Department for International Development

An Evaluation Study of FRP's Carbon Sequestration Project in Southern Mexico

A Report
by

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June 2000

Ref: MML/DH/99/65647-3

CONTENTS

EXECUTIVE SUMMARY

SECTION 1 - INTRODUCTION

1. DTZ Pieda Consulting was commissioned by the Department for International Development (DFID) to undertake an evaluation of three research themes from its Forestry Research Programme (FRP) and an additional one from its 'Flexibility Fund'. This report presents the findings from our investigation into carbon sequestration which has been piloted in Chiapas in Southern Mexico. The key findings from each of the sections in the report are summarised below.

SECTION 2 - BACKGROUND INFORMATION ON RESEARCH PROGRAMME

2. **Research Issues**. There are two main issues being addressed by the FRP funded research into carbon sequestration:

   (i) *Environmental Impact* – firstly, the mitigation of the greenhouse problem through the absorption of carbon dioxide from the atmosphere by photosynthetic organisms (in this project the sequestration is focused exclusively on afforestation and/or improved management of existing forestry resources); and

   (ii) *Impact on Rural Livelihoods* – secondly, how to implement carbon sequestration for the social and economic benefit of poor communities in developing countries so as to enhance rural livelihoods.

3. **Programme Rationale**. The research aims to develop a workable model for the roll-out of carbon sequestration in smallholder and communal agricultural areas in the developing world. The justification for this research programme is its focus on supporting rural livelihoods from the 'bottom up' with a high level of farmer participation. The other international pilot projects are very much top-down and there was therefore a clear need for this new perspective on carbon sequestration.

SECTION 3 - ACTIVITIES AND OUTPUTS OF RESEARCH PROGRAMME

4. **Phase 1 - Scolel Té (1995-98).** On the basis of the wide-ranging evidence reviewed, DTZ Pieda Consulting believes that ECCM and its partner organisations have met fully the objectives of the Phase 1 research project, namely:

- The establishment of an operational pilot project which demonstrates that carbon trading can work at the farmer/ community level;

- Evidence of beneficial impact on rural livelihoods – which is demonstrated in Section 5 of the report;

- The development of a web site 'Manual' which explains how to set up and operate a carbon trading system at the village/community level;

- The provision of training and development support to develop local capacity for the delivery of the pilot project and to improve the chances of its long term sustainability.

5. The testament to the success of the pilot project is its continued growth and development during the Phase 2 programme. It has provided an invaluable 'testing ground' for the research work throughout the programme and in particular it has contributed to the team's research work at a regional level on:

- Baseline systems;
- Technical specifications;
- Maximising impact on rural livelihoods;
- Project monitoring systems;
- Organisational structures and institutional framework.

6. Given the possibility of securing additional private sector funding for Scolel Té from carbon purchasers, there is every chance that the project will make a successful transition from pilot phase to an economically viable programme, following the conclusion of the Phase 2 research programme in 2001. As explained earlier in Section 3, the project has adopted a participatory approach and combined with its structural and organisational strengths this will maximise its **sustainability** in the longer term.

7. **Phase 2 – Regional Level System (1998 – 2001)**. At the time of the evaluation (March/April 2000) Phase 2 was at the half-way stage. This meant that a number of the research outputs were only partially completed. This was to be expected in an interim evaluation of this nature. However, there progress was sufficiently advanced on all of the key fronts to give confidence that the planned outputs will be met by the conclusion of the contract.

SECTION 4- UPTAKE PATHWAYS AND SCALING UP

8. **Uptake Pathways**. ECCM's strategy for the effective uptake of their pilot project and the wider findings of the research programme has been to communicate on three levels - regionally, nationally and internationally:

   (i) *Regionally* – through communication, training and joint-working with ECOSUR, farmers' unions in Chiapas and Oaxaca and the State Government in Chiapas;

   (ii) *Nationally* – through joint working with SEMARNAP and INE which has involved registration with USIJI; involvement and integration with the Scolel Té project and other FRP research; and the planning for the future scaling up in Mexico (through World Bank funded study); and

   (iii) *Internationally* – through the publication of research papers; the development of web sites to promote the emerging findings, Plan Vivo System, etc.; hosting international conferences and seminars; and through the roll-out of other pilot projects in India and Africa.

9. **Scaling Up**. If forestry and land use based carbon offsets in the developing world are approved as part of the CDM, then the potential for 'scaling up' will be immense. This applies not just to those developing countries where trees grow very well – for example, Brazil, Indonesia and Central America – but possibly also to more marginal areas such as India where there is lower rainfall.

10. Various researchers have estimated the global potential for carbon sequestration over the next 50 years to be in the range of 50 to 100 billion tonnes of carbon[1]. This amount of sequestration could compensate for around 10 to 15 years of fossil fuel emissions.

SECTION 5 – IMPACT ASSESSMENT

11. **Project Take-up**. There has been a keen interest in Scolel Té and recruitment has not been a problem. In retrospect farmers would participate in the project. There has been no evidence of displacement and additionality is high.

[1] Cannell, M. 1995 Forests and the Global Carbon Cycle in the Past Present and Future, Research Report, Vol 2. European Forest Institute, pp66.

12. **Direct Impacts**. The potential returns to farmers from the commercial sale of cedro in the Tzeltal/Chol region are very high – timber sells at £100/ m^3 . In the Tojolobal region the returns are more marginal due to the lower quantities of harvested wood and the lower price of \$25/ m^3. However, the farmers benefit from improved utilisation of marginal land and other 'by-products' such as firewood, timber for construction, fence posts, herbs and berries, etc.

13. Any increased income to the farmers would be used for a variety of purposes which would have the effect of alleviating poverty and improving their quality of life. Examples include expenditure on agricultural equipment, food processing equipment, household equipment (e.g. wood burning stoves), health and education.

Indirect Impacts:

- *Learning Effects* – participating farmers have learnt new skills in agro-forestry from training and 'learning by doing' – the participatory approach has been particularly helpful;
- *Balanced Agricultural Production Systems* – by introducing agro-forestry and FMR systems, there are benefits to the farmers from having a more balanced agricultural system;
- *Mitigating Deforestation Pressures in Environmentally Sensitive Areas* – in Muquenal village, it was agreed that if there was a significant increase in afforestation in the Tzeltal area, then this would alleviate the pressures on the nearby Selva Lacandona Region, a prime conservation area; and
- *Other Environmental Benefits* – the retention and development of the forestry resource will have important bio-diversity benefits in terms of the flora and fauna which can be sustained through a more balanced and diverse agro-forestry system.

SECTION 6 – CONCLUSION

14. **DTZ Pieda Consulting's Conclusion**. We believe that DFID's contribution of £520k to support ECCM's research into carbon sequestration is fully justified. This view is based on the potential contribution of the research to both the environmental and developmental objectives of the programme. The work is of strategic importance at a world level and the potential benefits are immense.

15. For example, our case study work has highlighted that the discounted benefit to farmers could lie in the range of a $109/ha loss, to a gain of $1,687/ha depending on the type of agro-forestry system adopted and the location. If one uses a conservative assumption of an average gain of $100/ha across all future carbon sequestration/conservation work in the developing world, then this would yield additional funding in excess of $40 billion over a 50 year period for disadvantaged rural communities.

ASSUMPTIONS AND INCOME CALCULATION

- Approximately 400 million ha of land in the tropics could be available and technically suitable for afforestation [2]);
- average net income (discounted) for farmers/communities of $100/ha over a 25 year period;
- total increased income going to disadvantaged rural communities of over $ 40 billion over a 50 year period (note: the average income per hectare would be greater than $100 if the time horizon was extended from 25 to 50 years);
- average annual increased income of $0.5 to 1 billion (note: the phasing of this income is not linear due to the lead time of >15 years before tree harvesting can begin).

16. Although this is a somewhat simplistic calculation, and there is likely to be a degree of inaccuracy, it does demonstrate the point that the potential returns from carbon sequestration within the developing world are at a major level. When compared to the current level of international aid, the figure of $0.5 to 1 billion per annum from carbon sequestration could revolutionise the support for developing countries. However, this would be dependent on the extent to which the CDM evolves in a way which is complementary to poverty alleviation in the developing world – this is by no means certain.

17. With regard to the leadership and development of the programme, DTZ Pieda Consulting would like to commend ECCM and their in-country partners on their achievements to date. It should also be recognised that the State of Chiapas is probably one of the most difficult environments within which to roll-out a pilot project and 'hands-on' research programme. Their progress is therefore all the more commendable.

18. However, the development of a regional level carbon sequestration system is a highly challenging research assignment. It is very difficult to develop a 'bottom-up' methodology which is both cost-effective and also delivers all of the environmental and developmental impacts sought.

[2] Dixon, R.K., Winjum, J.K. & Schroeder, P.E. 1993 Conservation and Sequestration of carbon: the potential for forest and agroforest management practices. *Global Environmental Change*. June. 159-173.

19. There are a number of important research outputs which are still outstanding and the ultimate success of the programme will be the extent to which they are addressed satisfactorily by the completion date of October 2001. The amount of work remaining should not be underestimated and the ECCM team will have to work hard to ensure that they meet their remaining targets.

1 INTRODUCTION

BACKGROUND TO STUDY

1.1 DTZ Pieda Consulting was commissioned by the Department for International Development to undertake an evaluation of three research themes from its Forestry Research Programme (FRP) and an additional one from its 'Flexibility Fund'. This report presents the findings from our investigation into carbon sequestration which has been piloted in Chiapas in Southern Mexico.

1.2 The Rural Livelihoods Department (Research Section) in DFID was responsible for commissioning the study. The background to the evaluation was a desire to critically appraise the effectiveness of DFID's research funding in the forestry sector.

1.3 In a similar fashion to DTZ Pieda Consulting's work in evaluating the Department's agricultural research funding in 1998, the goal was to select a small number of research areas which were perceived to be 'high performers' in terms of development impact, the alleviation of poverty and support for rural livelihoods.

1.4 DTZ Pieda Consulting conducted the study over the period January to April 2000. There are separate reports for each of the other research themes evaluated and an Executive Summary Report. Table 1.1 summarises the four research themes evaluated.

Table 1.1
FRP Research Themes Evaluated

Research Theme	Location	Funding Period
Carbon Sequestration	Chiapas, Southern Mexico	1995 - 2001
Calliandra	Kenya	1990 - 2000
Gliricidia	India	1982 - 1999
Bee Keeping*	Tanzania	1992 - 1998

Note: * The bee keeping research theme was funded through DFID's Flexibility Fund, not the FRP

STUDY OBJECTIVES

1.5 The full Terms of Reference is contained in Appendix A. The key study objectives are summarised below.

> "*The objective of the consultancy is to identify, describe and quantify the benefits achieved which are directly attributable to the research carried out*

under each theme/project and assess the value for money achieved. T review should focus on economic benefits achieved but should also highlight positive issues relevant to poverty, equity, the environment and institutional ----the review shall include:

- *an overview providing details of the extent of the problems being*

  details of projects undertaken, stated objectives, costs, countries and

  identification of the products generated, their nature and relationship programme purposes;

- *links with intermediate institutions, delivery mechanisms, scale of actual uptake, sustainability, constraints to uptake;*

- *an assessment of the possibilities and evidence for scaling up;*

- *quantification of the benefits (social, economic, environmental, institutional) generated by the uptake and application of the research*

  losses in the 'without research' scenario should also be attempted."

APPROACH TO THE STUDY

1.6 The following methodology was common to all four research themes evaluated:

- **Stage 1 – Briefing Meeting** with the Rural Livelihoods Department, Research Section to review the study objectives, expected outputs, etc.;

- **Stage 2 – Selection of Research Themes** – a meeting was held with the Programme Manager for the FRP (Mr. John Palmer) who works for Natural Resources International Ltd, and Mr. John Hudson, Senior Forestry Adviser for DFID. A long list of some 15 research themes were selected and these were subsequently short-listed down to 4 on the basis of perceived development impact (actual/potential), the availability of data, institutional linkages, etc.;

- **Stage 3 – Desk Research** – meetings were held with the relevant UK research Institute/University to obtain a more detailed briefing and to secure relevant background information and reports;

- **Stage 4 – Field Research** – each research theme was evaluated through a field visit to the developing country benefiting from the research. This enabled the study team to gain a detailed understanding of the programme at first hand and to collect primary data on research impacts through consultations with farmers and those involved in the management of the forestry resource;

- **Stage 5 – Analysis and Report Writing** – separate reports for each of the research themes were then prepared in draft for comment by the UK research institutes and DFID, prior to issue of the final reports. An Executive Summary Report was then produced covering the findings from each of the research programmes and commentary on some of the generic and cross-cutting findings.

REPORT STRUCTURE

1.7 The remainder of this report is structured as follows:

- **Section 2** – a description of the research programme and the underpinning projects – this includes the research issues being addressed; the rationale for the FRP programme; the extent to which it is 'additional' at an international level; a history of the research work and funding secured to date in for the research work in Chiapas;

- **Section 3** – an evaluation of the research activities and outputs of the FRP carbon sequestration programme from its inception in 1995 up to April 2000;

- **Section 4** – the uptake pathways used to disseminate the research findings and an assessment of their effectiveness. Also, the scaling up potential for the outputs of the research work;

- **Section 5** – impact analysis covering qualitative and quantitative impact assessments for the Scolel Te project, and other indirect impacts such as environmental, social and institutional;

- **Section 6** – summary and conclusions.

1.8 In addition to the Executive Summary, a summary is provided at the end of each Section in the report to assist the reader. Finally, two currencies are used in the report:

- Sterling for the quantification of funding by DFID and other donor sources; and

- Dollars for the assessment of impact in the Scolel Té project and all other operational income and expenditure items incurred in Mexico.

ACKNOWLEDGEMENTS

DTZ Pieda Consulting would like to thank the following for their assistance in the execution of this assignment:

- **Rural Livelihoods Department** – Research Section for their assistance with the mobilisation and management of the evaluation study; and its critical appraisal and enhancement of the research outputs;

- **Edinburgh Centre for Carbon Management** (ECCM) – for assistance in all aspects of the study including the desk research, facilitating our attendance at the workshop in Chiapas, organising the field work with farmers, and reviewing the evaluation report;

- **Organisations in Mexico** – the time devoted by the following organisations to meet with DTZ Pieda Consulting and to give their views openly: DFID's Mexican office; INE; SEMARNAP; ECOSUR; Ambio; Fondo Bio-Climatico;

- **Mexican Farmers** – and last but not least, the time devoted by the Mexican farmers in the three villages visited during the fieldwork.

A full list of the consultees is presented in Appendix B.

2 BACKGROUND TO RESEARCH

2.1 This section describes the background and parameters of the research programme under the following headings:

- The specific issues/opportunities being addressed and the rationale for research into carbon sequestration (including a description of the channels of impact – actual and potential);
- The rationale for DFID's research programme i.e. what is the demand for the research;
- Is it 'additional' to that which is already taking place at an international level?
- A history of the research work in carbon sequestration in Chiapas, southern Mexico; and
- A summary of the research work funded to date (and committed) distinguishing between FRP funded research and the support provided by other organisations.

