

Senior Programme Officer, The United Nations University

The years of hard work by the PLEC coordinators and Cluster scientists have now finally paid off. Following the official endorsement of PLEC by the CEO, the funding from the Global Environment Facility (GEF) is now a reality. The starting date of the project under GEF funding was 1 March 1998 and the funding will cover a four-year period.

This piece of good news also poses a major challenge to the project and its participants. Hitherto we have operated on a shoestring budget provided mainly from the UNU core funds. It is actually remarkable how much has been achieved with limited resources and how cohesive the PLEC network has become. I take this as a concrete demonstration of the commitment of the project participants to the objectives of PLEC, reflecting ultimately the innovative and exciting nature of the project. But until now PLEC has been mainly a research project and as such provided extraordinary freedom to its participants in carrying out their work.

With the inclusion of PLEC in the GEF work programme we have agreed to fulfil the obligations specified in the Project Document. I would especially like to remind you of the second and third objectives of the project: to develop participatory and sustainable models of biodiversity management, and to recommend approaches and policies for sustainable agrodiversity management to key government decision makers, farmers, and field practitioners. PLEC has, thus, evolved into a development oriented demonstration and capacity building project. These are the objectives against which the project's success will be evaluated.

These initial months will be essential to harmonize the methodologies and approaches employed. While PLEC thrives on diversity, there is now need to move towards a more homogeneous perspective. As the Principal Scientific Coordinator reports elsewhere in this issue, an important step was taken in this direction recently when the Uganda sub-Cluster hosted a workshop in Mbarara. Similarly, and equally importantly, we need to set up a standard for working discipline that will allow us to rigorously adhere to work plans, reporting schedules, and monitoring systems required by the GEF. To remind us all of our obligations, a full-time PLEC Managing Coordinator has now commenced his duties in the UNU Headquarters.

While all of this presents new challenges to the project and its participants, I have no doubt that we will succeed. The past has demonstrated what PLEC participants are able to achieve. After all, we all have the same goal of contributing towards better policies and programmes that will reconcile environmental conservation with people-centred development.

UNU/PLEC IS NOW A GLOBAL ENVIRONMENTAL FACILITY (GEF) PROJECT

Harold Brookfield

The Good News is real. This report announces it, and then considers what it means for UNU/PLEC. It goes on to describe the meeting held at Mbarara in western Uganda at the end of March and beginning of April, a meeting that showed great enthusiasm and fellowship, and produced some excellent critical discussion and perceptive ideas on inputs and outputs. We held this number of *PLEC News and Views* until the meeting was over, and it is now important to get it out quickly. The report is consequently mainly factual. The next issue will further develop the more important business that arose, on method in relation to the 'demonstration sites'. Just two items are dealt with further here. PLEC now has a song (page 32), and hopes soon to decide on a logo. Details are on page 11.

UNU/PLEC became a GEF project on 1 March 1998

Final signatures were placed on the GEF Project Document in March, and the start-up date of the new project was fixed at 1 March 1998, to run to 28 February 2002. An initial tranche equal to the budgeted requirements of the first nine months has now been received at UNU in Tokyo. Plans have therefore been put in hand to issue new contracts for the financial year 1998 (until 28 February 1999) to all those UNU/PLEC Clusters which are included in the GEF project. Draft budgets and terms of reference, based on the approved GEF workplan for each Cluster, were drawn up and negotiated at the end of April and in early May. Contracts were written by mid-May. New contracts, using the more limited

UNU funds, will be written with those sub-Clusters that could not be included in the final GEF submission after their existing contracts are completed; in three of the four cases the 1997 contracts are still current.

Meantime, the project held its first meeting in the new context at Mbarara in western Uganda, from 29 March to 4 April. We have been planning this meeting for almost a year, and more intensively since October 1997. Since it was a large and costly meeting, there is no doubt that we took a risk in going ahead before any GEF funds could be committed to support the much more slender UNU budget. As March approached, there was a little biting of fingernails – but all was well. A report appears below, and a more detailed report on the central occasion, the symposium held on 'demonstration sites' on 1 April, will appear in the next issue of *PLEC News and Views*. An initial meeting of the UNU/PLEC Management Group was held during the Workshop, and a report appears below.

What the decision means for PLEC

PLEC has developed through five-and-a-half years from a small initial meeting in Washington in August 1992 to the Mbarara meeting in April 1998. Its progress and difficulties have been described in successive issues of this periodical, and are not recounted here. PLEC has been an integrated multinational project since the time of the Chiang Mai meeting in June 1994, but several participants at Mbarara who had been at the Chiang Mai meeting remarked on the major change in project

ethos and method that had taken place during that four-year period. PLEC now looks forward to four years of GEF funding, and the major question at Mbarara was what can be achieved during this time. The focus on small farmers and their agrodiversity has been constant from the beginning, but from a start purely as a research project PLEC is now a project which employs its research in collaboration with farmers for practical ends. The purpose is to demonstrate how innovative and experimental farmers can effectively manage resources in a manner which conserves the natural diversity on the land and in the soil.

Demonstration sites

Many important ideas were expressed at the meeting, and they gather together around the meaning and purpose of PLEC's 'demonstration sites'. This term, which replaces the old 'focus sites', is perhaps not ideal, because it calls up pre-conceptions based on the demonstration plots of formal agricultural researchers. **PLEC's 'demonstration sites' are not just places. They represent a distinctive set of ideas about how to work with farmers in the management of land and its biodiversity. PLEC is necessarily concerned with diversity and its value, and this is the core, the *sine qua non*, of PLEC.** As one participant at Mbarara remarked, a good PLEC field project is an association of scientists and farmers based on mutual respect, and having a common purpose. This is the base from which, drawing in the participation of other stakeholders, the public and government, PLEC seeks to demonstrate how locally-developed technologies, new as well as old, can offer solutions to the problems of farmers and conservationists alike. All these ideas, which had a preliminary airing at the Asia-Pacific regional meeting in Xishuangbanna, China, in December 1997, came together in the Mbarara workshop. They constitute a re-definition of what PLEC is about, one that is

common to all the varied natural and social environments in which its scientists are at work.

Monitoring

The new project will be closely monitored, both internally and by UNEP as Implementing Agency for the GEF.¹ There will be a mid-term review, and at some stage there will be a review by the Scientific and Technical Advisory Panel (STAP) of the GEF. Progress reports will be made every six months, with more substantive content at the end of each year. A schedule of scientific reports has been drawn up, and is included in the GEF Project Document; it begins in the second year, and delivery of all reports will have to be strictly enforced. Although we have a very good friend in our UNEP Task Manager, Mr Timo Maukonen, the more casual methods of the 'preparatory stage' will no longer satisfy our ultimate masters in UNEP and the GEF.

The project now has a **Managing Coordinator**, Mr Liang Luohui of Yunnan, China, who has been a member of the China Cluster. He is already in place at UNU headquarters in Tokyo, and will monitor report delivery very closely. Continuous internal monitoring is now the principal responsibility of the three Scientific Coordinators, Brookfield, Padoch and Stocking. In addition to paying advisory

¹ GEF Projects are, at present, handled through one of three Implementing Agencies, the World Bank, the UN Development Programme (UNDP) and the UN Environmental Programme (UNEP). Generally, another 'executing agency' actually undertakes the work. In our case UNEP is the Implementing Agency, and UNU the Executing Agency. Funds are supplied from the GEF to UNEP, which in turn makes them available to UNU. UNU has to report back to UNEP every six months, and UNEP in turn advises the GEF on how the project is using its money, and carrying out its assigned job. With a start-up date of 1 March, the **first six-monthly reports are all due on 31 August, 1998.**

visits, they will be in frequent communication with the Cluster and sub-Cluster leaders, all but two of whom now have electronic mail, and all of whom will soon enjoy this facility. As already described in *PLEC News and Views* No. 8, at page 3, the Scientific Coordinators have overlapping geographical division of responsibility, in addition to their general and specialist responsibilities.

Brookfield will monitor Africa and the Asia-Pacific, Padoch will monitor the American region and the Asia-Pacific Clusters, and Stocking will monitor the American region and Africa. To some degree, they will be assisted in this by regional advisers, presently Adilson Serrão of EMBRAPA (Brazil) in the Americas, and in Africa by Uzo Mkwunye, Director of UNU Institute for Natural Resources in Africa (UNU/INRA). The appointment of a regional adviser is in train for the Asia-Pacific Clusters. The role of these regional advisers will become more specific during the coming year.

Monitoring will be important, because PLEC is an innovative project that brings together about a hundred scientists of varied disciplinary backgrounds, most of them in developing-country institutions, together with their students and collaborators, and a population of cooperating farmers that already exceeds the number of scientists. They work within contrasted social systems, relate to different systems of government authority, and operate in a wide range of natural environments. A common PLEC ethos unites them, but its application in practice presents an enormous challenge.

Moreover, although Cluster leaders will receive small allowances, and financial support for work will from now on be more ample than it has been in the constrained preparatory years, PLEC is largely a voluntary project, relying on the enthusiasm and skills of its members. Monitoring will therefore be collaborative rather than authoritarian, and it will be important that the spirit of cooperation, which has so amply

characterized the preparatory years, be sustained.



THE MBARARA MEETING

The Mbarara meeting took the form of an International Workshop to plan the future course of PLEC. Work done in what we now call the 'preparatory phase' was reported mainly through some very effective poster presentations, to which representatives of the groups concerned spoke quite briefly in two sessions devoted to this purpose. Except in the formal opening session, there were no formal papers, and most speakers spoke with only minimal notes, though some had prepared papers behind these. All discussion was spontaneous. Thirty-eight members of the project team attended, two accompanied unofficially by their spouses; all Clusters and sub-Clusters were represented. Eighteen of those present throughout were African members of PLEC. A variable number, but up to more than twenty collaborators and visitors from within Uganda were also present for all or part of the time. A list of those participating in the whole meeting, and taking a part in its major formal occasions, appears on page 12.

