The sustainability of forest management
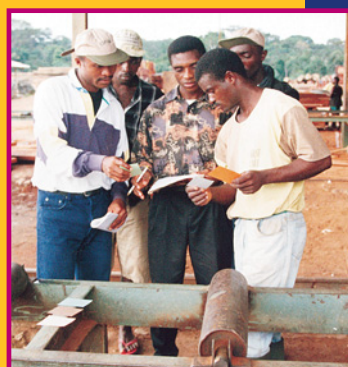
Assessing the impact of CIFOR's Criteria and Indicators research

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CIFOR

CENTER FOR INTERNATIONAL FORESTRY RESEARCH

Impact Assessment Papers Series

The sustainability of forest management

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Cover photos
Top photo by Carol J.P. Colfer: *CIFOR research partner, Francois Tiayon, interviews workers at the Wijma sawmill (southeast of Kribi, in Cameroon). One of the applications of CIFOR's C&I research is the evaluation of whether timber companies are managing their forests sustainably and are eligible for timber certification*

Middle photo by Eko Prianto: *Produced in several languages, the C&I Toolbox is a comprehensive set of manuals to guide forestry practitioners and stakeholders through the process of measuring forest sustainability*

Lower photo by Herlina Hartanto: *Criteria and Indicators field test with local communities, Nueva Vizcaya, Philippines*

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Abbreviations

ATO	African Timber Organisation
BAG	The Basic Assessment Guide for Human Well-Being (part of the C&I Toolbox)
C&I	Criteria and Indicators
CAR	Corrective Action Request
CATIE	Centro Agronómico Tropical de Investigación y Enseñanza
CBD	Convention on Biodiversity
CGIAR	Consultative Group on International Agricultural Research
CIFOR	Center for International Forestry Research
CIMAT	Criteria and Indicators Modification and Adaptation Tool
CIMAR	Centro de Investigacion y manejo de Recursos Naturales Renovables
COC	Chain of Custody
COP	Conference of the Parties
DDB	Deskundigenwerkgroep Duurzaam Bosbeheer
DWAF	Directorate of Forestry in the Department of Water Affairs and Forestry, South Africa
EIA	Environmental Impact Assessment
EMS	Environmental Management Systems of ISO
EPMR	External Programme and Management Review
FAO	Food and Agriculture Organisation of the United Nations
FMU	Forest Management Unit
FSC	Forest Stewardship Council
GEF	Global Environment Facility
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
HCVF	High Conservation value Forest
IBAMA	Brazilian Institute for the Environment and for Natural Renewable Resources
ICEFI	Iniciativa Chilena de Certificación Forestal Independiente
IPAP	CIFOR C&I International Project Advisory Panel

IPF	United Nations Intergovenmental Panel on Forests
ISO	International Organisation for Standardisation
ITTO	International Tropical Timber Organisation
ITW	Initiative Tropenwald
LEI	Lembaga Ekolabel Indonesia
LUCID	Local Unit Criteria and Indicators Development Project (USFS)
MCPFE	Ministerial Conference on the Protection of Forests in Europe
MTCC	Malaysian Timber Certification Council
NGO	Non-governmental Organisation
OED	Operations and Evaluation Department of the World Bank
P&C	Principles and Criteria (of the Forest Stewardship Council)
PEFC	Programme for the Endorsement of Forest Certification
QMS	Quality Management Systems of ISO
SBSTTA	Subsidiary Body on Scientific, Technical and Technological Advice
SCS	Scientific Certification Systems
SFI	Sustainable Forestry Initiative
SFM	Sustainable Forest Management
SGS	Société Générale de Surveillance
TFAP	Tropical Forest Action Plan
UNEP	United Nations Environment Programme
UNCED	United Nations Conference on Environment and Development
UNFCCC	United Nations Framework Convention on Climate Change
UNFF	United Nations Forum on Forests
USAID	United States Agency for International Development
USFS	United States Forest Service
USDA	United States Department of Agriculture
WCMC	UNEP World Conservation and Monitoring Centre
WWF	Worldwide Fund for Nature

1. Executive Summary

The Center for International Forestry Research (CIFOR) Criteria and Indicators (C&I) research responded to an international demand for science to help clarify the assessment of sustainable forest management through development and improvement of C&I. C&I help define standards for sustainable forest management and are now being used by many different groups. Governments are using C&I to help them regulate the practices of forest users and report on the status of their forests to international processes and fora. Forest certification bodies depend on C&I to assess whether forest management companies or groups are managing their forests in a sustainable manner. Forest managers themselves often use C&I to improve the quality of their management, and, similarly, local communities can use C&I to improve their own management practices and hold to account others who share their forests.

CIFOR's was the first international research effort that sought to test and compare the effectiveness of C&I for sustainable forest management at the forest management unit level. The research made use of multidisciplinary teams in a series of comparisons of indicator sets in various (often tropical) forest settings. This case study shows that the research achieved widespread influence and uptake across many different types of organisations. This uptake has led to the generation of significant international public goods through the improved management of forests.

The global total of Forest Stewardship Council (FSC)-endorsed certified forest is steadily increasing and currently stands at over 47 million ha. The area of forests certified in Asia, Africa and Latin America represents 18 per cent of the total certified area. Within this, the area of certified forests that occur within CIFOR 'mandate countries' exceeds 5.84 million ha. Official statistics from the United Nations Environment Programme (UNEP) and the FSC show that the most active certification companies globally in terms of the areas of forest certified have been SGS (Société Générale de Surveillance) Qualifor, Rainforest Alliance, Scientific Certification Systems (SCS) and the Soil Association. These four companies are responsible for auditing over 96 per cent of the world's current FSC-certified forest operations and are far more important than other certification agencies with regard to tropical forests and forests certified in the South. Whilst CIFOR was not a prime-mover in the emergence and eventual global acceptance of forest certification, it did make substantial positive contributions to this process

by independent testing of C&I used by certifiers to assess sustainable forest management.

Three of the four key FSC certification bodies acknowledge benefiting from the CIFOR work on C&I in developing their generic certification standards or auditing processes. Therefore, over 79 per cent of the global total of certified forest, or 37.1 million ha of forest, has been certified by companies that acknowledge some use of CIFOR's C&I research in their certification standards or audit processes. 'Spillover' effects are therefore large because the bulk of the world's certified forests are located in the developed countries of the North – outside of the countries that are central to the Consultative Group on International Agricultural Research (CGIAR) mission.

The standards developed and used by certification bodies did not adopt CIFOR's C&I in a 'wholesale' manner, and quantitative attribution of CIFOR's research contribution to certification standards proved problematic. Nevertheless, there was broad agreement among three of the four major FSC certification bodies that CIFOR C&I research highlighted general areas of weakness and inconsistency in Sustainable Forest Management (SFM) standards and showed that it is not practicably possible to have a single set of globally applicable C&I. Prior to the CIFOR research effort, C&I dealing with 'social sustainability' issues were relatively weak in the standards used by FSC certification bodies. The CIFOR work helped bring credibility and legitimacy to social sustainability issues that were initially regarded as very difficult to incorporate into assessments of sustainable forest management and forest certification processes. The CIFOR research provided information on limits to the geographical generalisability of forest management standards, highlighting in particular the site-specific nature of indicators for 'social sustainability'. The research highlighted the need, and provided the tools to adapt, indicator sets to local conditions.

Thus the CIFOR research helped focus the attention of certifiers on social sustainability issues and helped speed the development of certification standards in this regard. CIFOR's contribution in the realm of 'social' C&I was associated with stakeholder consultation methods, mitigation of conflicts with indigenous or local communities and consideration of their tenurial and land-use /usufruct rights. The research also helped draw increased attention to biodiversity issues, although the C&I developed by CIFOR lacked practical utility for certification field audits.

SmartWood standard sets specifically acknowledge CIFOR's research. Study findings suggest that the CIFOR research also helped SmartWood to focus its certification standards development processes on C&I that performed well in a

range of conditions and helped speed the development of C&I by highlighting areas where more effort in C&I development was required. In developing its standards it is clear that SmartWood made use of CIFOR research, and this is acknowledged on its official website and appears in the published text of its current generic standards set and in several published national standard sets.

The CIFOR work was of utility in helping the FSC-accredited certifier SGS Qualifor to develop its stakeholder consultation processes. The CIFOR C&I research helped to inform the SGS standards development process, particularly with regard to social issues relating to stakeholder consultation and 'intergenerational access to resources' in sustainable forest management, but there was no 'wholesale adoption' of CIFOR's generic C&I.

CIFOR C&I research was also important in the development Woodmark standards. Key informant interviews suggest that the C&I work was important for raising awareness and highlighting topics such as social issues, e.g., stakeholder consultation and biodiversity. The indicators developed through the CIFOR research, although not used directly in the Woodmark standard, helped focus the Soil Association's attention on aspects of sustainability that had not been dealt with adequately in earlier standard sets.

The study shows, through examination of public assessment reports, that certification, in turn, has led to large improvements in sustainable forest management on the ground. Substantial areas of forests have been certified, and the issues most closely associated with CIFOR research contributions to certification standards commonly feature in public records of certification audits. These commonly demand improvements in forest management in relation to stakeholder consultation processes, 'intergenerational access to resources' – land tenure and rights of local and indigenous communities therefore resulting in research-related improvements to management practices – and occur in audits that cover more than 3.2 million ha of forests in CIFOR target countries.