RESEARCH ISSUES AND PROGRAMME RATIONALE

2.2 There are two main issues being addressed by the FRP funded research into carbon sequestration:

(i) **Environmental Impact** – firstly, the mitigation of the greenhouse problem through the absorption of carbon dioxide from the atmosphere by photosynthetic organisms (in this project the sequestration is focused exclusively on afforestation and/or improved management of existing forestry resources); and

(ii) **Impact on Rural Livelihoods** – secondly, how to implement carbon sequestration for the social and economic benefit of poor communities in developing countries so as to enhance rural livelihoods.

2.3 The research work is therefore multi-objective. The potential environmental and developmental impacts are discussed in more detail below.

CO_2 AND THE GREENHOUSE EFFECT

2.4 The most important factor contributing to the greenhouse effect relates to the increased concentration of carbon dioxide in the atmosphere. This is due to two main factors:

(i) **Fossil Fuel Burning** – 80% of carbon dioxide emissions are due to fossil fuel burning. Global emissions have increased almost fourfold since 1950 and are approaching 6 billion tonnes of carbon per annum;

(ii) **Land Use Change** – the second major cause of CO_2 accumulation in the atmosphere is due to land use change. Annual deforestation of 17 million hectares of forest releases about 1.8 billion tonnes of carbon per annum, about 20% of the anthropogenic total.

2.5 The objective of **carbon sequestration** is to increase the amount of forest (it accounts for 80% plus of photosynthesis in the world) so that more carbon is absorbed from the atmosphere and the greenhouse effect is mitigated. In effect, forests are acting as a **carbon store**.

2.6 It is estimated that between 50 – 150 billion tonnes of carbon could be sequestered globally over the next 50 years, based on estimates that up to 1 billion hectares of land might be available for reforestation. This amount of sequestration could compensate for around 10 to 15 years of fossil fuel emissions. The key conclusions which one reaches therefore are:

- Carbon sequestration represents, potentially, a very effective option for reducing the level of CO_2 in the atmosphere;
- It is insufficient on its own to resolve the greenhouse problem;
- However, it can 'buy valuable time' in which cleaner technologies can be developed and to accommodate the delays in the developed world while it 'gets its act together' in reducing emission levels, introducing fuel saving measures, etc.;
- Ideally, re-afforestation should go hand-in-hand with emissions reductions, etc, as part of an holistic approach in addressing the greenhouse problem.

2.7 One of the key objectives of the FRP research is to contribute to our understanding of how carbon sequestration can be made to work in practice, so that its take-up by the developed and developing world is maximised.

[**Note**: the data and arguments put forward in this sub-section were drawn from a paper produced by Professor Grace of Edinburgh University entitled 'The Global Carbon Cycle' and submitted at a seminar in Brussels in 1997 hosted by the International Federation for Carbon Sequestration.]

IMPROVEMENT IN RURAL LIVELIHOODS

2.8 The second key issue addressed by the FRP research is how to apply carbon sequestration for the benefit of the developing world so as to improve rural livelihoods and alleviate poverty.

2.9 The basic proposition under-pinning the implementation of a carbon sequestration system is that a market will develop for the international trade in carbon. Those responsible for carbon emissions (principally the developed world) will pay for **carbon credits** to offset their carbon emissions (i.e. their carbon debits). These payments will go to those who produce **carbon offsets** - measured in tonnes of carbon (tC) which is the measure of the output of the carbon sequestration activity.

2.10 By far the greatest potential for carbon sequestration is in the developing world, hence there will be a flow of payments from the developed to the developing world. Carbon sequestration could therefore provide a major increase in funding for developing countries. The extent to which it can improve rural livelihoods will depend on a number of factors, including:

(i) The attractiveness of carbon sequestration as opposed to alternative forms of carbon reduction (the outcome of the forthcoming Sixth Conference of the Parties in November 2000 and the determination of whether carbon sequestration should be included as an integral element of the Clean Development Mechanism (CDM) will obviously be critical in this regard;

(ii) The attractiveness of carbon sequestration projects which are focused on rural communities as the beneficiaries as opposed to those which are aimed at large tracts of land where the objective is the maximisation of carbon sequestration for least cost. The former are much more resource intensive but the potential impact on rural livelihoods is high – see Table 2.1; and

(iii) The extent to which a viable carbon sequestration model can be developed for the benefit of rural communities. 'Viability' criteria will include ease of implementation and uptake, transparency, equity (i.e. the transfer of resources directly to farmers and not 'middle men') and cost-effectiveness.

Table 2.1 Carbon Sequestration Options (from the perspective of the carbon purchaser)		
Strategic Goal	**Carbon Maximisation at Least Cost**	**Maximising Rural Development Impact Combined with Carbon Sequestration**
Land Area	Large land tracts (single tract ideally)	Likely to be smaller tracts and broken up in parcels (related to village communities)
Ownership	Small number – ideally one owner only	Large number of farmers (measured in hundreds/ thousands)
Development, Management and Monitoring Inputs	Low	High
Cost of Carbon Sequestered (indicative only)	$1-3	$10-20
Impact on Rural Livelihoods	Nil or detrimental (due to displaced /adversely affected communities)	Positive impact due to increased rural incomes, more effective land management and the benefit of a long term forestry resource with high capital value.
Note: these two options represent extremes along a spectrum of possible options where the balance between carbon maximisation and rural development impact can be varied.		

2.11 Factors (i) and (ii) above are largely exogenous and difficult to influence directly. However, the development of a workable carbon sequestration model for the benefit of poor farmers in developing countries would provide a major contribution to the future development of carbon sequestration with the added benefit of improved rural livelihoods. This has been the focus of the FRP research programme.

2.12 Carbon offset revenue could support farmers in building sustainable, resilient land use systems. However, there are as many threats as there are opportunities and the value of this research has been in identifying the barriers and the means of overcoming them in the development of a viable sequestration model.

NEED FOR FRP RESEARCH PROGRAMME

2.13 Having explained the rationale for a research project into carbon sequestration which supports rural livelihoods, one must then determine whether it was sensible for DFID to fund such a programme. This question focuses on the extent to which the research programme is unique and 'additional', and is not replicating other research work elsewhere in the world.

2.14 For the environmental factors explained above, carbon management is a 'hot topic' at the moment and there is considerable international research and development work in this field. In the area of carbon offsets alone there are more than 150 bilateral carbon offset schemes which have been developed to date. Of these about 30 are based on forestry or land use change designed to conserve and /or sequester *additional* carbon. However, only 12 or so of these projects are fully operational (on a comparable basis to the FRP research programme in Chiapas).

2.15 The distinguishing feature of the FRP programme is that it is examining the carbon sequestration issue from the perspective of rural livelihoods as characterised by:

- The development of a carbon sequestration pilot project focused on the poorest State in Mexico – Chiapas;
- Sequestering carbon from agro-forestry and forestry management/ regeneration projects delivered by individual farmers and rural communities;
- The economic benefit from carbon sequestration being routed directly back to the farmers / community;
- A 'bottom-up' rather than 'top-down' approach to the planning, development and implementation of the project – the work in Chiapas has been highly participatory and inclusive of the communities involved.

2.16 In contrast, the other forestry based carbon sequestration projects tend to be looking at the issue from the perspective of the carbon purchasers in the developed world rather than from the perspective of the carbon producers in the developing world. A summary of some of the best known projects is provided in Table 2.2.

Table 2.2
Summary of Key Carbon Sequestration Projects

Project Description	Forest Area (ha)	Offset Funding (US$)	Carbon Offset Prediction (tC)
Noel Kempff Climate Action Project - Bolivia Expansion of the existing Noel Kempff Mercado National Park and the elimination of legal and illegal logging activities.	842,000	9.5 million	16.5 million
Face – Uganda National Parks Rehabilitation of two National Parks through restoration and reforestation.	35,000	1.9 million	6.8 million
Reduced Impact Logging – Sabah, Malaysia Funding a timber concession holder to implement RIL on 1,400 ha out of a concession of 1 million ha.	1,400	450,000	58,000
Isla Bananal – Brazil AES Electric is funding the conservation of tropical forest on the riverine island of Bananal – this land is part of two protected areas and has been untouched by development.	350,000	800,000	16.0 million

2.17 It is fair to say that the FRP research has been pioneering in its focus on the impact of carbon sequestration on rural livelihoods. Due to the dissemination of findings others are now starting to follow – the interest of CIFOR is a case in point. In summary, there was a clear need for this research and DFID's support through the FRP has provided a real contribution at an international level.

HISTORY OF RESEARCH INTO CARBON SEQUESTRATION IN CHIAPAS

2.18 The origin of this research programme stems back to the late 1980s and early 1990s when Richard Tipper, the current leader of the research programme, was considering the development of a community forestry programme. Having been involved in an afforestation programme in Chiapas which had had mixed success, he was keen to roll-out a more effective and sustainable forestry system.

2.19 However, in 1993 the opportunity arose to integrate his plans with research into carbon sequestration, through a feasibility study funded by the Mexican Government. This marked the effective start of research into carbon sequestration in Chiapas. Over the period 1993 to 2000 there have been four key inputs into the research work:

(i) **1993 – 1995**: the initial feasibility study into carbon sequestration initiated by the University of Edinburgh and funded by the National Institute of Ecology (INE) in Mexico at a cost of £30k. This work was pivotal in that it identified the potential for carbon sequestration; it developed relationships with key players such as the research organisation ECOSUR in Chiapas; it attracted significant interest from the farmers participating in the feasibility study in Chiapas, and it received the support of the Mexican Government. A paper was published on the potential for carbon sequestration at the conclusion of the study;

(ii) **1995 – 1998**: FRP funded the first phase of the pilot project at a cost of £131k. Originally the programme was established to examine community forestry management planning. However, during the early stages of the research an agreement was reached to re-focus on community planning within the context of a carbon sequestration model;

(iii) **1996**: the Federation Internationale del Automobile (FIA) agreed to provide annual funding of £37k ($55k) to support the roll-out of a 'live' carbon sequestration project, whereby it would pay $10 per tonne of carbon sequestered. [Note: this was subsequently increased to $12 per tonne and an annual payment of £44k ($66k)]. In effect, this funded the operation of the model and enabled the DFID funds to be devoted to research;

(iv) **1998 – 2001**: FRP funded the second phase of the pilot project at a cost of £239k. This money has been used to examine the potential for scaling up the local model to a regional context. The funding has been spent on developing regional base-line models, setting standards and specifications for implementation and assisting with the roll-out and dissemination of the pilot project findings.

RESEARCH FUNDING FOR CARBON SEQUESTRATION

2.20 In addition to the FIA monies, the FRP research programme has been very successful in leveraging in additional funding from other public sector bodies. Table 2.3 summarises the total level of funding which has:

- Either, been directly used by the Chiapas pilot project;
- Or, has been used indirectly by the Chiapas project;
- Or, shared by the Chiapas project with other organisations.

Table 2.3
Funding Sources for Research into Carbon Sequestration

Year	Description	Funding (£'000s)
DFID Funded Research:		
1995 – 1998	1st Phase Pilot Project	131
1998 – 2001	2nd Phase Pilot Project	239
2000 – 2001	Roll-out to Africa and India	30
1999	Funding of research study on the development impact of carbon sequestration on rural livelihoods	120
Sub-total		**520**
Other Research Funding:		
INE (1993-95)	Feasibility study	30
FIA (1997 – 2000)	Purchase of carbon credits for three year period (total funding to date)	120
US EPA & SEMARNAP (1995 – 2000)	Funding ECOSUR to study carbon fluxes associated with land use change which involved direct measurement of biomass in different vegetation types (this work was shared with the carbon sequestration pilot project)	333*
SEMARNAP (Mexican Govt. department for the environment: 1995 – 1996)	Training grants for forestry promoters	?
Darwin Initiative and British Council (1995-1998)	Funding staff exchanges between ECOSUR and the University of Edinburgh (both ways)	20
US Initiative on Joint Implementation	Funding for the application process; supporting research and fieldwork.	13
IEA – Greenhouse Gas	Research of the cost and potential for large-	

R&D Programme	scale carbon sequestration in southern Mexico using economic models and geographic information such as satellite images	50
DETR (1998)	Review of offsets from forestry projects in developing countries	7
British Embassy (1999)	Provision of a pick-up vehicle to support the fieldwork of the pilot project in Chiapas	5
OECD (Feb 2000)	Paper on the establishment of baselines for the monitoring of carbon sequestration	7
Sub-total		**252**
Total Funding to Date (1993 – 2001)		**1,105**
Note: * A significant proportion of this expenditure would have been expended irrespective of the Chiapas pilot project.		

2.21 The key conclusions which one derives from this analysis are:

(i) *DFID is the largest single research funder* and the key donor over the period 1995 – 2001, contributing some £520k which represents 47% of total funding for carbon sequestration research allied to the Chiapas project. Without this 'core research funding' the project would not have 'got off the ground' and the most likely outcome is that little, if any, significant research outcomes would have been achieved;

(ii) *The level of FRP funding has also given the research programme critical mass* and continuity over a six year period – as demonstrated later, this has enabled the programme to achieve outputs and impacts which would not have been achieved on a smaller scale programme;

(iii) The University of Edinburgh (subsequently the Edinburgh Centre for Carbon Management - ECCM) has been very successful in *leveraging funding from both public and private sector sources* to further support the roll-out of the pilot project and to enhance/expand the research effort;

(iv) Current negotiations suggest that *further sources of private sector finance will be forthcoming in the near future* for the purchase of carbon credits. The following are in the 'pipe-line':

- 'Future Forests' which is a UK-based organisation promoting carbon credits on behalf of the Chiapas project;
- Pemex, the national petroleum company in Mexico is discussing a possible deal;

- ColdPack, a Mexican firm is considering a commitment of 5,000 tC at $10/tonne which is anticipated to expand rapidly over the next three years.

[**Note**: not all of these will necessarily come to fruition. However, it is expected that one or more will be successful. On a smaller scale, the recent World Economic Forum in Davos confirmed a purchase of £5k per annum for carbon offsets.]

SUMMARY OF BACKGROUND INFORMATION ON RESEARCH PROGRAMME

2.22 **Research Issues**. There are two main issues being addressed by the FRP funded research into carbon sequestration:

(i) **Environmental Impact** – firstly, the mitigation of the greenhouse problem through the absorption of carbon dioxide from the atmosphere by photosynthetic organisms (in this project the sequestration is focused exclusively on afforestation and/or improved management of existing forestry resources); and

(ii) **Impact on Rural Livelihoods** – secondly, how to implement carbon sequestration for the social and economic benefit of poor communities in developing countries so as to enhance rural livelihoods.

2.23 **Programme Rationale**. The research aims to develop a workable model for the roll-out of carbon sequestration in the developing world. The justification for this research programme is its focus on supporting rural livelihoods from the 'bottom up' with a high level of farmer participation. The other international pilot projects are very much top-down and there was therefore a clear need for this new perspective on carbon sequestration.