The meeting was organized by the Uganda sub-Cluster, through a committee led by the sub-Cluster leader, Joy Tumuhairwe, with the participation of Francis Kahembwe and Edward Nsubuga of the sub-Cluster, Dr E. Sabiiti, the Dean of Agriculture and Forestry at Makerere University, and a number of others both from Kampala and Mbarara. Outside Uganda, correspondence with participants and with the organizing committee was handled by Harold Brookfield, and the foreign travel of participants from outside East Africa was arranged by Michael Stocking. Audrey Yuse in Tokyo took care of the budget and financial arrangements. Christine Padoch

organized the major symposium on demonstration sites. The venue of the meeting was the Lake View Hotel, the only large hotel in the town of Mbarara, headquarters of Mbarara District and once capital of the former Ankole Kingdom in Uganda. Mbarara is 280 km southwest of Kampala and the international airport at Entebbe, and organization of transport was itself quite a major achievement. Participants arrived at Entebbe over a period of three days, and all but a few had to overnight in one direction or both in either Kampala or Nairobi. On Sunday 29 March, the East African participants met as a group at Makerere University in Kampala before departing for Mbarara. All but the six PLEC members from Ghana, who were not able to arrive until Monday, reached Mbarara by mid-evening on Sunday.

Monday 30 March

Business began ahead of the official opening which was deferred until the afternoon to permit official participants to arrive from Kampala. After short introductory statements in which the purpose of the meeting was outlined by Juha Uitto, Harold Brookfield and Joy Tumuhairwe, there was a session of short presentations on work done by the sub-Clusters in Thailand, Jamaica and Mexico. The Coordinating Cluster leader of East Africa PLEC, Dr R.M. Kiome, then presented the work of EAPLEC as a whole, and this was followed by a presentation on the IUCN Mount Elgon Conservation and Development Project by its leader, Mr Edward Onenerach.

Monday afternoon was devoted to the formal opening of the Workshop, chaired by Dr Kiome. This began with a prayer offered by a representative of the Bishop of East Ankole Diocese. Dr Kiome, Mrs Tumuhairwe, Dr Uitto and Dr Brookfield then spoke about the development of UNU/PLEC. Mrs Beatrice Byarugaba, District Agricultural Officer (Mbarara), next described the environment and agriculture of the Mbarara area, and especially of Mwizi

Subcounty in which the Uganda sub-Cluster has been developing its first demonstration site. Mr Timo Maukonen of UNEP then spoke, placing PLEC in the larger context of UNEP's programme of work. He was followed by Dr Joseph Opio-Odong, Sustainable Development Adviser at the UNDP Country Office in Kampala. His keynote paper was entitled 'Promoting sustainable livelihoods: issues and challenges facing the United Nations University Project on Collaborative Research on People, Land Management and Environmental Change'. Dr Opio-Odong offered some valuable advice to PLEC.

At this point there was a break in formal proceedings. A member of the Peruvian sub-Cluster, Dr Mario Pinedo-Panduro, had written a theme-song for PLEC, entitled (in Spanish) '**Banderas Verdes del PLEC**' (**Green Banners of PLEC**). Accompanying himself on a guitar, he sang this song which is printed, together with an English translation, at page 32. It was received with acclamation, and was sung again after the Workshop dinner on Thursday, this time in both languages.

Dr E. Sabiiti, Dean of Agriculture and Forestry at Makerere University then introduced the Guest of Honour, who was to have been the Hon. Dr Israel Kibirige-Sebunya, Minister of State for Agriculture, Animal Industry and Fisheries in the Government of Uganda. Unfortunately, Dr Kibirige-Sebunya had been called away on urgent business, and his remarks were presented, in a very appropriate context, by the Vice-Chancellor of Makerere University, Professor P.J.M. Ssebuwufu, acting on his behalf. Dr Kibirige-Sebunya's address noted the relevance of PLEC to the agricultural and development problems of Uganda, particularly praising the placement of farmers at the centre of PLEC's field activities. Professor Ssebuwufu then declared the Workshop open and, together with Dr Sabiiti and the Workshop organizers, inspected the poster presentations which had been set up outside the conference

room. They took a very real interest in these, and asked a large number of questions.

The weather was fine, as it remained with scarcely a break all week, so that the 'Welcome Party' was held on the grass in front of the hotel, facing the small lake. A very lively entertainment had been prepared by the Mbaco Troupe (of Mbarara College), directed by Mr Geoffrey Twine-Matsiko. The members of the troupe were mostly students and teachers. The presentation lasted more than three hours and included vivid dancing and acting on both modern and traditional themes, with excellent choreography and vigorous drum accompaniment. Presented in stages through the evening was a play on a PLEC theme, entitled 'You Deserve It', concerned with the consequences for one family of the absence of new land to open for cultivation, and concluding with the need for new ways. A part of this entertainment plus the opening ceremony, and sections of film taken next day on the field excursion, were put together as a video, prepared by Mr Elly Rwakoma of Associated Stores Ltd. Studio, Mbarara. Archival copies of the video are held in both Tokyo and Canberra.

Tuesday 31 March

On this day the Workshop got down to serious business. Most of the day was taken up with a Symposium and Discussion organized and chaired by Christine Padoch on Demonstration Site Purpose and Method. After initial remarks, it was then addressed by members of the three Clusters that have advanced furthest in establishing demonstration sites, West Africa (Ghana), presented by Edwin Gyasi and William Oduro, China, presented by Guo Huijun, and Amazonia (Brazil) presented by Toby McGrath and Miguel Pinedo-Vasquez. Following this excellent start, on which more will appear in the next number of *PLEC News and Views*, shorter presentations were made on their plans and preparations by members of other Clusters and sub-Clusters, Papua New Guinea, Thailand,

Tanzania, Kenya, Guinea, Jamaica and Mexico. Two of the papers prepared, and verbally presented by participants, appear in this issue.

Christine Padoch then opened the discussion, stressing the importance of demonstration sites to PLEC, and the need for interdisciplinary integration, then asking what elements are required to make a good PLEC demonstration site, and what activities are important. She emphasized that a PLEC demonstration site is not just a plot of land, but is a process that needs working through with farmers. Of major importance are good characterization and inventory, sound monitoring and intelligent experimentation, and the fullest local participation by farmers and others; together with outreach to generate awareness, and determination of the variables that are important for replication. The final outputs are recommendations for policy, training, scientific methodology and drawing out the global implications. Within an ultimate goal of assuring food security, along with biodiversity conservation, she nominated the triad of production, productivity and sound resource management as central elements in the work of these meeting places of scientists with local people.

In discussion, stress was placed on the need to develop projects which belong to the people, through organized and self-managed local groups. Regular visits are of great importance, and trust and mutual understanding are only built up by keeping appointments, allowing villagers' affairs to take priority over the scientists' interests when they must, and above all by bringing the best farmers into the planning of all work, and its presentation. Village 'experts' are not easy to identify, but such experts must be the real leaders; they are not necessarily to be found among the politically prominent. A 'godfather' syndrome, in which excessive reliance is placed on the scientists to initiate action and sustain the pace, is a problem to be avoided.

Hopes must not be raised too high, to unrealistic levels. Problems that are soluble need to be identified, and the scientific focus placed on these. Scientists should develop a sense of equal partnership with the local groups; one solution advanced to the 'godfather' problem was to develop 'contracts' of limited term with the local organizations, contracts which can be renewed or discontinued from either side after their expiry. Emphasis was also placed on holding open meetings, involving farmers' own organizations, politicians, members of non-governmental organizations, and the local agricultural officers who should, in time, become the demonstration agents.

After this discussion, which could have continued longer had there been more time, Joy Tumuhairwe introduced the Mwizi area of western Uganda, and the developing demonstration site plans of the Uganda sub-Cluster in this area. She then outlined plans for the Workshop visit to Mwizi, to be held on the following day. After this presentation there was an open initial meeting of the PLEC Management Group, separately reported below.

Wednesday 1 April

Most of this day was spent in the Mwizi demonstration site a few kilometres south of Mbarara. This is a dissected upland area of plateaux and steep-sided valleys, reaching 1,800 m in elevation, and nowadays closely settled and under cultivation systems from which managed fallow is progressively being eliminated. Though it has been cultivated for a long time, it was not intensively occupied for several decades before the 1950s when it was settled by a mixed population of Ankole people and Bakiga migrants who moved there from the more densely-peopled uplands to the west. An economy based on maize, millet and sorghum, with sweet potatoes and other crops is increasingly replaced by a banana monoculture, mainly for commercial sale. The Workshop participants were divided into three groups, each of which followed a different itinerary and visited different sets of

farmers. We were able to see a range of farming practices, both indigenously developed and introduced, but were impressed – and concerned – by the modern spread of a monoculture the sustainability of which has not been established, and the evidence that complex intercropping and rotational practices are of diminishing significance. Emphasis was placed on farmers now growing medicinal crops, since there is little wild forest left from which medicinal plants can be obtained.

After return to Mbarara, there was an open discussion, chaired by Edward Onenerach, on what had been seen and heard, and a number of suggestions were made to the Uganda team. One critical problem identified is the decline in soil fertility, and the need for methods to bring this under control.

Thursday 2 April

The first half of the morning was occupied in presentations elaborating on their poster papers by those Clusters and sub-Clusters which had not presented on Monday: Ghana, Guinea, Tanzania, Kenya, Papua New Guinea, Brazil and Peru. The second half of the morning and most of the afternoon were then devoted to an 'open discussion' on the future of PLEC, chaired by Geoff Humphreys, who had previously asked participants to rank a proposed list of topics in the order they wished to see them discussed.

The first item discussed, at length, was the **generation and content of the data base** that is a requirement in the first project year. A difficulty was promptly raised concerning use of the data base on plant diversity in demonstration site areas, toward which substantial progress has been made in several Clusters. This information is the property of the countries concerned. We were told that this should not be made generally available before 1 January 2005. There are therefore major difficulties in the way of putting the information that has been gathered into a publicly-accessible

data bank, through UNU, as is envisaged in the GEF Project Document. It was agreed to seek advice on this matter before the planned meeting of the Management Group in Tokyo on 2-5 July, and meanwhile to take no further action to bring separate Cluster biodiversity data together.

Data collected on agrodiversity is subject to no such legal limitations, but there is also no agreed format within which such data should be collected. Very variable information only has yet appeared in Cluster reports, and the recommendations made in 1995 by Zarin have not been closely followed. The most comprehensive presentation is at too small a map scale for general use in PLEC. If data on farming systems are to be compared, a more generally-usable format for such data is now urgently required, although it must be a format adaptable to the different needs of each region. Noting from Annex 5 of the Project Document that it is the responsibility of the Scientific Coordinators, together with the Managing Coordinator and the Senior Programme Officer, to provide guidelines on this matter and the content of the reports which are to follow in Year 2 and subsequently, attention was drawn to certain existing guidelines for collection of data on farming systems, crops and soil types.

