199 suggestions for adding trees to farms

RIU

Validated RNRRS Output.

A method has been developed to collate practical information about the benefits of trees and how best to integrate them on farmland—and to transfer this knowledge to farmers. Central to this was the 'Central American Trees Sourcebook' produced by the project, which covers 199 tree species popular with farmers. It also identifies the native tree species best suited for different uses, such as living fences and perennial crops. Also available are decision-support tools and a digital image library useful to extensionists. The Sourcebook is being used widely in Central America, and over 1400 extensionists and farmer leaders have already been trained to use it. A website is also used for dissemination. Such a successful approach could be applied in many other regions of the world.

Project Ref: **FRP09:**
Topic: **1. Improving Farmers Livelihoods: Better Crops, Systems & Pest Management**
Lead Organisation: **University of Oxford, UK**
Source: **Forestry Research Programme**

Document Contents:

Description

FRP09

Research into Use
NR International
Park House
Bradbourne Lane
Aylesford
Kent
ME20 6SN
UK

Geographical regions included:

Caribbean, Central America, South America,

Target Audiences for this content:

Forest-dependent poor,

A. Description of the research output(s)

1. Working title:

Tree species for farmers: offering sustainable management options

Acronym: TREEOPTIONS

2. Name of relevant RNRRS Programme(s) commissioning supporting research and also indicate other funding sources, if applicable.

The outputs were funded mainly through DFID's **Forestry Research Programme** (FRP). However, there was also significant support from more than 220 GOs and NGOs in terms of personnel and logistics, principally in the dissemination process, estimated at a total of US$ 56,100 (based on $20 per day salary and $500 per course, see table 1 Question 14).

The Inter-American Institute for Cooperation in Agriculture (IICA) supported the preparation of a distance learning module in agroforestry through salaries (approx 4 months between 5 people - US $20,000, and financed the printing and distribution of modules.

The British Embassies in Costa Rica, Honduras and Panama hosted public launches of the manual, contributing approx. US$2,000. An additional US$5,800 towards Sourcebook printing was provided by: AED – Academy for Educational Development, Panama; BOSCOM-INAB - Proyecto Bosques Comunales del Instituto Nacional de Bosques, Guatemala; British Embassy Honduras; GEF – Global Environment Facility; IDB – InterAmerican Development Bank.

3. Provide relevant R numbers (and/or programme development/dissemination reference numbers covering supporting research) along with the institutional partners (with individual contact persons (if appropriate)) involved in the project activities. As with the question above, this is primarily to allow for the legacy of the RNRRS to be acknowledged during the RIUP activities.

The outputs were produced mainly through FRP project R7588, but drew heavily on results of many years of DFID support to research (conducted by OFI) in Central America, including those generated under the projects listed below and the activities of CATIE, CONSEFORH. The work is also related to various previous DFID funded bilateral projects (CONSEFORH, CUPROFOR, CATIE/ ITE link-phase II, TC support to CATIE/Tree Improvement, Afforestation on Cattle Farms in Costa Rica).

R7588/ ZF0133	**Mesoamerican Tree Species: a *Source Book* for Farm Planting and Ecological Restoration**
R2145	Central American pine provenance research
R3158	Central American pines and hardwoods
R3643	Improved information on wood properties of secondary species from tropical forests (PROSPECT Database)

R3714	Tropical hardwoods for dry and semi-arid zones
R4091	The intensive study of tropical and subtropical multipurpose tree genetic resources
R4101	Evaluation of the international provenance trials of *Cordia alliodora* and *Cedrela* spp.
R4179	Evaluation of international trials of Central American dry-zone hardwood species
R4369	Expansion and integration of the OFI forest genetic resources data base
R4454	Evaluation of Central American multipurpose hardwood tree species for dry zones
R4484/ 4724	*Cordia alliodora*: study of the breeding systems and development of breeding strategies for an agroforestry species
R4485	Exploration and collection of *Calliandra calothyrsus*
R4524	Intensive study of *Leucaena* genetic resources in Central America and Mexico
R4525	Evaluation of genetic variation in *Gliricidia sepium*
R4726	Fodder quality studies on *Gliricidia sepium* and other tropical multipurpose trees
R4856	Genetic improvement of non-industrial trees with particular reference to *Gliricidia sepium*
R5063	Systematics of *Parkinsonia* and closely related species in the genus *Cercidium*
R5399	Intensified transfer of forest genetic technology and information in Central America (CATIE tree improvement project)
R5465	The taxonomy and ecology of Latin American pines and the conservation of coniferous resources
R5648	Expansion and collaborative development of the forestry and biodiversity information systems, BRAHMS, FROGGIE and SISTEM+
R5728	Genetic improvement of *Calliandra calothyrsus*
R5729/ 6516	Genetic diversity and population structure of trees in fragmented dry zone forests of Central America
R6168	A study of the reproductive biology and population differentiation of *Bombacopsis quinata*; a threatened Central American dry zone tree with potential for semi-arid zones
R6296	*Leucaena* genetic resources: dissemination of results
R6514	Conservation of tree species diversity in Mexico and Central America: project preparation phase
R6535/ 6536	Genetic improvement of *Calliandra calothyrsus*; phase 2
R6549	Investigation of factors affecting the nutritive value of *Calliandra calothyrsus* leaf as fodder for ruminants
R6551	Evaluation of selected non-industrial tree species and development of approaches to facilitate utilization of results
R6683	BRAHMS and SISTEM+: the completion of sustainable products
R6913	Conservation through use of tree species diversity in fragmented Mesoamerican dry forest
R7210	A species monograph on *Bombacopsis quinata*

4. Describe the RNRRS output or cluster of outputs being proposed and when was it produced? ***(max. 400 words)****. This requires a clear and concise description of the output(s) and the problem the output(s) aimed to address. Please incorporate and highlight (in bold) key words that would/could be used to select your output when held in a database.*

The Output, produced between 2000-2005, is a process/methodology for the collation and transfer to farmers of information on options and benefits of integrating trees on their land, including possible tree species to use and products to sell.

The Problem

Diversification makes farmers less subject to cost rises, decreases in selling prices and adverse climatic effects. While trees can play an important role in improving and diversifying production systems, it is rare that this is isolated from other components of resource poor farmers' production systems. Farmers need information on the options and benefits of managing trees, possible tree species to use and products to sell, whereas often only a limited range of management options and species are promoted.

From dusty library to dusty farm – accessing the information

Much research exists on native tree species. However, most of the information remains in libraries and files of research institutions. For extensionists access to such information is limited both physically (location, time, cost) and because of the scientific style of writing. Compilation and presentation into a single book offered easy access to such information.

A sourcebook for all farms

An innovative and cost-effective methodology used pre-existing surveys to select 199 **native** Central American **tree species** based on **farmer preferences**. The **sourcebook** covers species use by focussing on farming systems, farmer opportunities and preferences. The sourcebook provides details of which species appear best suited to which systems (e.g. living fences, trees with perennial crops, natural regeneration), along with **decision support tools** (DST) to provide the extensionist with options to suit individual farmers, and a **digital image library** to aid production of extension materials. The accessible style suits not only forestry extensionists but a wider community of extensionists and rural development organisations involved in the promotion of **sustainable land use options**. Interest from teachers (university and high school) has shown the sourcebook also offers a useful resource for a wider audience.