2.24 **History of Research**. The key stages in the roll-out of the carbon sequestration research programme have been:

- 1993 – 1999: feasibility study in Chiapas funded by the INE;
- 1995 – 1998: 1st phase of pilot project funded by FRP;
- 1996 onwards: the commitment of FIA towards the purchase of carbon credits on an annual basis;
- 1998 – 2001: 2nd phase of pilot project funded by FRP.

2.25 **Research Funding**. The key points are:

- core funding has been provided by FRP amounting to £520k over the period 1995 – 2001;
- the scale and continuity of the research funding has enabled the project to make much greater progress than would otherwise be the case (see later evidence in this report);
- the University of Edinburgh/ECCM has been very successful in leveraging private and public funding to support the execution of the pilot project and the accompanying research programme;
- there are discussions underway with a number of additional private sector funders with regard to the purchase of carbon credits.

3 OUTPUTS OF RESEARCH

INTRODUCTION

3.1 This section describes the activities and outputs of the FRP carbon sequestration research programme from its inception in 1995 up to April 2000, the date of the current evaluation study. It is structured under the following headings:

- Framework and definitions;
- Phase 1 Research: 1995 – 1998;
- Phase 2 Research: 1998 – 2001;
- Summary and Conclusions

Note: the focus in this section is on a description of the activities underpinned by the research and an evaluation of the outputs. The analysis of impact is deferred to Section 5.

FRAMEWORK AND DEFINITIONS

3.2 The framework for the research programme is illustrated in Table 3.1. Each of the key elements are described below.

Table 3.1
FRP Carbon Sequestration Research Framework

← CLIMAFOR Programme →	
1995 1998 2001	
Phase 1 – Scolel Te	**Phase 2 – Regional Level System**
Objectives/Outputs	*Objectives/Outputs*
• Local Focus (communities within Chiapas) • Establishment of pilot project at local level • Development of 'Plan Vivo' system • Production of Manual to describe system • Local capacity building/institutional strengthening	• Regional system at State level (Chiapas); • Methodology for establishing baselines cost-effectively at a regional level • Standards being developed to maximise beneficial impact on rural livelihoods • Technical specifications for implementation of carbon sequestration model for different tree species/ environmental conditions • Overall organisation of carbon sequestration at a regional level

	• Dissemination and scaling up.
Status • The research outputs have been achieved by year 2000 • However, the Scolel Té project continues to develop and expand at a local level • There is the expectation that the Scolel Té project will become self-financing and sustainable in the longer term	*Status* • The evaluation was undertaken at the mid-point in the Phase 2 research programme • Hence, the final outputs have not been achieved to date • Instead, partial completion • Study reports on progress and the likely attainment of the final research outputs

3.3 **CLIMAFOR Programme**. This is the name which the University of Edinburgh gave to the whole of its research programme into carbon sequestration as applied to forestry and its impact on climate change. It is no more than a 'badge or label' which encompasses the wide-ranging activities executed under the carbon sequestration research programme. It spans the FRP funding period 1995 to 2001.

3.4 **Phase 1 – Scolel Té**. This refers to the establishment of the carbon sequestration pilot project in Chiapas. "*Our objective is to develop a prototype scheme for sequestering CO_2 in sustainable forest and agricultural systems*." The title of the project **Scolel Té** means 'growing trees' and was the name given to the project by the participating farmers. It is important to draw the distinction at this stage between the two types of outputs/impacts arising from the Scolel Té project:

(i) *Research outputs* – whereby the implementation of the pilot project has yielded important lessons and research findings which have been captured by the research team for possible replication elsewhere in the developing world for the benefit of rural livelihoods. This is the focus of Section 3 in the evaluation study;

(ii) *Developmental outputs/ impacts* – whereby the implementation of the pilot project has yielded (or will in the future) direct benefits to the participating farmers in Chiapas. This is the focus of Section 4 in the evaluation study.

Note: the funding for the trade in carbon credits in Scolel Té has been provided by FIA through its commitment to fund $55k pa., subsequently rising to $66k p.a., for the purchase of carbon credits. The FRP funding has been directed at the research costs surrounding the pilot project, not its actual implementation. This is true for both Phase 1 and Phase 2 of the research programme.

3.5 **Phase 2 – Regional Level System**. The second phase of FRP research funding has been focused on the development of a 'regional level' system which enables carbon sequestration to be 'rolled out' consistently across a much larger area to give critical mass and improved cost-effectiveness.

3.6 **Lead Research Organisation**. At the commencement of the research programme in 1995, the lead applicant body for the research funding was the Institute of Ecology and Resource Management (IERM) at the University of Edinburgh. However, although there has been continuity in the senior research staff leading the programme, there has been a change in organisational structure.

3.7 In 1998/99 the research unit separated from the University to set up its own company entitled Edinburgh Centre for Carbon Management (ECCM). Responsibility for the carbon sequestration research programme has transferred to ECCM[3]. To avoid confusion in the presentation of our findings, from now on only the title ECCM will be used to denote the programme manager, irrespective of the date. Hence, in the earlier years the title ECCM will be used despite the fact that it was actually IERM managing the programme.

PHASE 1 - SCOLEL TÉ

3.8 As explained in Section 2, the first phase of FRP funding was re-positioned during 1996 to meet with the combined goals of carbon sequestration and a more sustainable approach to community forestry management – a bottom-up rather than top-down approach with a high level of participatory involvement by the villages in the planning and implementation process. This move was supported by the Mexican Government and endorsed by DFID.

3.9 As a consequence of this re-positioning, the original approval paper for project number R6320 Cb has been superseded. In particular, the following elements of the research approval papers no longer apply, in part or in full:

- Research objectives;
- Project activities;
- Logical framework which specifies measurable indicators, means of verification and important assumptions for goal, purpose, outputs and activities.

[3] ECCM is still in close collaboration with the University through the "Edinburgh Carbon Management Programme"

3.10 No revised '*Funding Application and Project Memorandum Form*' was completed and DTZ Pieda Consulting has therefore had to improvise by agreeing revised research objectives and outputs ex post with ECCM: see Table 3.2. We believe that this represents a fair and accurate measure of the effectiveness of the Phase 1 Scolel Té pilot project.

Table 3.2
Scolel Té Project Measures

Perceived Objectives	• "To establish a carbon offset pilot project for small holder farmers and villages in southern Mexico." • "To develop a basic planning system to facilitate the roll-out of the pilot project." • "To trial the carbon trading system at both an individual farmer level and the community level." • "To ensure that the farmers are fully integrated into both the development and roll-out of the pilot project so that the impact on rural livelihoods is maximised."
Expected Outputs	(1) The establishment of an operational pilot project which demonstrates that carbon trading can work at the farmer/ community level. (2) Evidence of beneficial impact on rural livelihoods. (3) The development of a Manual which explains how to set up and operate a carbon trading system at the village/community level. (4) The provision of training and development support to develop local capacity for the delivery of the pilot project and to improve the chances of its long term sustainability.
Sources: ECCM; DTZ Pieda Consulting	

3.11 Our evaluation of the pilot project's success in meeting these objectives/ outputs is presented below. The evidence is presented against each of the 'expected outputs'.

(1) - Establishment of a Pilot Project which 'Works'

3.12 Back in 1995, the establishment of a fully operational pilot project in Chiapas was a very challenging remit, given:

- The novelty of the project – this would be the first of its kind in the world;

- The lack of a buyer for the carbon;
- The limited experience within Chiapas of community style forestry projects which depended on active farmer participation;
- The socio-political obstacles facing the roll-out of a new project in Chiapas, given the Zapatista revolt in 1993/94. This was the most difficult State in Mexico within which to launch such a pilot project. However, it has the benefit of giving the project a real test – as the Project Manager in ECCM stated:

  "*if it can be made to work in Chiapas then it can work almost anywhere*".

3.13 It is DTZ Pieda Consulting's conclusion that the research programme has been highly successful in the launch and on-going development of Scolel Té. The evidence in support of this conclusion is presented under the following headings:

- Team;
- Funding;
- Structure;
- Participatory approach;
- Plan vivo system;
- Coverage and take-up.

3.14 **Team**. The foundation for any successful project is the team responsible for its implementation. Developing an effective team is dependent on two main factors:

- Selecting the correct organisations/ individuals at the start and retaining their participation throughout; and
- Getting the individuals to work as a 'team'.

3.15 On both counts Scolel Té has been very successful. The key organisations which have been instrumental in the delivery of the project have been:

(i) *ECCM* (formerly IERM at the University of Edinburgh) – they have provided the leadership and technical expertise to initiate, build and drive the project forward;

(ii) *ECOSUR* – a specialist environmental and ecological research centre, headquartered in Chiapas. They have been responsible for specific scientific inputs such as the calculation of the carbon sequestration potential of different agro-forestry/forestry management and restoration (FMR) systems; the calculation of baselines using satellite

data at a sub-regional level, etc. ECOSUR have acted as in-country research partners to ECCM involving themselves in joint publications, seminars and conferences;

(iii) *Ambio* – this organisation was formed as the 'on-the-ground' team, responsible for the day-to-day implementation of the project. There are two team members: one focusing on the office based work, management of records, financial flows and case files for the farmers; and the other devoting his time to work in the field rolling out the plan vivo system with participating farmers;

(iv) *Social Advisers* – two advisers have been recruited to act as intermediaries between the project team/Ambio and the farming community. It must be appreciated that the recruitment of farmers is a skilled job given the political environment, the sensitivities of the communities concerned and their wariness of 'government backed' initiatives which have a poor track record in this Region (**for example:** the two Ambio staff members were imprisoned overnight by one of the communities visited and their vehicle retained for a month).

3.16 It is our view that ECCM recruited the correct organisations and appropriate team players, in terms of expertise, experience and abilities, to participate in the pilot project. This has been a key factor in the success of the project to date. Furthermore this team has been retained and developed throughout the period so that there has been continuity of key staff members.

3.17 ECCM has also been successful in getting the organisations and individuals to work together effectively as a team. This has been achieved through:

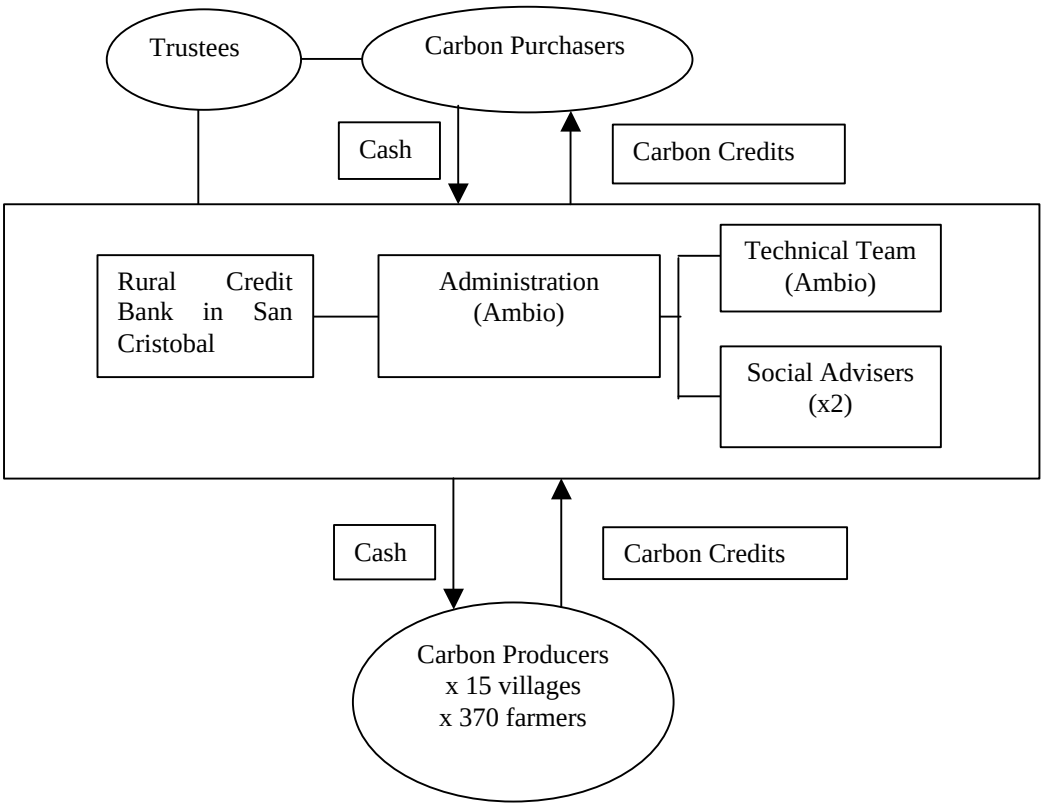
- Field visits by ECCM staff based in Edinburgh to HQ in San Cristobal and to participating communities;
- Exchange visits of ECOSUR and ECCM staff between the UK and Mexico;
- On-the-ground management, specifically when John Taylor was present during the earlier stages of Scolel Té (he worked as part of the Ambio team – he has now left the project);
- Effective management through the clear demarcation of responsibilities amongst the different organisations and team members delivering the project.

3.18 **Funding**. The critical breakthrough in the project was the involvement of FIA and their contribution of $55k per annum which has subsequently been scaled up to £66k p.a. Credit for this must go to the Project Leader in ECCM who was responsible for the active marketing of the pilot project to major corporates in the UK and internationally including multiple retailers, the automotive industry and energy companies.

3.19 He has also been successful in securing additional funding from a variety of public and private sector sources to support the research programme – see Table 2.3 in the previous section of the report.

3.20 **Structure**. You can have the best team players in the world with plenty of funding, yet this does not guarantee a successful project. A key feature is an effective operational structure. For Scolel Té this has been provided by the formation of a trust fund called **Fondo Bio-Climatico**. It has the responsibility of acting as a marketing intermediary between the buyers of carbon credits (the CO_2 emitters in the developed world) and the providers of carbon credits (the carbon producers in the developing world) – see Figure 3.1.

Figure 3.1
Organisational Structure for Fondo Bio-Climatico



3.21 The Fondo has a legal status in its own right. Its board of Trustees represents the interests of the carbon purchasers. Its remit is to manage the transfer of funds from the carbon purchaser (FIA is presently paying £12 for every tonne of carbon sequestered) to the carbon provider to ensure that the transactions are carried out transparently and with due financial diligence and propriety.

3.22 We have one concern regarding the current composition of the Board of Trustees - only the Project Manager from ECCM sits on the Board of Trustees. Our recommendation would be for a wider Board to be selected. The criteria for selection would be:

- Relevant business/commercial skills relating to the management of funds;
- Regional representation to ensure regular attendance at the quarterly meetings;
- Independence - the trustees should not have an operational role in Scolel Té – this will ensure that they provide a totally objective and independent input to the management and direction of the Trust.

3.23 Although there was insufficient time to conduct a proper financial audit of the Fondo, DTZ Pieda Consulting was reassured by the financial and management reporting which was displayed at the quarterly meeting of the Fondo attended by the Bank, Ambio, trustee (ECCM Project Manager) and farmer representatives (this meeting took place during the course of the field visit by DTZ Pieda Consulting to Chiapas).