The Scientific Coordinators agreed to bring together their own work, and that of others in these areas, with a view to generating a fairly simple set of common requirements that can be elaborated on as desired by Clusters. Clusters were each asked, by the Chairman, to nominate one of their members to correspond on this question, but this was not done at the time. The Principal Scientific Coordinator will communicate with Cluster leaders. Major progress needs to be made before the time of the Tokyo meeting in July, at which the data base question will be a major topic for review. At this stage there can be agreement only on the basic locational and background information that must be included, that systems developed should be

linked into mapping, using GIS, and that database collection and management should not be allowed to divert excessive attention from the principal purpose of the project, which is to work with farmers.

No other topic was discussed in the same detail. Questions were asked about the role of **scientific advisers**, other than the Coordinators, and there was agreement that so far as possible such advisers should be drawn from among PLEC membership and associates, with very specific and limited-term tasks. It was agreed that **networking among Clusters** should be developed to include working visits, and that some of these should include farmers as well as scientists; the value of in-the-field experience of the work of other groups was widely recognized.

On the need for **assistance with access to scientific and other relevant literature**, there were varied responses from participants, based on their own experience, but some Clusters – especially but not only in Africa – would find such assistance of great value. It was agreed that the Canberra office should, at least in the first two years, act as a clearing house, obtaining copies of papers as requested (see inside back cover for details) and distributing reading lists on selected topics as well as resuming the printing of such lists in *PLEC News and Views*. It was also agreed that **anyone who encounters items of wide utility in the literature should make titles and abstracts available through the e-mail network**, and also that such information should be printed in the succeeding number of *PLEC News and Views*.

There were informative interchanges on this topic, and others, including the **utility of the Internet in PLEC**. It was suggested by some members that each Cluster should develop its own Homepage, linked into the general UNU/PLEC Homepage that is still under development (see page 31). A number of sub-Clusters, and many members

of Clusters, either lack Internet access altogether or have it only very recently, and for many the connection is unreliable, consumes time and resources, and in addition they lack the necessary technical support. For some, extensive use of the Internet would encounter substantial charges. Some national telecommunications systems, especially in Africa, remain seriously deficient. The situation, which is already dramatically different from what it was in the early days of UNU/PLEC, is rapidly changing, and it should be a role of UNU/PLEC to help Clusters to make greater use of electronic networking as this becomes available.

One topic that aroused considerable interest concerned the **possibilities of enhancing career development within PLEC**. It was noted that, in addition to training programmes that might be available in universities of the 'north', there are important programmes within the institutions that participate in the PLEC network, for example at the Federal University of Pará, in Brazil, and at Chiang Mai University in Thailand. A significant weakness in Africa is training in taxonomy. It is a major role of UNU, as well as of UNU/PLEC, to assist capacity building, and varied ways of doing this need to be explored.

This wide-ranging discussion exposed more issues than it resolved, but it provided an agenda on which UNU/PLEC and its members must work. It was followed by a short Closing Ceremony (of formal business), opened with a prayer by Joy Tumuhairwe. Michael Stocking then offered an effective summary of the achievements of the meeting, and this was followed by impromptu remarks by Harold Brookfield and Juha Uitto. The organizers, especially Joy Tumuhairwe, were warmly thanked as were all participants for their cooperation in making the meeting a success. The formal business of the meeting was then closed by the Dean of the Faculty of Agriculture and Forestry of Makerere University, Dr E. Sabiiti, on behalf of the Vice-Chancellor. In

the evening an informal Workshop dinner took place in the open air, ending characteristically in song. Particularly memorable were a duet, in Finnish, sung by Timo Maukonen and Juha Uitto, and several songs by our Latin American and African participants.

Friday 3 April and Saturday 4 April

On Friday, Workshop members were taken to the intensively cultivated region in the hills around Kabale, and travelled to the Rwandan border. On the way, they visited a community near Rubare, where PLEC members are collaborating with CARE in efforts to control a large and deep gully. Next morning, after several participants had visited Lake Mbuho National Park near Mbarara, all were taken by bus to Kampala or Entebbe. Some left Uganda that day, while others left on Sunday 5 April.

An African Regional Meeting

During the Mbarara Workshop, on Thursday afternoon, 2 April, a meeting of all African members present, from both East and West Africa, was convened by Uzo Mokwunye, the Director of UNU/INRA and regional adviser to the African Clusters. Participants used the opportunity to reaffirm their commitment to the goals of PLEC and especially to emphasize the need to ensure that activities carried out under the project are geared toward improvement of the lives of Africans. To promote synergy between the two sub-regions, the participants recommended the following:

1. Exchange of membership lists of both Clusters showing the specialities of each member.
2. Members of each Cluster should be invited to the planning meetings of the other.
3. There should be provision for one or two members from each Cluster to pay

working visits to the other during each year.

4. There should be exchange of information on an on-going basis. A Newsletter was suggested, and also a joint African PLEC Homepage.
5. The Cluster leadership was encouraged to organize general meetings and workshops to highlight the activities of PLEC and promote increased visibility with African policy makers.
6. UNU/INRA was requested to play a greater coordinating role to ensure that there is synergy between the activities of both Clusters.

The Management Group

The Management Group of UNU/PLEC is minimally defined in the Project Document as the leaders of the five GEF-funded Clusters, together with the Scientific Coordinators, the Managing Coordinator (as secretary), the Programme Administrative Officer, the UNEP Task Manager, and the UNU Senior Programme Officer (as chair). **This group cannot be diminished, but can be enlarged as circumstances require.** For the initial year, we add to it the leaders of GEF-funded sub-Clusters in separate countries, and of those sub-Clusters which are not funded by the GEF. This will be varied in later meetings. The initial meeting, held 31 days after start-up date, included all the above and was open to others with a close involvement in PLEC management. A second meeting, also broadly defined to include all the sub-Cluster leaders, will be held in Tokyo from 2-5 July 1998, and will be concerned with the detailed planning of UNU/PLEC work in the first two GEF years.

The initial meeting at Mbarara on 31 March 1998 was chaired by Timo Maukonen, the UNEP Task Manager, in the absence of Juha Uitto who was in Kampala obtaining money to pay per-diem allowances to

Workshop participants. Business was as follows:

1. The Managing Coordinator **Mr Liang Luohui** was introduced, and his role in project business was explained. He will be the focal point for all administrative business, and will be kept informed also of all business to do with scientific management and financial management. He will have particular responsibility for the reporting schedule. **Administrative correspondence formerly addressed to Juha Uitto should now be addressed to Liang Luohui (Liang@hq.unu.edu), with copies to Juha Uitto, Audrey Yuse (financial), and Hiroko Kuno.**
2. It was noted that a six-monthly reporting schedule applies for progress reports, and that **the first progress reports are due on 31 August 1998.** Reporting will be discussed in greater detail at the Tokyo meeting.
3. Budget flexibility for Clusters and all others on institutional contracts is limited to 20 per cent of each budget line. The financial management contracts for all Clusters will in future be institutional. The terms of variation were discussed, and will be finally established at the Tokyo meeting. Institutional contracts will include an item for 'institutional services' which will cover all 'overhead costs', which GEF and UNU rules do not permit as such. This will be stated in the contracts.
4. The most important item concerned the sub-Clusters which were not included in the GEF submission (for different reasons) and which are therefore not included in the GEF budget. These sub-Clusters (Thailand, Mexico, Peru, Jamaica) can be supported directly only from UNU funds. Leaders expressed willingness to work to the same objectives as the rest of UNU/PLEC, and meet the same reporting requirements and schedules. On this basis, it was agreed that they should be regarded

internally as sub-Clusters of UNU/PLEC in parallel with those Clusters and sub-Clusters which are more amply supported from the GEF budget. The term 'associated groups' will no longer be used, and UNU/PLEC will therefore remain one project for all internal purposes. It was noted that three of the four sub-Clusters concerned still hold outstanding 1997 contracts and that, as with all Clusters, these must be cleared before new contracts can be written.

5. A general meeting of PLEC is scheduled, in the Project Document, for late in the second year, about the end of 1999. It was agreed that this should be held in Amazonia.
6. Other matters included [a] a request that the Project Document, or the major parts of it, be translated into French, Spanish and Chinese; [b] discussion of the present vacancy in national leadership in the Papua New Guinea Cluster; [c] matters concerning coordination, scientific advisers, and training that were also raised in the general meeting on Thursday 2 April.

It had been planned to hold a brief second meeting of the core Management Group on Friday 3 April to consider matters arising from Mbarara that should be discussed in Tokyo, but this was cancelled due to late return from the excursion to Kabale and Rubare. The agenda of the Tokyo meeting will therefore be determined through correspondence.

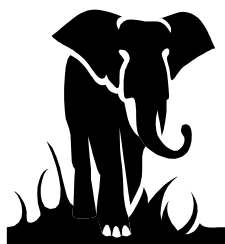
Christine Padoch is Vice-Chair of STAP

On 6 April, Mr Klaus Toepfer, Executive Director of UNEP, announced the appointment of Christine Padoch as Vice-Chair of the new Scientific and Technical Advisory Panel of the GEF (STAP). The Chair of the new STAP is Dr Madhav Gadgil (India), the first developing country scientist to hold this position.

PLEC congratulates Christine on her appointment.

A LOGO FOR PLEC

At the Uganda meeting, a design for a PLEC logo was submitted by one of our members. It was decided that all Clusters should have an opportunity to submit logo designs. These should be simple but visually effective. Offers, with drawings, should reach Dr Juha Uitto, Senior Programme Officer, United Nations University, 53-70 Jingumae 5-chome, Shibuya-ku, Tokyo 150, Japan, **by 30 June**. The Management Group, meeting 2-5 July, will then consider the designs submitted.