Reaching the farmer

Writing and distributing a book is no guarantee of its use, and transfer of the information to farmers. To ensure the book reached the extensionists, it was distributed free through **training** courses. Building on a "multiplier effect", more than 130 extensionists were trained in organising and delivering courses, resulting in **uptake** in excess of 1300 **extensionists** and **farmer leaders** able to use the book to extract information appropriate to their context.

5. What is the type of output(s) being described here?

Product	Technology	Service	Process or Methodology	Policy	Other Please specify
			X	X	X(DST)

6. What is the main commodity (ies) upon which the output(s) focussed? Could this output be applied to other commodities, if so, please comment

The main commodity of the outputs is **trees**, although they focus on the uses, products and services they provide. Some extensionists specialized in agricultural topics commented on how useful the Sourcebook was for them, since they lacked formal training in forestry and agroforestry techniques. In turn they identified the possible wider application to other commodities by suggesting forestry technicians and extensionists should have a similar book on agricultural crops and techniques. Hence, another application of this methodology could be to produce a similar sourcebook on the most preferred crops from a farmer's perspective, along with data mining research of state-of-the-art knowledge about management and marketing of these crops.

7. What production system(s) does/could the output(s) focus upon?

Semi-Arid	High potential	Hillsides	Forest-Agriculture	Peri-urban	Land water	Tropical moist forest	Cross-cutting
X		X	X	X		X	

The outputs focus on the production systems shown above. In a preliminary workshop held in Cuba we detected great scope for extending the methodology and outputs to include peri-urban areas, where the "Mi Programa Verde" (*My Green Programme*) of the Ministry of Agriculture is committed to increasing the number of trees in the capital and other major urban areas by helping people to plant them in their backyards and communal gardens.

8. What farming system(s) does the output(s) focus upon?

Smallholder rainfed humid	Irrigated	Wetland rice based	Smallholder rainfed highland	Smallholder rainfed dry/cold	Dualistic	Coastal artisanal fishing
X			X	X	X	

*9. How could value be added to the output or additional constraints faced by poor people addressed by clustering this output with research outputs from other sources (RNRRS and non RNRRS)? (**max. 300 words**).*

Through Sourcebook validation, training courses, external review of uptake and exploratory workshops in the Caribbean, opportunities were identified for adding value to outputs. These consist of; i) applying the process to other geographic areas, ii) further uptake through new initiatives, iii) additional topics.

i) Geographic spread – scaling out

Workshops in Cuba, Dominican Republic, Haiti and Jamaica identified the opportunity for immediate applicability through a Caribbean sourcebook. Medium term opportunities for developing options for native species also exist in East Africa (see R6549), West Africa and South-East Asia.

ii) Carbon sequestration will become crucial with the Clean Development Mechanism (Kyoto Protocol). Emissions from deforestation are equal to those from transport worldwide and identified as an easier means of quickly reducing emissions (Stern 2006). While creating environmental/ economic benefits, there is a risk that a reforestation “gold rush” will lead to monocultures of a few tree species. Debate on the social implications of carbon forestry projects shows tradeoffs between social benefits and cost-effectiveness (Smith and Scherr 2003). Large industrial plantations and strict forest protection are economically viable, but pose high social risks. Socially beneficial projects are less cost-effective and enabling policies also required for their success. Regulation of carbon markets will therefore be required to reduce social risks and enhance benefits. Wider use of the sourcebook approach with readily accessible information on a broad range of native species would facilitate sustainable implementation of the Mechanism.

iii) Certification schemes. The need for successful case studies and guides to set up participatory schemes in communal forests was often expressed as a priority, to gain access to markets that are presently closed and exploited by illegal loggers.

There are clear economic benefits from including more information on practicalities of commercialising **non-timber forest products** and managing trees for **fodder** in highlands with dairy production.

Although farmers and extensionists can identify common local trees, they have trouble with closely related species which can lead to inappropriate planting of species with different uses and values. With current digital technology accurate, but cost-effective, **field guides** specific to an area are feasible.

Please specify what other outputs your output(s) could be clustered. At this point you should make reference to the circulated list of RNRRS outputs for which proformas are currently being prepared.

Carbon sequestration

R6320 (R7274) – Sustainable community forest and carbon sequestration in indigenous communities in Chiapas, Mexico.

R7374 – Rural livelihoods and carbon management.

Certification and forestry standards

R7589 – Certification of small forest enterprises.

R6370 – A practical toolkit for forest concessionaires on the implementation of international forestry standards.

Commercialisation and management of non-timber tree products

R7285 – Viability and potential of ethical trade.

R8295 – Methodology for planning sustainable management of medicinal plants in India and Nepal.

R7925 – Successful non-timber forest product commercialisation

R6549 (R6535) (R5732) – Factors affecting nutritive value of *Calliandra calothyrsus*.

Development of field guides

R7475 – Developing methodology for biodiversity guides

R7367 – Comparison and development of tropical forest plant field guide formats with a handbook to assist production of field guides

Extension methodologies

R6072 – Agroforestry manual for illiterate women

Validation

B. Validation of the research output(s)

*10**. How** were the output(s) validated and **who** validated them?*

*Please provide brief description of method(s) used and consider application, replication, adaptation and/or adoption in the context of any partner organisation and user groups involved. In addressing the "who" component detail which group(s) did the validation e.g. end users, intermediary organisation, government department, aid organisation, private company etc... This section should also be used to detail, if applicable, to which social group, gender, income category the validation was applied and any increases in productivity observed during validation **(max. 500 words)**.*

The list of native tree species preferred by farmers, the Sourcebook and the Decision Support Tools, the training methods, and the multiplier effect for dissemination, were all validated in a total of **10** workshops in and outside the target countries, as summarised below. Demand for the Manual and training courses grew after the validation workshops and training courses, leading to donors funding extra copies of the book (see question 2 above).

Output validated	How	By whom	Application, replication, adaptation, adoption
Method of selecting list of native tree species preferred by farmers by using pre-existing surveys.	W S	[F] End users from extension service provider organisations [P] End user groups: Extensionists, technicians, botanists, forestry researchers	A provisional list of approximately 150 species and a sensitivity analysis were validated through workshops (4), and targeted surveys to academics, experts and researchers. In the workshops, extensionists and technicians indicated species they considered important that weren't in the provisional list. 30 additional species were added through this process. Also included were a further 19 species with narrow distributions that are closely related to priority species and recognised to be of importance in particular localities (e.g. *Inga* spp. *Leucaena* spp.).
Manual and Decision support tools	W TC	[F] Project staff [P] End users, researchers, educators, final beneficiaries	Sourcebook drafts were validated in workshops with the participation of project collaborators and a variety of end users (extensionists, educators), replicated in 5 target countries. Some workshops included final beneficiaries (farmer leaders). First editions of the Manual and DSTs were validated with end users through a first round of training courses in all target countries
Uptake of the Source Book through integrated training	W TC	[F] Project staff [P] End users, researchers, educators	Training methodology in use of the Sourcebook was thoroughly validated during the 7 validations of the Sourcebook draft, and later during 14 training courses of both trainers and extensionists. Exercises, case studies, teaching examples, presentations, extension material group projects, and programme length and contents were adapted to each country and locality. Events finished with an evaluation by participants of the course trainers and methods, and an assessment of what participants had learnt, providing feedback for later courses.