3.24 **Participatory Approach**. A key feature of the ECCM methodology has been a highly participatory approach towards the development and implementation of the Scolel Té project. This has included:

(i) *Engagement of farming communities* – local representatives from Chiapas were selected as intermediaries for the engagement of communities (these individuals are referred to as 'Social Advisers'. Once the village community has been engaged, the social workers retain an on-going involvement as liaison officers. Only villages which have a genuine interest in participating are 'recruited';

(ii) *Engagement of farmers* – participation of farmers within Scolel Té is purely voluntary, so that although a community agrees to participate, it is up to the farmers themselves to 'join the project'. Farmer participation levels vary from 5% to 100% in the Scolel Té villages. The appointment of a 'Lead Farmer' within the village to act as the liaison point for the Ambio Team has facilitated the implementation of the project at a village level;

(iii) *Contribution of Farmers* – once a farmer has agreed to participate in the project, there is a high level of responsibility placed on him to decide the following:

- How much land area he wishes to devote to carbon sequestration;
- What type of agro-forestry /FMR system is best suited to him;
- The most suitable tree species to be introduced;
- The timing of the planting, thinning, harvesting, etc.

[**Note**: these decisions are summarised in the 'Plan Vivo' system which is described in more detail in the next sub-section. Each farmer has complete ownership of his own 'plan vivo'.]

3.25 Having had experience of evaluating Participatory Crop Improvement (PCI) methodologies in Nepal, DTZ Pieda Consulting endorses the participatory approach being adopted by the Scolel Té project. In our view it has been highly successful in engaging the communities through a 'bottom-up' rather than 'top-down' approach. This confers two main benefits:

(i) The carbon sequestration activities will have a higher probability of successful implementation – if the farmers are empowered in the planning process they are more likely to have the incentive to maintain their tree crops effectively in the long term; and
(ii) The impact of the project on the enhancement of rural livelihoods will be greater.

3.26 **Plan Vivo System.** The term 'plan vivo' means 'living plan' in Spanish and it refers to the whole planning and operational system developed out of the Scolel Té project. The ECCM definition is as follows:

"*Plan Vivo is a system for planning, managing and monitoring the supply of carbon offsets for small farmers in ways that enhance rural livelihoods.*"

3.27 Unlike traditional products, which are delivered to the buyer for use or consumption, the service of carbon storage is not directly visible to the buyer – so a mechanism is required to provide assurance that the carbon purchased is really sequestered. The Plan Vivo System aims to provide a structured operating system that will safeguard the investments of carbon service purchasers. However, if forestry and other activities are planned solely for the purpose of storing carbon there may be detrimental local effects. The Plan Vivo System aims to ensure that forestry developments are farm-led, environmentally positive and livelihood enhancing and that agreements between service providers and purchasers are transparent and fair.

3.28 The above summary description of the Plan Vivo System has been drawn from the ECCM carbon sequestration web site. This presents a detailed 'manual' of how to establish a Plan Vivo System and there is no intention to repeat the details in this report. Suffice to say that guidance for the implementation of a carbon sequestration project is structured under the following headings:

- Feasibility study;
- Pilot project;
- Operational stage – scaling up.

3.29 **Coverage and Take-up**. Appendix D summarises the participation by farmers in Scolel Té and the level of carbon sales to the end of March 2000. A key strength of the project is the strong evidence of 'action on the ground'. The FIA funding has been used to roll out a significant programme in Chiapas with the following features:

(i) *Widespread Programme* – 15 villages have taken up the carbon sequestration programme with 370 participating farmers and 352 ha of land committed. In addition, there is an outstanding community wide plan which would involve an additional 2,500 ha if it came to fruition. The locations of the six village zones where the Scolel Té project has been rolled out are detailed in Map 3.1;

(ii) *Geographic/Climatic Diversity* – an interesting mix of different geographic and climatic zones have been selected – from the higher Tojolobal zone at up to 1500m; to the Tzeltal at approximately 800m; to almost sea-level at Marquez de Comillas. This provides a range of different growing zones for carbon sequestration. For example, the tC sequestered per hectare varies from 25tC in the Tojolobal to 143 in the Tzeltal;

(iii) *Farming Diversity* – given this geographical variation, the farming types vary between the highly productive coffee producing areas of the Tzeltal to the basic maize and cattle zone of the Tojolobal;

(iv) *Land Ownership* – the principal focus to date has been on land 'owned' by farmers – note, the term ownership is not always strictly correct in a Mexican context, but for the purposes of this study it is the best description in that the farmer has control over the use of the land in perpetuity and can determine the agricultural/forestry system which best meets his needs. The more limited community level initiatives are due to the political and legislative issues facing the roll-out of Scolel Té – these are discussed in more detail later in this sub-section;

(v) *Carbon Sequestration Models* – there have been a mix of different agro-forestry and FMR models pursed by the participating farmers/communities;

(vi) *Carbon Sales* – the level of take-up of available FIA funding ($176k) has been good with $99k out of a total of $132k paid over to farmers to date. The majority of the balance has already been committed. Indeed, the key limitation for the further expansion of the project is the lack of additional purchasers of carbon credits;

(vii) *Development Potential* – the project has demonstrated continued growth and development over the period 1996 – 2000. Indeed, there are other communities where scoping visits and initial training have taken place:

- Sta Creiz Tepetotutla (Oaxaca State) – Plan Vivo in progress;
- Rincon Chamula and UREAFA (10 communities) – Plan Vivo completed but the project is on hold for other reasons.

3.30 In summary, DTZ Pieda Consulting believes that the Scolel Té pilot project has been highly successful across all of the parameters described above. It has provided an excellent research model for the FRP programme which has led to:

(i) a number of important research outputs which are described later in Section 3; and
(ii) important lessons where the project has encountered difficulties. These are discussed below.

Map 3.1

Location of
Scolel Té Communities in
CHIAPAS, MEXICO

(as at April 2000)

DTZ Pieda Consulting

3.31 **Problems Experienced by Scolel Té**. There are two key problem areas which have had to be addressed by the project:

(i) Firstly, the general socio-political environment has been difficult for the roll-out of the project. This makes the recruitment of villages and the on-going management of the project more difficult than would otherwise be the case. However, there is little that can be learnt from this, other than the importance of careful country/ regional selection prior to commitment. The implementation of the project within the Chiapas environment has been a model of good practice which has mitigated the adverse socio-political factors; and

(ii) Secondly, a linked issue has been the difficulty in securing community level participation in the project (as opposed to farmer level involvement). This is due to a combination of factors, including:

- Difficulty in obtaining universal community agreement on forestry management objectives;
- Difficulty in obtaining forestry technicians with a combination of technical and social skills – the ability to work with communities at a 'political' level; and
- Institutional obstacles /barriers within Chiapas State (this is much less of a problem in the neighbouring Oaxaca State).

CASE STUDY – JUSNAJAB VILLAGE

- **Objective** – to develop a community wide forestry management project for Jusnajab village – which would include harvesting.
- **Approval Process** – this requires a Forestry Management Plan which is very bureaucratic and has to meet specific guidelines of the State Government/SEMARNAP. A plan was prepared by Ambio with the input from a private forestry engineer. Plan was rejected and its has now been re-submitted.
- **Lessons** – this type of project is too resource and time intensive for the Scolel Té project. Instead, the policy is now to encourage communities to develop their own plan with the support of one of the 7 private forestry engineers in Chiapas. Once the formal Management Plan has been approved then the much simpler Plan Vivo can be 'bolted on' ex post.

(2) – EVIDENCE OF BENEFICIAL IMPACT ON RURAL LIVELIHOODS

3.32 This is the subject of a detailed impact assessment in Section 5, which examines the quantitative and qualitative benefits stemming from the Scolel Té project. It is not discussed further in this section.

(3) – PRODUCTION OF A 'MANUAL'

3.33 ECCM has set up two web sites for their carbon sequestration research. The first describes the Scolel Té project and the wider CLIMAFOR programme under the following headings:

- *Introduction to the Project*: background; objectives; how it works; how much carbon can be sequestered; who is responsible; what carbon sequestration costs and associated research;
- *Detailed Description*: outline; organisation; feasibility; timescale; location; potential impact; planning and implementation; inputs; financing and purchasing agencies;
- *Participants*: contact information for key organisations participating in CLIMAFOR;
- *Research Projects and Development Grants*: list of all donor funding supporting the CLIMAFOR programme;
- *CLIMAFOR Project*: a paper which describes the environmental context for the CLIMAFOR project;
- *Technical Papers*: a paper on the '*mitigation of greenhouse gas emissions by forestry: a review of technical, economic and policy concepts*'; and '*a framework for monitoring and evaluation of carbon mitigation by farm forestry projects; example of a demonstration project in Chiapas, Mexico'*.

3.34 This web site provides a helpful description of the Scolel Té project and the wider context of the CLIMAFOR programme. It has also been supplemented by relevant technical information. However, the web site was set up in late 1998 and now needs to be updated to reflect the roll-out of Scolel Té, the lessons which have been learned and the further outputs from the regional level research.

3.35 The second web site describes the Plan Vivo System. It starts by explaining the system by addressing the following questions:

- What is the problem that the system addresses?
- How does the Plan Vivo System work?
- What is the advantage of the Plan Vivo System?
- What are the principles of the system?
- What are the main components of the system?

3.36 It then gives a detailed description of how to develop and launch a Plan Vivo System in the three key stages:

- Feasibility study;
- Pilot project;
- Operational stage – scaling up.

3.37 This web site is in effect the 'manual' for the Scolel Té project. It provides a very concise but helpful guide to how such a project can be replicated elsewhere in the developing world. For example, ECCM are planning to use the web site as part of a training programme planned for NGOs in India and Africa interested in implementing the Plan Vivo System during 2000.

3.38 Having the manual on the web enables it to be updated at regular intervals as the lessons/techniques from the CLIMAFOR programme can be incorporated into the web site. The plan is for the Plan Vivo web site to be updated quarterly.

(4) - Provision of Training and Development Support

3.39 The final key output for the Scolel Té project was:

> "*The provision of training and development support to develop local capacity for the delivery of the pilot project and to improve the chances of its long term sustainability*."

3.40 Because ECCM have adopted a 'bottom-up' and participative approach with the development and roll-out of Scolel Té there has been a heavy reliance on capacity building at a local level. Examples include:

(i) *Ambio Staff* – the two key 'front-line' staff members (Tito and Elsa) have been trained by ECCM and given the necessary development support; initially by an ECCM team member based in-country, and latterly on a remote basis by the team in Edinburgh. It is a test of their development that they have been able to run the project on their own since the departure of John Taylor in 1999;

(ii) *Social Advisers* – they had to be trained on the parameters of the Scolel Té project and the 'mechanics' of carbon sequestration. Although the two Advisers had the necessary networking, social skills and contacts,

they still had to be 'inducted' into the project. As the conduit between the communities and the front-line project staff they have had to explain the concepts to the target villages and convince them of its merits, answer questions, etc. This training was provided by the ECCM team;

(iii) *Farmer Representatives* – the normal format in working with villages (or groups of villages/communities) is to identify a spokesman for the participating farmers and this individual is trained up on the Plan Vivo System. This can involve visits to San Cristobal for training courses and/or to attend quarterly meetings of the Fondo Bio-Climatico; on site training by Ambio staff; training visits to other sites including Oaxaca and Tabasco (training centre) and to ECOSUR;

(iv) *Individual Farmers* – last but not least, the farmers themselves undergo a learning and developmental process through the Plan Vivo System. They have to produce their own 'plan' and they are often engaged in a new form of agro-forestry with important learning effects. Their training and development support is provided by the farmer representatives, Ambio staff and possibly by other participating farmers as they learn from each other through the participatory approach in Scolel Té.

3.41 The effectiveness of this training and development support combined with the participative approach will greatly improve the sustainability and long term future for the Scolel Té project. Given the possibility of securing additional private sector funding from carbon purchasers, there is every chance that the project will make a successful transition from pilot phase to an economically viable programme, following the conclusion of the Phase 2 research programme in 2001.

PHASE 2 – REGIONAL LEVEL SYSTEM

3.42 The objective of Phase 1 was the establishment of a working carbon sequestration model at a local level and, as evidenced above, the project has been highly successful in meeting this goal. However, to create significant impact on carbon stocks, a pilot project has to be 'scaled up'. In the case of Scolel Té the goal has to been to move to a regional level.

3.43 Phase 2 of FRP funding which covers the period 1998 – 2001 has therefore focused on specific research topics to enable this to happen: see Table 3.1. Progress towards the attainment of the four main research objectives/outputs is reviewed below:

- Methodology for establishing baselines cost-effectively at a regional level

- Standards being developed to maximise beneficial impact on rural livelihoods
- Technical specifications for implementation of carbon sequestration model for different tree species/ environmental conditions
- Overall organisation of carbon sequestration at a regional level

3.44 Dissemination and scaling up is addressed separately in Section 4 of the report.

(1) – Methodology for Establishing Baselines at a Regional Level

3.45 The ECCM /ECOSUR team have been tackling the complex issues surrounding the establishment of accurate baselines from two angles:

(i) a *top-down approach* which draws upon macro level statistics and scientific measurement to measure Land Use Change (LUC) over a large area – ECOSUR is studying a major proportion of the forestry resource in Chiapas covering an area of 2.8 million hectares; and

(ii) a *bottom-up approach* which examines LUC from the perspective of the farmers themselves and how they meet their basic needs for staple foods such as maize, firewood, timber for domestic use (e.g. construction), and income to meet other needs.

3.46 ECCM, in conjunction with their partners in ECOSUR, held a seminar in San Cristobal from 4th to 7th April 2000 to 'brainstorm' the whole subject area of '*Carbon Management Baselines and Planning Systems'*. DTZ Pieda Consulting attended this seminar and participated in the discussion. The emerging findings were presented by the ECCM/ECOSUR team for critical appraisal. The key findings on baselines to emerge from the seminar are described below.

TOP-DOWN BASELINE METHODOLOGY

- At this half-way stage in the Phase 2 research programme the top-down baseline approach is considerably more advanced than the bottom-up;
- It is DTZ Pieda Consulting's view that the use of satellite 'mapping' of the forestry resource combined with analysis of the key LUC variables is likely to be the most cost-effective way forward;
- Of the top-down LUC variables examined the most significant are the proximity of the forestry resource to agriculture (majority of deforestation occurs in land < 500m from agriculture) and the proximity to roads (there is a much higher deforestation in land < 500m from roads). Population growth is also key, however, this is much more difficult to predict at a sub-regional level;

- Variables which are less effective predictors of deforestation are the degree of slope, the height of the land, type of agriculture system, and measures of poverty;

BOTTOM-UP BASELINE METHODOLOGY

- The bottom-up methodology is based on understanding the current/future needs of farmers in addressing their 'basic needs'. This is achieved through open discussion with farmers; through a structured analysis of production and consumption; through comparison between communities and by using a variety of information sources (census data – INEGI; other published data such as FAO);

- This information has to be combined with the 'factors of change' which includes population growth, migration, land use policies and economic factors such as the market price of crops/timber and the availability of external work;

- The exact process of how this baseline system would work in practice has yet to be fully trialed. However, the structure of the system is quite clear-cut:

  - Identify what the current basic needs are;
  - What the resources of the farmers are;
  - How these resources are distributed and how they are likely to change in the future.