UNU/PLEC PARTICIPANTS AT THE MBARARA MEETING MARCH-APRIL 1998

Name	Institution	Country
Mr John Addipa	University of Ghana	Ghana
Dr Bryant Allen	Australian National University	Australia
Dr Mariama Awumbila	University of Ghana	Ghana
M. Abdoul Karim Barry	Université de Conakry	Guinée République
Professor Ibrahima Boiro	Université de Conakry	Guinée République
Professor Harold Brookfield	PLEC Project, Australian National University	Australia
Ms Muriel Brookfield	PLEC Project, Australian National University	Australia
Miss Pamela Busingye	Makerere University	Uganda
Dr Chen Aiguo	Xishuangbanna Tropical Botanical Garden	China
Dr Lewis Enu-Kwesi	University of Ghana	Ghana
Professor Guo Huijun	Chinese Academy of Sciences/Kunming	China
Professor Edwin A. Gyasi	University of Ghana	Ghana
Dr Geoff S. Humphreys	Macquarie University	Australia
Dr Carlos Arriaga Jordán	CICA-UAEM	Mexico
Mr Frances Kahembwe	Forestry Research Institute	Uganda
Mr Fidelis Kaihura	Agricultural Research and Training Institute	Tanzania
Mr Edward Kaitaba	National Soil Service - Mlingano	Tanzania
Mr Rodney Kameata	National Research Institute, University of PNG	Papua New Guinea
Dr R. M. Kiome	Kenya Agricultural Research Institute	Kenya
Mr Liang Luohui	United Nations University, Tokyo	Japan
Mr David McGrath	Universidade Federal do Pará	Brazil
Mr Timo Maukonen	UNEP	Kenya
Dr Uzo Mokwunye	Director of UNU/INRA	Ghana
Mr Edward N.B. Nsubuga	Makerere University	Uganda
Dr William Oduro	University of Science and Technology	Ghana
Professor Ryutarō Ohtsuka	School of International Health, University of Tokyo	Japan
Mr Barrack Okoba	KARI-RRC Embu	Kenya
Mr Edward Onenerach (guest)	IUCN Mount Elgon Conservation and Development Project	Uganda
Professor Joseph Opio-Odong (guest)	UNDP, Kampala	Uganda
Dr E. Osusu-Bennoah	University of Ghana	Ghana
Dr Christine Padoch	New York Botanical Garden	USA
Dr Mario Pinedo-Panduro	IIAP, Iquitos	Peru
Dr Miguel Pinedo-Vasquez	Columbia University, New York	USA
Dr Kanok Rerkasem	Chiang Mai University	Thailand
Associate Professor E.N. Sabiiti (guest)	Makerere University	Uganda
Mr Shen Lixin	Yunnan Academy of Forestry Sciences	China
Professor P.J.M. Ssebuwufu (guest)	Vice Chancellor, Makerere University	Uganda
Professor Michael Stocking	University of East Anglia	England
Professor Elizabeth Thomas-Hope	University of the West Indies	Jamaica
Mrs Joy Tumuhairwe	Makerere University	Uganda
Dr J.I. Uitto	United Nations University, Tokyo	Japan
Dr Jane Wamuongo	Kenya Agricultural Research Institute	Kenya
Profa. Dra. Tereza Ximenes-Ponte	UFPa, Brazil	In USA until 1999



UNU/PLEC participants at the Mbarara meeting March-April 1998

In addition, 24 invited persons from Uganda and two private accompanying persons from Mexico and South America attended all or part of the meeting.

NEWS FROM THE CLUSTERS

All UNU/PLEC Clusters and sub-Clusters presented reports on their work at Mbarara, most of them also providing informative poster presentations. Among these, the Peruvian sub-Cluster presented material from a paper already prepared for publication, which is printed in this issue of *PLEC News and Views*. A detailed technical report on its Preliminary Phase work was brought to the meeting by the Tanzania sub-Cluster, and formally submitted. Edited material from this report will be published, by UNU Press, together with material from the other African sub-Clusters, which is also complete for the Guinea sub-Cluster, and is anticipated very soon from the others. Some leaders have also provided activity reports since the appearance of *PLEC News and Views* No. 9, and these form the main basis of this set of summary reports. The next issue of *PLEC News and Views* will contain information from all areas on progress toward the setting up of demonstration sites.

West Africa - Ghana

In southern Ghana, substantial progress has been made with the first demonstration site at Gyamfiase-Adenya, especially on the promotion of tree conservation on farms around the forest grove. A plant nursery with some 2,600 seedlings (especially teak, *Tectona grandis*; *ankye*, *blighia sapida*), and income-generating farms of pepper and food crops intermingled with trees, were established by the Collaborative Agroecosystems Management Project (CAMP). This PLEC-assisted farmers' organization now has over 200 members together with two women's affiliate groups. There was substantial support from the Ministries of Food and Agriculture, and

Lands and Forestry, which provided technical advice, tools, seeds and seedlings. Some of the planted materials were made up of volunteer seedlings collected in the Gyamfiase grove. Other work was with farmers in Sekesua-Osonson and Amanase-Whabeniya, former study areas where demonstration site activities are planned.

In central Ghana, the Kumasi-based team continued to monitor its established agroforestry work with a women's group at Jachie, and demarcated a sacred grove at Bofie. The team also carried out collaborative work with local people on agrodiversity, land use and soil-fertility status at two other communities. In northern Ghana, the Tamale-based group was enlarged, and continued work with farmers in the Bawku-Manga area on rice, onions and the rehabilitation of old bunds which the farmers find of value in soil and water conservation. Preliminary work was also carried out at Tolon, a Dagomba area near Tamale.

It was noted at the Mbarara meeting that there are over 3,000 locally-protected forest groves in Ghana, ranging in area from a quarter-hectare to over a square kilometre. The PLEC focus on land around such groves thus has a wide potential significance.

East Africa - Tanzania

Filling of gaps in work in the Arameru area made possible completion of the report that was brought to Mbarara. In addition, PLEC members who are associated with the 'Soil Conservation and Agroforestry Project in Arameru' (SCAPA) have been asked to document their experiences of working with farmers in land management and

conservation. Selection of farmers in two Arameru communities which will form the Tanzanian demonstration sites has also begun.

China, and an Asia-Pacific Regional Meeting

The China Cluster has continued its work at three main sites, two in the Gaoligongshan region (Hanlong, on the eastern side of the mountain where the Farmers' Biodiversity Conservation Association is based, and Minzudi in Saba administrative village on the western side of the mountain), and one in Xishuangbanna (Daka). Reconnaissance work was also done in other villages. The Cluster held a field workshop in Xishuangbanna from 6 to 12 October 1997, the main purpose of which was to refine field methodology and introduce new participants to village-based work. Particular emphasis was given to further modification of 'agrobiodiversity assessment', classified within nine main types of management system, to be subdivided. Except in homegardens, which need to be inventoried as a whole, the project will use the 20x20 m quadrat size standard in China for forestry work. After analysis, this will provide the base for identification of the current status and problems of agrobiodiversity management, in a tri-partite collaboration between farmers, scientists and officials. The workshop also drew up a detailed workplan, and decided on a reorganization of China Cluster work, with a central scientific and political management group, and two working groups. The Xishuangbanna working group is led by Chen Aiguo and the Gaoligongshan working group by Shen Lixin.

Cluster members, and also Juha Uitto, Harold Brookfield and Christine Padoch, together with members of the Papua New Guinea Cluster listed below, attended the third meeting of the UNESCO/UNU/Third World Academy of Science programme on 'South-South

Cooperation on Environmentally Sound Socio-economic Development in the Humid Tropics" held in Kunming from 8 to 11 December. A paper on Gaoligongshan was prepared for this meeting by the Cluster leader, and was presented by Shen Lixin and Dao Zhiling who emphasized the strong growth of the Farmers' Biodiversity Conservation Association, its autonomy and its collaboration with PLEC scientists. This delivery and the very effective discussion which followed was, perhaps, the star occasion among the Kunming presentations.

After this meeting, PLEC participants met together from 12-14 December at Xishuangbanna Tropical Botanical Garden. This was specifically an Asia-Pacific regional meeting of UNU/PLEC, and it was also attended by Tom Nen, Ryutaro Ohtsuka, Masahiro Umezaki and Geoff Humphreys of the Papua New Guinea Cluster. One half-day was spent on presentation and discussion of work completed and plans for the GEF stage. Over the next two days four villages were visited, principally Daka and Baka, with shorter visits to two Dai villages, Guanzhai and Manjing. Each is remarkably different from all the others. The visit to Daka was used to present the well-advanced planning for demonstration site work in this community, where specific problems have already been identified together with the farmers. At Baka, farmers are seeking help with problems of declining soil fertility in a situation where resources are very constrained.

Three informal meetings were also held. One (led by Christine Padoch) focused on the relevance of social anthropological methods in village work, and on demonstration-site strategy. It was urged that one student should work in each of the four villages for a sustained period. The second (led by Harold Brookfield) sought to bring together the views and ideas presented at the regional meeting. The third (led by Guo Huijun and Tom Nen) discussed means of collaboration, and exchange of national

personnel for field work, between China and Papua New Guinea.

Amazonia

A report received earlier from Amazonia reviews work near Macapá and Santarém that continued through 1997. The Macapá group has developed two demonstration areas in each of which are protected and managed community or family forests. Selected smallholder families included those known to be the best managers, and also households headed by single mothers. Technical assistance was provided in inventory of managed fallow areas and house gardens, by introduction of two fast-growing varieties of cassava from the middle Amazon region, and in thinning of managed forests. With large outmigration of young people, agriculture itself has declined, but agroforestry and extraction of forest products have increased. Training activities have included meetings to strengthen community and inter-community organizations, and two-day technical courses in which skilled smallholders trained other smallholders, especially in agroforestry techniques for the production of bananas in fallows and house gardens.

The Santarém group has continued its concern with lake-resource management reported in *PLEC News and Views* No. 8, and has offered technical assistance in soil management, intercropping and biological control of pests and diseases. Based on a successful experience, one village is building anchored rafts for production of vegetables, medicinal and ornamental plants during the high-water season. Work on an environmental education programme for schools has included workshops and, at the end of 1997, production of an illustrated manual for teachers and students entitled *O Mundo da Várzea*.

Mexico

A second interim report has been received from the Mexico sub-Cluster, describing their work on 'Agrodiversity Management and Sustainable Agriculture in the Hill Slopes of the Highlands of Central Mexico'. Work has concentrated in two villages where demonstration site work is being initiated. It explores especially the relation of maize types selected for planting to the soil types recognized by farmers, and the management of these soils under different seasonal conditions. A 'seed workshop' was held to bring farmers together to discuss criteria for seed selection. From 28-30 April 1998 a 'Mesoamerican Seminar on Agrodiversity in Campesino Agriculture' was held at Toluca. The first keynote paper, on 'The PLEC project and the work on agrodiversity in Brazil', was given by Christine Padoch, who later visited the working sites.