The analysis of public certification assessment reports coupled with a review of findings published in recent literature show that certification in developing countries has:
• helped secure or improve environmental services in certified forests;
• improved worker conditions within certified forests;
• acted to reduce social conflict in and around certified forests;
• helped in securing land tenure and usufruct rights (in certified community forests);
• improved the image of the forest management enterprise locally and in associated markets;

- provided greater access to premium timber markets (where they exist); and
- helped promote sustainable forest management more generally through dialogue between the private sector, government bodies, non-governmental organisations and civil society.

Such improvements clearly contribute to the CGIAR goals over large areas, but the magnitude of distribution and attribution of benefits remain difficult to quantify and compare.

The CIFOR research effort was timely because certification in general, and FSC certifier indicator sets in particular, were developing quickly during the life of the CIFOR research project. In the period since the completion of the CIFOR C&I research, large areas of forests have been certified under the FSC system using C&I-based standard sets and audit process.

The FSC itself has made limited use of the CIFOR C&I yet key documents such as 'FSC Guidelines for Certification Bodies' encourage certifiers and national working groups to refer to CIFOR research regarding financial C&I for SFM: *'Certification bodies and FSC National Initiatives are encouraged to study the CIFOR paper, especially Table 5 'Recommended Criteria and Indicators', with a view to improving the certification bodies' 'generic standards', and FSC Regional Standards.'*

Regional/national FSC standards development processes are iterative, participatory and accommodate a wide range of stakeholder interests – consequently direct research influence on such processes is challenging and requires research organisations to remain engaged in the long-term or succeed in achieving 'first mover advantage'. There are examples of CIFOR research influencing national /regional FSC standards development processes through the CIFOR C&I field tests in Brazil and Cameroon: the tests were conducted when certification processes were nascent in these countries. In the case of Brazil, CIFOR played a key role early in the process of developing standards for *terra firme* forests. Substantial forest areas have come under FSC-certified management in Brazil, however most of them are outside the Brazilian Amazon where the CIFOR work had its greatest relevance and influence.

There is evidence of influence on FSC national standards development processes in Nicaragua, Honduras, Costa Rica, Guyana and Guatemala through application of C&I selection methods developed by CIFOR and Centro Agronómico Tropical de Investigación y Enseñanza (CATIE). More indirect, and less attributable, influence has resulted from the use of the CIFOR research outputs as a general information resource for standard-setting processes, and through use of the Pathfinder tools

by national working groups in Chile and Cameroon. Generally, research uptake in FSC working groups has been patchy, and many FSC national standards development processes have yet to be completed in developing countries. This fact alone largely constrains the possible impact generated through this pathway to date. In some instances, e.g., Cameroon, there may be research impact through this pathway in the future.

In addition to certification-related uptake and impact, the study highlights a number of uptake events across a wide range of organisations at international regional, national and subnational levels. In some cases these events have led to significant outcomes and impacts.

CIFOR research from the Cameroon C&I test was extensively used in the development of C&I by the African Timber Organisation (ATO). These C&I were later harmonised with those of the International Tropical Timber Organisation (ITTO) for use in ATO countries.

Thorough examination of a large number of key policy documents produced by major donors supporting forest-related initiatives showed that CIFOR C&I research was frequently cited. Notable examples included World Bank Forest Policy, the Global Environment Facility – Roundtable on Forests, the Convention on Biodiversity (CBD)'s Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) report to the 5th Conference of the Parties (COP5) and in guidelines for best practice in integrating biodiversity into national forest planning, and in Intergovernmental Panel on Forests (IPF) /United Nations Forum on Forests (UNFF) decisions. In general, the CIFOR C&I research has been highly regarded at the international level, and has been acknowledged in key documents that have helped to shape the international forestry agenda.

CIFOR C&I research played an important role in shaping national and state policies in India. CIFOR experience with multi-stakeholder processes and methods for selection of C&I was important in the formulation of national forest management standards in South Africa. The Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA) enforces compliance with the Forest Code through its regional offices in each state, and has made use of the CIFOR C&I, and, especially, the CIFOR C&I Brazil test findings, to revise guidelines to audit the activities of companies involved in the timber business in the state of Para.

The United States Forest Service (USFS) tested the CIFOR C&I in the state of Idaho and developed a standard framework to monitor the sustainability of the

United States Federal Forests. This framework, which draws extensively on CIFOR research, has been further applied in test areas that cover more than 7.5 million ha of forest in the USA and Canada. The USFS initiative has also been influential in standards development for forest management in Canada and Mexico.

There is potential for additional 'spillovers' in coming years from new certification initiatives emerging in the oil palm industry, in coffee, soya, banana and citrus production. These are drawing upon the experiences gained with forest certification, and, in the case of oil palm, are currently developing C&I for sustainable production using the FSC Principles and Criteria (P&C) as a model. CIFOR's work on C&I (particularly issues relating to community conflicts and traditional land-use rights) may yet spill over into standards for the sustainable production of oil palm, and other plantation crops, with potentially large impacts. The development of C&I for resource management is an area that remains of strategic importance for CIFOR and the CGIAR more generally.

The variety of cases of research uptake and widespread research influence highlight the strategic relevance of CIFOR C&I research and the range of 'pathways' through which outcomes can result. The variety and number of positive outcomes highlight the international public goods nature of the CIFOR C&I research.

2. Background and introduction

2.1 The international context – demand for Criteria and Indicators (C&I) for sustainable forest management

International and popular concern about the wide-scale loss and degradation of forest areas, especially in tropical countries, emerged in the 1980s and, coupled with the Brundtland Commission's calls for 'Sustainable Development', resulted in forest issues receiving considerable attention at the 1992 Rio 'Earth Summit' (the United Nations Conference on Environment and Development, UNCED). The emergence of C&I was an integral part of these developments in the global forest agenda. In follow-up action from Tropical Forest Action Plan (TFAP) initiatives of the 1980s, the International Tropical Timber Organisation (ITTO) developed 'Guidelines for the Sustainable Management of Natural Tropical Forests' in 1990, and published a set of C&I (i.e., standards) for sustainable forest management (SFM). At UNCED, in Chapter 11 of Agenda 21 (section 11.23b), governments agreed to undertake, in co-operation with special interest groups, the formulation of scientifically sound C&I as well as guidelines for the management, conservation and sustainable development of forests.

The major outcomes stemming from UNCED with implications on forests were: Chapter 11 of Agenda 21, on Combating Deforestation; Non-legally-binding Forest Principles; the Convention on Biological Diversity (CBD); and the Framework Convention on Climatic Change (UNFCCC), all of which recognised the need and utility of internationally agreed-upon C&I that demonstrate and characterise the management, conservation and sustainable development of all types of forests.

The Ministerial Conference on the Protection of Forests in Europe in 1992 (MCPFE) and the Forest Stewardship Council's (FSC) Principles and Criteria (P&C) for Natural Forest Management (1993) also highlighted the need for C&I to support sustainable management of forests. The changes in the global environmental agenda had shifted emphasis from the production of sustainable timber yields to sustainable forest management, which incorporated the environmental and socio-economic functions of forests. The MCPFE stated: 'sustainable management means the stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future,

relevant ecological, economic, and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems'.

UNCED precipitated a plethora of national and international and regional initiatives aiming to promote sustainable forest management. The development of C&I for sustainable forest management at the national level was prominent and was pursued within five regional and international initiatives: the ITTO, the Pan-European Forest, Montreal, Dry Zone Africa Process and Tarapoto proposal (FAO 2000).

These initiatives, and others, highlighted a need to formulate internationally acceptable and scientifically testable criteria to characterise sustainable forestry for all types of forests. Sustainable forest management, C&I and forest certification became issues commanding great attention at national and international levels and were a prominent topic for the United Nations Intergovernmental Panel on Forests (IPF), which followed on from UNCED. The IPF agreed on several proposals to promote C&I development and diffusion, and called for more research on the topic.

Prior to the CIFOR C&I research, considerable effort had gone into the development of standards to evaluate the sustainability of forest management. Most of this development initially took place in North America and later concentrated on tropical forests. Some initiatives originated from within governments, such as in Indonesia and Cameroon, while others were the result of inter-governmental negotiations, such as the African Timber Organisation (ATO)'s certification scheme, or the MCPFE's list of quantitative indicators for sustainable forest management.

Similarly, various national working groups, specialised certification bodies, non-governmental organisations and industrial institutions committed themselves to the task of identifying and employing C&I to evaluate the sustainability of forests at a Forest Management Unit (FMU) level. Some of these introduced their own sets of standards for sustainable management: prominent among them were the SmartWood scheme of the Rainforest Alliance, and the Responsible Forestry Standards of the Soil Association.

Although the numerous C&I development efforts reflected global concerns for the sustainability of forest management, they lacked rigorous scientific testing. There was 'a need to harmonise the different standards, to test them with respect to their relevance to sustainability and effectiveness as criteria thereof.' There was a need to develop and define criteria relevant to the different forest conditions

prevailing within each country. This process, it was argued, would benefit from systematic testing and a standardised methodology (Prabhu *et al.* 1998).

Whilst there was adequate research capacity to undertake research on C&I available among advanced forestry research organisations of the North, no single organisation had the skill sets in combination with the practical forest-based management experience required to complete the work. CIFOR had been established in response to global concerns about the social, environmental and economic consequences of loss and degradation of forests and as such was well positioned to undertake the international comparative studies for the following reasons: a) its international status and global mandate, b) its focus on forests, sustainability and livelihoods, c) its established *modus operandi* of working through partnership arrangements (which was unusual among forestry research organisations at that time) and, d) its legitimacy, independence and impartiality as perceived by environmental and industry-oriented forest interest groups with somewhat polarised interests in C&I development. The were few if any credible alternative sources of supply, especially for the development of C&I relevant to the developing tropics.

