

Conservation through Use of Mesoamerican Dry Forest Tree Species: looking for overlaps between Bioquality and Use Rankings

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The CUBOS project (Conservation through Use of Tree Species Diversity in Fragmented Mesoamerican Dry Forest)⁴ aimed to identify opportunities for conservation of tree species diversity which were compatible with existing systems of culture and land tenure. The Mesoamerican dry forest was chosen as the focus of this work due to its status as a centre of diversity of tree species, many of which are of international utility (*e.g. Cordia alliodora, Gliricidia sepium, Leucaena spp.*); because of the degree of anthropic pressure being suffered by the genepools of many of these species; and because of the apparent opportunities in the region for building on farmers' traditional practices in the development of conservation strategies.

The research focused on two contrasting study areas within the diverse dry forest zone of the Pacific slopes of Mesoamerica: the southern departments of Choluteca and Valle, Honduras, and the lowlands of Oaxaca, S.E. Mexico, between the Sierra Madre del Sur and the sea. The principal differences between these areas are that:

- in Oaxaca (in common with several neighbouring states on the pacific coast) extensive areas of apparently intact dry forest still exist, whereas all that remains in southern Honduras (in common with much of the Pacific slope of El Salvador, Nicaragua and Costa Rica) is a highly altered agroecosystem
- in Oaxaca, much of the land tenure is communal (or *ejidal*) in nature and well-developed systems for community-based resource management exist, whereas in southern Honduras most land is either *de jure* or *de facto* private and community-level controls are largely ineffective.

The following basic principles guided the research:

- Global resources for conservation are limited and should be focused on those areas where they can have the greatest impact. There is an opportunity cost attached to the use of conservation resources in non-priority areas.
- Although there may be “win-win” situations in which conservation and use are complementary, in many cases conservation represents a cost to local people; this cost should only be imposed in the case of the resources (species) in most need of conservation.

Therefore, the main questions asked were:

- Which species are most in need of conservation?
- In which areas and land uses are most of the species in need of conservation found?
- Can local people's use of these species contribute to their conservation?
- If not, in what ways can the impacts of conservation on the welfare of local people be minimised?

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In order to answer these questions, parallel botanical and socioeconomic research was carried out. The aim of this paper is to share the experiences of the researchers in trying to coordinate and bring together the results of disparate forms of research to answer a common question; and their reflections on the various themes related to this work. For conciseness, we do not go into great detail about methodology or analysis; we have recently submitted twin papers on the botanical and socioeconomic research to *Agroforestry Systems* which will contain more detail on these aspects.

Methodology

The Sample

Within each study area (coastal Oaxaca and southern Honduras), four rural communities were chosen non-randomly for study, with the aim of reflecting between them the diversity of prevailing socioeconomic, culture and vegetation conditions. Within each study community, 20 farm families were selected on a stratified random sampling basis, within wealth strata identified by the community members themselves.

Botanical Research

The following considerations guided the botanical research:

- Only tree species were considered, rather than biodiversity as a whole.
- Species were prioritised for conservation importance according to the narrowness of their natural ranges, under the assumption that those confined to the most limited areas would be most vulnerable to particular pressures (for example, land use changes).
- Sites or land uses were prioritised for conservation importance according to their “bioquality” rather than their “biodiversity”. Bioquality relates to the proportion of high conservation priority species present in a particular locality or land use, *not* the total number of species.

Rapid botanical surveys (RBS) were carried out in a random subset of land units, selected from the 20 households identified in each community (spread across the wealth gradient identified by the community members). Land unit categorisation followed definitions given by the householders; categories included, for example, *milpas* (fields for the production of annual crops, especially maize), fallows, pastures, woodlots and home gardens. A second, forest level, survey inventoried tree diversity in a subset of forest areas not limited to the study communities themselves.

Each sample site was delimited by the boundaries of the parcel of land or woodlot. Each sample consisted of a species presence-absence inventory; each inventory was considered complete when either 45 woody species had been recorded and/or collected for later herbarium identification, or when approximately 1.5 hours (4.5 person hours) of systematic searching had been completed. This approach is justified because what is sought is the relative proportions of species of different conservation priorities (“bioquality”), rather than information on the numbers of species per unit area (“biodiversity”).

The species found were assigned “star” categories according to their conservation priority, ranging from Black Star through to Green Star. The criteria used for each category are explained in Table 1.

Table 1. Key for categorising species according to star ranking

Criteria	Species
* Endemic to the southern dry zone of Honduras.....	Black star
* Endemic to mesoamerican pacific dry forests, present in two to four Central American countries/Mexican states.....	Gold star
* Endemic to mesoamerican dry forest and present in five to eight Central American countries/Mexican states OR not endemic to mesoamerican dry	

forest but present in one to four Central American countries/Mexican states.....	Blue star
* Endemic to mesoamerican dry forest and present in more than eight Central American countries/Mexican states OR not endemic to mesoamerican dry forest but present in more than four Central American countries/Mexican states.....	Green star

This approach was modified from that developed by Hawthorne & Abu-Juam (1995) in Ghana.