PNG Cluster Leadership

Mr Tom Nen, who has been national leader of the Papua New Guinea Cluster since 1996, was appointed in early 1998 to a new post as Managing Director of the Forest Authority in Papua New Guinea. He has therefore moved from the National Research Institute, and has relinquished his role in PLEC. The National Research Institute is the in-country institution which undertakes PLEC work in Papua New Guinea, in association with twinned groups in Australia and Japan. The Institute wishes to sustain its involvement, but it will be a little while before a suitable replacement for Tom Nen can be appointed. In the meantime, therefore, Dr Beno Boeha, Director of the National Research Institute, has agreed to act as interim Cluster leader.

FROM FORESTS TO FIELDS: INCORPORATING SMALLHOLDER KNOWLEDGE IN THE CAMU-CAMU PROGRAMME IN PERU

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Background

Cultivation of Amazonian forest products with economic value by local farmers has been recommended by experts. This would effectively replace unsustainable patterns of resource extraction and biodiversity loss, and lead to more sustainable resource management (Arnold 1995; Moran 1993; Homma 1992). The steps that need to be followed and ways to motivate rural Amazonians - such as the *ribereños* of Peru - to plant and manage forest species in their fields, fallows, house gardens and forests have been outlined by Dufour (1990), Lampietti and Dixon (1995) and Peters (1996). The economic and ecological advantages of cultivating rather than extracting forest products have been discussed by many (Dufour 1990; Afsah 1992; Clay and Clement 1993; Arnold 1995; Homma 1996).

Development and conservation agencies have acted upon such expert advice and are implementing programmes in Amazonia that promote the production of formerly extractive products. Most of these programmes are implemented by public agencies and NGOs by designing and promoting technical packages developed by urban-based experts on experimental research stations. The majority of these programmes also include several requirements in regard to size of plantings, type of soils, etc., that farmers need to follow in order to become beneficiaries of

the programmes. One such activity in Peruvian Amazonia is directed toward the cultivation of a shrub species (*Myrciaria dubia*) for production of the vitamin-rich camu-camu fruit (Figure 1). The fruit of *M. dubia* contains from 2000 to 2994 mg of ascorbic acid per 100 g of pulp (Peters and Hammond 1990), making it the fruit with the highest known concentration of vitamin C; over thirty times that of an orange (FAO 1986).

An increase in the demand for camu-camu fruits in the international market is predicted because of its high content of natural vitamin C. The rising demand for camu-camu has led to suggestions that production of the fruit can even be a viable alternative to coca production in several regions of Peruvian Amazonia (El Comercio 1996; Expreso 1996). Although there are few reliable data on the amount of camu-camu fruit that is extracted and sold in markets today, most experts believe that the market demand cannot be supplied by continuing to extract fruits from natural stands. Based on these projections, *ribereños* are being encouraged to plant *M. dubia* in their fields, fallows, house gardens and managed forests.

Planting *M. dubia* is seen by conservationists as a solution to the problem of overharvesting fruits from natural stands. Overharvesting of camu-camu fruits is believed to have a negative impact on natural regeneration of the species as well



Figure 1 Camu-camu fruits

as on fish populations (Goulding et al. 1996). Camu-camu fruits are an important source of food for some of the most valuable Amazonian fish species such as gamitana (*Colossoma macropomum*). The adaptability of *M. dubia* and its tolerance of floods and other environmental constraints of the Amazon floodplain is also an important reason why *ribereiros* are being encouraged to plant the shrub (FAO 1986).

Research and extension activities promoting the planting of camu-camu in Peruvian Amazonia began more than 20 years ago, and until recently have had very little success. Since 1995, fruit production has been through the camu-camu programme as part of a reforestation effort funded by the Peruvian government and implemented by private enterprises. Despite the considerable time, expense, and work that has been devoted to the promotion of camu-camu, *ribereiros*, i.e. the smallholders of the Amazon floodplain, have responded

little to the government programmes or incentives. The experience of one programme that eventually incorporated *ribereiro* knowledge into the technology package is at last promising favorable results. In this brief article we discuss a few reasons why many of the government-initiated programmes were unsuccessful and how using local knowledge, locally developed technologies, and the help of local village experts has helped in understanding the reluctance of smallholders to plant the fruit using the original technical packages, and, more importantly, how it has led to a better-planned project.

What we know about *ribereiro* management systems

The *ribereiros* of the Amazon floodplain (or varzea) are known to have developed sophisticated and complex agriculture and agroforestry production techniques suited to

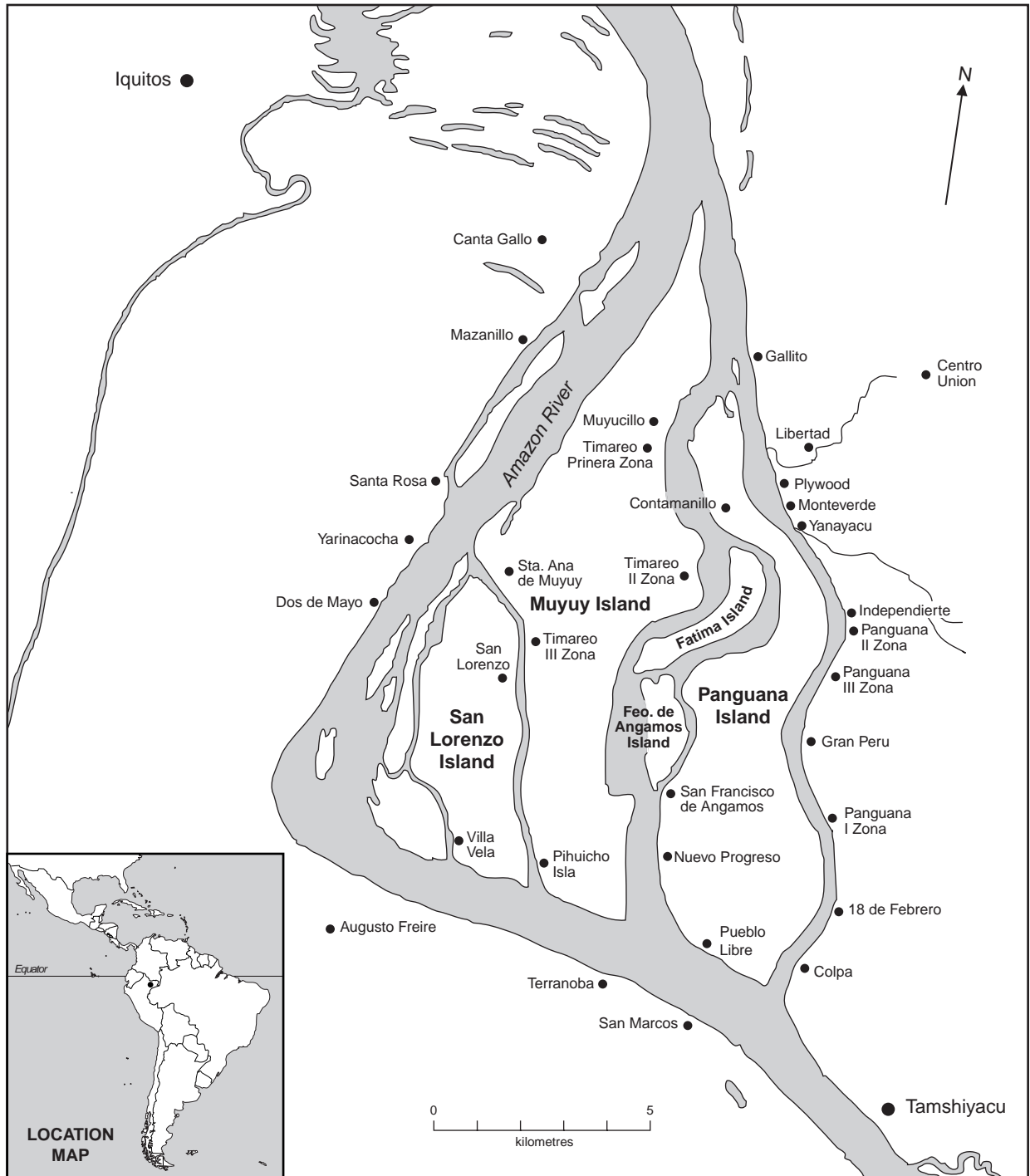


Figure 2 Villages where planting camu-camu fruits is being promoted, Iquitos, Peru

different varzea environments (Padoch et al. 1987). Most *riberños* have traditionally managed and even occasionally planted a great diversity of forest species with wide ranges of uses (Padoch and Pinedo-Vasquez 1996). In addition, *riberños* who manage a changeable and very risky environment such as the varzea, have long experimented with different management schemes and species. Amazonian farmers are constantly manipulating forest species in different varzea environments as a way of selecting the best genotypes and the most suitable environments for their production.

Studies of *riberño* agriculture and agroforestry have described a wide array of production types, but none report floodplain farmers planting monocultures of trees or woody shrubs on levees, the practices that camu-camu projects have been attempting to promote (Padoch and Pinedo-Vasquez 1996). These attempts have taken into account some ecological data about camu-camu and the kinds of stands it naturally forms, but have included only sketchy, if any, information about farmers' practices and needs. Such information is, of course, critical for planning any role for *riberños* in the process of cultivating camu-camu or any other forest products.

Motivating *riberños* to plant *M. dubia*

The process of promoting *M. dubia* cultivation among Amazonian smallholders near Iquitos, Peru, has involved several researchers, urban-based technicians, and *riberño* households (Figure 2). The process began in 1980 when a total of 279 seedlings of *M. dubia* were planted in an experimental plot of 0.4 ha located at the Padre Isla research station (Pinedo-Panduro 1989). Seedlings of this shrub were interplanted with other fruit species that were adapted to varzea conditions. *M. dubia* seedlings showed the highest survival rate (100%) and were the first ones to produce fruits (Pinedo-Panduro 1996). Although camu-camu yields in the plots

were only 9% (1 tn/ha) of the average yield of 11 tn/ha that is produced in natural stands, the study demonstrated that camu-camu can be cultivated. Further experimental studies involved varying the distance between planted seedlings. Yields, however, failed to improve much (1.1 tn/ha). Experiments conducted in farmers' house gardens again yielded similar results. *M. dubia* seedlings were transplanted from natural stands to the lowest sections of house gardens (Figure 3). Fruit production obtained by these families after four years ranged from 0.7 to 1.2 tn/ha (Pinedo-Panduro 1996).