Exemplary extension materials	W SI	[F] End users from collaborator extension service provider organisations [P] Farmers (Final beneficiaries)	A set of three extension materials, produced as an example for the book contents and training courses, was validated with semi-literate and illiterate farmers prior to their inclusion in the Sourcebook. Results provided new insights into illiterate farmer's strategies to use extension materials, and feedback to update some of the Sourcebook content and training course methods.
Dissemination and multiplier effect	TC	[F] End users from target institutions [P] End users (extensionists)	All the 102 courses (1743 extensionists trained) originated, organized and implemented by end user institutions, and the four workshops to help the development of a full proposal for a Caribbean sourcebook project (CARIBTREES) acted as a validation framework for the multiplier effect, spin-off products such as a Distance Learning Module, and scaling-out opportunities for the outputs. They consistently proved the cost-effectiveness of the multiplier effect as an output dissemination method and that, as long as the Sourcebook, DSTs, and training methods are adapted to each country, target institutions will enthusiastically uptake the outputs. CONSEFORH showed successful adoption and adaptation through its move to deal directly with farmer leaders
Scaling-out opportunities	W	[F] Project staff [P] End users, Beneficiaries (farmer leaders), researchers, educators	
Distance learning module	TC	[F] Project staff [P] End users, educators.	
Legend How: [W] Workshops; [S] Surveys; [SI] Semi-structured interviews; [TC] Training courses By whom: [F] Facilitated; [P] participants in the validation			

*11. **Where and when** have the output(s) been validated?*

*Please indicate the places(s) and country(ies), any particular social group targeted and also indicate in which production system and farming system, using the options provided in questions 7 and 8 respectively, above **(max 300 words)**.*

Outputs validated	Where and when	Social groups, production systems and farming systems targeted

Method of selecting a list of native tree species preferred by farmers by using pre-existing surveys.	4 workshops March-April 2001 (Guatemala, Honduras, Nicaragua, Costa Rica)	Participants came from farming areas in the main forest ecotypes covered by the sourcebook, including semiarid, hillside, tropical moist, rainforest and mangrove coastal areas
Sourcebook and Decision support tools	1 validation workshop in Granada (Nicaragua) with project collaborators from each target country in Feb. 2002. 6 validation workshops (1 per Central American country except Belize) Nov. 2002 and April 2003	Special efforts and resources were allocated to ensure participation of representatives from all regions and forest ecotypes in each country, thus covering the major farming and production systems.
Uptake of the Source Book through integrated training	A total of 13 courses in November/December 2003 and March/April 2004 Belize (1, San Ignacio) Guatemala (2, Guatemala City, Cobán); El Salvador (2, San Andrés, San Vicente); Honduras (2, Siguatepeque, Comayagua); Nicaragua (2, Managua, Bluefields); Costa Rica (2, San José, Esparza); Panama (2, Panama City, David). In each country, project staff trained trainers in the first course, and acted as observers to assist a pair of trainers to implement a second course in their own institutions.	Apart from ensuring participants from all regions and a diversity of organisations, particular efforts were made to train extensionists working in the most deprived areas in each country. The second course in Guatemala was done in Cobán, Guatemala with Qek-chi extensionists working with Qek-chi communities. The second one in Nicaragua took place in Bluefields, where most of the population belongs to Garifuna communities.
Exemplary extension materials	3 workshops and semi-structured interviews in 7 communities in Western, Central and Southern Honduras.	Validation with resource poor farmers from hillside and semiarid areas.

Dissemination Multiplier effect and Scaling-out opportunities	Training courses in Belize Guatemala El Salvador Honduras Nicaragua Costa Rica Panama Colombia Ecuador CATIE April 2004 to December 2006 (see 14 for numbers)	
	CARIBTREES proposal development, 4 workshops (Cuba, Dominican Republic, Jamaica, Haiti)	

Current Situation

C. Current situation

12. ***How and by whom*** *are the outputs currently being used? Please give a brief description* ***(max. 250 words****).*

Use of the Sourcebook's information in changing practices depends on its relevance to farmers' problems and interests. Prioritising native species, the manner in which the Sourcebook's species were selected and focus on options for tree management within farming systems, increase the possibilities the information is relevant to farmers' needs and realities.

Current monitoring focuses on how trained extensionists use the Sourcebook in their daily work. A review of uptake in Honduras (Hellin 2006) shows the majority of extensionists and farmer leaders trained in use of the Sourcebook use it to provide and share information with fellow farmers (*Output multiplier effect methodology*). Outputs described in Questions 4, 5, 10, 11 are obviously not in use, since their purpose was to generate the Sourcebook and dissemination multiplier effect.

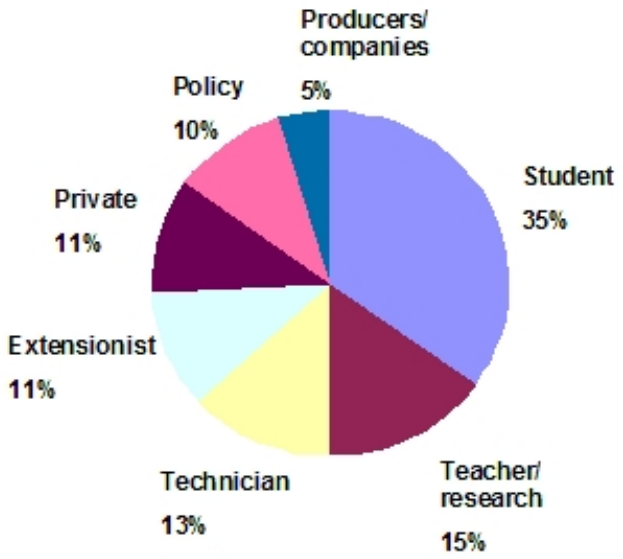


Figure 1 Profile of registered users of website during first 10 months of operation

Extensionists are providing individualised information to farmers/farmer associations, and developing extension materials using Sourcebook information and images. Farmer leaders have started to share information with other farmers, producing farm diagrams with changes to implement; e.g. planting shade/fruit trees in coffee plantations.

Keenest uptake has been by organisations whose extensionists lack formal forestry training. Consequently the most used topics are farm diversification/agroforestry and small plantations. Organisations with high pre-existing social capital (*e.g.* COMUCAP indigenous women's organisation) participate intensely in the multiplier effect due to their group cohesion and lack of alternative extension advice.

Unexpected uses are for preparing more informed proposals to donors by farmer leaders. It is also used in forestry/agroforestry education at pre-university levels, while university students and teachers download many documents from the website.

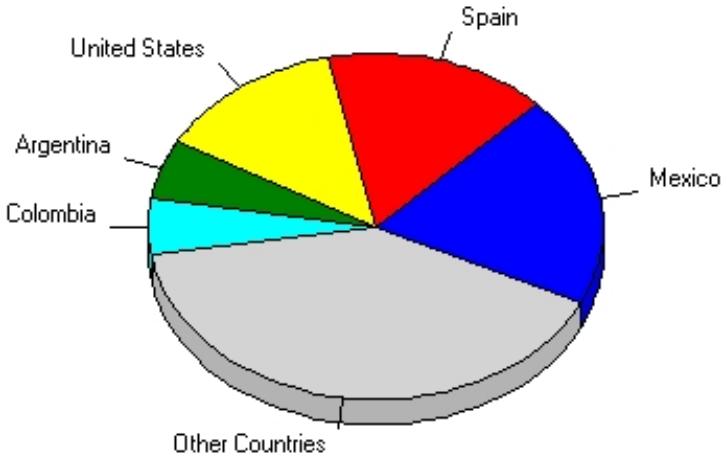
*13. **Where** are the outputs currently being used? As with Question 11 please indicate place(s) and countries where the outputs are being used **(max. 250 words).***

Outputs are, as expected, mainly used across all areas of the Central American target countries (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama), although the fact that other training activities have happened in Colombia, Cuba, Dominican Republic, Ecuador, Haiti and Jamaica has led to use in these countries to a minor degree.