- Although still early days, DTZ Pieda Consulting believes that this approach is likely to be much more resource intensive and there is no evidence yet that the outputs from the 'bottom-up' system will be inherently more accurate than the 'top-down' approach.

(2) – Standards and Guidelines to Maximise Impact on Rural Livelihoods

3.47 ECCM would like to produce a paper which describes the principles and good practice to ensure that the beneficial impacts on rural livelihoods are maximised from carbon sequestration projects. For example, this would include:

- Farmer participation to ensure that the method of carbon sequestration/ conservation is the most suitable and sustainable in the long term;
- Farmers understanding their rights and obligations when entering into a carbon contract;
- Ensuring that there is a direct channel for carbon payments from carbon purchasers to carbon producers (i.e. that there is no misappropriation of funds by intermediaries to the disadvantage of farmers);
- Maximising the efficiency of the Trust Fund (e.g. Fondo Bio-Climatico) and the delivery organisation (e.g. Ambio) to ensure that the proportion of funding required to operate the project is minimised and the proportion of funds going to carbon sequestration/conservation is maximised;

- Insofar as possible, given the limitations of the market for carbon services, establishing a fair price per tC sold so that this provides an equitable return to the farmers investing in agro-forestry/FMR, etc.

3.48 The research team have already gained considerable knowledge from the Scolel Té project concerning good practice in a number of key areas. However, it would like to formalise this into a published document, with additional inputs being provided through a variety of sources:

- Direct contact with farmers in the Scolel Té project;
- Workshops with farmers and other members of the project;
- Inputs from seminars and other international events hosted or attended by the research team;
- The rural livelihoods report produced by S. Bass et al.

(3) – Technical Specifications for the Implementation of Carbon Sequestration

3.49 ECCM, in conjunction with their research partner ECOSUR, are in the process of developing technical specifications for different production systems. DTZ Pieda Consulting examined two draft technical specifications while in Chiapas:

(i) *Taungya System* – an agro-forestry system which involves combined tree and crop production - specifically the tree species Cedrela odorata (cedro) in combination with maize production; and

(ii) *Improved Fallow* (high forest system) – the management of secondary pine/oak vegetation for the production of timber, fuelwood and other products through enrichment planting with Pinus oocarpa and liberation thinning to encourage the growth of naturally regenerating oak (Quercus sp).

TECHNICAL SPECIFICATION FOR IMPROVED FALLOW

- SUMMARISED CONTENT -

- **Summary** – a description of the production system
- **Ecology** - including the topography, climate range and soil fertility; the relevant tree species and their productivity under different ecological conditions
- **Management Objectives** – the principal objective is to manage the woodland for timber

– specifically pine and oak but also for other regenerating species:

- Products for pine include both round and sawn wood for local house construction;
- Also thinning for other wood products;
- Regenerating tree species are the preferred source for fuelwood, stakes and poles and also NTFPs.

- **Other benefits**:

  - Regeneration of pine/oak has a high biodiversity value due to variety of tree species and flora/fauna;
  - Soil conservation is improved on steep slopes.

- **Income** – expected harvest of 750m3 pine timber/ha and 200m3 oak timber/ha – will produce an income of US $2,500

- **Management Practices** – detailed technical advice on establishment, thinning and harvest, restocking and estimated inputs and costs.

- **Carbon Sequestration** – the estimated carbon storage potential per hectare for different conditions:

  – Vegetation strata – tC/ ha for shrubs, small, medium, large and v. large trees;
  – Abundance measure – conversion factors for none, few, moderate and many;
  – Productivity classification – high, medium and low.

- **Monitoring Indicators** – e.g. establishment rates > 85% for years 1 and 2; tree height by year 5; tree height and stem density by year 10; height, DBH and stem density at year 16.

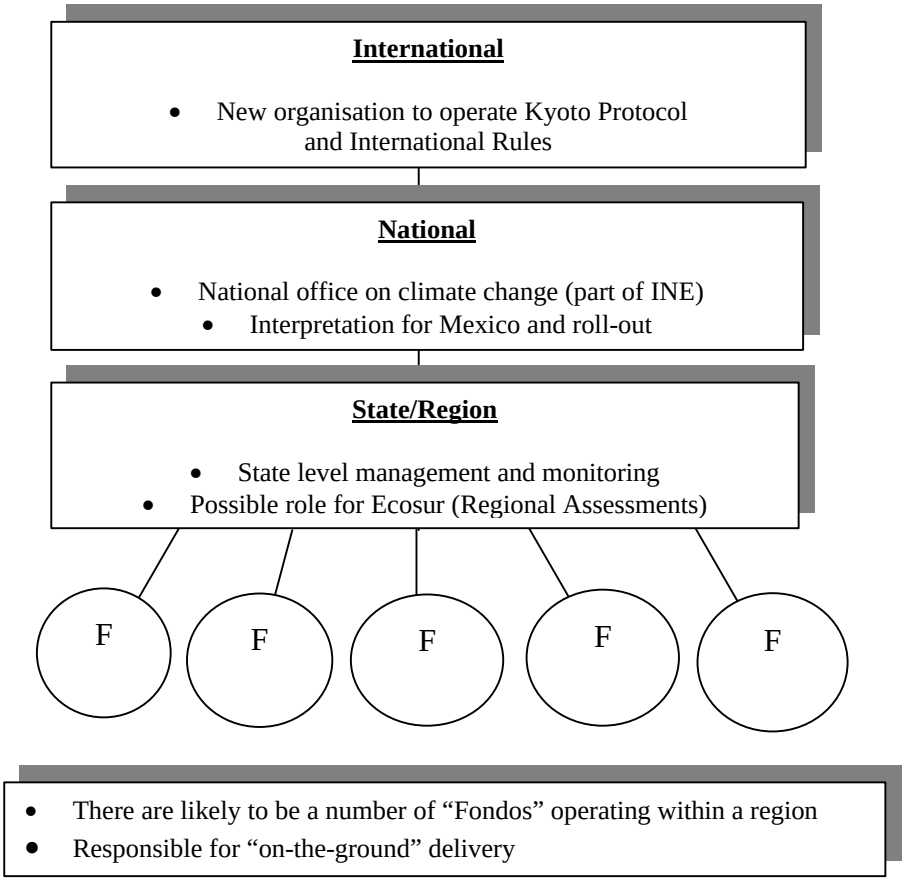
(4) – Organisation and Management of Carbon Sequestration at a Regional Level

3.50 At the conclusion of the research programme, ECCM in conjunction with ECOSUR and INE will produce a joint paper which sets out a proposed structural model for carbon management at a regional level. This will include:

- Systems for baseline development;
- Technical specifications;
- Project monitoring systems;
- Guidance on how to maximise the beneficial impacts on rural livelihoods;
- Recommendations on the appropriate organisational/institutional framework:
  – Establishment of trust fund(s) at a regional/sub-regional level;
  – Interface with State programmes (e.g. regional development programmes, forestry grants, etc.);
  – Interface with State/National legislation (e.g. forestry management plans).

3.51 Ideally, this would result in the establishment of official government standards, the allocation of responsibilities for the different functions in rolling out a regional level programme, timetable, etc. Figure 3.2 illustrates the structural model and the basis for apportioning responsibilities at each level.

Figure 3.2
Outline Structure for Regional Level Carbon Management System



• Number of "Fondos" operating within a region
• Responsible for "on-the-ground" delivery

SUMMARY AND CONCLUSIONS

3.52 **Phase 1 - Scolel Té (1995-98).** On the basis of the wide-ranging evidence reviewed, DTZ Pieda Consulting believes that ECCM and its partner organisations have met fully the objectives of the Phase 1 research project, namely:

- The establishment of an operational pilot project which demonstrates that carbon trading can work at the farmer/ community level;
- Evidence of beneficial impact on rural livelihoods – which is demonstrated in Section 5 of the report;
- The development of a web site 'Manual' which explains how to set up and operate a carbon trading system at the village/community level;
- The provision of training and development support to develop local capacity for the delivery of the pilot project and to improve the chances of its long term sustainability.

3.53 The testament to the success of the pilot project is its continued growth and development during the Phase 2 programme. It has provided an invaluable 'testing ground' for the research work throughout the programme and in particular it has contributed to the team's research work at a regional level on:

- Baseline systems;
- Technical specifications;
- Maximising impact on rural livelihoods;
- Project monitoring systems;
- Organisational structures and institutional framework.

3.54 Given the possibility of securing additional private sector funding for Scolel Té from carbon purchasers, there is every chance that the project will extend its life beyond the conclusion of the Phase 2 research programme in 2001. As explained earlier in Section 3, the project has adopted a participatory approach and combined with its structural and organisational strengths this will maximise its sustainability in the longer term.

3.55 **Phase 2 – Regional Level System (1998 – 2001)**. At the time of the evaluation (March/April 2000) Phase 2 was at the half-way stage. This meant that a number of the research outputs were only partially completed. This was to be expected in an interim evaluation of this nature. However, there progress was sufficiently advanced on all of the key fronts to give confidence that the planned outputs will be met by the conclusion of the contract.

3.56 In the case of Phase 2 the FRP/Natural Resources Institute (NRI) Funding Application and Project Memorandum Form provides specified outputs for the research project. DTZ Pieda Consulting's assessment of their attainment as at April 2000 is summarised in Table 3.3.

Table 3.3
CLIMAFOR Regional Level Project
- Extract from Logframe -

Outputs	**Objectively Verifiable Indicators (OVIs)**	**DTZ Pieda Consulting's Assessment**
1. Working model for scenario analysis of land use change, C-fluxes and poverty impacts.	Model developed and in use by mid – 1999.	Model has not been finalised and is therefore behind schedule. However, clear evidence of progress in the complex area of baselines, poverty measures, etc.
2. An administrative system for a regional forest sector GHG mitigation programme.	Model and administrative system integrated and working by October 2001.	Work on the building blocks of such a system are already well advanced. Actual implementation will depend on INE 'buy-in' and sufficient carbon purchases.
3. A set of internationally applicable guidelines and methods for assessing and regulating forestry offsets.	Series of documents informing and responding to developments of UNFCC'S CDM.	Contributions have included research papers, international seminars/ conferences, web sites, the Project Leader being invited to sit on IPCC. An ambitious target which depends to a large extent on exogenous factors outside the control of ECCM and its partners.
4. More than five local organisations with the capacity to implement C-offset forestry projects.	More that 5 feasibility studies or pilot projects underway by Oct 2001.	Strategy has been the expansion of Scolel Té within Chiapas to date. Feasibility study completed in Oaxaca; roll-out in India underway and planned for Africa. Further work will be needed to reach the target of five. However, what is more important is the quality and effectiveness of the roll-out programme and this appears to be very strong.
5. Training, software development and dissemination of outputs.	Series of outputs in course of project.	Extensive amount of training has been completed – staff exchanges between ECCM and ECOSUR; training of farmers, local institutions, etc. Web sites have been developed; Further software development required; Dissemination of outputs has been exceptional – see next Section.

3.57 **Lessons and Suggested Enhancements**. From the findings of the evaluation study, DTZ Pieda Consulting would like to put forward a number of suggestions which ECCM may wish to consider. In most cases this is very much a case of 'being wise in hindsight' and the ECCM team are fully aware of the situation.

(i) *Enhanced Database and Monitoring System*. For the Scolel Té project there is a requirement for a more effective system to record operational data at a farmer level on land commitment, forestry system adopted, estimated carbon capture, attainment of monitoring indicators, receipt of carbon payments versus outstanding balance, etc. This is a complex area and one which needs to be handled efficiently. A new access database is currently under development to address this issue. We believe this to be a priority given the scaling up of the project – there are now 370 participating farmers – and the need to ensure complete transparency for financial transactions and to support the effective management of the programme;

(ii) *Farmer Passport System*. There has been agreement within the project team, and this was confirmed subsequently at a farmer workshop, that the contractual parameters and carbon trading position for each participating farmer needed to be recorded in a simple 'bank account pay-in booklet' type system. This will ensure that the farmer fully understands what his 'trading position' is at any given point in time;

(iii) *Repositioning a Research Project*. If a research project is re-positioned part-way through a three year contract, then a revised NRI Funding Application and Project Memorandum Form needs to be completed. In practice this will probably only entail an 'addendum' to incorporate a revised Project Logical Framework, the revised objectives, outputs, OVIs, etc.;

(iv) *Board of Fondo Bio-Climatico*. This needs to be broadened out to include local/regional level representatives from Chiapas with suitable commercial experience and with no conflict of interest with the Scolel Té project. The plan should be for the ECCM Project Manager to come off the Board and for others to take his place;

(v) *Development of Web Sites*. The Scolel Té web site needs to be updated to reflect the development of the project since the end of 1998 when the site was constructed. This highly relevant case study would be complementary to the Plan Vivo web site. In addition, there are planned updates to the Plan Vivo web site. The final Regional Level System will also be put on the Web;

(vi) *Baseline Systems*. The ECCM and ECOSUR team will have to develop a practical and cost-effective methodology for the

development of baselines at a macro as opposed to a micro level. In our view, the research findings to date support a top-down approach and this requires further work as a priority due to the difficulty of the subject area (the other elements of the Regional Level System are much easier to develop and roll-out); and

(vii) *In-Country Support*. In an ideal world it would have been beneficial to have had a full-time member of the ECCM team based in Chiapas throughout the research programme to support the in-country institutions; specifically ECOSUR, Ambio and the Fondo Bio-Climatico. The departure of John Taylor has obviously had somewhat of a detrimental effect. However, the two Mexican staff running Ambio would appear to have risen to the challenge and have taken on increased responsibility and have developed their skills accordingly. An alternative would be to secure the services of a suitable NGO to take on responsibility for overseeing in-country delivery (this is the strategy being adopted in India and Africa).

(viii) *System for Certification of Carbon Credits. Article 12 of the Kyoto Protocol states that emission reductions associated with projects in developing countries need to be certified. It is therefore suggested that the Plan Vivo System should be developed to the state where an ISO9000 type verification can be applied. It is known that a number of leading international certification organisations (including SGS and KPMG) are interested in developing the capability for offset project certification.*

4 UPTAKE PATHWAYS AND SCALING UP

4.1 The objective of Section 4 is to examine two important issues which will affect both the long term sustainability of the Scolel Té project and the future uptake and application of the research findings – the uptake pathways and the potential for scaling up.

UPTAKE PATHWAYS

4.2 ECCM's strategy for the effective uptake of their pilot project and the wider findings of the research programme has been to communicate on three levels: regionally, nationally and internationally. Their methods for maximising uptake are described below.