Despite the rather low yields of camu-camu fruits produced in their house gardens, six *riberño* families who cooperated with the camu-camu programme reported that they were not dissatisfied with the experiments. Among the most valuable results obtained by them was the identification of the specific varzea areas where *M. dubia* could be planted successfully. Based on this *riberño* experience, farmers decided that *M. dubia* grows better on backslopes of levees or *bajeales* (the lowest section of the varzea lands) that remain flooded an average of seven months during the year. In addition, all six farmers found that *M. dubia* on *bajeales* could be interplanted with rice, corn, beans, water melon, vegetables and other annual crops (Figure 4). These results led them to a technology significantly different from the package that had originally been promoted by the urban-based technicians. The technicians had advised farmers to plant camu-camu on levees or *restingas* (rather than *bajeales*) in agroforestry systems, or alternatively, in monocultures. While the six families agreed that camu-camu fruits can be produced in monocultures of *M. dubia*, they argue that converting their landholdings into plantations of this shrub species is ecologically as well as economically risky. They also decided that their levees were better devoted to

Figure 3

A *ribereño* woman expert and her planted camu-camu



other crops including food staples like plantains and manioc.

Planting models developed by the six households in cooperation with the technicians were then promoted to other potential producers by establishing demonstration sites on the landholdings of *ribereño* families. The promotion process started by organizing groups of *ribereños* from communities to visit the camu-camu fields of the six households. After the visits, families that expressed an interest in planting *M. dubia* were provided with seedlings and their landholdings were

visited. The 'demonstrator households' were particularly good at giving relevant advice on production and economic risks associated with the new endeavor to their fellow *ribereños*. They helped their neighbors make reasonable judgements on whether they should 'self-select' themselves as good candidates for the process of experimentation and problem-solving that the camu-camu programme still required.

The experience of establishing demonstration sites in the *ribereños'* landholdings and organizing visits had mixed results. Most *ribereño* farmers who



Figure 4 Interplanting camu-camu with annual crops following the *ribereño* system

visited the demonstration sites expressed interest in participating in the camu-camu programme, but they continued to vary their methods of planting. For instance, households from the communities located in the complex of hamlets known as 'sector de Muyuy' (a PLEC research site and soon to be a demonstration site) planted 2,170 seedlings of *M. dubia* in a total area of 0.9 ha of *bajeal* lands, distributed in small patches. The technicians had planned for much larger, continuous plantations. The farmers, however, not only interplanted other crops including watermelon, maize and other vegetables, but took advantage of a patchy environment to plant their camu-camu in the small areas that presented micro-environments that were best suited for cultivating the shrub. Some of the plots planted to camu-camu measured only a few metres square.

The village demonstration sites have already played a key role in the process of

converting camu-camu fruits from an extracted to a cultivated product. The participation of the *ribereño* households have provided insights on how to promote the cropping of *M. dubia* among *ribereños*. Among some of the most important lessons was that promotion of the cultivation of a new crop like camu-camu fruits needs to be conducted primarily by *ribereños*: technicians can best play a secondary role. Perhaps some of the most relevant lessons learned from the families that consented to have their lands used as demonstration sites was that *ribereños* trust *ribereños* to identify who can or cannot produce camu-camu fruits in their landholdings. Technicians can provide some useful technical and scientific advice on how to produce a product, but often this information is then made available to the wrong people.

Apart from the valuable lessons learned from the households on how to promote the production of camu-camu fruits among

ribereños, new and useful technical information was also obtained from these families. For instance, the farmer experimenters found that *M. dubia* seedlings on *bajeales* are vulnerable to desiccation as well as weed invasion. The families identified weeding as the most difficult and costly operation in the maintenance of planted *M. dubia* in *bajeales*. However, after three years of experimentation the households managed to control weed invasion ever more successfully by increased interplanting of corn, beans, water melon and vegetables. Intercropping *M. dubia* with these annual crops has helped the households reduce the maintenance costs and compensate for the relatively low yields of camu-camu fruits obtained in their sites. Yield of fruits per area harvested by these farmers remains within the range (an average of 1.1 tn/ha) of the fruit yields produced in the experimental sites at the research station of Padre Isla.

The use of the fields planted with *M. dubia* by the families as demonstration sites helps to expand the cultivation of camu-camu fruits to other communities. Work in other communities has more recently been facilitated by the availability of financial incentives given by the Peruvian government since 1995. In addition, the project team began working with a private institution, the Compañía Amazónica de Producción Forestal - CAMPFOR based in Iquitos.

Several private institutions, including CAMPFOR, obtained grants from the government in 1995 to promote the planting of *M. dubia* as part of the reforestation programme mentioned above. While most private enterprises are using these grants to put in their own plantations of *M. dubia*, members of the CAMPFOR team are employing the funds to continue the experiences of working with *ribereño* families in the process of converting camu-camu fruits from an extracted to a cultivated product. Investing the grant in promoting the planting of *M. dubia* in the landholdings of

ribereños is seen as a direct way to help smallholders to increase their income by producing camu-camu fruits. Although CAMPFOR's cooperating farmers have yet to harvest and market their fruits, the project can already be counted a partial success because of the information that has been obtained through the partnership with *ribereño* farmers. Using smallholders as advisors on technical matters of production as well as advisors on the best ways to promote the project in the area has proved to be both rewarding and efficient.

Discussion

Programmes promoting the planting of extracted species as a way of conserving them while enhancing rural incomes have long existed in Amazonia. Planting rubber (*Hevea brasiliensis*), cacao (*Theobroma cacao*) and other species that produce valuable commodities have been intensively promoted by private and public agencies since the end of the 19th century (Almeida 1996). Urging *ribereños* to plant *M. dubia* for the production of camu-camu fruits is one of several programmes that are currently being implemented by NGOs and state agencies in rural communities. Most *ribereño* families living in the Iquitos region have participated in or are participating in one or another of these programmes.

While projects that promote the cultivation of forest species offer some technical and economic incentives appreciated by *ribereños*, their proliferation in numbers, their short time-frames, and competition among them is creating an environment that limits rather than facilitates the participation of farmers. Most NGOs and state institutions are engaged only in short-term programmes (an average of two years long) to promote activities whose success must be measured in the long term. Most agencies use economic incentives to attract as many farmers as possible. Because of the short project lifetimes and the economic advantages that are offered,

most *ribereño* families perceive these programmes as short-term financial opportunities and not as viable livelihood alternatives or ways to increase their household income for the future. Lack of continuation of technical and financial support from NGOs or state agencies was one of the main reasons given by farmers to explain why some of them quickly abandoned their plantations of *M. dubia*, even some of those located in *bajeales*.

While lack of continued effective technical and financial support has negative impacts on the process of moving forest products into cultivation, this is not the main reason why many farmers who were first offered camu-camu seedlings stopped participating in *M. dubia* projects. The package offered *ribereños* was not well suited to their management needs and only those few 'experimenters' who were motivated to continue the process of determining acceptable planting conditions managed to persist and benefit. The ecological, economic and social factors that involve cultivating previously uncultivated species require a certain level of expertise and interest that not all *ribereños* have, and that most of the technicians involved could not offer. Identification of 'local experts' who can aid technicians in determining the optimal or at least acceptable conditions is an important step which is not considered by most NGOs and state agencies that are promoting the production of camu-camu fruits. The village experts eventually 'self-selected' themselves and continued the necessary experimentation.

Apart from the need to include *ribereño* experts in cultivation trials, further promotion of production techniques and methods also required the use of demonstration sites as well as 'demonstrators' whose information was valued and trusted by other farmers. While most NGOs and state agencies use their research stations as demonstration sites, we found that the most efficient way to promote the planting of *M. dubia* is by using the farms of the self-selected households as

demonstration plots. By observing and learning from these village experts, other *ribereño* farmers could evaluate whether they too could overcome the technical and financial problems that would come up when NGOs or state agencies promoting the programme cease to exist. Self-selected *ribereños* also provided valuable technical advice to their fellow farmers as well as to the technicians. Working with *ribereño* experts we learned that for most farmers the important questions went beyond how or where to plant *M. dubia* to what kind of management is needed to reduce damages caused by floods, strong river currents and weed invasion. Finally, most of the important techniques and strategies on how to maintain planted *M. dubia* were learned from the village experts, the self-selected households, and by using their planted areas as demonstration sites.

Apart from their technical input, the expert households played an important role in the process of identification and selection of other families that were qualified to produce camu-camu fruits in their landholdings. The main concern of the qualified *ribereño* families in deciding to plant or not plant *M. dubia* was the lack of information on how to overcome ecological and economic risks that few urban-based technicians could properly evaluate. Such critical information was provided by the *ribereño* experts and the households that had continued to experiment during the visits to the demonstration sites.

The experience of using demonstration sites in farmers' fields to promote the production of camu-camu fruit also helped us appreciate just how greatly the urban-based technicians' plans for camu-camu differed from those of the *ribereños*. For instance, technicians expected to establish monocultural plantings of *M. dubia*, while *ribereños* wanted to plant this species as a secondary crop interplanted with other species, maintaining both plant diversity and economic flexibility. The farmers expect camu-camu to be eventually a source of

some additional income for the household, while most technicians and urban-based experts expected camu-camu fruit to become the main source of income for smallholders of the area.

While planting camu-camu has increased the value of areas of *bajeales* that are too low for planting crops such as banana and cassava for some farmers, production of camu-camu fruits cannot replace food staples and other crops as the main source of household income in the plans of most local producers. In addition, most *ribereños* believe that it will be difficult for them to compete in the market with private enterprises that are establishing large industrial-scale plantations of *M. dubia* in several regions of Amazonia. Past experiences of promoting the production of former forest products such as cacao and guarana (*Paullinia cupana*) in Amazonia support the misgivings we heard cited by *ribereños* concerning the marketing problems of smallholders. Despite this and other limiting factors, it is clear that *ribereños*, especially local 'experts' and 'experimenters', have already played an important role in the process of converting camu-camu fruits from extracted to produced resources; and that they will continue to do so with other important economic resources in Amazonia.