The training provided to CATIE's MSc students from all over Latin America in formal degree

courses and specific sourcebook training extends the reach of the outputs on a yearly basis, when the students return to work in their home countries in Central America, South America and the Caribbean.

The Sourcebook's website access logs also show widespread use of the Sourcebook's information from Latin American countries. Mexico has the most users, due to its language, population size and commonality of species and targeted ecosystems, followed by Colombia and Argentina within Latin America. Digital use has also increased geographically through requests from ICRAF to include the CDROM version in a toolkit they developed to provide information on sustainable production, as part of their scaling-up activities for agroforestry technologies. The CDROM species selection tool, database and agroforestry chapter were also included in an Information System to support coffee farmers in the selection of options for diversification of their farms (IDB funded).



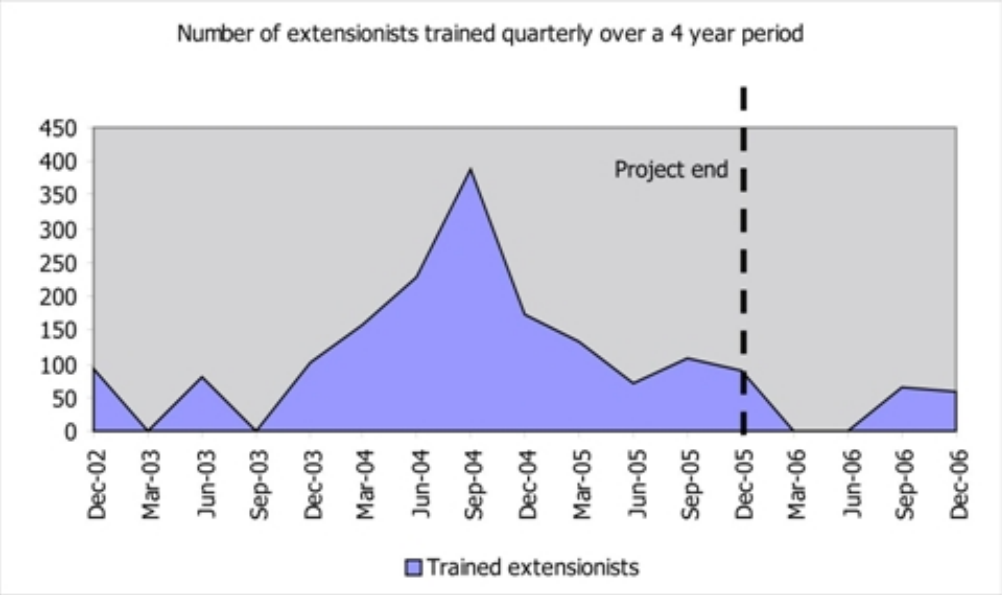
14. What is the scale of current use? Indicating how quickly use was established and whether usage is still spreading ***(max 250 words).***

Updated figures on dissemination through a multiplier effect are shown in table 1, with the latest courses occurring as recently as December 2006. CATIE has also trained **109** university students, who are now back at work in their home countries all across Latin America. The graph shows that dissemination still continues through the multiplier effect, even though the project finished a year ago. Demand for courses is still high and further spread will be limited by the lack of Sourcebooks.

Training	Belize	Guatemala	El Salvador	Honduras	Nicaragua	Costa Rica	Panama	Colombia	Total
Courses for trainers	1	1	2	1	1	1	1	0	8
Courses for extensionists	1	15	13	18	18	15	13	1	94
Total courses	2	16	15	19	19	16	14	1	102
Certified trainers	5	14	17	16	17	16	15	0	100

Trained extensionists	21	236	228	317	361	243	217	20	1,643
Total trained extensionists	26	250	245	333	378	259	232	20	1,743
Institutions	7	27	15	51	49	45	25	5	224

Table 1 Training in use of the Central American Trees Sourcebook as part of the multiplier effect over four years (December 2002 - December 2006).



Website access to the Sourcebook's information and DSTs continues to be strong, with an average of **1401** users per month and a total of **46231** different users from January 2004 (when the website was set up) to December 2006 (see figure below).

15. In your experience what programmes, platforms, policy, institutional structures exist that have assisted with the promotion and/or adoption of the output(s) proposed here and in terms of capacity strengthening what do you see as the key facts of success? ***(max 350 words).***

One of the most satisfactory outcomes has been that most dissemination took place on the initiative of end-users. However, other factors also influenced successful uptake of the outputs. Existing agroforestry networks in each country, incorporating principal GO/NGO extension providers, contributed greatly by promoting project activities and as a springboard for planning/ implementation of training courses. CATIE's national offices in target countries provided invaluable help with project activities, and after FRP funding finished, in particular in facilitating the multiplier effect by storing Sourcebooks and the administration of their hand-over to course organisers. The widespread credibility of the main collaborator (CATIE) with respect to the quality of its teaching, research and projects facilitated enormously both the project's activities and uptake of the outputs. Regarding to policies, the current lack across Central America of government support to agricultural extension services has led to a vacuum that we filled at an opportune moment.

No other single factor that contributed to successful uptake is common to all countries. However, it is worth mentioning the contribution of: i) exceptionally well run and efficient collaborator's (CATIE) national office (El Salvador, Nicaragua); ii) a nation wide government extension service (Nicaragua) and in contrast, the scarcity of government extension support to smallholder farmers (Honduras) leading to an informal network of NGOs keen on uptake of the outputs; iii) government forestry programmes for smallholder farmers promoting forestry plantations and natural forest management (FONAFIFO-Costa Rica, BOSCOM-Guatemala), iv) proximity to the main collaborator headquarters and Ministerial support (Costa Rica), v) exceptional individual efforts of particular collaborators (e.g. CONSEFORH, Honduras).

Although some disappeared after the end of the project, British embassies in Costa Rica, Honduras, Nicaragua and Panama were willing collaborators offering assistance at a variety of

stages through the opening of workshops, and hosting official launches of the Sourcebook. Launches targeted managers/leaders/decision makers of government agencies and NGOs. They raised awareness of the project's outputs, promoted support for the participation of lower level employees in project activities, and promoted support for continuation of activities post FRP. They also raised the profile of the project through associated press coverage.

Current Promotion

D. Current promotion/uptake pathways

*16. **Where** is promotion currently taking place? Please indicate for each country specified detail what promotion is taking place, by whom and indicate the scale of current promotion **(max 200 words).***

The main current promotion pathways are the national collaborators, individual trainers, CATIE's national technical offices, and existing national agroforestry networks across Central America. This ensures that the outputs are reaching target end users and institutions. Promotional activity is currently slow as the end users targets in training were met and further promotion is limited by the small number of Sourcebooks remaining. Demand is however still high, as more people become aware of the Sourcebook and its potential uses.

The website is on-going and stored in the Oxford University Herbarium webserver (financed by **FRP R7367)**. A search using "arboles centroamerica" returns the website in the top position of results using the following search engines; Google, Yahoo, LiveSearch (Microsoft Network), Lycos, Ask.com, AOL and Altavista. We are frequently contacted by target end users showing interest in the training courses, requesting copies of the Sourcebook, CDROM, or seeking permission to uses images from the Digital Image Library (e.g. ICRAF).