Thus the CIFOR C&I research project entitled 'Assessing the sustainability of forest management: Developing criteria and indicators' had global relevance, was timely and represented a direct response to international discussions on the validity of using C&I for evaluating the sustainability of forest management at the FMU level.

3. CIFOR Criteria and Indicators (C&I) Research

3.1 Objectives and purpose

The underlying purpose of the CIFOR C&I research was to contribute to the development and evaluation of technologies to determine whether forests are being managed on a sustainable basis at the individual Forest Management Unit (FMU) level and to link the work to relevant initiatives at the national and regional levels, e.g., the Helsinki Process for European forests and the International Tropical Timber Organisation (ITTO) requirements.

At the time of project inception, there were no accepted and tested practical methods for this, especially methods that accommodated development and evaluation of social and biodiversity indicators. Social and biodiversity-related C&I were aspects that were generally under-represented in the C&I sets established prior to the CIFOR work. In addition, the various sets of C&I in use by different certification initiatives were perceived by some constituencies, both within the forest industry and within conservation-oriented organisations, as lacking credibility and scientific validity. Although an abundance of forest-related criteria and indicators were developed prior to the CIFOR work, their applicability and reliability in a variety of forest settings had never been tested formally within a scientific framework.

The broad hypothesis addressed by the research was that a C&I-based approach could be used to assess the sustainability of forest management reliably and cost-effectively.

C&I for sustainable forest management can be regarded as 'tools which add value to information through improving its organisation in a manner that helps conceptualisation, evaluation and implementation of sustainable forest management'. Criteria 'are the intermediate points to which the information provided by indicators can be integrated and where an interpretable assessment crystallizes'; Indicators 'are any variables or components of a forest ecosystem or management system that are used to infer the status of a particular criterion'; and Verifiers 'are data or information that enhances the specificity or the ease of a specific indicator' (Prabhu *et al*. 1996, 1999). The value of information can 'lie in the way it is organised' and C&I provide structure to standards designed to assess sustainable forest management.

Table 1. Elements and definitions of forest management standards

Element	Definition
Principle	Fundamental Law or rule, serving as a basis for reasoning and action; objective or attitude concerning the function of the forest ecosystem or concerning a relevant aspect of the social system that interacts with the ecosystem; explicit elements of a goal.
Criterion	State or aspect of the dynamic process of the forest ecosystem, or a state of the interacting social system which should be in place as a result of adherence to a principle; give rise to a verdict on the degree of compliance in an actual situation.
Indicator	Quantitative or qualitative parameter which can be assessed in relation to a criterion; describes in an objectively verifiable way features of the ecosystem or the related social system; describes elements of prevailing policy and management conditions and human driven processes indicative of the state of the eco- and social system.
Verifier	Source of information for the indicator or for the reference value for the indicator.

(Lammerts van Bueren and Blom 1997).

The CIFOR research was thus concerned with the development, testing and refinement of C&I for selected sets of characteristics including biodiversity and socio-economic values. The CIFOR research aimed to test the utility of C&I sets from different organisations by organising an international comparison that brought together multiple disciplines to perform comparative tests in a range of different practical forest settings. The C&I identified as consistently performing well across different settings being deemed the best 'generic' C&I for use in assessment of the sustainability of forest management.

The usefulness of such methods and criteria was thought to go well beyond their incorporation in forest certification systems; it was anticipated that they would play an important role as general guidelines for improving forest management practices globally – i.e., research on C&I for sustainable forest management would have multiple uses, at multiple levels and would generate benefits across regions, national borders, generations and population groups. Such C&I would be useful in:
• evaluating the implementation of United Nations Conference on Environment and Development (UNCED) forest principles;
• negotiating international financial support for Sustainable Forest Management (SFM);
• informing standards applied in timber certification schemes;
• help provide a basis for comparing country performances in SFM; and
• create and stimulate debate on sustainable forest management.

In short, the project would produce significant international public goods.

In this regard, the ultimate anticipated gains stated in the initial project documentation at the time of inception were:

- to enable the differences between sustainable and unsustainable forest management practices to be clearly discerned and so reduce uncertainty concerning environmental and social costs of logging and thereby promote greater productive and equitable use of forests;
- reduction in environmental impacts and degradation through an improved ability to diagnose the factors affecting sustainability of management practices; and
- reduction in social inequities and enhancement of opportunities for income generation and improved quality of life.

The CIFOR C&I team adopted a 'transparent' consultative approach to the research, creating an external International Project Advisory Panel (IPAP) and a separate technical Scientific Support Group. IPAP was comprised of internationally recognised experts from primary user groups, including international, regional and national C&I-related processes (e.g., the ITTO, the Helsinki Process, Montreal process, African Timber Organisation (ATO), UN Food and Agriculture Organisation (FAO), United Nations Intergovernmental Panel on Forests (IPF)/ United Nations Forum on Forests (UNFF) and the organisations involved in practical certification efforts in managed forests such as the Forest Stewardship Council (FSC), Rainforest Alliance's 'Smartwood', the UK Soil Association's 'Woodmark' and Société Générale de Surveillance (SGS)'s 'Qualifor' programmes. IPAP provided advice to the CIFOR research team, monitored their progress, and provided review and critique on the research process and products. Thus IPAP provided external oversight to the research but also presented an opportunity for CIFOR to disseminate research findings and promote 'ownership' of them among key audiences during the research process itself. These audiences were also able to provide feedback on the form and content of the eventual research outputs.

3.2 Phase I: August 1994 – January 1996: field evaluation and development of different sets of C&I

The first phase of the research involved field tests in five countries and seven locations: Austria, Germany, Indonesia, Côte d'Ivoire (Mengin-Lecreulx *et al.* 1995) and Brazil.

The objective of the first phase of the study was to develop a methodology to identify a minimum number of cost-effective and reliable C&I for each site, and

to find ways of bringing the information together so that it provided a coherent picture of how the forests were being managed. At each of the first four sites, a multi-disciplinary team of two national and three international foresters, social scientists and ecologists selected and evaluated an appropriate set of C&I. Despite their wide international acceptance, neither the ITTO's C&I for sustainable forest management nor the FSC's Principles and Criteria (P&C) for good forest stewardship were considered in the tests. The research team regarded both these sets to be development 'umbrellas' (i.e., defining the scope for C&I), rather than field assessment tools. The initial list of over 1100 C&I was drawn from the nascent certification schemes and standards for forest management that were available at that time:

Smart Wood (Rainforest Alliance, USA), Woodmark (Soil Association, UK), Criteria for an Evaluation of Sustainable Management of Tropical Forests (Initiative Tropenwald (ITW), Germany), Lembaga Ekolabel Indonesia (Indonesia) and Deskundigenwerkgroep Duurzaam Bosbeheer (Dutch Working Group - The Netherlands).

The test in Germany identified nine attributes as important for assessing C&I. These attributes were seen as instruments with which the cost-effectiveness of an assessment system could be improved and were applied in all subsequent CIFOR tests. Criteria and indicators should be:
• relevant
• unambiguously related to the assessment goal
• precisely defined
• diagnostically specific
• easy to detect, record and interpret
• reliable, especially as indicated by replicability of results
• sensitive to stress on the forest management, ecological or social systems
• able to provide a summary or integrative measure over space and/or time
• appealing to users

The C&I were classified into three types – biophysical, social and managerial – and each team member was given the task of assessing and evaluating the C&I in his or her particular field. For example, anthropologists and sociologists assessed social C&I; natural scientists assessed biophysical C&I. The research method involved an initial screening selection process, during which the number of criteria and indicators was reduced to those thought to be most relevant to the management setting. The interdisciplinary assessment team then attempted to apply the remaining C&I practically in the field. The evaluation team used standardised methods for assessing the performance of the C&I applied.

For each test site, the evaluation team's findings were presented and discussed in multi-stakeholder workshops that drew together participants from different institutional and disciplinary backgrounds, selected for their knowledge and interest in sustainable forest management and their understanding of local conditions.

The field trials were then followed by analysis of the C&I and identification of those most cost-effective and practicable across the range of forest conditions tested. Social C&I, not surprisingly, showed a markedly lower level of commonality across test sites than did the other aspects. The relevant averages for commonality in the C&I selected for the three tropical tests decreased from a high of 72 per cent for ecological C&I to a low of 34 per cent for the social C&I. The policy and forest management-related C&I showed an average commonality of 57 per cent and 60 per cent respectively. Site-specific elements are important particularly for social aspects and at lower levels of hierarchy, such as verifiers.

The contribution of the five 'base' sets to the C&I selected by the field test teams varied among sites and among disciplines. For the set of C&I proposed in the Indonesian test, about 80 per cent of all C&I owed their origin to the base sets; the remaining 20 per cent were new developments by the expert team in reaction to perceived gaps in the base sets and specific site conditions. This figure dropped to 68 per cent in Brazil and 62 per cent in Côte d'Ivoire. The ecology C&I across all three tropical sites showed the highest proportion of references to the base, with 89 per cent. Between 61 per cent and 68 per cent of the policy, forest management and social criteria and indicators were developed directly out of the base sets (Prabhu *et al.* 1996).

The findings clearly showed that there could be no universal set of C&I for forest management. Forest conditions vary substantially, and the C&I used to guide management towards the desired objectives (which themselves may vary) must be appropriately matched to the prevailing ecological, economic and social conditions. The work also showed that there was, generally, a greater site-specific nature of 'social' C&I compared to ecological or 'production systems' C&I. The Phase I report outlined the extent to which the C&I selected by field test teams recommended the use of C&I from the original base sets considered.