References

- Afsah, S.
1992 *Extractive reserves: economic-environment issues and marketing strategies for non-timber forest products*. Washington, DC: ENVAP, World Bank
- Almeida, M.W.B.
1996 Household extractive economies. In Ruiz-Pérez M. and J.E.M. Arnold (eds) *Current issues in non-timber forest products research*, pp 119-141. Bogor, Indonesia: CIFOR.
- Arnold, J.E.M.
1995 Farming the issues. In J.E.M. Arnold and P.A. Dewees (eds) *Tree management in farmer strategies: responses to agricultural intensification*, pp 3-17. New York: Oxford University Press.
- Clay, J. and C.R. Clement
1993 *Selected species and strategies to enhance income generation from Amazonian forests*. FAO Working Paper. Rome: FAO.
- Dufour, D.L.
1990 Use of tropical rainforest by native Amazonians. *BioScience* 40: 652-659.
- El Comercio
1996 El camu-camu puede convertirse en el nuevo "boom" de la selva. Article published in the issue of 9th August. Lima, Peru.
- Expreso
1996 El camu-camu ingresa al mercado de Japon. Article published in the issue of 9th August. Lima, Peru.
- FAO
1986 *Food and fruit-bearing forest species: examples from Latin America*. Forestry Paper 44/3. Rome.
- Goulding, M, N.J.H. Smith and D.J. Mahar
1996 *Floods of fortune: ecology and economy along the Amazon*. New York: Columbia University Press.
- Homma, A.
1992 The dynamics of extraction in Amazonia: an historical perspective. In D. Nepstad and Schwartzman (eds) *Nontimber products from tropical forests: evaluation of a conservation and development strategy*. *Advances in Economic Botany* 9: pp 23-31. New York: New York Botanical Garden.
- 1996 Modernization and technological dualism in the extractive economy in Amazonia. In M. Ruiz Perez and J.E.M. Arnold (eds) *Current issues in non-timber forest products research*, pp 41-57. Bogor, Indonesia: Center for International Forestry Research, CIFOR.
- Lampietti, J.A. and J.A. Dixon
1995 *To see the forest for the trees: a guide to non-timber forest benefits*.

- Environmental Economics Series No. 013. Washington, DC: The World Bank.
- Moran, E.
 1993 Land use and deforestation in the Brazilian Amazon. *Human Ecology* 21:1-21.
- Padoch, C. and M. Pinedo-Vasquez
 1996 Smallholder forest management: looking beyond non-timber forest products. In M. Ruiz Perez and J.E.M. Arnold (eds) *Current issues in non-timber forest products research*, pp 103-117. Bogor, Indonesia: Center for International Forestry Research, CIFOR.
- Padoch, C., M. Pinedo-Vasquez and W. de Jong
 1987 Traditional agroforestry practices of native and *ribereño* farmers in the lowland Peruvian Amazon. In H. Gholz (ed.) *Agroforestry: realities, possibilities and potentials*, pp 179-194. Dordrecht, The Netherlands: Martinus Nijhoff.
- Peters, C.M.
 1990 Population ecology and management of forest fruit trees in Peruvian Amazonia. In Anderson A.B. (ed.) *Alternative to deforestation: steps toward sustainable use of Amazon rain forest*, pp 86-98. New York: Columbia University Press.
- 1994 *Sustainable harvest of non-timber plant resources in tropical moist forest: an ecological primer*. Biodiversity Support Programme. Landover, MD: Corporate Press Inc.
- 1996 *The ecology and management of non-timber forest resources*. World Bank Technical Paper No. 322. Washington, DC: The World Bank.
- Peters, C.M. and E.J. Hammond
 1990 Fruits from the flooded forests of Peruvian Amazonia: yield estimates for natural populations of three promising species. *Advances in Economic Botany* 8:159-176.
- Pinedo-Panduro, M.
 1989 *Evaluación preliminar de la germinación de 28 frutales tropicales*. Lima, Peru: Instituto Nacional de Investigación Agraria y Agroindustrial.
- 1996 Camu-camu (*Myrciaria dubia* H.B.K McVaugh), una propuesta agroecológica para la Amazonia Baja. *Bosques Amazónicos*, 1(2):7-8.

FROM LIBRARY SEARCH

The following reference may be of interest to readers:

Tengberg, A., M. Daveiga, S.C.F. Dechen and M.A. Stocking. 1998 Modelling the impact of erosion on soil productivity - a comparative evaluation of approaches on data from Southern Brazil. *Experimental Agriculture* 34(1):55-71.

Erosion changes soil properties, removes nutrients and alters crop yields. A knowledge of these impacts on soil productivity is needed for economic analyses of erosion and conservation. Based on a United Nations Food and Agriculture Organization experimental design to monitor these changes, results are reported from four research sites in southern Brazil on Ferralsols and Cambisols, enabling the construction of erosion-yield-time and nutrient loss relationships. Plot experiments ran for up to seven years of natural erosion, followed by one or two years of maize cropping. A remarkably consistent composite erosion-yield relationship in logarithmic form was found, showing a sharp yield decline with initial soil loss. Soil 'resilience' was identified through erosion-time relationships, 'sensitivity' through erosion-yield equations. As erosion progressed, losses of nutrients, especially of organic carbon and calcium, were significant. In situ changes in soil properties were far less marked. Together with measured yield reductions caused by cumulative erosion, these results enabled the modelling of changes in soil productivity over time with respect to both soil quality and impact on yields. A production 'half-life' of between one and 39 years according to soil type and level of erosion was also identified.

Note: This is an example of the short version of a reference provided by the PLEC library service.

PLEC EXPERIENCES WITH PARTICIPATORY APPROACH TO BIOPHYSICAL RESOURCES MANAGEMENT IN GHANA¹

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Background

In order to enhance the use of biophysical resources for sustainable development, modern thinking advocates a participatory management that responds to basic human needs. The participatory methodology involves continuous bottom-up interactive synergistic learning and practice among all the players involved in both experimental and applied work. It is justified by recognition of a need to inform human-oriented developmental efforts by the realities of local conditions including the people's values, concepts, perceptions, aspirations and management systems which, often, are collectively termed 'traditional knowledge', 'indigenous knowledge', and 'local knowledge'. Local level participatory methodology or '*gestion de terroir villageois*' is also justified by the sustainable development that it supposedly enhances through greater commitment of the local people (Chambers et al. 1989; Van den Breemer et al. 1995; Scandinavian Seminar College 1996).

Participatory procedures are central to the biophysical defence scheme of PLEC. Other procedures include multidisciplinary work and networking among scientists, their students, farmers, policy makers and other environmental stakeholders

In West Africa pioneer PLEC studies are focused on a site in Pita-Kollagui basin in the Futa Jalon, and on various other sites in Ghana. In both countries work is managed

by university-based scientists who operate in collaboration with each other, with farmers and government and non-government officials through correspondence, meetings, seminars, exchange of visits, and collaborative field studies. The core teams in Guinea are drawn from Université de Conakry; and, in Ghana, from Kwame Nkrumah University of Science and Technology (until recently called University of Science and Technology) at Kumasi, University for Development Studies at Tamale and University of Ghana, Legon, which is the principal management base of WAPLEC, the West African component of PLEC.

Participatory methodology in West Africa

WAPLEC work has advanced the most in Ghana.

In Ghana, PLEC studies are focused on selected sites in all the major agroecological zones, but with emphasis on the southern sector of the forest-savanna mosaic zone or ecotone.

Key elements of the participatory method used include:

- preliminary visits to identify and establish contacts locally;
- village level meetings and durbars;
- regular visits to study/demonstration sites;
- farm visits;

¹ extracted from papers presented at:

- International Conference on *Environment and Development in Africa: an Agenda and Solutions for the 21st Century*, organized by The Society of South African Geographers et al., at Eskom Conference Centre, Midrand, Republic of South Africa 29 June - 4 July 1997.
- START/NAFCOM/CARPE workshop on *Land Use and Cover Change (LUCC) in West Africa*, held at Royal Ravico Hotel, Nungua, Accra, Ghana, 3-5 November 1997

- identification of principal local cooperators or contacts and their involvement in key PLEC activities, notably workshops;
- group discussions; and
- transect walks, and systematic transect surveys and mapping of land holding with the involvement of local people.

In the southern sector of Ghana's forest-savanna transition zone, the group discussions involve environmentally-centred dialogue between the PLEC multidisciplinary research team, and groups of local people including landowners and non-landowners, i.e. tenants, while the transect survey is similarly carried out on a collaborative multidisciplinary basis through the involvement of selected local people as field assistants.

Outputs by the participatory methodology

What then, were achieved by the participatory procedures?

Pilot study

We refer first to our 1993 pilot study, the field work for which was carried out with the participation of local people. The study suggested the occurrence of major changes in the sparsely inhabited thick forest that, in the past, covered the southern forest-savanna transition zone, and the accelerated transformation of this ecotype into grass, savanna and a mosaic of forest-savanna. With a few but significant exceptions, the deforestation was accompanied by a decline in environmental quality.

However, amidst the negative agro-environmental changes there were positive changes in the form of spontaneous local adaptive agro-environmental regenerative measures such as:

- modification of cropping patterns, including a change towards nitrogen-fixing herbaceous and leguminous crops, e.g. beans, groundnuts and cabbage;

- use of cassava sticks and maize stalks for mulching, and the hoeing under of these and other biomass to enrich the soil;
- the preservation of trees and other plants such as *lelo*, *sublatso awamba*, *kumelo*, *agbatafotso* and *mokotso* (all Adangbe names) that enhance soil moisture content, provide ideal shading conditions for yams and other shade-loving crops, and are indicative of soil quality; and,
- nurturing of certain useful naturally propagated trees, notably *Cassia siamensis*, through careful coppicing, and sporadic revival of the practice of teaching children traditional environmental conservation taboos, customs and methods including the avoidance of indiscriminate cutting of rare useful saplings and mature trees, for, as one woman noted in Sekesua:

Trees are important: they protect the soil; the leaves drop and add nutrient to the soil; when some are cut and burnt, the ash adds nutrient to the soil. So when we cut all the trees, how do we get organic matter?

(Gyasi et al. 1995; Gyasi and Uitto 1997).

Transect survey and cadastral mapping

Greater insights into land use and cover and into biophysical conditions relative to land holding types were obtained by a more systematic multidisciplinary survey carried out within quadrats along linear transects, with the aid of locally recruited assistants and volunteer village headmen, who played the crucial role of identifying the land holders/farmers and the plants by their local names.