*17. What are the current barriers preventing or slowing the adoption of the output(s)? Cover here institutional issues, those relating to policy, marketing, infrastructure, social exclusion etc. **(max 200 words)**.*

The biggest barrier is the precarious nature of employment in Central America for extension workers. The efforts to provide them with a Sourcebook full of useful information and the training and motivation to use it effectively are wasted if these individuals lose their jobs with one extension provider and do not find a similar role in an alternative organisation. Not only is the capacity lost, but also the personal interactions between them and the farmers, and the positive messages from the project's outputs (see also question 16).

There is an underworld of small NGOs in each country that is not integrated in the main extension and knowledge transfer networks. Although not large in resources, area covered and scope, they are extremely active, and immensely keen to use outputs they trust. They are most often locally

based, usually in the remotest or most deprived areas of each country. They are well trusted locally, and guarantee day to day contact with farmers. Such groups were specifically targeted in the training (see 11), but failure by the main networks to acknowledge or keep contact with these organisations prevents the outputs from reaching a greater number of those beneficiaries in most need of help.

18. What changes are needed to remove/reduce these barriers to adoption? This section could be used to identify perceived capacity related issues ***(max 200 words).***

We envisage two main actions to remove/reduce barriers. There is a need to advocate for strengthening of extension services. This might prove a failure as current government policy trends move away from national extension services. Instead in the last two years *Environmental Units* in municipalities in Honduras and Nicaragua are starting to fill this role, supported by laws forcing creation of such units. Finding ways to strengthen the links between these Environmental Units and facilitating their obligation to provide information to farmers could prove far more effective than advocacy at policy makers.

To keep momentum in uptake by target institutions and adoption of outputs by farmers, there is a need of “in country” project staff who promote outputs and monitor impact. They could ensure contact with the hidden but very important organisations (described in Question 17). Although maintaining permanent staff in each country is expensive, the same effect could be achieved in a cost effective way by funding CATIE’s national offices with small amounts to pay for expenses and staff to achieve specific goals. To date, these offices have helped as part of the principal collaborator’s activities. However, as the offices are self-financed, their support though crucial is currently limited.

19. What lessons have you learnt about the best ways to get the outputs used by the largest number of poor people? ***(max 300 words).***

The first lesson was very positive: validation of the multiplier effect as a cost effective methodology, to disseminate outputs and ensure they reach target users, that can be adapted and transferred to a wide range of situations: geographical, knowledge base.

The Sourcebook was written for extensionists and it was not originally envisaged that collaborators would directly train farmers. Impact has however been strengthened by CONSEFORH’s decision to train farmer leaders, giving potential for both a bigger multiplier effect and reaching areas not on the extension map. Despite the best intentions of many organisations involved in extension, there are vast areas of Honduras where extension provision is pitiful or privatised and therefore largely out of reach of most smallholders. It would be expedient to continue the two-pronged process of training extensionists and farmer leaders. Training of farmer leaders needs to be done in the field and based on a diagnostic study of farmers’ needs (Hellin 2006).

Although the original target group for the outputs was retained, once the Sourcebook was available it became clear there was interest from other groups, both type (students, educators) and geographically (all Latin America). Hence, it is important not to underestimate the potential of certain dissemination pathways.

It is also best to ensure national collaborators active involvement at all stages in producing/ disseminating outputs and not just sporadically in workshops. This should lead to a higher sense of ownership for the collaborators, with exponential growth of the multiplier effect. Efficient networks involving all collaborators, through rapid, low cost, communication technologies are crucial for effective output uptake.

The degree of adaptation to each country needs to deepen as policy issues can affect both uptake by end users and adoption by beneficiaries. Again, more involvement from collaborators would facilitate incorporation of current policy and legal issues at all stages.

Impacts On Poverty

E. Impacts on poverty to date

20. Where have impact studies on poverty in relation to this output or cluster of outputs taken place? This should include any formal poverty impact studies (and it is appreciated that these will not be commonplace) and any less formal studies including any poverty mapping-type or monitoring work which allow for some analysis on impact on poverty to be made. Details of any cost-benefit analyses may also be detailed at this point. Please list studies here.

Rural poverty and the environment

Many observers conceptualise the link between rural poverty and environment as a 'downward spiral' with population growth and economic marginalisation leading to environmental degradation. A global analysis of agroecosystems (Wood *et al*. 2000) affirmed that long-term productivity is threatened by increasing water scarcity and soil degradation, which is now severe enough to reduce yields on about 16% of agricultural land, particularly cropland in Africa and Central America and pastures in Africa. Soil degradation is estimated to have reduced global crop productivity by around 13%.

Recent micro-scale research challenges this general model, showing striking heterogeneity in environmental management by the rural poor, their success in adapting to environmental change and the efficacy of policies in influencing outcomes. Local endowments, conditions affecting the adoption of resource-conserving technologies and local institutions supportive of the poor are key factors that condition poverty–environment interactions and outcomes in relation to agriculture. The main strategies to jointly address poverty and environmental improvement are to increase poor people's access to natural resources, enhance the productivity of poor people's natural resource assets and involve local people in resolving public natural resource management concerns (Scherr 2000).

Studies of livelihood strategies have revealed that although the rural poor may have limited resources, they still have considerable capacity to adapt to environmental degradation, either by

mitigating its effects on their livelihoods or by rehabilitating degraded resources. A wide variety of coping mechanisms may be used to deal with environmental stress. Some of these responses imply further impoverishment (e.g. reducing consumption, depleting household, or moving). Others may offset the welfare effects of resource degradation without improving the natural resource base (e.g. increasing off-farm employment, exploiting common property resources). However, some strategies both improve natural resources and reduce household poverty by protecting and preserving the asset base, diversifying and improving on-farm production systems, or taking out credit to invest in future production or resource protection (Scherr, 2000). It is in this context that the outputs offer diversified land management options and the following sections explore results from relevant studies.

Agroforestry and forestry as a possible solution

Many innovative technologies, systems, institutions, and policies can increase the provision of both agricultural and environmental goods and services from agroecosystems, and improve the well-being of producers and consumers. Only a few, however—such as minimum tillage, organic production of high value vegetables, integrated pest management, and some agroforestry practices—have been adopted on a regional or global scale (Wood et al. 2000). Perennial intercrops, for instance, diversify income, add value per unit of land, improve cash flow and cause only a limited loss of the main crop (Current et al. 1995).

Other opportunities are emerging, e.g. organic/fair trade production of traditional export commodities such as coffee and bananas in Costa Rica and Colombia. Greater effort is needed to generate innovations in more environments and farming systems, to scale up successful strategies, and to rapidly disseminate information on successes and failures (Wood *et al*. 2000).

One quarter of the world's poor and 90% of the extreme poor depend significantly on forests as seasonal supplements for foods, fuel, income from timber and non-timber forest products (McNeely and Scherr 2003). An estimated 350 million poor people rely on forests as safety nets or for supplemental income (Scherr 2003). Even if the investment in the conservation of forests and biodiversity may not necessarily lead to a reduction of poverty, it would certainly contribute to not exacerbating the problem. Scherr (2003) claims that biodiversity loss threatens food security and income. International attention to biodiversity focuses mainly on conservation of "globally-important" biodiversity: rare, endemic and endangered species and ecosystems. Less widely recognized is the centrality of biodiversity to food security and livelihoods of the poor, and the impact of biodiversity loss. Rural poor rely heavily on direct consumption of wild foods, medicines and fuels, especially for meeting micronutrient and protein needs, and during "hungry" periods. Scherr (2005) concludes that one of the root causes of hunger today is biodiversity loss associated with ecological deterioriation; hence, restoring ecosystem services and biodiversity is essential in many regions to meet the Millenium Development Goals. She also sustains that there is compelling evidence that integrated strategies for biodiversity and food security can work and need to be scaled up dramatically. The synergies between food security, poverty reduction and biodiversity conservation could be greatly expanded by investing in programmes and technologies that explicitly seek such synergies.