"In absolute terms, the ITW and Woodmark sets were the sources with the largest number of references in the proposals made by the experts at each of the three tropical test sites. Relative to the number of C&I in the original set, references to the Smart Wood set were highest: 94% of SmartWood's C&I set was used by team members as models or starting points for the sets of C&I proposed by them. In comparison about 34% of all C&I proposed by the three teams were

based at least in part on the SmartWood set. The ITW set with over 600 C&I was generally considered to be the most comprehensive, in terms of conventional forest management. 233 C&I from the ITW set were used by the teams as 'models' or starting point for 49% of all the C&I proposed by them. The Woodmark set contributed 103 C&I or 43% of all C&I proposed by the teams. It was considered to be the most prescriptive of the five base sets. The LEI and DDB sets contributed 33% and 20% respectively to the C&I in the proposals." (Prabhu *et al.* 1996).

The research also suggested that, in general, the level of expertise required for good assessment had been underestimated. The costs of sustainability assessments needed to be reduced and simple pragmatic C&I applied.

3.3 Phase II: February 1996 – January 1999 development of sustainability assessment tools: the CIFOR C&I Toolbox

Phase I field tests consistently showed that C&I for biodiversity and social sustainability were weak and, consequently, Phase II devoted special attention to developing these C&I, and further field tests were conducted including in Cameroon (Prabhu *et al.* 1998), Gabon (Nasi *et al.* 1999), and the United States. By 1998, there were already a number of initiatives to develop C&I in several countries and because of the large variation in forest conditions there was demand for tools and methods to generate C&I that were not only locally relevant but also scientifically sound and internationally compatible. Research efforts were therefore directed towards the design and production of the basic tools necessary for C&I development.

The main focus of Phase II was on:
1. Developing cost-effective, transparent and practical sustainability assessment methods based on C&I selected as being suitable after the first phase. Most performance thresholds have to be developed on a site-specific basis. Therefore the emphasis was on the development of methods.
2. Developing operational indicators for areas where shortcomings were identified during the first phase; the social dimensions of forest management, impacts on biodiversity and on environmental services of forest ecosystems.
3. Testing C&I in forests managed by local communities. Because the management objectives, resources and techniques applied are very different in this case from forests managed for commercial timber production, CIFOR designed a separate research module for forests managed by communities.
4. Developing transparent, effective methods for scoring, weighting and resolving evaluation conflicts in order to arrive at decisions in a transparent, acceptable manner.

Despite the value-laden nature of the concept of sustainability, the results revealed a surprising level of general agreement about its main components. The team identified a 'generic C&I template' comprising six basic principles and about 25 criteria related to policy, ecology, social conditions and production that most experts felt were useful. They were **NOT** intended to be an 'ideal and universally applicable' set of C&I, but a 'point of departure' for adaptation of C&I to local conditions, and they were the foundation of the C&I Toolbox. The CIFOR work also provided 'tools' and methods to assist C&I development and adaptation processes.

3.4 CIFOR C&I research outputs

CIFOR first disseminated a 'generic' set of C&I for Sustainable Forest Management in 1998. These C&I were embedded in a hierarchical framework from broad principles to verifiers. The 'Criteria and Indicators Toolbox Series'[1] was a comprehensive series of eight manuals and decision-support software which guided researchers, foresters, conservationists, certifiers and others through the complexities of assessing the sustainability of natural and planted forests, enabling them to decide which assessment tools and decision-making methods were appropriate for a given overall management situation.

Of key importance to certifiers was the CIFOR work on the social criteria and indicators for sustainable forest management. The Basic Assessment Guide for Human Well-Being (or The BAG) focused on the social C&I for sustainable forest management, a topic that has been and continues to be a subject of considerable controversy and uncertainty. The guide was designed for user groups who are interested in assessing sustainable forest management but who do not have a high degree of expertise in social sciences. The six simple methods described in the manual were designed for use by assessors and were presented in a 'cookbook' format. The Scoring and Analysis Guide was intended for use with The BAG, and provided additional support in making assessments of human well-being, including a specific scoring method. In addition, the publication *Who Counts Most? Assessing Human Well-Being in Sustainable Forest Management* presented a matrix-based method for differentiating 'forest actors', or people whose well-being and forest management are intimately intertwined, from other stakeholders. The method focuses formal attention on the full range of forest actors in an effort to develop sustainable forest management. The work identified seven dimensions by which forest actors can be differentiated from other stakeholders, and presented a simple scoring technique for use by formal managers or assessors in determining whose well-being must form an integral part of sustainable forest management in a given locale.

Figure 1. The CIFOR C&I 'Toolbox'

The C&I Toolbox was produced in English, Indonesian, French, Portuguese, Chinese and Spanish. Over 1000 copies were distributed in English alone. In addition to methods for developing and selecting C&I for natural forests exploited for their timber, the research developed methods applicable to a wide range of other forest uses, many of which did not involve commercial markets. CIFOR tested and developed C&I in the context of community forestry in Indonesia, Cameroon and Brazil. Later, plantation forests were also covered by this research when large-scale timber and pulp-wood plantations in Indonesia and India were used as the basis for developing relevant indicators. Researchers produced journal articles, participated in international C&I-related meetings and processes and provided policy advice and technical support. Numerous seminars, workshops and conferences were held to improve awareness among key target groups and receive feedback on the set of outputs. A large number of scientific papers, books and book chapters were also produced by the project.

Phase II also specifically included a field-based test of the CIFOR generic C&I template led by a team of certification auditors from SmartWood and SGS. This initiative took place over a 5-month period in 1998 and helped further raise awareness of the CIFOR work at a practical level among SmartWood and SGS technical staff whilst providing useful feedback to CIFOR. The findings were documented in a report (Blakeney *et al.* 1998). In applying the CIFOR C&I

in a field audit context in Indonesia the professional certifier team provided a critique of the environmental C&I: 'Indicators must be focused on management and its impacts, not on the collection of general data concerning biodiversity'… 'Some verifiers must be rephrased to make it clear what the forest manager has to achieve and what the assessment team should look for' (Blakeney *et al. op. cit.*). However, the certifier team found that the social criteria, indicators and verifiers provided were more consistent, clear and auditable than those in the ecology section. They observed that some of the criteria were based on assumptions that all local communities are forest-dependent and have a culture which is different and distinct from that of the forest enterprise. They also noted a low level of reference to the rights or welfare of forest workers in the CIFOR C&I set.

After the C&I work had concluded, CIFOR also conducted a user feedback survey (Parasram 2000) that highlighted perceptions of both strengths and weaknesses of the C&I Toolbox and dissemination efforts across a wide range of recipients. Opinions regarding the utility of the CIFOR C&I from among the FSC certifiers and other users appear to have remained fairly consistent since that time.

Table 2. Feedback on the C&I Toolbox from key users

Positive feedback
• CIFOR C&I were perceived to be academically strong and scientifically credible.
• The comparisons made between different C&I sets were very useful for highlighting the overlaps between different standards and their key strengths and differences.
• The comprehensive and open process in testing C&I helped promote perceptions of CIFOR's impartiality and enhanced perceptions of objectivity with regard to the research outputs.
• The multi-disciplinary approach adopted in the CIFOR C&I research was acknowledged and appreciated by user groups.
• The CIFOR C&I outputs were used by wide a variety of users (global, trans-boundary, national, regional and local levels)
Third-party critique
• Users felt that there was a lack of consultation with the private sector.
• The generic CIFOR biodiversity C&I were perceived as being complex and impractical to implement.
• Another dominant perception was that user group needs should have been identified with greater specificity in order to allow a clearer definition of what was required in the research outputs, i.e., presentation of information, content of C&I tools, conditions for use of the outputs etc. 'Awareness-raising' activities ('marketing') was, perhaps, overly focused on research and academia.
• The CIFOR C&I outputs were perceived as being too complex by many users. Although a detailed scientific basis to support the C&I was thought to be important, the 'user-friendliness' of the C&I tools could have been improved.

Adapted from Parasram (2000)

Other milestones included a review of the project as part of CIFOR's Consultative Group on International Agricultural Research (CGIAR) External Programme and Management Review (EPMR) in 1988, and a range of CIFOR C&I-Criteria and Indicators Modification and Adaptation Tool (CIMAT) training activities conducted (1999–2002) by CIFOR staff for a variety of audiences.

3.4.1 The WWF/WB Alliance/IKEA 'Pathfinder' Toolkit

Further collaboration in 2001/2002 between the Worldwide Fund for Nature (WWF), Pi Environmental consulting, CIFOR, the FSC and IKEA on the 'Pathfinder' initiative led to additional products[2]. CIFOR's C&I adaptation software, CIMAT, was promoted globally as a key component of this jointly prepared, certification-related information resource. The development of the resource involved representatives of FSC Standards Development National Working Groups from Malaysia, Vietnam, China, Cameroon and Ecuador. As a part of this work, nine case studies were conducted in eight countries around the world. CIFOR developed a Standard Setting Instrument modified from the earlier CIMAT software to assist the development and assessment of national standards based on the FSC's P&C for Forest Stewardship. The software allows comparison of C&I sets from ITTO, the Pan-European/Montreal Processes and CIFOR C&I. The multi-stakeholder working group Toolkit presents important background information and provides specific tools for setting up multi-stakeholder national working groups and analysing forest certification national standards. It has also been translated into Chinese and disseminated. The FSC made use of the 'Pathfinder' tools and promoted their use among all FSC national standard working groups.