REGIONAL UPTAKE PATHWAYS

4.3 ECCM has built strong relationships with the following organisations:

(i) *ECOSUR* – as the leading research institute in Chiapas, ECCM has established a strong working relationship with this organisation. They have, in effect, been partners in the research programme since 1993. Their intimate involvement ensures that there will be an organisation with the technical skills to oversee the longer term roll-out of carbon sequestration/conservation in Chiapas and possibly further afield. This would enable ECCM to exit from the programme, yet still ensuring the long term sustainability of their work;

(ii) *Farmers' Unions* – ECCM has worked through four farmers' unions in Chiapas and one in Oaxaca in rolling out its Plan Vivo System. These unions have widespread farmer membership and will provide an invaluable conduit for the scaling up of the project in Chiapas and Oaxaca;

(iii) *State Government* – the relevant government officials for the forestry sector in the State of Chiapas have been consulted so that they are informed of the work and supportive. This will facilitate the future scaling up of the work at a regional level.

NATIONAL UPTAKE PATHWAYS

4.4 As part of DTZ Pieda Consulting's consultations in Mexico City, interviews were conducted with both **SEMARNAP**, the Mexican government Ministry for Environment, Water, Forestry and Fisheries, and **INE**, the Institute for National Ecology. Both organisations have been fully involved in ECCM's research programme – indeed, it was the Mexican government which funded the original feasibility study back in 1993-95.

4.5 The ECCM Project Manager has cultivated their interest and involvement in his research programme through the following:

(i) *Providing briefings* on the research programme;

(ii) *Securing their input* and contribution to seminars and conferences (for example, there were a number of SEMARNAP representatives at the Baselines Seminar attended by DTZ Pieda Consulting on the 4th to 7th April 2000); and

(iii) *Working jointly with them* in raising the international profile of ECCM's research on carbon sequestration – for example, they were involved in the registration of the research programme under the US Initiative on Joint Implementation (USIJI).

4.6 The Mexican Government is fully committed to supporting initiatives which mitigate carbon emissions, even though it is not an Annex 1 country in the Kyoto protocol. Indeed, it has an inter-ministerial **Committee for Climate Change** with responsibility for policy contributions at an international level and for internal co-ordination on climate change initiatives. There is also a '**National Strategy for Climate Change'** which is about to be published.

4.7 The ECCM Scolel Té project and associated research programme is highly complementary to this strategy because it is multi-objective, not solely focused on climate change. It meets the key criteria demanded:

- Improved environmental benefits in terms of bio-diversity, reduced soil erosion, etc.;
- Improved social impacts in terms of supporting disadvantaged /rural communities, excluded groups (e.g. women);
- Improved economic performance and poverty alleviation.

4.8 A new **National Office on Climate Change** is to be launched in parallel with the new National Strategy for Climate Change. This will have responsibility for developing/leading climate changes internally within Mexico. The Government is committed to the widespread roll-out of carbon sequestration in southern Mexico. In support of this, the World Bank has agreed to fund a study on how the Government can launch a major project. This will involve funding requirements/sources and a roll-out mechanism. ECCM and the relevant staff from INE are working jointly to secure the $60k funding for this study.

INTERNATIONAL UPTAKE PATHWAYS

4.9 Probably the most important pathways for the Chiapas research programme are the ones operating at an international level. In comparison with the regional and national uptake pathways which are focused on scaling up at a state/country level, the international pathways are concerned with the roll-out of the Plan Vivo methodology, baseline systems, etc., at a world level.

4.10 There are three main benefits from international dissemination and communication concerning the research programme:

(i) Firstly, the involvement of an international audience is helpful in contributing to the development of the optimal Regional Level Model through feedback to papers, active involvement in the project, discussion groups, etc.;

(ii) Secondly, the work in Chiapas is helping to inform the debate on whether carbon sequestration within the developing world should be included as part of the Clean Development Mechanism (CDM). For example, the ECCM Project Leader has been invited to sit on the IPCC and to contribute to the Special Report on 'Land Use Change and Forestry' which will be submitted to the 6th Convention of the Parties in November 2000;

(iii) Thirdly, subject to the approval of carbon sequestration as part of the CDM, the ECCM research programme and implementation model will greatly facilitate the quick and effective roll-out of forestry sequestration/conservation at a world level.

4.11 DTZ Pieda Consulting was very impressed with the communication skills of the ECCM team and its Mexican partners in the development of international pathways. The key pathways are:

(i) *Research Papers* – the research team publishes its research findings on a regular basis. An illustrative list of the team's publications is contained in Appendix C;

(ii) *Web Sites* – to date two web sites have been developed – one describing the Scolel Té project and the other describing the Plan Vivo System. There are further plans to further develop the Web as a communication medium:

- for the findings of the Baselines Workshop; and
- particularly for the final operational framework;

(iii) *Conferences* – there have been four main international conferences/ seminars/ workshops to date – see Table 4.1; and

(iv) *International Roll-out* – ECCM is in the process of establishing a pilot project in India (see details below) and it is actively seeking in-country partners for roll-out in Africa.

Table 4.1
Carbon Sequestration Conferences

Date	Venue	Details
1997	Brussels	To highlight the potential for Carbon Sequestration and the benefit conferred towards improved rural livelihoods; Audience comprised the automotive industry and politicians; Funding from the FIA.
Feb 1999	Mexico City	A conference to discuss carbon sequestration and rural livelihood issues; Representation from the F7 Group – the major forestry rich countries including USA, Canada, China, Brazil, India and Indonesia.
Aug 1999	Edinburgh	A conference to discuss the findings of the DFID funded research on 'Rural Livelihoods and Carbon Management' – published by the International Institute for Environment and Development, EcoSecurities Ltd, University of Aberdeen and ECCM.
April 2000	Chiapas	Workshop to discuss baselines and planning systems; Attendance of 25; Principally from within Mexico, although there were representatives from The Nature Conservancy and Harvard University.

Pilot Project in India

- ECCM has built up a relationship with 'Women into Sustainable Development' as a suitable partner organisation in India. Its operational base is in Bangalore.
- It has good contacts with large NGOs in the Region – the most relevant one is the Rural Development Trust which has over 2,000 staff. It would have the resources and expertise to roll-out a project in India;
- The goal is to establish a pilot project – initially on a smaller scale than Scolel Té, with 20 families participating;
- The carbon sequestration will be based on fruit tree growing, bio-energy and watershed management;
- Project funding is being provided by Virgin Airways - £10k per annum for carbon offset funding;
- DFID is putting in an extra £10k as a one-off contribution towards in-country training costs

4.12 DTZ Pieda Consulting gained first hand experience of the effectiveness of ECCM's communication strategy when it attended the technical workshop in San Cristobal on carbon management baselines and planning systems. This was a four day event structured as follows:

(i) Days 1 and 2 were devoted to a presentation and discussion of the baseline methodologies – both top-down and bottom-up;

(ii) Day 3 involved a presentation of the Plan Vivo System and discussions with Ambio staff in their operating base in San Cristobal. There was also the opportunity to attend presentations of their data management and monitoring systems. In the afternoon the attendees could sit in and listen to the quarterly meeting of Fondo Bio-Climatico where farmer representatives, the Rural Credit Bank of San Cristobal, Ambio and ECCM staff reviewed progress over the previous quarter, reviewed finances, etc.; and

(iii) Day 4 was devoted to a field visit to a participating village in the Tzeltal coffee growing region called Muquenal. Two agro-forestry plots cultivating maize and cedro were examined and interviews with the head villager and two farmers took place.

4.13 The key attributes of this event were:

- The representation from 17 different organisations accounting for some 25 attendees;

- The organisation of the event was 'low-key' but very efficient and professional;
- The structure and content of the event was good;
- The benefit of informal communication which occurred between the more formal 'set-piece' elements of the workshop;
- The workshop group 'gelled' which ensured that everyone was 'included' and was able to provide their own contribution;
- All of the participants which DTZ Pieda Consulting spoke to commented very favourably on the work of ECCM and its Mexican partners and that they had learnt important lessons from the workshop. The most frequent comment was that the rural livelihood issue had often been overlooked in the larger carbon sequestration projects in Bolivia and elsewhere.

SCALING UP

4.14 The real long term benefit from the FRP funded research into carbon sequestration will only come to fruition when two conditions apply:

(i) Carbon offsets from forestry projects in the developing world are approved as an integral element of the CDM (it is hoped that this will be achieved at COP 6 in November 2000); and

(ii) There is widespread take-up of these carbon offsets by the private sector in the developed world.

4.15 If both of these conditions are realised then the potential for 'scaling up' will be immense. This applies not just to those developing countries where trees grow very well – for example, Brazil, Indonesia and Central America – but possibly in more marginal areas as well, such as India, where there is lower rainfall. Investigations by ECCM in India indicated that carbon sequestration can be viable as the following example shows:

- Tamarind plantations which sequester about 40 tC/ha;
- Implementation costs estimated by the Rural Development Trust in years 1 – 3 are $300/ha;
- Assuming a carbon value of $10/ tC, then this would yield an income of $400/ ha which would be sufficient to cover the costs of the project.

4.16 Various researchers have estimated the global potential for carbon sequestration over the next 50 years to in the range of 50-150 billion tonnes of carbon[4]. This amount of sequestration could compensate for around 10 to 15 years of fossil fuel emissions.

4.17 The contribution of the ECCM research work will have been to assist in the development of an internationally agreed trading mechanism and implementation methodology which confers the following benefits:

- A *faster uptake* of carbon offsets by both the developing and developed world that would otherwise have been the case i.e. the benefits will be realised earlier and over a longer period;
- A *higher level of uptake* of carbon offsets so that the 'scaling up' process is maximised;
- A *more cost-effective and co-ordinated roll-out* at an international level of carbon trading between the developed and developing world than would otherwise have been the case; and
- The *beneficial impact of carbon sequestration on rural livelihoods* in the developing world is maximised.

SUMMARY OF UPTAKE PATHWAYS AND SCALING UP POTENTIAL

4.18 **Uptake Pathways**. ECCM's strategy for the effective uptake of their pilot project and the wider findings of the research programme has been to communicate on three levels - regionally, nationally and internationally:

(i) *Regionally* – through communication, training and joint-working with ECOSUR, farmers' unions in Chiapas and Oaxaca and the State Government in Chiapas;

(ii) *Nationally* – through joint working with SEMARNAP and INE which has involved registration with USIJI; involvement and integration with the Scolel Té project and other FRP research; and the planning for the future scaling up in Mexico (through World Bank funded study); and

(iii) *Internationally* – through the publication of research papers; the development of web sites to promote the emerging findings, Plan Vivo

[4] Cannell, M. 1995 Forests and the Global Carbon Cycle in the Past Present and Future, Research Report, Vol 2. European Forest Institute, pp66.

System, etc.; hosting international conferences and seminars; and through the roll-out of other pilot projects in India and Africa.

4.19 DTZ Pieda Consulting was very impressed with the range, scale and effectiveness of ECCM's uptake strategy and implementation.

4.20 **Scaling Up**. If forestry and land use based carbon offsets in the developing world are approved as part of the CDM, then the potential for 'scaling up' will be immense. This applies not just to those developing countries where trees grow very well – for example, Brazil, Indonesia and Central America – but possibly also to more marginal areas such as India where there is lower rainfall. The global potential for carbon sequestration over the next 50 years is estimated to be in the range 50 – 100 billion tonnes of carbon.

5 IMPACT ASSESSMENT

INTRODUCTION

5.1 Due to the fact that the research programme has yet to be completed and the final outputs disseminated, it is not possible to undertake an impact assessment in the normal sense. We are still only at the pilot project stage and it is too early for scaling up for the reasons articulated in Section 4. Hence, this interim evaluation cannot complete a cost-benefit analysis (CBA) which compares the benefits against the £500k+ of DFID research funding.

5.2 However, as an alternative, DTZ Pieda Consulting has been able to examine the impacts of the pilot project and it has undertaken this on two levels:

(i) *Qualitative* – an analysis of the interview results from consultations which were undertaken in three villages during the course of the fieldwork (tabulated results are contained in Appendix E); and

(ii) *Quantitative* – a discounted cash flow analysis of the potential returns to participating farmers in the Scolel Té project under two different agro-forestry systems (spread sheets for the DCF analysis are contained in Appendix E).

QUALITATIVE IMPACT ASSESSMENT

Village Profile

5.3 The three villages consulted were:

(i) *Muquenal* – lying in the fertile coffee growing region of the Tzeltal at about 600-800 metres in height, this village has planted cedro (a fast growing mahogany type tree) in combination with maize and coffee);

(ii) *Yokpokityk* – lying is a very similar agricultural /climatic area called the Chol, this village has adopted the same agro-forestry system as Muquenal;

(iii) *Yaluma* – lying in the Tojolobal highlands of Chiapas at about 1,500m, this village has focused on improving marginal land containing mixed woodland.

Standard of Living

5.4 Although Mexico is considered to be a 'middle income' country by DFID, Chiapas is the poorest State in the country and the level of poverty in the rural areas addressed by the Scolel Té project is quite high. For example, in the above villages there is no public sewerage system, electricity for lighting was only achieved within the last 12 months for one of the villages, and typically there is only one telephone for the whole community area which can be as many as 2,000 people.

5.5 Although Chiapas does not have the extreme poverty levels experienced in some parts of India and Africa, the areas assisted are by no means unworthy of development support.

KEY FINDINGS

Project Take-up

- There has been a keen interest in Scolel Té and recruitment has not been a problem;
- In retrospect farmers would participate in the project;
- Without the support of the project farmers would either not have undertaken the agro-forestry/FMR activities; or if they would have, it would have been on a smaller scale;
- There was no evidence of displacement and no examples of similar agro-forestry/ FMR systems in operation in the neighbouring areas (i.e. there is a high level of additionality);
- There is a demand from non-participating farmers to join the Scolel Té project – especially in the highly productive villages in the Tzeltal and Chol areas, where the potential returns from harvesting timber are significant (see quantitative analysis later in Section 5).

Direct Impacts

5.6 The reason for farmers participating in Scolel Té are quite different between the lowland and highland villages. In the lowland villages the objective is a straight commercial return from the harvesting of high value timber from year 15 onwards. Cedro sells for approximately £100 /m^3;

5.7 In the highland villages the objective is not to increase income per se, but rather to improve the utilisation of marginal mixed woodland. Successful forestry management and regeneration will result in a variety of outputs which will be used by the farmer directly including firewood, construction materials, fence posts, herbs and berries for cooking, etc. In addition, some of the higher value tree species can be harvested for sale on the open market. However, the level of income which this generates is much lower that in the lowland agro-forestry systems – much smaller volumes at \$25/ m^3

5.8 In summary, the Tzeltal /Chol areas represent high return/high risk ventures. The high risk is due to the possibility of catastrophic loss of the cedro species due to storm, pest, fire, etc. Also, the venture represents a long term investment for the farmer, in that the commercial returns will not be realised for at least 15 years. The opportunity cost of this highly productive land is a key factor because higher income in the short to medium term has to be foregone for higher long term income.