Extension theory and practice have evolved over the past decades from concepts of transfer of technology and market-oriented extension in the 1960s and 1970s, through farming systems

research and participatory technology development in the 1970s and early 1980s, to facilitation of participatory and social learning in the 1990s. Today, the theme of FAO's work in forest extension is to promote problem solving and participatory and multistakeholder approaches to enhance the contribution of trees and forests to sustainable land use and food security (FAO 2006).

Even in places where the challenges are less acute, such linked approaches will often be more cost-effective in meeting policy objectives. In regions that are “hotspots” for both rural poverty and biodiversity, such as the Mesoamerican Biological Corridor, montane Southeast Asia and the east African highlands, such direct programme linkages and policy harmonization are essential (Scherr 2003).

Many studies, but most local

The economic, social, and environmental benefits of forestry and agroforestry projects have been documented for years. The majority of studies are local, though, and focus on specific farming systems, under certain legal and policy backgrounds. This makes comparisons and extrapolations very difficult if not impossible, and their use to assess the possibilities to scale-up and scale-out successful technologies carries many risks.

A few regional or global studies

Only a few studies have successfully analysed the benefits of forestry and agroforestry for a whole region, taking into account a variety of management options and differences in regulations and policies across. Focusing on the costs and benefits that accrue to farmers in adopting various agroforestry measures, Current et al. (1995) gathered findings from 21 projects in Central America and the Caribbean to undertake an economic and institutional analysis, and to help understand the reasons why some projects succeed while others fail.

Agroforestry is truly profitable, but under certain conditions

Agroforestry systems in Central America and the Caribbean are profitable. Different systems and interventions return different benefits in different places, but can be profitable even with conservative assumptions. Out of 56 technologies analysed by Current et al. (1995), many were profitable at real discount rates of 20% or higher, with benefit/cost ratios above 1 in most cases and above 2 in 18 systems. Except for woodlots, payback periods were only between one and six years. Additionally, current systems of economic valuation fail to reflect not only the long-term value of environmental services from agroecosystems, but often even their current monetary value to users or providers (e.g. increased costs of water purification resulting from agricultural pollution or subsidized provision of irrigation water; Wood *et al*. 2000).

Though a major reason for adoption of agroforestry by farmers was found to be income diversification, Current et al. (1995) encountered significant risk factors associated with some systems. One example was unsuccessful plantations because of unusual drought conditions or poor planting materials. Other projects failed because of weak, or lack of, support in developing or improving farmer’s access to tree product markets. Risk also occurred through the loss of associated crops from overly competitive tree species or a lack of management. These risks, along with the fact that no single agroforestry system studied outperformed the others in every single situation, spells out a clear need for the provision of information on a wide range of species and system options for a variety of climates (as provided by the Sourcebook), market situations and

policy frameworks, along with improving extension methodologies that would help to avoid these pitfalls.

Natural forestry and small plantations are also a profitable venture for smallholder farmers and rural communities.

Small plantations of fast or semi-fast growing species offer good returns. Small plantations managed for quality timber from native species (e.g. *Bombacopsis quinata*) in Central America can offer returns of 10-12%, the equivalent to an income of US$60-330/ha/year on marginal lands (Gómez and Zelaya 2003; Ponce *et al.* 2000). At an average real discount rate of 5% typical of the area, this is very competitive with current opportunity costs in marginal lands of US$30-55/ha/ year for basic grain crops or extensive livestock husbandry. Farmers are not used to the 25 year rotation to recover the investment, but the possibility of short/mid-term returns from management subproducts, use of marginal land with few options, the possibility of additional income through public incentives in some countries (US$453/ha in Costa Rica), the possibility to obtain a grain crop on the same land during the first 2-3 years of establishment, and the fact that they see the plantation as a savings account for the future, encourages them to diversify through small plantations.

New opportunities for smallholder farmers

Ethnic minority groups and smallholders can also profit from new opportunities to establish trees. Certified organic agricultural products offer higher prices to the producer. Certified timber has not substantially increased prices, but allows access to important niche markets. The potential for the adoption of native tree species is high in Latin America, since it has the highest percentage of organic farms in the world (34%) due to the tens of thousands of smallholder organic cocoa and coffee farmers (Lernoud 2005), which rely on trees for shade and other benefits. Certification has been adopted differently in each country and different regions of Latin America and the Caribbean, and there are substantial geographical differences by type of forest and ownership (communal or private natural forest, or plantations). Out of a total 8million ha of certified forests and plantations in Latin America and the Caribbean, 15% are communal natural forests. Of this, 88% are in Mesoamerica, mainly in Mexico and Guatemala (Stoian 2006 with data from FSC 2005).

In the Talamanca Corridor (Costa Rica), a Nature Conservancy programme enabled 1500 small-scale producers of shaded cocoa (most from the BriBri and Cabécar indigenous groups) to move to organic production, and who now receive 85% more than the average price. As a result, farmers have not only stopped cutting trees, but are expanding the area under cocoa (Andrade and Detlefsen 2003; McNeely and Scherr 2003; Nature Conservancy 2000).

ECAO is a small local programme working in Petén (Guatemala) on the production and promotion of organic agricultural products; examples highlighted in the Sourcebook (e.g. *Cordia dodecandra* fruits in syrup, *Pouteria sapota* puree for the pastry industry, chilli sauce). Through diversification of farms, 25 poor families earn on average US$1,557 per year, with US$584 (38%) exclusively from diversified farm products (Granados 2003). Providing information on native trees and market opportunities can develop markets. Some of the products promoted by ECAO are gathered from the wild forest (e.g. *Cordia dodecandra* fruits) and processed, adding value to a product that formerly was given hardly any attention. Sold as fresh fruit at US$26/Tm, it is now processed, preserved in syrup and sold at US$3,736/Tm, leaving a profit of US$1,494/Tm after processing

costs and labour,.

Three hundred small-scale farmers in Chiapas, Mexico, sold 170,000 tonnes of sequestered carbon at US$ 10-12 per tonne. They kept up to a 75% of the carbon revenues to cover establishment costs of live fences, improved fallows, coffee with shade trees and reforestation on about 2,200 ha of land (Totten 1999).

Not all is income, there are social and environmental benefits to Agroforestry and forestry

There is anecdotal evidence that agroforestry systems are replacing less stable systems in watersheds, protecting the remaining forests by providing an alternative supply of tree products, protecting cities from the effect of airborne dust, and providing sources of employment and income generation for rural communities, helping to slow out-migration.

However, does this benefit the poor?

It is only fair to speculate whether the potential benefits of agroforestry and forestry apply to the moderately and extremely poor. Research and development organisations worldwide are grappling with how best to assess/measure the impact of their work on poverty and farmers' livelihoods. The task is complicated by the fact that there is actually little agreement on the definition and levels of poverty. Clarification of how poverty is defined is extremely important as different definitions of poverty imply the use of different indicators.