3.4.2 Total C&I research cost

The total costs of the C&I research are estimated to be approximately US$ 3.3 million from inception in 1994 to completion of Phase II of the project in 1999. Donors included Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), United States Agency for International Development (USAID) and the European Commission.

4. Criteria and Indicators (C&I) research and impact pathways

In general terms, the impact of research is more readily appraised in situations where new science-based innovations are clearly defined and where their adoption directly affects patterns of production, consumption and /or human welfare. Nevertheless, impact from science may also be achieved indirectly, for example through influencing policies, decision-making processes, management assessment processes or development assistance interventions. Where new technologies are developed for use 'on the ground' directly by land mangers (farmers/forest managers), the magnitude of the impact is often dependent on the number of adopters of a particular research innovation and the land areas over which the research innovation yield an 'improvement'. However, there are other types of impact pathways where a small number of adoption events (or a single event) can change the way a 'system' or a process functions, e.g., national governance processes or a regulatory system (such as forest certification).

The CIFOR C&I research generated information rather than 'finished' technologies. However, the utilisation of information from research (to a greater degree than with 'finished' technologies) is not a binary phenomenon. The use of information from research may be symbolic, advocative, conceptual or instrumental, and often there is no 'straight-line' cause and effect between the provision of information and outcomes leading towards mission-relevant benefits. 'Plausible causal connections' between research and outcomes of interest are more usually iterative and web-like in character than they are unidirectional and linear. Additionally, information may be only partially applied, further increasing the difficulties of determining the level of 'adoption' and concomitant linkages to any changes 'on the ground'.

4.1 Generalised impact pathways for CIFOR C&I research

The C&I for Sustainable Forest Management developed through the CIFOR research were intended to be of relevance for application at individual Forest Management Units (FMUs) to improve forest management across a wide range of countries and settings. The C&I were also intended to have relevance for broader C&I initiatives at both national and regional levels. Whilst the C&I were intended for application at the FMU level, a range of 'pathways' leading to improved forest management were anticipated. In fact, achieving the desired outcomes of widespread improvement in forest management at the FMU level was thought

Research Process & Outputs

Decision Support Systems (CIMAT/Pathfinder tool)

Field based tests of C&I

Generic C&I Template and Local Modifier Methodologies - Community Forestry C&I

Academic Publications

Intermediary users of research

Intergovernmental Processes .e.g IPF/ UN Forum on Forests, CBD

National Policy Processes

Development/ Technical Assistance Agencies

Regional C&I based Initiatives e.g. ATO / ITTO, PEFC

Trade Organisations

Trainers and researchers

The CIFOR C&I Toolbox

Principal Target users

National Forest regulatory agencies Land Use Planners

National FSC Working Groups on forest management standards

Managers of Forests (Public and Private Enterprises and Communities)

Accreditation and Certification Agencies e.g FSC, SmartWood, Woodmark, SGS

Intended Outcomes

Policy Changes e.g. new forest management regulations

Use of C&I in national reporting and monitorng

Use of C&I in forest based development assistance projects

Use of C&I development and selection tools

Use of C&I-based Management Standards

Accreditation Standards

Improvement of Certification Standards (scope, reliability, credibility)

'Certified' Forests and resultant changes in forest management

Intended Impacts

Public benefits from Improved Management of Forests

Global

National

Sub-national

Forest Management Unit

Figure 2. A generalised representation of impact pathways relating to the CIFOR C&I project

to be less likely through a series of independent, direct (cumulative) adoption events among multiple separate forest management entities. Widespread impact was thought to be more likely through the use of C&I in regulatory processes (national legislation and regulation and/or voluntary certification).

The uptake (and impact) strategy for the C&I work was based on the premise that collaborative research and engagement of key stakeholders (e.g., through CIFOR's C&I International Project Advisory Panel – IPAP) would be an effective and cost-effective way of generating interest in, and ownership of, the research findings among key user groups. It was anticipated that the work would be used by certification bodies, accreditation agencies, development assistance agencies, national forestry authorities, regional and national C&I development processes to help them assimilate current best practice and orient existing C&I-related trends and initiatives in the right direction. The research would be used in the following ways:

- by independent forest auditors or certifiers as the basis for standards for certification assessment at the FMU or community level by independent forest auditors or certifiers;
- by groups assigned the task of developing regional or national certification standards;
- by governments as the basis for development of national guidelines for Sustainable Forest Management (SFM) which might be incorporated into national laws, administrative requirements, etc; and
- by forest managers to understand, implement and/or monitor the sustainability of their management in their FMU.

The international comparative C&I research study sought active engagement with international initiatives and powerful regional and national organisations. This active engagement presented additional opportunities to highlight new issues and stimulate decision-makers and opinion leaders to think about them. In this way it was thought that the CIFOR C&I research process would raise awareness and help to shape the international forest agenda with respect to C&I and SFM.

4.2 Impact pathways through Forest Stewardship Council (FSC) certification processes

This study focuses on specific impact pathways and examines the extent to which certification bodies, the FSC and national standards development processes made use of the CIFOR C&I research. This is followed, in Section 5, by an analysis, drawn from information published in public certification assessment reports, showing patterns of improvement in the management of FSC-certified forests in developing countries of the South. The general impact of certification on forests

(an attempt to compare outcomes 'with/without' certification) is distilled from recently published literature on certification in these forest settings.

Figure 3 shows a schematic diagram of three related impact pathways associated with FSC certification. A critical element in all three pathways is that C&I research is used to inform, shape or influence the performance standards for certification of forest management. Performance standards link directly to improved forest management practices on the ground through the regulatory framework of the FSC certification process.

CIFOR C&I research and products	CIFOR C&I research and products	CIFOR C&I research and products
Forest Stewardship Council-defined regulations for certification	National Forest Stewardship Council working groups	Certifier generic standards (C&I) or audit procedures
FSC Certifiers	FSC-approved national standard	Certifiers' standards
Forests certification audits using C&I-based standards	FSC requires that approved national standards are applied by FSC certifiers	Forests certification audits using C&I-based standards
Changes in forest management	Forests certification audits using C&I-based standards	Changes in forest management
Mission-relevant benefits	Changes in forest management	Mission-relevant benefits
	Mission-relevant benefits	

Figure 3. Major impact pathways through FSC certification processes

Data Source, Figures 3-6: UNEP-WCMC, WWF, FSC & GTZ (2004), endorsed by Forest Stewardship Council (FSC).[3]

4.3 Introduction to forest certification

This section presents a brief introduction to forest certification in order to set C&I research impact pathways in a clear context.

In the early 1990s, there was a great surge of interest in timber certification as a potentially effective market-driven incentive to improve forest management. In simple terms, the concept was to provide a guarantee to retailers and consumers that timber and wood products had been produced from enterprises that managed their forests in a sustainable way. It was anticipated that wood and timber products produced from independently certified sources could later be sold at premium prices.

Forest certification systems usually have the following elements:
- A set of 'standards' which represent 'good' or 'acceptable' practice. These must be locally relevant but have wider (national or international) compatibility and credibility.
- A formal auditing process for comparing the functions and activities of an enterprise with the standards.
- A system for identifying the source of a product. In the case of forest certification this means being able to trace the forest from which a forest product originates (commonly called a 'chain-of-custody' (COC) audit).
- A foolproof system for applying for a certificate and labelling any product.

Forest certification therefore includes a process by which the performance of 'on-the-ground' forestry operations is assessed against a predetermined set of standards (that make use of C&I). Timber or wood products produced from certified forests are then linked to markets through additional COC certification arrangements that ensure that the wood products from certified forests are labelled as such and reach the market without being 'mixed' with or substituted for wood from other sources.

Despite forest certification's rising to prominence primarily because of global concerns over the loss of tropical forests, the vast majority of certified forests are currently located in temperate and boreal regions of the North. Some certification companies focus entirely on this market segment. Gullison (2003) notes that by 2002 the Programme for the Endorsement of Forest Certification (PEFC)[4] scheme and the American Forest and Paper Association's Sustainable Forestry Initiative (SFI)[5] had certified the largest forest areas (c. 46.6 million ha and c. 30 million ha respectively at that time). The PEFC is a private-sector initiative that provides a mutual recognition framework for national (mostly European) standards, and the SFI primarily certifies privately owned industrial forests in the United States. Globally, the proliferation of international, regional and national certification schemes has led to the initiation of a process for mutual recognition[6].

4.4 Certification and the FSC

The largest and most significant forest certification system operating globally and including developing countries is that of FSC. The FSC is an international organisation offering independent third-party verification of forest management and timber products. It is a membership association open to a wide range of organisations and individuals. The FSC has internal voting processes that are balanced South and North, and some 560 individual, institutional and corporate members comprise economic social and ecological 'chambers' (FSC 2004). The FSC was a pioneer in the development of an internationally recognised system for forest certification and remains the only international forest certification system with wide geographical coverage that includes natural and industrial forest in both temperate and tropical zones.

The FSC was founded in 1993 after three years of extensive international consultation with a broad range of stakeholders and interested parties. The process included representatives from environmental institutions, the timber trade, the forestry profession, indigenous people's organisations, community forestry groups and forest-product certification organisations from 25 countries. This diverse group, representing social, economic and environmental interests, developed the FSC's Principles and Criteria (P&C) that apply to tropical, temperate and boreal forests. The FSC P&C are analogous to an international agreement to which FSC members, certification bodies, forest managers and FSC working groups are all committed. The 10 performance-based P&C underpin FSC certification but they do not represent standards against which forestry management operations can be directly assessed.