5.9 In comparison, the mixed woodland management in the Tojolobal area involves lower levels of planting with more emphasis on careful management of a diverse range of tree/shrub species. It is low return/low risk. There are risks, particularly from drought, fire, etc., but the investment outlays are fairly modest and the opportunity cost of alternative land uses are minimal.

5.10 The impact of the additional income should be to improve the quality of life and rural livelihoods for the participating farmers and their families. A range of spending priorities were expressed by the farmers interviewed:

- *Agricultural machinery* – e.g. a hand-held rotivator;
- *Food processing equipment* – e.g. coffee drying machine; tortilla machine;
- *Household equipment* – e.g. wood burning stoves;
- *Health care* – to pay for medical treatment – e.g. a son of one of the villagers had contracted typhoid and was in hospital;
- *Education* – to pay for college/university fees;
- *'Luxuries'* – none of the villages had items such as cars/trucks which could greatly improve the hard labour in hauling goods/timber up and down steep slopes (Chiapas is a very hilly country and the two villages visited in the Tzeltal/ Chol areas were situated on steep slopes).

5.11 Because there has been no income from timber sales to date, it was not possible to verify if these types of spending priorities will materialise in the future so that rural livelihoods are improved. It is always possible for the head of the household to squander the money in ways which has little or no benefit in terms of improving standards of living.

5.12 However, there has been evidence of carbon offset money in Scolel Té being used by the villages with the objective of improving rural livelihoods. Two examples were identified during the fieldwork:

(i) *Yokpokityk* – the village purchased a coffee drying machine at a cost of $3,000. The objective was laudable, but the execution of this investment was weak. There was no element of a feasibility study carried out, so that the required upgrading of the power supply was not taken into account. Nine months after having been bought the machine lies rusting because the villagers are unwilling to commit themselves to the cost/risk of resolving the installation/power supply issue;

(ii) *Yaluma* – fuel efficient stoves were bought with carbon offset money. The objective was to improve fuel efficiency. In practice, it was found that the level of firewood consumption did not alter very much. However, an unexpected outcome has been to improve the quality of life for the women cooking and the other members of the household due to reduced smoke emissions (fuel stoves have a chimney, unlike the open fires which are the norm in rural villages of this type). There are also likely to be health benefits for the families.

Indirect Impacts

5.13 A range of indirect benefits were identified, the principal ones being:

(i) *Learning Effects* – participating farmers have learnt new skills in agro-forestry from training and 'learning by doing' – the participatory approach has been particularly helpful. In effect, the farmers are having to learn 'new' skills which their ancestors had prior to deforestation:

- Establishment performance on different slopes;
- How to prune correctly;
- Identification and management of Hipsipola, the main disease which threatens cedro;
- Soils types best suited to cedro;

(ii) *Balanced Agricultural Production Systems* – by introducing agro-forestry and FMR systems, there are benefits to the farmers from having a more balanced agricultural system. They have short, medium and long term crops/harvests. By investing a proportion of their land in timber, the farmers are developing a more balanced portfolio of agro-forestry activities;

(iii) *Mitigating Deforestation Pressures in Environmentally Sensitive Areas* – in Muquenal village, it was agreed that if there was a significant increase in afforestation in the Tzeltal area, then this would alleviate the pressures on the nearby Selva Lacandona Region, a prime conservation area; and

(iv) *Other Environmental Benefits* – the retention and development of the forestry resource will have important bio-diversity benefits in terms of the flora and fauna which can be sustained through a more balanced and diverse agro-forestry system.

Carbon Sequestration and Mitigation of the Greenhouse Effect

5.14 Although it is only on a small pilot, one of the principal purposes of the Scolel Té project was to increase the level of carbon storage to mitigate CO_2. It is still early days, but the evidence from tree establishment (target of 85% + in the first three years) and the projections of carbon storage are favourable. The project has secured farmer commitments of 15,950 tC out of a potential 16,500 tC from the FIA payments as at 31st March 2000 (see Appendix D). The level of draw-down on funds is also high at $99k out of a potential of $132k.

5.15 However, a key issue for the future of the project is effective monitoring to ensure that the farmers deliver the level of carbon offsets for which they have been contracted and that their payments match the level of carbon sequestered. This is a complex area and one which DTZ Pieda Consulting was not able to verify quantitatively during the course of the field visit.

5.16 Indeed, the system of balancing carbon payments to carbon outputs is still under development. However, anecdotal evidence and qualitative feedback suggests that the project is on course to deliver the level of planned carbon offset.

Critique of Scolel Té

5.17 All of the farmers interviewed were supportive of the Scolel Té project and commented favourably on:

- The technical support which was provided;
- The organisation and administration of the project;
- The Plan Vivo System and the participatory approach.

5.18 The only enhancements identified were:

(i) To provide an 'account-style' passbook for each participating farmer which would record the balance on their carbon offset account – how much they were contracted to sell; the level of payment received; balance outstanding, etc. This booklet would also be useful for monitoring purposes;

(ii) For farmers to focus on primary production in the early stages of the project rather than enter into down-stream processing/manufacturing (for example, timber/food processing);

(iii) If there are to be any community level investments with carbon offset money then the feasibility of the investment should be formally assessed prior to committing what could be significant sums of money. This would reduce the risk of project failure (e.g. the coffee drier project in Yokpokityk).

QUANTITATIVE IMPACT ASSESSMENT

5.19 At the request of DTZ Pieda Consulting, ECCM produced a simple DCF analysis of the expenditure and revenue streams for the two most common types of agro-forestry/FMR system in the Scolel Té project. The objective was to determine the cost-effectiveness of the two systems for the participating farmers – does the increased income compensate for the time and resource cost of afforestation and improved forestry management?

5.20 Appendix E details the quantitative data and the key assumptions under-pinning the models. The summarised results are presented in Table 5.1.

Table 5.1
Summary Results from DCF Analysis

Forestry System (25 year period)	**Agro-Forestry (cedro and maize) Per Hectare**	**Pine Oak Restoration Per Hectare**
Regional area	Tzeltal/Chol	Tojolobal
Carbon Sale (tC)	120	80
Timber harvested (m^3)	124	36
Timber price ($/$m^3$)	100	25
Total cost ($ constant prices)	1,133	1,140
Total income ($ constant prices)	13,360	1,540
Net income (discounted NPV)	**1,687**	**(109)**
Discount rate	10%	5%

Notes:

(1) ECCM provided source data and assumptions (excluding discount rate).

(2) Discount rate reflects the real rate of return which farmers could expect to generate from alternative farming activities. DTZ Pieda Consulting has been conservative and erred on the high side. The differential rates reflect the variations in opportunity cost between the highly productive coffee growing Tzeltal/Chol region as opposed to the more marginal land in the Tojolobal region.

(3) The discount rate is not a sensitive variable in the DCF due to the fact that the bulk of the income does not arise until years 15-25.

5.21 The DCF highlights the commercial attractiveness of the mixed forestry and crop production in the Tzeltal region. It has a high NPV of $1,687 per hectare which is exceptionally good in comparison to the returns from other forestry investments. Assuming similar operating assumptions for Scolel Té in the future we can expect there to be a high level of demand from farmers to participate in the project.

5.22 The main factor which could influence commercial performance is the increased timber supply which would result if a large number of farmers /communities invested in the cedro species. This could then flood the market with timber from year 15 onwards which would have the effect of depressing market prices from the current high level of $100/ m^3 .

5.23 For the pine oak restoration model, the NPV after 25 years is negative – ($109). However, one should not necessarily jump to the conclusion that this type of forest management and restoration activity is 'unprofitable' for the participating farmers. Excluded from the financial model are the 'non-commercial' by-products which are not marketed. These would include firewood, construction materials, food ingredients, etc. All of these have a real value to the farmer but there has been no attempt to integrate their shadow price into the financial model. This has the effect of understating the real return from this forestry activity to the farmers. The real NPV may actually be positive.

5.24 Notwithstanding the above caveat, it is clear that pine oak restoration in the Tojolobal region is much less beneficial for the participating farmers. There was also evidence from the farmer workshops that the level of farmer interest in this region is much less than in the Tzeltal/Chol region.

IMPACT ASSESSMENT SUMMARY

5.25 **Project Take-up**. There has been a keen interest in Scolel Té and recruitment has not been a problem. In retrospect farmers would participate in the project. There has been no evidence of displacement and additionality is high.

5.26 **Direct Impacts**. The potential returns to farmers from the commercial sale of cedro in the Tzeltal/Chol region are very high – timber sells at £100/ m^3 . In the Tojolobal region the returns are more marginal due to the lower quantities of harvested wood and the lower price of $25/ m^3. However, the farmers benefit from improved utilisation of marginal land and other 'by-products' such as firewood, timber for construction, fence posts, herbs and berries, etc.

5.27 Any increased income to the farmers would be used for a variety of purposes which would have the effect of alleviating poverty and improving their quality of life. Examples include expenditure on agricultural equipment, food processing equipment, household equipment (e.g. wood burning stoves), health and education.

5.28 Indirect Impacts:

- *Learning Effects* – participating farmers have learnt new skills in agro-forestry from training and 'learning by doing' – the participatory approach has been particularly helpful;
- *Balanced Agricultural Production Systems* – by introducing agro-forestry and FMR systems, there are benefits to the farmers from having a more balanced agricultural system;

- *Mitigating Deforestation Pressures in Environmentally Sensitive Areas* – in Muquenal village, it was agreed that if there was a significant increase in afforestation in the Tzeltal area, then this would alleviate the pressures on the nearby Selva Lacandona Region, a prime conservation area; and

- *Other Environmental Benefits* – the retention and development of the forestry resource will have important bio-diversity benefits in terms of the flora and fauna which can be sustained through a more balanced and diverse agro-forestry system.

5.29 **Carbon Sequestration and Mitigation of the Greenhouse Effect**. The evidence suggests that Scolel Té will be successful in meeting its carbon sequestration target of 16,500 tC (the committed figure as at 31/03/00). This will have a beneficial impact on the environment in terms of increased carbon storage and the mitigation of harmful CO_2 emissions.

5.30 However, the Scolel Té project will need to pay careful attention to the monitoring of farmers to ensure that they deliver their carbon commitments and that their receipt of carbon payments matches their level of carbon sequestration. This is a complex area to manage and there is evidence emerging from the pilot project that further work is required in the establishment and operation of a cost-effective system.

5.31 **Critique of Scolel Té**. All of the farmers interviewed were supportive of the Scolel Té project and commented favourably on:

- The technical support which was provided;
- The organisation and administration of the project;
- The Plan Vivo System and the participatory approach.

5.32 Suggested enhancements included a passport style book for the farmers; the need for farmers to focus on primary production not secondary processing at this stage; and the need to undertake feasibility studies prior to investment in capital equipment/larger scale projects.

5.33 **Quantitative Impact Assessment**. The DCF highlights the commercial attractiveness of the mixed forestry and crop production in the Tzeltal region. It has a high NPV of $1,687 per hectare which is exceptionally good in comparison to the returns from other forestry investments. Assuming similar operating assumptions for Scolel Té in the future we can expect there to be a high level of demand from farmers to participate in the project.

5.34 For the pine oak restoration model, the NPV after 25 years is negative – ($109). However, one should not necessarily jump to the conclusion that this type of forest management and restoration activity is 'unprofitable' for the participating farmers. Excluded from the financial model are the 'non-commercial' by-products which are not marketed.

5.35 Notwithstanding the above caveat, it is clear that pine oak restoration in the Tojolobal region is much less beneficial for the participating farmers. There was also evidence from the farmer workshops that the level of farmer interest in this region is much less than in the Tzeltal/Chol region.

6 CONCLUSION

6.1 The final section of the report presents DTZ Pieda Consulting's conclusions arising from the evaluation study. This is a short section focusing of the key points only - for a full résumé the reader is referred to the Executive Summary.

6.2 We have undertaken a detailed examination of the whole carbon sequestration programme funded by FRP and feel confident regarding our understanding and interpretation of the work led by ECCM (formerly the University of Edinburgh) over the period 1995 – 2000. We hope that the results will confer the following benefits:

(i) Reassure the FRP management and DFID on the value for money and developmental impact which the programme will potentially confer;

(ii) Provide an *'outsider's perspective'* on the strengths and weaknesses of the programme which will assist ECCM and its partners in the future development of the research programme; and

(iii) Contribute to a wider perspective on the contribution of the whole of the FRP – this evaluation is one of three being conducted by DTZ Pieda Consulting within the FRP. The outputs of all three evaluation studies will be reviewed and a Summary Report prepared.

INTERIM EVALUATION

6.3 The first point we would like to stress is that this is an interim evaluation study. The research programme is still on-going, with the final completion date being October 2001. As at April 2000 therefore, one cannot test the effectiveness of the research work in terms of its uptake, application and impact at an international level – which will be the key determinants of its success.

6.4 Instead we have had to focus on achievements to date and the contribution which the Scolel Té pilot project and supporting research programme have had.

KEY FINDINGS

6.5 On the basis of our desk research and field work in Chiapas, we have been able to examine and report favourably on the following:

- *Rationale for the research* – there is a very strong case for supporting the development of a carbon trading model which can be applied in the developing world, given the pressing need to resolve the greenhouse problem;

- *Supporting Rural Livelihoods* – the key distinguishing feature of the ECCM research programme is its objective to develop a carbon trading system which will provide direct benefits to farmers in rural communities;

- *High Additionality* – the FRP carbon sequestration research programme was pioneering in that it was the first to try and develop a 'bottom-up' and participative methodology as opposed to a 'top-down' instructional approach. Only now are others starting to address this issue;

- *Scolel Té Pilot Project* – a highly commendable pilot project has been established by ECCM and its Mexican partners. Its key strengths are its team, funding support, structure, the participatory approach, training and development, coverage and uptake by villages;

- *Plan Vivo System* – a clearly presented 'Manual' for the development of a full-scale carbon sequestration project based around the Plan Vivo System has been developed on the project's web site;

- *Regional Level System* – the research programme for 1998 – 2001 is at the half-way stage. There is clear evidence of significant progress towards the establishment of methodologies for the establishment of regional baselines, setting standards for maximising impacts on rural livelihoods, producing technical specifications for different carbon sequestration systems, and the management and organisational structure for the roll-out of carbon sequestration at a regional level;

- *Uptake Pathways* – these are strong at a regional level (ECOSUR, farmers' unions and the State Government in Chiapas), national level (SEMARNAP and INE) and internationally through the following dissemination channels: publication of research papers, establishment of web sites, conferences and workshops and the roll-out of further international pilots in Africa and India;

- *Scaling Up* – subject to the inclusion of carbon offsets from forestry in the CDM, the potential for scaling up is immense: central and south America, Indonesia, India, etc.

- *Impact Assessment* - at the level of the Scolel Té pilot project there are strong qualitative and quantitative impacts which indicate there will be higher incomes for participating farmers, improved rural livelihoods

and beneficial impacts on the environment in terms of improved bio-diversity and increased carbon storage.