Sites and land uses were then assigned “Genetic Heat Indices” (GHI) according to the proportions of species of different Star categories which they contained. The GHI were calculated by simply assigning a value to each Star category and summing the values of the species found in each site (with adjustment to take into account different total numbers of species listed in each site).

Socioeconomic Research

The aims of the socioeconomic research were twofold:

- The identification of the species most used for different purposes
- The identification and quantification, by species, of tree management practices.

The relative use of different species was evaluated by simply asking the interviewees (each of the 20 farmers selected from each study community) to mention the species they most use for timber, posts and fuelwood, respectively. At the same time, farmers were asked (in a semi-structured, informal manner) to describe how they managed different species, and to mention those which they most planted or protected.

From the interview transcripts, a database was built up of all of the different species mentioned, indicating for each, for example, numbers of mentions as being used for different purposes, as being actively protected in fields or as being actively planted.

A use index was developed for each species and each use: for each species, its number of mentions for that use was divided by the total number of all the mentions of all the species for that use; then a weighting was applied to reflect the different numbers of species mentioned for different uses (the more limited the number of species used for a given purposes, the greater the use value assumed for each).

Analysis

To answer the principal questions posed by the research project, we looked at the following correlations:

- i) Were the species most mentioned as used also the species most mentioned as actively protected or planted?
- ii) Were the species most mentioned as used, actively protected or planted also the species of most priority for conservation?

Results

Here we present only a summary of the results; more detail will be presented in the forthcoming publications already mentioned.

- i) In southern Honduras, it is common for farmers actively to protect trees in fields as a source of timber and other products, due to the scarcity of off-farm sources of supply; there is a strong correlation between those species which farmers value for timber and those which they actively protect.

- ii) In Oaxaca, there is little evidence of active protection of individual trees due to their timber or other values; rather, conservation is carried out at a forest level, motivated by both use and non-use values.
- iii) In both study areas, there is little correlation between the species which farmers most plant and those which they most use for timber, posts or fuelwood; this is because farmers mostly rely on natural regeneration as a source of these products and only tend actively to plant trees in their homegardens and backyards (*solares*) where the main emphasis is on fruit trees.
- iv) Most importantly, with regards to the overall hypothesis of the project, there is very little overlap between the species which most need conservation and the species which farmers most use and/or manage (through protection or planting) on an individual basis; however, the highest priority species are mostly found in the areas (the relatively intact forests of Oaxaca) which receive the most effective community-based protection at an ecosystem level.

Points for Reflection:

1. Is it valid to focus on only one component of biodiversity?

The focus of the project exclusively on tree species is explained partly by the sectoral focus of the funding source (the Forest Research Programme) and partly by the proven particular value of many Mesoamerican tree species as an internationally useful resource, and the obvious degradation being suffered by their germplasm pools in their native ranges.

This focus led to the need for careful qualification of results when presenting them to local institutions: we could say, for example, that southern Honduras did not appear to be a priority area for tree species conservation relative to the high bioquality areas of Oaxaca, for instance, but had to qualify this by saying that we knew nothing about fauna or other flora. To be most useful to both conservation funding agencies and local NGOs in setting conservation priorities, a single component approach such as this one would ideally be complemented by similar evaluations of other components of the ecosystem.

2. Is it valid to focus on bioquality, rather than biodiversity?

Conservation assessments commonly value areas for conservation according to the total number of species which they contain. However, which warrants conservation more, a site with 100 species of which 20 are endemic or one with 50 species of which 40 are endemic? Bioquality seems a more appropriate means of assigning conservation priorities than biodiversity.

3. Do multidisciplinary teams work?

The original suggestions for the organisation of data collection called for joint teams composed of botanists, socioeconomic researchers and the landowner/farmer in question to be inventorying species and at the same time recording the farmer's comments on their uses and management. This turned out not to be practical, for the following reasons:

- the botanical sampling needed to be based on an understanding of the different land uses present, information which could only be obtained by prior socioeconomic work (though at the same time, in order to define the geographical focus of the socioeconomic research it was necessary to have some prior knowledge of the "botanical" situation, i.e. which areas might be of most conservation interest – in this project this knowledge came largely from previous FRP-funded research in the region);
- the different researchers worked at very different rates; it would have been inefficient in terms of the researchers time, and also tiresome for the farmer, for him/her and the socioeconomic researchers to be present during the whole process of species inventory by the botanical team.

4. Are botanical and socioeconomic data compatible?

As discussed by Wong *et al.* in the case study presented earlier in the workshop, the reconciliation of local and scientific names can present a significant challenge. The present study was not an exception, especially given the differences in common nomenclature between Honduras and Mexico and between each of the Mexican communities. The “bottom line” for the study, given its aim to assess global conservation priority, had to be the scientific names. The bridge between common and scientific names was the presence of a local people during all of the botanical inventory; however, at the end of the day there were still a significant number of species with scientific names but without common names, and *vice versa*. Part of the problem was ambiguities in the interview transcriptions from the socioeconomic research: for example did “Carreto” mean Carreto negro (*Pithecellobium saman*) or Carreto real (*Albizia guachepele*) and did “Cedro” mean Cedro espino (*Bombacopsis quinata*) or Cedro real (*Cedrela odorata*)? Common and scientific nomenclature also at times worked at different scales; for instance, local people assigned the same common name “sangreado” to 3 distinct species of *Pterocarpus* in Mexico.