The FSC P&C are used for:
- development and evaluation of 'certification body standards'
- development and evaluation of 'regional/national standards'
- monitoring of certification decisions (by FSC and others)

Table 3. Forest Stewardship Council Principles

FSC Forest Stewardship Principles
1. Compliance with Laws and FSC Principles
2. Tenure and Use Rights and Responsibilities
3. Indigenous people's Rights
4. Community Relations and Worker's Rights
5. Benefits from the Forest
6. Environmental Impact
7. Management Plan
8. Monitoring and Assessment
9. Maintenance of High Conservation Value Forests (HCVF)
10. Plantations

http://www.fsc.org/fsc/how_fsc_works/policy_standards/princ_criteria

The FSC does not itself conduct certifications but, instead, accredits independent certification bodies to conduct impartial, detailed assessments of forest operations at the request of landowners. Assessments make use of approved forest management standards. If the forest operations are found to conform to FSC-accredited certifier standards, a certificate is issued, enabling the landowner to bring products to market (through additionally certified COC arrangements) as 'certified wood', and to use the FSC trademark logo.

It should be stressed that in conducting forest audits, FSC-accredited certification companies **do not** certify that a forest management unit has 'achieved sustainability', nor do they require or imply the implementation of uniform sets of forest management prescriptions: they certify that FSC-approved standards of forest management have been met. Nevertheless, these standards are widely accepted among a broad cross-section of stakeholders as being consistent with the principles of good forest stewardship and sustainability.

4.4.1 Global trends in FSC forest certification 1993–2004

The global total of FSC-endorsed certified forest is currently 47 million ha (UNEP-WCMC, WWF, FSC & GTZ (2004). The area of FSC-certified forests has risen rapidly since 1996 and continues to increase.

The area of forests certified in Asia, Africa and Latin America represents only 18 per cent of the total FSC certified area; the area of FSC-certified forests that occur within CIFOR 'mandate countries' exceeds 5.84 million ha. Whilst FSC has formally accredited 13 forest certification companies, analysis of the area of FSC-certified forests globally and in CIFOR 'mandate' countries shows that the certification agencies SmartWood, the Soil Association and Société Générale de Surveillance (SGS) Qualifor and, to a lesser extent Scientific Certification Systems (SCS), dominate FSC forest certification (Figures 5 & 8).

Figure 4 shows the rapid increase in FSC-approved certified forest areas since 1995. The graph also shows the timing of the main phases of the CIFOR C&I research; a period during which the major certification companies were engaged with the CIFOR C&I work and during which the generic certification standards used by these companies were developing rapidly. In this regard, the CIFOR C&I work was very timely.

Official statistics from the United Nations Environment Programme (UNEP) and the FSC show that the most active certification companies globally in terms of the areas of forest certified have been SGS Qualifor, Rainforest Alliance, SCS and the Soil Association. Figure 5 shows that these four certification companies
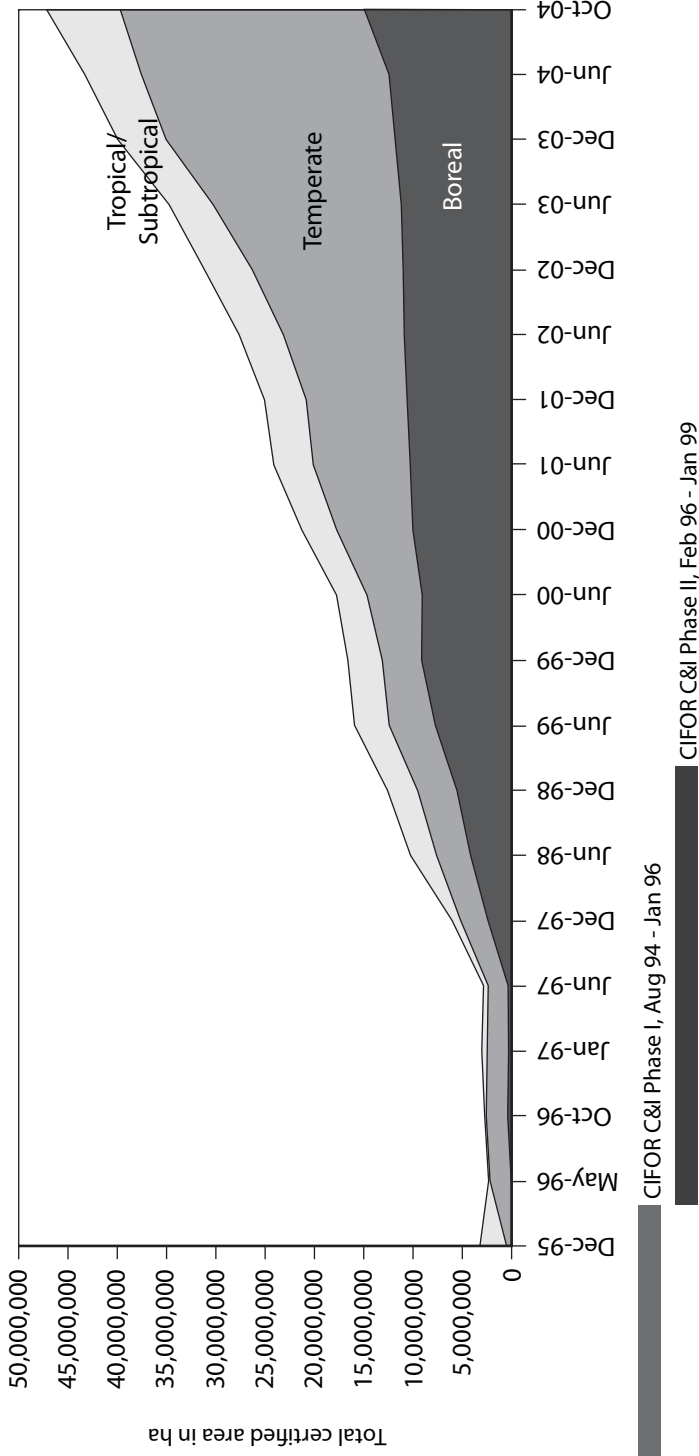
Figure 4. The rate of increase in FSC-certified forests 1995–2004

Certification Bodies (04/10/04)

% Total Certified Area

Number of Sites

Certification body	Total Area	% of Total
SGS Forestry QUALIFOR Programme	17,762,745	37.78
Rainforest Alliance SmartWood Program	13,663,343	29.06
Scientific Certification System (SCS)	7,990,036	17.00
Soil Association	5,725,868	12.18
Other Certification Bodies		
Skal	300,638	0.64
Silva Forest Foundation (SFF)	194	0.00
GFA Terra System	1,073,421	2.28
Instutut für Marktökologie (IMO)	284,452	0.61
Eurocertifor	1,012	0.00
SQS	7,078	0,02
CICLA	203,476	0.43
Total:	**47,012,263**	**100.00**

Certification body	No of Sites
Rainforest Alliance SmartWood Program	266
SGS Forestry QUALIFOR Programme	192
Soil Association	74
Scientific Certification System (SCS)	60
Other Certification Bodies	
Instutut für Marktökologie (IMO)	31
Skal	14
GFA Terra System	19
Silva Forest Foundation (SFF)	1
Eurocertifor	1
SQS	2
CICLA	6
Total:	**666**

Figure 5. Official FSC/UNEP statistics on the distribution of certified forest by certification companies (November 2004)

Forest Types (04/10/04)

% Total Certified Area

Number of Certified Sites
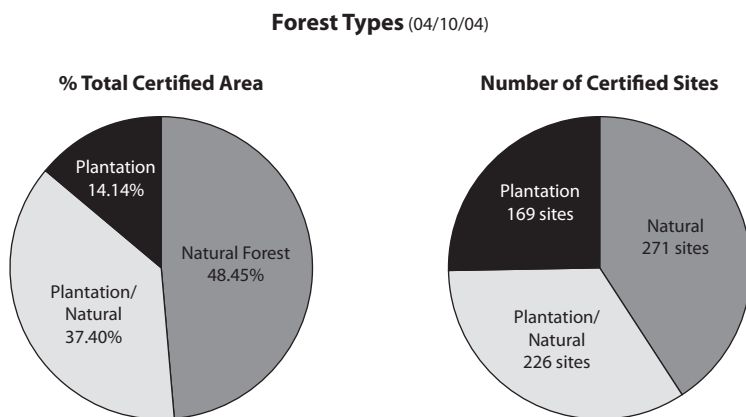
Figure 6. Official FSC/UNEP statistics on distribution of certified forest by forest type

Biomes - Preliminary Data (04/10/04)

% Total Certified Area

Temperate
52.60%

Tropical
15.60%

Boreal
31.98%

Number of Certified Sites

Temperate
482 sites

Tropical
157 sites

Boreal
27 sites
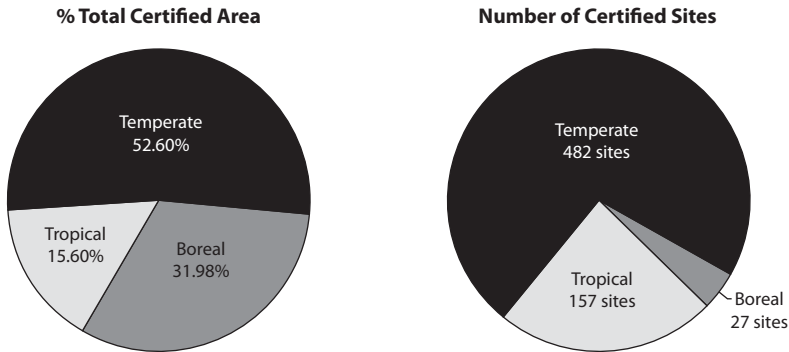
Figure 7. Official FSC/UNEP statistics on distribution of certified forest by 'biome'