A similar procedure involving participation of local people was followed in a ground mapping of land holding patterns to serve as a framework for the promotion of biophysical measures and their monitoring in Gyamfiase-Yensiso area. Among other roles, the participating local people identified land boundaries and their holders.

Preliminary examination of data from the transect survey and landholding mapping suggest:

- outnumbering of landowners by migrant-settler tenant farmers by a significant ratio of approximately 2:1 in Gyamfiase-Yensiso;
- lower but significant proportions of females among the tenants (27% in Gyamfiase-Yensiso);
- serious fragmentation of land among the tenants; and
- less favourable biophysical conditions on tenancy units than on owner-occupier land, evidenced by the occurrence of greater crusted surfaces, soil acidity and soil erosion in the tenancy farms.

The survey also resulted in the identification of threatened or increasingly rare useful plants and environmentally harmonious traditional farming systems which, together with the other pertinent findings outlined above, provides valuable information for planned biophysical management.

Other outputs

A significant output was the identification of biophysical priorities through meetings including a video-taped durbar that brought together PLEC scientists, farmers, Chiefs and government and non-government officials at Gyamfiase. Another was the voluntary visit to the campus of the University of Ghana, by villagers led by their Chief from a PLEC study site. This they did with a view to getting acquainted with University activities, including work at the plant tissue culture laboratory in the Department of Botany, a facility that we plan to tap for the propagation of desirable plant species, *ex situ*.

Applied work

The major applied works are being attempted through the Collaborative

Agroecosystems Management Project (CAMP), a barely one year-old PLEC-inspired community-based initiative in biophysical conservation. CAMP seeks to use both modern scientific knowledge and the knowledge that systematic PLEC studies have yielded about traditional agro-ecological adaptations. The latter include proven conservation practices, as a basis for the planned protection and enhancement of the relict Gyamfiase forest grove and its surrounding indigenous agroforestry system. This will lead, ultimately, to the rehabilitation of the degraded adjoining areas farmed by settler migrant tenant-farmers.

CAMP is made up of a cross-section of the inhabitants, and has affiliated with it two women's environment-oriented groups, formed through the encouragement of PLEC.

This core local association of farmers appears to be contributing significantly towards a revival of the traditional practice of conserving trees, *in situ*, in future. Through the influence of CAMP, over 20 farming families among a total population of about 800, are practising this pre-eminently sensible method of conserving trees in the immediate neighbourhood of the Gyamfiase forest grove. The grove is the focal point of the applied work in the incipient 100 km² Gyamfiase-Yensiso demonstration site, which is inhabited by an estimated 15,000 people.

With the support of the Ministry of Agriculture and Ministry of Lands and Forestry, CAMP is developing prototypes for possible wider dissemination, plus an income-generating farm of peppers, a nursery of exotic and endemic plants, and a biodiverse farm of food crops and trees, all located on parcels of land donated without charge by local leaders for the cause of PLEC-CAMP. Some of the plants in the biodiverse farm are made up of volunteer seedlings harvested from the nearby forest grove. This practice demonstrates the role of such conserved groves as seed or germplasm banks.

On the basis of membership dues, income from the pepper farm, and a modest supportive grant by PLEC, a bank account has been opened by CAMP to strengthen the foundations for its development into a self-sustaining environmental protection and rural development organization.

A recent development is the initiation of a firebelt around the Gyamfiase forest grove.

In concert with CAMP, PLEC has started exploratory work towards creation of more job opportunities, and reduction of poverty and its minimization of pressure on the remnant forest at Gyamfiase. It is planned to achieve these through the development of fodder banks and other facilities to sustain a rural livestock industry. This will be based on the proliferating grass, and returns from the booming manioc/cassava industry, and the promotion of mushroom and small farming, which PLEC-held studies have identified as priority needs or realistic aspirations of the people.

A penultimate goal is the development of Gyamfiase area into a demonstration site for sustainable rural land resources management systems.

Challenges

On the basis of the PLEC experience in West Africa, it appears many challenges are associated with a participatory approach. They include how to minimize, overcome or avoid the following:

- communication difficulty between research scientists and villagers having radically different training and cultural outlooks;
- danger of raising the hopes and expectations of ordinary rural folks beyond what is realistically attainable;
- rural folk research saturation syndrome, arising from prolonged investigative field studies, particularly those of a social kind that have no immediate discernible impact on local welfare; and

- popular local perception of a principal researcher as a 'Godfather', capable of providing and solving all.

These challenges might be met through regular meetings, group discussions and other forms of interaction. Group discussion provides an excellent opportunity for the various participating scientists to orchestrate their specialized views in an interactive manner among themselves, and with the target group. In this way, the various participants depart a group discussion having learnt from each other, and having had the chance to contribute to a common fund of knowledge. Multidisciplinary transect survey carried out in concert with local people, and other such collaborative procedures, hold similar promise of positive synergistic effects.

Other challenges beg for answers. They include the following:

- whether or not cadastral and land use and cover maps derived through rough and ready rapid participatory survey methods could be made GIS-compatible, and if so, how, without compromising the participation of the basically illiterate or only semi-literate small rural farmer;
- how to devise a system of participatory biophysical monitoring that has sufficient scientific depth but is, at the same time, simple and pragmatic enough for the ordinary village folk to meaningfully participate in its application;
- how to rapidly establish the scientific and common English names of flora and fauna identified by their local vernacular names;
- how to widen the geographic scope of demonstrative field work without sacrificing the close interaction with local people that is so central to participatory work;
- how the research scientist may effectively combine teaching and other conventional essentially office-bound, urban-based academic work with the extended stay in the field in rural areas that applied work through a participatory methodology demands; and

- how to ensure the sustainability of participatory biodiversity defence measures?

Conclusion

On the basis of the PLEC experience in Ghana, it may be said that a participatory approach holds much promise for the sustainable management of biophysical resources. However, there are several challenges associated with the approach. Those challenges need to be seriously addressed if the promise of the participatory approach is to be fully realized.

References

Chambers, R.A., A. Pacey and L.A. Thrupp (eds)
 1989 *Farmer first: farmer innovation and agricultural research*. London: Intermediate Technology Publications.

Gyasi, E.A. and J.I. Uitto (eds)
 1997 *Environment, biodiversity and agricultural change in West Africa: perspectives from Ghana*. Tokyo: United Nations University Press.

Gyasi, E.A., G.T. Agyepong, E. Ardayio-Schandorf, L. Enu-Kwesi, J.S. Nabila and E. Owusu-Bennoah (eds)
 1995 Production pressure and environmental change in the forest-savanna zone of Southern Ghana. *Global Environmental Change* 5(4):355-366.

Scandinavian Seminar College
 1996 *Environment and development in Africa*. Gentofte: E.O. Forlag

Van den Breemer, J.P.M., C.A. Drijver and L.B. Venema (eds)
 1995 *Local resource management in Africa*. Chichester: Wiley.



INTERNET ADDRESSES

For those with access to the Internet:

**UNITED NATIONS UNIVERSITY
 HOMEPAGES**

- UNU Main Homepage:
<http://www.unu.edu/>
- UNU Environment Area Homepage:
<http://www.unu.edu/env/>
- PLEC homepage (under construction):
<http://202.253.138.133/plec.htm>

USEFUL INTERNET SEARCH ENGINES

- Alta Vista <http://www.altavista.digital.com/>
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- Lycos <http://www.lycos.com/>
- Yahoo <http://www.yahoo.com/>
- C/net <http://www.search.com/>

Biodiversity library reference

Hawksworth, D.L., P.M. Kirk and S. D. Clarke (eds) 1997. *Biodiversity information: needs and options*. Oxford: CAB International.

The book is based on an International Workshop on Biodiversity Information 1996 sponsored by CAB International (CABI), IUBS, IUFRO, UNEP and IUCN.

The UNEP/GEF Biodiversity Data Management Project (BDM) is described in Chapter 8.



THE PLEC SONG



'BANDERAS VERDES' (del PLEC)

SI PODEMOS CANTAR
UNA MISMA CANCION
SI... PODREMOS LOGRAR
UN MANANA MEJOR
APRENDIENDO NO EXISTEN FRONTERAS
HOJAS VERDES SON NUESTRAS BANDERAS

JUNTOS A TRABAJAR
POR LOS PUEBLOS EN PAZ
AGRODIVERSIDAD
ALIMENTOS NOS DA
COMENZANDO DE ABAJO Y DE ADENTRO
LA MUJER, LA FAMILIA... EL TALENTO

CON LA FUERZA DEL SOL
Y DE TU CORAZON
ABRIREMOS CAMINOS
CON ETERNO VERDOR

CON LA FUERZA DEL SOL
Y DE TU CORAZON
SEMBRAREMOS FUTURO
UN MANANA MEJOR

...CON LA FUERZA DEL PLEC

GREEN BANNERS (of PLEC)

If we're able to sing
Everywhere the same song
We'll be able to achieve
A better tomorrow
Learn together that there are no borders
And that green leaves must be our banners

Together we're working
For peace for all people
Agrodiversity
For food security
Beginning at the bottom, and from inside
The family, the women... the spirit

With the power of the sun
And the strength of your heart
We can open the way
To greenness forever

With the power of the sun
And the strength of your heart
We can sow for the future
A better tomorrow

New York, 25th March 1998
Mario Pinedo-Panduro
Iquitos Peru-PLEC

Translated from Spanish to English by Elizabeth
Thomas-Hope, Jamaica-PLEC



HINTS ON HOW TO USE THE CANBERRA LIBRARY SERVICE

For the next two years, the Canberra office has volunteered to provide a literature search service for those PLEC members who need it (see page 8). We have access to several libraries and to some hundreds of journals through the Internet and electronic databases. Current Contents and Uncover provide tables of contents of recent journals, often with abstracts. An example is given on page 26.

Initially we will adopt the following procedure:

1. PLEC members requiring material should e-mail/fax the address below. It is essential to give the topic plus several key words, including countries/regions of interest, and to be as specific as possible. This will save valuable searching time.
2. Search results, with abstracts where available, will be e-mailed/faxed in list form from Canberra.
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A = already available.
(A) is important for office records.
4. Copyright restrictions must always be observed. Acknowledgement of final copies received would also be helpful.
5. Library search is a two-way process. We will do all that we can in the time available - but since we are all part-time with other commitments, please do not expect miracles!

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