5. Was the research participatory?

The researchers made a genuine effort to make the research as useful as possible to local people, and to involve them as much as possible, for instance by:

- involving local NGOs and projects in the process of selection of the study communities in order for the results to be useful for them in their activities
- holding initial meetings in each community studied, to explain to their members the objectives and results of the research
- holding feedback meetings in present the results of the research to community members.

In addition, the researchers used a number of tools commonly employed in participatory research and development activities, for example:

- matrices to identify and rank production systems and to establish wealth categories
- timelines to trace historical patterns in land and tree use
- focal group meetings to discuss specific themes which had emerged during the individual interviews.

However, the real test of whether the research was truly participatory or not is whether it formed part of a process of decision-making and development of the communities themselves, in pursuit of aims and answering questions formulated by them. At this level, the research cannot claim to have been participatory; the aims of the research were largely set by outsiders (albeit on the basis of a thorough review of many years of experience of researchers in the region and support expressed by local institutions); given the need to satisfy the objectives agreed with the donor as a condition for funding, they were only up to a certain point negotiable with the NGOs and projects which were consulted. An additional complication in the case of this project was its need to produce comparable results between two widely separated study areas, which further reduced its ability to be flexible in response to the wishes of local actors.

Relations with NGOs were in general excellent, though variable, given the efforts made by the team to look for ways to be of benefit to them. This was especially so in the case of one NGO in the Oaxaca study area, where regular informal brainstormings were of great use to both the researchers and the NGO members, and the NGO was of great help in facilitating entry into the communities. In another case, however, an NGO felt the presence of the researchers in the community in which they were working to be disruptive, rocking the boat in a situation in which the community’s support for the NGO was divided.

6. Did the research result in a benefit or a cost to local people?

The results of the research certainly generated interest in some of the communities to which they were fed back, as did the community meetings and focal groups used as part of the research. However, it is very doubtful whether the results were taken on board and used in any concrete manner by the communities involved; the way in which the project can most claim to have benefited them was by (hopefully) contributing to the overall pool of knowledge about tree diversity and how local people use trees, and therefore helping local and regional institutions to serve local communities better and avoid imposing on them unnecessary costs as a result of conservation activities (it is worth noting that nothing more than this was promised in the introductory community meetings, though inevitably expectations of something more were unintentionally raised). In pursuance of this goal, the researchers prepared a policy briefing paper discussing the implications of the current legal situation for conservation through use in Honduran dry forest and proposing how the forthcoming new forestry law should deal with these considerations; also they provided training to NGOs and projects working in the study communities, on participatory rural appraisal and methods of botanical survey and information management.

The willingness of the community members to share their time and knowledge was impressive; however despite this generosity it became clear that there was a limit to the time demands which the researchers could in good conscience make on people, especially given the essentially extractive nature of the research. In a few cases, especially in the Mexican study communities where there had been less of a history of NGO presence than in Honduras, community members expressed suspicion about the researchers' intentions.

Conclusions

True multi/interdisciplinarity is difficult in practice in biodiversity evaluation, due to the different ways of working and time demands of specialists in the botanical and social spheres. However, neither is it essential for botanists and socioeconomists to work together in multidisciplinary field teams, as long as there is a careful coordination and harmonization of aims, and a continuous flow of information between the two disciplines.

Research aimed at answering questions set by outsiders can be useful to communities either directly, by helping communities to reflect on their situations, or indirectly, by increasing NGOs' knowledge of the resource base and of how their beneficiaries interact with it. However, consultation, feedback and the use of research tools borrowed from Participatory Rural Appraisal must not be confused with true participation, which requires the research to answer questions set by the communities themselves as part of their development process. The need to answer the questions agreed with the funders limits researchers' flexibility to adapt their research to the needs of the communities studied or of individual NGOs.

Despite the difficulty of being useful to the study communities at a local level, researchers can be useful at a policy level, presenting facts to decision makers and policy formulators who are often guided by inherited and unquestioned misinformation about the dynamics of local peoples' interactions with their environment. This ability to modify the policy, legal and institutional environments in ways that are beneficial to the population as a whole justifies extractiveness in a few case study communities. Despite this justification, advantage should still be taken of any opportunities that do present themselves to be directly useful at a local level; for example through the provision of training, capacity building and information transfer to the NGOs and projects which serve the communities studied, helping them in this way to provide them with more focused, relevant and effective attention. In any case, a key guiding principle should be sincerity with the communities affected regarding the degree of participativeness or extractiveness of the research, its objectives, proposed methods and expected direct or indirect benefits.

References:

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