**Scientific Certification
System**
470,982 ha; 8%

Soil Association
434,022 ha; 7%

SGS Qualifor
1,912,534 ha; 33%

Rainforest Alliance
3,038,619 ha; 52%
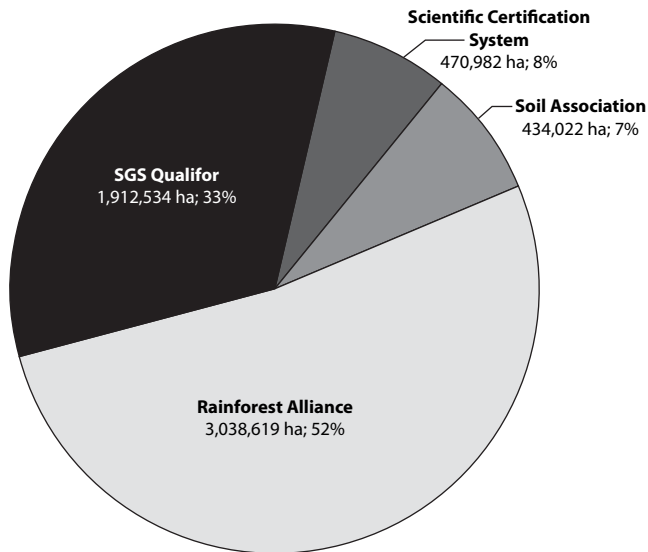
Figure 8. FSC-certified forest in CIFOR target countries[7] by certification company (November 2004)

are responsible for auditing over 96 per cent of the world's current FSC-certified forest operations. These FSC-accredited certification agencies are also far more important than other certification agencies with regard tropical forests and forests certified in the South (Figure 5).

The regulatory nature of the certification process means that **if CIFOR research has been used to improve the standards used by certification bodies, these improvements are then applied over large areas of forest**. The certification process, which includes annual auditing of forest management in certified forests, provides a link to 'on-the-ground' changes in management practice and an independently verified assurance that improvements in forest management are sustained during the period for which the certification is valid.

4.4.2 Forest management standards

One of the most important organisations in standard-setting and certification is the International Organisation for Standardisation (ISO), an independent body based in Geneva, co-ordinating and managing the development of hundreds of international standards for different industry sectors.

Forest certification is a relative newcomer in the arena of standards and certification. High standards of management performance for forest enterprises can be independently verified by the ISO, but do not focus on 'outcomes in the forest'. The FSC standards and those of the ISO 9000 and 14000 series relating to Quality Management Systems and Environmental Management Systems (QMS and EMS) are complementary and provide assurances that are different but not contradictory. The ISO standards deal largely with management systems (process), whilst national and regional standards of FSC and accredited certifiers are strong on performance levels (outcomes in the forest). This study focuses on the latter.

The FSC standards are explicitly designed to support statements about the quality of the forest management operations, and claims about good forest management. The standards applied to forest management by certifiers are required to cover all aspects of the FSC's P&C[8].

Gullison (2003) regards the FSC standards (as opposed to PEFC, SFI, Malaysian Timber Certification Council (MTCC) etc.) as being the most demanding of all the certification systems with respect to biodiversity conservation. This view is supported and further strengthened by the findings from a recent independent review of forest certification schemes commissioned by the British government. The Central Point of Expertise on Timber Procurement (CPET 2004) review found that only the FSC and Canadian Standards Association satisfy the UK government's contract definition of sustainable forest management (used for timber procurement by the UK government). The PEFC certification label was downgraded to evidence of 'legal' sourcing only. Along with PEFC, the SFI and the MTCC have also been classed as proving 'legal' but not sustainable sourcing. Standards are therefore pivotal to certification and to the implications for 'on-the-

ground' changes in forest management. Standards provide the basis for the quality of any certification scheme and are the frame of reference for any claims made in relation to it.

In the early years, FSC certification bodies were free to develop their own structure in specifying forest management standards. To help ensure the application of more consistent assessment methods by different certifiers and promote transparency through public reporting, the FSC General Assembly demanded, in 1999, that certifiers adopt the FSC P&C as a common structure for their forest management standards.

Forests vary enormously in their biology, climates, soils and social and economic contexts. Definitions of 'sustainable forest management' also vary, but all agree that it involves a balance of economic, environmental and social requirements. However, it is often impossible to achieve all of these simultaneously and sometimes conflicts arise. In common with CIFOR's mission, sustainable forest management encapsulates multiple objectives which, although not mutually exclusive, are not necessarily wholly convergent.

Nussbaum *et al*. (2002) observe in regard to defining certification standards, '*it is not possible to simultaneously fulfil an economic desire to fell trees and an environmental desire to leave an area as pristine forest. Similarly, it is not possible to simultaneously protect wildlife for environmental purposes and meet a social requirement to allow unlimited hunting. Therefore, decisions have to be made about how to deal with conflicting requirements*'… '*we do not have all the necessary information to understand and model in detail the way in which forests function, nor their response to the disturbances inherent in management. There are many gaps in the information where it is incomplete or totally lacking. Therefore, we have to base any standard on the best available information combined with decisions about what to do when there are uncertainties*'.

The development of forest certification standards is often a process involving a variety of information sources and a range of interest groups. Figure 9 presents a schematic diagram of the types of inputs and decision processes that can prevail in forest certification standard setting.

FSC-approved national/regional standards are developed through a highly consultative multi-stakeholder process and yield a 'multi-stakeholder' standard. Such processes aim to produce a standard which is intentionally specific – i.e., specifically adapted to whatever social, environmental, administrative and economic conditions are unique in the appropriate region.

In general, FSC certification bodies proactively seek stakeholder inputs to their generic standards and checklists. Generic standards and checklists are subject to scrutiny by the FSC. In setting standards a certification body aims to produce a standard which is intentionally 'generic' – i.e., usable in all situations at all times. The 'generic standard' is then adapted to national/subnational or regional levels to incorporate the specifics of applicable legislation and the comments of stakeholders. These 'locally adapted' standards for forest certification either implicitly or explicitly inform a decision-making framework. Thus the standards applied in any given field-audit context involve stakeholder inputs, but decisions on their final content are taken by the accredited certification companies themselves rather than through use of consultative voting or consensus-based processes.
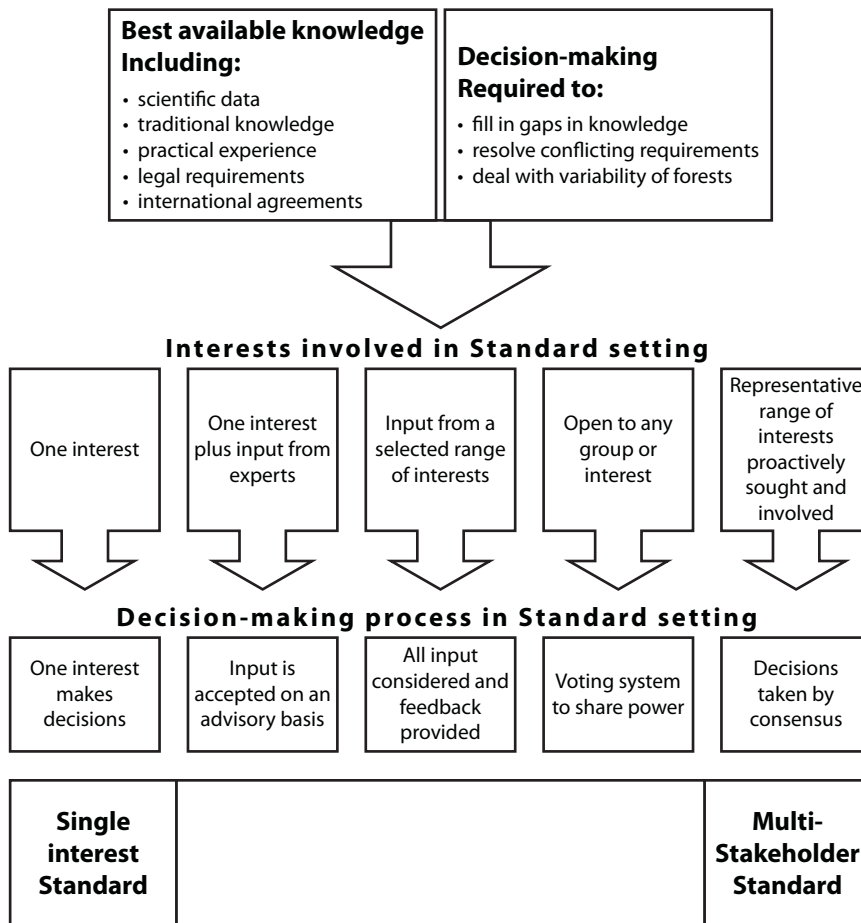
Figure 9. Inputs and decision processes in forest certification standard setting

In this context, research and science-based information is often only one source of information among many other competing sources and interests that contribute to the development of standards used in certification processes.

4.5 Uptake of CIFOR'S C&I research by FSC certifiers

As shown in Figure 8 above, only a few companies have been responsible for the bulk of FSC-certified forests. Standards development within these certification companies progressed rapidly between 1994 and 2000. However, there were relatively few individuals within these companies responsible for the refinement of certification standards. Key staff of certification agencies employed at the time that early certifier standards development took place were canvassed for their perspectives on whether or not the CIFOR C&I research played any role in the development of those standards and, if so, what the likely outcome would have been in the absence of the CIFOR work. In addition, project documentation (reports, meeting minutes and emails), published documents and internet resources were examined for evidence of FSC certifiers making use of CIFOR's C&I research.