Development can be defined as "those freedoms that allow individuals to pursue that which they have cause to value" (Sen, 1999). The Capability Approach (CA) to development suggests a focus not only on the ends, but also on the means by which ends are achieved, turning individuals into active agents of change and not passive recipients of charity and aid (IISD webpage 2004). As capabilities can be measured and evaluated, they provide a more appropriate measure of human well-being than more traditional measures like GDP or personal income.

The sustainable management and use of trees will enable the moderately poor, and some of the extreme vulnerable poor (see Question 22 below) to self achieve (or make progress towards) five of the ten determinant factors of well-being closely related with ecosystems (Duraiappah 2004), *i. e.*: to be adequately nourished; to have energy to keep warm and to cook; to use traditional medicine; to continue using natural elements found in ecosystems for traditional cultural and spiritual practices; to cope with extreme natural events including floods, tropical storms and landslides; to make sustainable management decisions that respect natural resources and enable the achievement of a sustainable income stream.

Agroforestry and forestry projects have, however, not always benefited the poor. Many agro-ecosystems were converted for commercial activities with the intention that they provide the poor with the resources to purchase the nourishment they need. In the many occasions where the poor have not benefited from the conversion process, the main reasons have been government and market failure (Scherr 1999).

21. Based on the evidence in the studies listed above, for each country detail how the poor have benefited from the application and/or adoption of the output(s) ***(max. 500 words):***

- *What positive impacts on livelihoods have been recorded and over what time period have these impacts been observed? These impacts should be recorded against the capital assets (human, social, natural, physical and, financial) of the livelihoods framework;*
- *For whom i.e. which type of person (gender, poverty group (see glossary for definitions) has there been a positive impact;*
- *Indicate the number of people who have realised a positive impact on their livelihood;*
- *Using whatever appropriate indicator was used detail what was the average percentage increase recorded*

If one adopts a Capability Approach to defining poverty then an increase in any one of the livelihood capitals (see question 20) can be seen as helping to establish the foundations for poverty reduction as opposed to poverty reduction *per se* (Hellin 2006). In terms of the livelihoods framework, the training of extension workers and farmer leaders has contributed to increased human capital among those trained and, in some cases where there has been a multiplier effect, among greater numbers of farmers (Hellin 2006).

In traditional economic terms, costs tend to be lower where strong and capable local institutions already exist – especially if these have a history of collaborative management – and user groups are homogenous (Scherr 2003). After the training, extension agents and farmer leaders' human capital has increased across all countries in the region. In some cases farmers' human capital has already also improved. While this does not represent poverty reduction *per se*, it can be argued that by increasing one of the livelihood building blocks, it is a laying the foundations for poverty reduction (Hellin 2006). In terms of the multiplier effect, more can be achieved by working with groups where there is already a high degree of social capital. An example is a women's association in Marcala (Honduras) that grows certified organic coffee. Certification is on a group basis and indicated a large degree of social cohesion and trust among the association's members. This makes it easier for some of the information from the training to spread throughout the association.

The potential scale of those benefiting within Central America is evident from the multiplier effect. During the process of developing training through the multiplier effect, extensionists estimated that 1600 extensionists could be trained, a figure that was shown to be accurate by the actual number trained (table 1, question 14). The same process estimated that these extensionists work directly with some 83,000 farmers, and while this doesn't consider the training of farmer leaders or other initiatives the scale of beneficiaries is clear.

Slow but sustainable adoption

Due to constraints and resources, adoption by smallholders should be slow and gradual. Poorer farmers may find some options profitable, but their rate of adoption is constrained by land, labour, capital, and the need to ensure food security and reduce risks. Programmes to promote rapid adoption may put their financial security at risk or create a bias towards higher income farmers. Continuous small-scale adoption is more appropriate for smallholder programmes. The preferred agroforestry systems between farmers are those that offer short term intermittent benefits that allow them to self-finance further investments (Current et al 1995). In this light, it is unrealistic to

expect large immediate impacts from the promotion of agroforestry and forestry for smallholder farmers. Current et al. (1995) commonly found in 21 projects in Central America and the Caribbean, between five to ten years for adoption to occur. It is thus realistic to assume that impacts will eventually be achieved and, most importantly, that they will be sustainable.

Environmental Impact

H. Environmental impact

24. What are the direct and indirect environmental benefits related to the output(s) and their outcome (s)? ***(max 300 words)***

This could include direct benefits from the application of the technology or policy action with local governments or multinational agencies to create environmentally sound policies or programmes. Any supporting and appropriate evidence can be provided in the form of an annex.

Direct/indirect environmental benefits related to uptake are expected in three main areas; i) increased forest cover reducing CO^2 emissions, ii) biodiversity conservation, iii) increased soil fertility.

i) CO^2 emissions from deforestation are equal to those from world transport and identified as an easier means of quickly reducing carbon emissions (Stern 2006).

ii) The Sourcebook fosters management of native species in general promoting an increase in their presence, helping to conserve biodiversity. Of the 199 species described 14 are classified as threatened by IUCN (e.g. *Abies guatemalensis*, *Guaiacum sanctum*; Oldfield et al., 1998) or CITES (e.g. *Swietenia humilis*, *S. macrophylla*), while others are threatened locally. Apart from stressing the importance of native species, the manual offers options for their sustainable management, both in natural forest and in agroforestry systems, making their conservation more feasible.

In some tropical ecosystems there is little left of the original forest and what remains is highly fragmented. In such conditions, trees managed in agroforestry systems may provide habitat for pollinators and seed dispersers that facilitate gene flow, or create habitat conditions that favour regeneration (Boshier, 2004; Gordon et al, 2003; Gordon et al, 2004) or other wildlife. Although tree cover is fairly low in agricultural lands of many parts of the world, a majority of rainfed agricultural land in Latin America, Sub-Saharan Africa, and South/Southeast Asia has significant and increasing tree cover, which enhances habitat for biodiversity. A number of agricultural systems and management strategies, such as fallowing, agroforestry, shaded coffee, and integrated pest management, can encourage diversity (animal and plant) as well as productivity (Wood *et al*. 2000).

iii) The management options offered through the outputs not only offer expectations of reductions in soil erosion associated with increased tree cover, but also increased fertility of the remaining soil

(Hellin et al. 1999).

25. Are there any adverse environmental impacts related to the output(s) and their outcome(s)? ***(max 100 words)***

Although it will be some time before we can evaluate the true environmental impacts of the outputs they are highly unlikely to have adverse impacts. The negative conservation and wider environmental impacts caused by introduced tree species are increasingly recognised. The focus on native tree species is specifically designed to avoid risks associated with new species introductions. Specific mention is made of those native trees that show invasiveness and management options for these. The proposals for scaling out to other areas take into account exotic species, but emphasise only those with no evidence of potential weediness.

26. Do the outputs increase the capacity of poor people to cope with the effects of climate change, reduce the risks of natural disasters and increase their resilience? ***(max 200 words)***

Two of the ten determinant factors of well-being closely related to ecosystems (Duraiappah 2004), are the ability to cope with extreme natural events (floods, landslides), and being able to make sustainable management decisions that respect natural resources and enable a sustainable income.

The outputs' focus on use, commercialisation and socio-economic benefits of trees shifts the perspective towards enabling farmers to use trees as a risk diversification method. Diversification will help them to be less vulnerable and more resilient to adverse climate conditions, and the associated produce price falls, rises in production costs, etc., arising from extreme events.