DTZ PIEDA CONSULTING'S CONCLUSION

6.6 We believe that DFID's contribution of £520k to support ECCM's research into carbon sequestration is fully justified. This view is based on the potential contribution of the research to both the environmental and developmental objectives of the programme. The work is of strategic importance at a world level and the potential benefits are immense.

6.7 For example, our case study work has highlighted that the discounted benefit to farmers could lie in the range of a $109/ha loss, to a gain of $1,687/ha depending on the type of agro-forestry system adopted and the location. If one uses a conservative assumption of an average gain of $100/ha across all future carbon sequestration/conservation work in the developing world, then this would yield additional funding in excess of$40 billion over a 50 year period for disadvantaged rural communities

6.8 Assumptions and Income Calculation:

- approximately 400 million ha of land in the tropics could be available and technically suitable for afforestation [5]);
- average net income (discounted) for farmers/communities of $100/ha over a 25 year period;
- total increased income going to disadvantaged rural communities of over $40 billion over a 50 year period (note: the average income per hectare would be greater than $100 if the time horizon was extended from 25 to 50 years);
- average annual increased income of over $0.5 – 1.0 billion (note: the phasing of this income is not linear due to the lead time of >15 years before tree harvesting can begin).

6.9 Although this is a somewhat simplistic calculation, and there is likely to be a degree of inaccuracy, it does demonstrate the point that the potential returns from carbon sequestration within the developing world are at a major level. When compared to the current level of international aid, the figure of $0.5 – 1.0 billion per annum from carbon sequestration could revolutionise the support for developing countries. However, this would be dependent on the extent to which the CDM evolves in a way which is complementary to poverty alleviation in the developing world – this is by no means certain - see further analysis in the box below.

[5] Dixon, R.K., Winjum, J.K. & Schroeder, P.E. 1993 Conservation and Sequestration of carbon: the potential for forest and agroforest management practices. *Global Environmental Change*. June. 159-173.

FACTORS LIKELY TO AFFECT POVERTY ALLEVIATION THROUGH THE CDM

The average annual figure of £0.5 – 1.0 billion may be an over-estimate of benefit to the rural poor because much of the 400 million hectares is likely to be owned by large landowners. It is also important to point out the potential downside of the carbon economy – if not managed with the explicit objective of improving rural livelihoods it could lead to increased concentration of wealth and land ownership and could reduce the availability of natural resources to some of the poorest groups - if land is tied up in sequestration forests.

The carbon economy is becoming a reality - in UK we now have a "dummy price of carbon" of about £30 /tC derived from the combination of the climate change levy and the CBI's proposed emission trading system - and as the phenomenon becomes globalised there will be winners and losers. Unless the CDM develops in a way that is compatible with poverty reduction in rural areas and livelihood improvement, it is very likely that the rural poor will be in the "losers" group.

6.10 With regard to the leadership and development of the programme, DTZ Pieda Consulting would like to commend ECCM and their in-country partners on their achievements to date. It should also be recognised that the State of Chiapas is probably one of the most difficult environments within which to roll-out a pilot project and 'hands-on' research programme. Their progress is therefore all the more commendable.

6.11 However, the development of a regional level carbon sequestration system is a highly challenging research assignment. It is very difficult to develop a 'bottom-up' methodology which is both cost-effective and also delivers all of the environmental and developmental impacts sought.

6.12 There are a number of important research outputs which are still outstanding and the ultimate success of the programme will be the extent to which they are addressed satisfactorily by the completion date of October 2001. The amount of work remaining should not be underestimated and the ECCM team will have to work hard to ensure that they meet their remaining targets.

SPECIFIC RECOMMENDATIONS

6.13 The following recommendations are put forward for consideration by ECCM:

- An enhanced database and monitoring system for Scolel Té is a priority;
- A farmer passbook system should be introduced to better inform farmers of their carbon trading position, outstanding payments, etc.;

- The Board of Trustees for the Fondo Bio-Climatico should be expanded to include relevant commercial experience from within Chiapas;

- The Scolel Té web site needs to be updated to reflect the development of the project since the end of 1998;

- The Phase 2 project is behind schedule in determining the most suitable methodology for determining regional baselines and this needs to be resolved quickly;

- Ideally, DTZ Pieda Consulting would like to see the former system of full-time in-country support from ECCM for the Ambio/ECOSUR team. Alternatively is there an 'on-the-ground' leader who could be co-opted from an NGO or research institute (e.g. ECOSUR)?

- If there are any community level investments with carbon offset money then the feasibility of the investment should be formally assessed prior to committing what could be significant sums of money; and

- The development of a model for verifying and certifying carbon offsets from the Plan Vivo using an ISO9000-based system should be a priority for next year, given the requirement in the CDM text for emission benefits to be certified.

POSTSCRIPT

6.14 Subject to international approval of carbon trading for forestry projects as part at COP 6 in November 2000, the outputs from ECCM's research programme should confer the following benefits:

- The improved sustainability and reliability *of carbon offsets* so that the credibility of the carbon trading process is maximised. This will have the added benefit of maximising the 'scaling up' potential for carbon sequestration;
- A *more cost-effective and co-ordinated roll-out* at an international level of carbon trading due to the adoption of agreed international standards; and

- That the *beneficial impact of carbon sequestration on rural livelihoods* in the developing world is maximised – this is the most important benefit of all.

Appendix A

Terms of Reference

Appendix B

List of Consultees

APPENDIX B

LIST OF CONSULTEES

MAINSTREAM CONSULTATIONS	
DFID	• Jos Wheatley – Field Manager for Mexico and Central America
Edinburgh Centre for Carbon Management	• Richard Tipper • Gus Hellier • Willie McGhee
Ambio	• Elsa Esquivel Bazán • Adalberto Vargas Guillen (Tito)
ECOSUR	• Miguel Angel Castillo • Lorena Soto
SEMARNAP	• Dr. Fernando Tudela – Chief of Staff for SEMARNAP (Ministry for Environment, Water, Forestry and Fisheries); Chairperson for Inter-Ministerial Committee for Climate Change; • Dr. Ing. Rafael Martinez Blanco – Director of National Office for Climate Change – SEMARNAP; • Francisco Giner – Director General for Climate Change – SEMARNAP; • Gerardo Segura – Head of Forestry Department – SEMARNAP; • Alexandra Zenzes – International Affairs – SEMARNAP
INE	• Julia Martinez – Director of Global Climate Change – INE (Institute of National Ecology)

BASELINE WORKSHOP PARTICIPANTS – CHIAPAS **(4th-7th April2000)** **Informal Consultations**	
Ins. Ecologia UNAM	Alejando Flamenco
TNC	Bill Stanley
CCMSS. A.C	Fernando Ruiz Noriega
Harvard University	Cathy Fogel
CRIM-UNAM	Maria de Jesus Ordoñez
SEMARNAP Programas Regionales	Daniel Saldivar
SEMARNAP Programas Regionales	Javier Apodaca
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SEMARNAP PROCYMAF	Alma Guadalupe Godoy Ramos
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Bioymas de Tehuacán Peubla.	Jose Martin Atela
IDESMAC	Luis Villafuerte
UCLAC	Efrain Peña Hernandez
Vera, Burguete y Celis, S.C	Santiago Lobeira
Vera, Burguete y Celis, S.C	Luis R. Vera Morales

Appendix C

Bibliography & CLIMAFOR Publications

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- DFID Funding Application and Project Memorandum Form 1998-2001;
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- USIJI Uniform Reporting Document: Activities Implemented Jointly under the Pilot Phase;
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- 'Carbon Offsets from Forestry Projects in Developing Countries' – draft April 1999;
- Review of Scolel Té and Plan Vivo System web sites;
- 'Rural Livelihoods and Carbon Management – A Draft Issues Paper for DFID' – 23rd August 1999;
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Appendix D

Summary Statistics for Scolel Té

Appendix D
SUMMARY STATISTICS FOR SCOLEL TÉ

Summary Statistics for Scolel Té (as at 31/03/00)	**Tzeltal - Zone 1**								**Tojolobal - Zone 2**				**Zones 3 - 5**		
Village Name - acronym	AC	Ch	2da	Jo	Mu	JI	SMC	Qu	Ya	PR	Ju	RdO	MdC	Hu	Ch
Village Profile															
No. of families in village	40	20	20	50	30	50	D/K	D/K	450	74	160	D/K	D/K	D/K	100
Private land (P); community area (C); whole community (CC)	P	P	P	P	P	P	P	P	P	C	P/ CC	C	C/P	P	P
Agricultural profile – see coding refs. Below	M/C	M/C	M/C	M/C	M/C	M/C	M/C	M/C	M/G	M/G	M/G	M/C	M/G	M/C	M/C
Take-up Data															
No. of families in Scolel Té	11	3	11	11	10	7	3(R)	2(R)	24	74	61	13	8(R)	113	18(R)
Year village started planting/FMR	1997	1997	1997	1997	1998	1998	1999	1999	1998	1997	1998	1998	1999	1999	1998
Land committed (ha)	11	3	11	11	13	7	3	2	36	28	66/ 2,500	20	10	113	18
Agro-forestry/FMR description – see coding refs. below	TA/AM/CA/MN								AMP	RN	AMP MF	AM	TA/ AM	AM/ CA/ TA	TA
Carbon sequestered (tC)	1,100	200	800	1,500	1,000	1,000	200	150	1,400	1,500	2,500	500	600	3,000	500
t/C sequestered per hectare	100	67	73	136	77	143	67	75	39	54	38	25	60	27	28

REFERENCE CODING FROM TABLE

(R) – a proportion of the families in the village are on a 'reserve list' i.e. they want to participate in Scolel Té but they have yet to receive confirmation of funding. Note: some of these families have still gone ahead with their agro-forestry system on the expectation of future payment.

Geographical Zone	Village Code	Village Names
Zone 1 – Tzeltal	AC Ch 2da Jo Mu JI SMC Qu	Alan Cantajal Chapullil 2da Coloteel Jolcacuala Muquenal Jol Ikbatil San Maria Cantajal Quexil
Zone 2 – Tojolobal	Ya PR Ju RdO	Yaluma Palma Real Jusnajab Riza de Oro
Zones 3 to 5	MdC Hu Ch	Marquez de Comillas Huitupan Chol (Yokpokityk)

Land Ownership	
P	Land which is privately owned by the farmer; The carbon sequestration contract is directly with the farmer.
C	Parcels of land within the community which are community owned; The carbon sequestration contract applies to these community-owned areas.
CC	Where the carbon sequestration contract covers the whole community; These typically will be much larger land holdings.

Agricultural Profile of Villages		
Code	**Label**	**Description**
M/C	Maize – coffee	Where the principal crops are maize and coffee; This applies to the lower lying areas in Chiapas suitable for coffee production – e.g. Tzeltal; Other agricultural production such as fruit and poultry also takes place.
M/G	Maize – ganado (cattle)	Where the principal crop is maize; Supplemented by cattle grazing; Typically on the higher Tojolobal ground.

Agro-Forestry/ FMR Description		
Code	**Label**	**Description**
TA	Taungya	Combined tree and crop production; Crop production is possible under this system up until years 6-8 at which point the tree canopy prevents further crop cultivation.
AM	Acahual Mejorado	Promoting natural regeneration of the forest through the introduction of high value species – approx. 600 trees per hectare; Thinning and active forest management is required.
CA	Café and Trees	Planting trees in marginal coffee areas; Trees provide the shade necessary for successful coffee production – they are referred to as 'mother trees'.
MN	Milpa con Nescafe	Non-burning maize with leguminous cover crop.
AMP	Acahual Merjorado de Pino	Improved mixed woodland from scrub-land; Planting pine and oak.
RN	Natural Regeneration	Fencing off forestry land to prevent cattle grazing; No trees planted – purely natural regeneration.
MF	Forestry Management	Active management of significant community forest areas; This to include a management plan approved by government.

Analysis of Carbon Sales (as at 31/03/00)				
	1997	**1998**	**1999**	**Total**
Tonnes of Carbon Sold (tC) to FIA	5,500	5,500	5,500	16,500
Carbon Sequestered to Date (tC) – farmer commitments (in progress)	-	-	-	15,950
Price per tC ($)	10	10	12	-
Fondo Bio-Climatico Income ($) to Date	55,000	55,000	66,000	176,000
Amount available to Farmers ($)	41,250	41,250	49,500	132,000
Amount used for administration, technical support & monitoring	13,750	13,750	16,500	44,000
Payments Received by Farmers to Date ($)	-	-	-	99,000

Appendix E

Impact Data

Appendix E – Impact Assessment

SUMMARY OF VISITS TO SCOLEL TÉ VILLAGES			
Village Name	**Muquenal**	**Yokpokityk**	**Yaluma**
Village Profile:			
Geographic zone	Tzeltal	Chol	Tojolobal
No. of families in village	30	100	450
No. of families in Scolel Té	10	18(8R)	24
Land committed to project (ha)	13	18	36
Av. land committed per farmer (ha)	1.3	1.0	1.5
Holding size range for farmers	5-20	1.5 – 2.0	2-15
Land tenure	private	private	private
Agricultural system	maize/coffee	maize/coffee	maize/cattle
Approx. height of village (m)	600-800	600-800	1,300-1,500
Standard of Living:			
Electric light (majority)	✓	✓(10 months ago)	✓
Water supply (stand pipe only)	✓	✓	x
Telephone	?	✓(1 phone for 600)	✓(1 for 2,000)
Public sewerage/drainage service	x	x	x
Supplementary income to farming	x	x	✓
Cash crop (coffee)	✓	✓	x
Carbon Project:			
Date of first planting	1998	1998	1998
Agro-forestry system	cedro/coffee	cedro/coffee (incl. boundary/fallow)	improved mixed woodland
Carbon sequestered for village (tC)	1,000	500	1,400
Carbon sequestered/ farmer (tC)	100	50	58
Interviewees:			
Social adviser (Chepe/Fernando)	✓	✓	✓
Technical adviser (Tito)	✓	✓	✓
ECCM Project Manager	✓	✓	✓
Village Co-ordinator	✓	✓	✓
No. of farmers in Scolel Té	2	6	2
Other non-participating farmers	-	12	1

SUMMARY OF VISITS TO SCOLEL TÉ VILLAGES			
Village Name	**Muquenal**	**Yokpokityk**	**Yaluma**
Key Findings:			
Reason for joining?	Timber production	Timber production	Improved use of marginal land
Risk-return profile?	Hi. return/ hi. Risk	Hi. Return/hi. Risk	Low ret./low Risk
Impact on farm incomes?	High	High	Modest
Farmers would do it again?	✓	✓	✓
Achieve outcomes without project?	No	Yes (smaller scale)	No
Wider interest in village?	✓	✓	✓
Displacement?	No	No	No
Other examples of agro-forestry system in neighbourhood?	No	No	No
Benefits for women (direct)?	No	No	Yes
Indirect impacts?	✓	✓	✓
Critique of Scolel Té?	V. good	V. good	V. good