From an environmental perspective, the Sourcebook's approach of promoting 199 tree species for a wide range of uses and farming systems allows diversification of the ways in which trees are incorporated into the landscape. This, in turn makes the landscape, and the people living off it more resilient to adverse climatology and extreme climatic events. One of the many regulating services forests provide is the mitigation of floods, landslides and the impacts of storms. Removal of forest cover for commercial and/or subsistence activities leaves hillsides vulnerable to soil erosion and increases the probability of landslides as well as floods (Duraiappah 2004).

Annex

References

Andrade, H, Detlefsen G. 2003. Principales actores de Talamanca. Agroforesteria en las Americas, 37/38: 6-11.

Boshier, DH 2004 Agroforestry systems: important components in conserving the genetic viability of native tropical tree species? In G. Schroth, H. Vasconcelos, CA. Harvey, C Gascon, G Fonseca

(eds). *Agroforestry and Biodiversity Conservation in Tropical Landscapes*. Island Press, USA. pp. 290-314.

Chambers, R. Conway, G. 1992. *Sustainable Rural Livelihoods: Practical Concepts for the 21st Century*. IDS DP296 Feb 1992.

Chapman, R., Slaymaker, T. and Young, J. 2003. Livelihoods approaches to information and communication in support of rural poverty elimination and food security. ODI. London, UK. 69 pp.

Cosbey A. 2004. *A Capabilities Approach to Trade and Sustainable Development: Using Sen's Conception of Development to Re-examine the Debates*. International Institute for Sustainable Development, Winnipeg, Canada. 72 pp.

Current, D, Lutz, E, Scherr, SJ. 1995. *Costs, Benefits, and Farmer Adoption of Agroforestry. Project Experience in Central America and the Caribbean*. Papers 14, World Bank - The World Bank Environment Paper Number 14; 212 pp.

DFID. 1999. Participation in forest management. DFID Key sheets for sustainable livelihoods. 2 pp.

Duraiappah, A. 2004. *Exploring the Links: Human Well-being, Poverty and Ecosystem Services*. International Institute for Sustainable Development, Winnipeg, Canada. 46 pp.

FAO. 2006. Equitable partnerships, markets and forest extension. FAO Forestry Website. www.fao.org/forestry/site/5831/en

Gómez M, Zelaya Y. 2003. Factores socioeconómicos relacionados con el uso y conservación en algunos países del área de distribución natural. In Cordero J and Boshir DH (Eds.). 2003. *Bombacopsis quinata*: un árbol maderable para reforestar. Oxford Forestry Institute, Oxford, UK. Tropical Forestry Paper 39. pp 125-149.

Gordon, J. E., A. J. Barrance, and K. Schreckenberg. 2003. Are rare species useful species? Obstacles to the conservation of tree diversity in the dry forest zone agro-ecosystems of Mesoamerica. Global Ecology and Biogeography12:13–19.

Gordon JE, Hawthorne WD, Reyes-Garcý A, Sandoval G & Barrance AJ (2004) Assessing landscapes: a case study of tree and shrub diversity in the seasonally dry tropical forests of Oaxaca, Mexico and southern Honduras. Biological Conservation 117: 429-442.

Granados, E. 2003. Preparación y mercadeo de frutas tradicionales en el Petén, Guatemala. In Cordero J and Boshier D (Eds.). 2003. Árboles de Centroamerica: un manual para extensionistas. CATIE/OFI. Oxford, UK. 1080 pp.

Hellin, J. 2006. Impact of the manual Árboles de Centroamérica. Review report prepared for the assessment of FRP R7588 project. 16 pp.

Hellin J, Welchez L, Cherret I. 1999. The Quezungual system: an indigenous agroforestry system from western Honduras. *Agroforestry Systems* 46: 229-37

Lernoud P. 2005. Latin America. In Willer, H; Yussefi M. (Eds.). 2005 The world of organic agriculture: statistics and emerging trends. International Federation of Organic Agriculture Movements (IFOAM), Bonn, Germany. pp 123-145.

McNeely JA, Scherr, SJ. 2003. Ecoagriculture: strategies to feed the world and save wild

biodiversity. Island Press, Washington DC. 324 pp.

Matthews E, Payne R, Rohweder M, Murray S. *Pilot Analysis of Global Ecosystems: Forest Ecosystems*. World Resources Institute, Washington, D.C. 86 pp.

Nature conservancy. 2000. Nature Conservancy's Innovative Venture Capital Fund Announces First Investment. http://www.nature.org/pressroom/press/press105.html

Ponce E, Zelaya Y, Martínez I. 2000. *El cedro espino: una inversión forestal rentable*. OFI/ CONSEFORH Comayagua, Honduras. 26 pp.

Scherr SJ. 2000. A downward spiral? research evidence on the relationship between poverty and natural resource degradation. *Food Policy* 25 (4) 2000:479-98.

Scherr SJ. 2003. *Hunger, poverty and biodiversity in developing countries*. A paper for the Mexico Action Summit, Mexico City, Mexico, June 2-3, 2003.

Scherr, SJ. 1999. *Poverty-Environment Interactions in Agriculture: Key Factors and Policy Implications*. Paper prepared for the United Nations Development Programme (UNDP) and the European Commission (EC) expert workshop on Poverty and the Environment, Brussels, Belgium, January 20-21, 1999, Revised March 1999.

Sen, A. 1999. *Development as Freedom*. Anchor Books. New York.

Smith Y, Scherr SJ. 2003. Capturing the value of forest carbon for local livelihoods. *World Development* 31(12) 2003: 2143-60.

Stern, N. 2006. The economics of climate change. Cambridge University Press.

Totten, M. 1999. Getting it right: emerging markets for storing carbon in forests. Forest Trends and World Resources Institute, Washington DC. 58 pp.

Wood, S., K. Sebastian and S.J. Scherr. 2000. *Pilot Analysis of Global Ecosystems: Agroecosystems*. International Food Policy Research Institute and World Resources Institute, Washington, D.C. 108 pp.

List of acronyms used

AED	Academy for Educational Development, Panama
BOSCOM	Project Bosques Comunales del INAB, Guatemala
BRAHMS	Botanical Research and Herbarium Management System
CA	Capabilities Approach
CATIE Rica	Centro Agronomico Tropical de Investigación y Enseñanza, Costa
CITES	Convention on International Trade in Endangered Species
CONSEFORH Honduras	Proyecto de Conservación y Silvicultura de Especies Forestales de

COMUCAP	Coordinadora de Mujeres Campesinas de La Paz, Honduras
CUPROFOR	Centro de Utilización y Promoción de Productos Forestales, Honduras
DFID	Department for International Development, United Kingdom
DST	Decision Support Tool
ECAO	Equipo de Consultoría en Agricultura Orgánica, Gutaemala
FAO	Food and Agriculture Organization
FONAFIFO	Fondo Nacional de Financiamiento Forestal, Costa Rica
FRP	Forest Research Programme of DFID
FSC	Forest Stewardship Council
GDP	Gross Domestic Product
GEF	Global Environment Facility
GO	Governmental organisation
IDB	InterAmerican Development Bank
IICA	Inter-American Institute for Cooperation in Agriculture, Costa Rica
INAB	Instituto Nacional de Bosques, Guatemala
IUCN	International Union for the Conservation of Nature, Switzerland
NGO	Non-governmental organisation
OFI	Oxford Forestry Institute, University of Oxford, UK

Annex 1: Letters of support for scaling out to the Caribbean

These are contained in the attached files

1) anex1_letters of support.pdf

2) letter of support_aeci.tif

3) letter of support_fao.jpg

4) letter of support_upr1.tif

5) letter of support_upr2.doc