4.5.1 Comparing the content of the CIFOR generic C&I with published FSC certifier standards

An attempt was made to determine the extent to which CIFOR C&I research was used or adopted by the FSC, national FSC working groups and forest management certification companies. The P&C of the FSC and the standards that the major forest certification agencies currently apply in their work to assess the sustainability of operational forest management practices were examined. The specific language and meaning of certifiers' 'base' indicator sets produced prior to the CIFOR work were compared with the standards that they currently apply, the idea being that changes in certifier standards incorporating C&I phraseology unique to the CIFOR 'generic C&I template' could indicate uptake of CIFOR C&I.

Direct comparisons of the language and content of the CIFOR C&I with those contained within the standards used by certifiers proved difficult in practice for three major reasons:

i)   The CIFOR Phase I research tested a large number of C&I, many of which were drawn or modified from the initial certifier 'base sets' of C&I of SmartWood, the Soil Association, Woodmark (and others), thus the presence of C&I that appear to be drawn from the CIFOR C&I set may, in fact, themselves have been modified from original certifier base sets.

ii)   Crucially, in 1999, the FSC issued a requirement that accredited certification bodies must present their C&I-based standards in a manner consistent with the format and structure of the FSC P&C. This requirement forced all FSC-accredited certifiers to restructure their base indicator sets. The CIFOR 'generic C&I template had already been developed and published shortly before this FSC requirement was decided upon and announced. Although the scope and content of the CIFOR generic C&I set are broadly consistent with the FSC P&C, they are structured quite differently. Thus, when certifier standards were revised to comply with the structure required by the FSC, incorporation of any CIFOR C&I would have required modification in terms of the specific language used. Direct comparisons of specific C&I contained within published certifier standards 'before' and 'after' the CIFOR research were therefore problematic.

iii) The inclusion of indicators that appear to support the case for use of CIFOR research findings may also reflect changes to the C&I developed independently by certifiers as their field experience grew.

Whilst there were a great many similarities in the content of the C&I currently used by certifiers and those appearing in the CIFOR 'generic set', the findings from this analysis proved equivocal.

4.5.2 Evidence of research uptake by Smartwood – Rainforest Alliance

SmartWood was established in 1989 and became the world's first independent forestry certifier, pioneering the concept of forest and forest-products certification that has since taken hold around the world. SmartWood was a prime-mover in promoting forest certification globally and is currently the world's leading non-profit forestry certifier with 14.8 million ha of forest in approximately 50 countries.

In 1991, the Rainforest Alliance's SmartWood Program presented its draft 'Generic Guidelines for Assessing Natural Forest Management' as the first broadly based (i.e., worldwide) set of evaluation or assessment criteria applicable at the field or operational level. At the same time, SmartWood developed and distributed region-specific guidelines for the management of natural forests in Indonesia, and in 1993 distributed its draft 'Generic Guidelines for Assessing Forest Plantations' whilst revising its guidelines for natural forest management. In 1998 SmartWood again revised its criteria for assessing forest management in both natural forests and tree plantations. These 'Generic Guidelines' were reviewed and approved by the FSC. Soon after, in 1999, SmartWood again revised its generic guidelines to comply with the structure of the FSC P&C.

Richard Donovan, Smartwood's Chief Forester, a key figure in certification since its inception, made the following comments regarding the utility and impact of the CIFOR C&I research.

'The [CIFOR C&I] field tests helped to change the way people looked at sustainable forest management'… 'they helped to inject realism into a debate that was often very theoretical'… 'CIFOR and its partners went into the field and looked at what worked and what didn't work. That made a big difference.'

According to Donovan, SmartWood has continued to make occasional use of the CIFOR C&I Toolbox in periodic review and update of its indicator sets.

In developing its standards it is clear that **SmartWood made use of CIFOR C&I research**. This is acknowledged on its official website and **appears in the text of its current generic standards set**[9]. Significantly, the SmartWood generic standards form the basis of the interim standard sets that are adapted for certification audits of forest management in a range of different countries.

'we believe these criteria are in accord with the intent of relevant forest management and biological conservation guidelines issued by the International Union for the Conservation of Nature (IUCN) and the International Tropical Timber Organization (ITTO). **We have also drawn on work by the Center for International Forestry (CIFOR)**, World Rainforest Movement, International Labor Organization (ILO), and FSC regional standards working groups.'
SmartWood Generic Guidelines for Assessing Forest Management (2000).

Interim standards are used by SmartWood where there are no FSC-approved national/regional standards. Some SmartWood interim standards refer specifically to CIFOR C&I research in similar terms to that quoted in the generic SmartWood standard. Table 4 shows published SmartWood interim standards that are derived from the generic Smartwood standard, and highlights which of them contain a formal acknowledgement of the CIFOR research. The areas currently certified by SmartWood using these interim standard sets are also shown where data is available.

SmartWood interim standards for Costa Rica, Guatemala/Belize, Honduras, Mexico, Nicaragua, Panama, Uruguay, Spain, Argentina and Venezuela are all modified from the generic standard but do not contain a specific acknowledgement of the CIFOR research contribution.

Table 4. SmartWood certification interim national standards for assessing forest management[10]

Country/ region	Current certified area (ha)	Year standard produced/ revised	Specific reference to CIFOR in standard	Country/ region	Current certified area (ha)	Year standard	Specific reference to CIFOR in standard
China	6,177	2003	Yes	Australia	509,716	2002	Yes
Lao PDR	-	2003	Yes	Japan	148,600	2002	Yes
Indonesia*	90,240*	2003	No*	New Zealand	109,329	2002	Yes
Thailand	-	2003	Yes	Portugal	-	2003	Yes
Ecuador	1,341	2002	Yes	Russia	812,849	2003	Yes
Chile	64,570	2002	Yes	Southern USA	No data	2003	Yes

*The Joint Certification Protocol between FSC and Lembaga Ekolabel Indonesia (LEI) certification bodies (2001) specifies that the LEI C&I will be used for natural forest management certification by all certification bodies operating in Indonesia. LEI was a key collaborator in CIFOR's C&I project, and the C&I research was used extensively by LEI, especially in the development of their social C&I.

CIFOR project staff also received a personal communication in 1997 from Mr. Tasso Rezende de Azevedo, Director of Imaflora (SmartWood's affiliate organisation in Latin America) on the utility of the C&I developed during the CIFOR Brazil test as forming the template for the development of a set of C&I used in the certification of Precious Woods (Mill Madereira), Manaus, one of the earliest forests to receive FSC certification status in Brazil (De Camino and Alfaro 1998).

Counterfactuals with regard to CIFOR's influence of SmartWood's standards remain difficult to determine. The comments from Richard Donovan, Smartwood's Chief Forester, and the supporting fact that the standard sets acknowledge CIFOR's research inputs imply that the CIFOR research helped speed the development of C&I and enhanced their practical utility and scientific credibility. The research also helped SmartWood to focus its certification standards development processes on C&I that performed well in a range of conditions, and highlighted areas where more effort in C&I development was required.

Without the CIFOR research it seems unlikely that SmartWood certification standards would have developed very differently, although perhaps in some aspects they would have developed less rapidly and possibly less effectively (e.g., with regard to social C&I and effective methods for stakeholder consultation). The utility of the CIFOR C&I tests in this regard is acknowledged.

4.5.3 Research uptake by SGS Qualifor

SGS is an international inspection, verification, testing and certification company, originally founded in 1878 in Rouen as a French grain shipment inspection house. The company was registered in Geneva as Société Générale de Surveillance in 1919, and SGS became active in forest certification in the early 1990s, launching the 'Qualifor' certification programme.

SGS Qualifor develops 'checklists' based on an endorsed FSC national standard if it exists. Otherwise SGS develops a set of C&I based on the generic SGS Qualifor checklist together with any draft local FSC standard, local requirements or codes of practice. There is no direct reference to CIFOR (or any other research or information source) evident in the standards documents.

However, evidence from key informants suggests that the CIFOR research had a positive influence on SGS forest certification standards and audit procedures. This includes the following written comment from SGS staff involved in the key standards development work in 1998 sent to the CIFOR research team.

Box 1. Research influence on SGS standards and audit processes

'The whole area of defining and judging or certifying sustainable forest management is one which is fraught with practical, political and scientific problems… [The CIFOR] team managed to pull together policy makers, foresters and academics and not only get them to discuss the issues but also to test things out in practice, which pushed the whole debate forward in a constructive and practical way.

One particular feature of the project is that CIFOR was perhaps one of the only organisations which could do this. I feel that it is a perfect example of what CIFOR as an international, non-aligned entity can do. Research on forests themselves will always have to be done through local projects, but research into international policy issues with very significant local implications fits perfectly within the mandate of an organisation such as CIFOR…in particular the work done by Carol Colfer and her associates on social issues in forestry – in many ways the most difficult area to tackle. Her work on ranking the importance of stakeholder requirements, published in a CIFOR paper, has formed the basis for our stakeholder consultation programme which is increasingly successful …as a way of tackling the need to involve a wider range of interested parties in forest management.'

R. Nussbaum, Director SGS Qualifor, 1998

This comment was verified in a key informant interview with Ruth Nussbaum. The CIFOR work was of utility in helping SGS to develop its stakeholder consultation processes and helped to inform its standards development process, particularly with regard to social issues, stakeholder consultation, and 'intergenerational access to resources' in sustainable forest management[11] but there was no 'wholesale adoption' of CIFOR's generic C&I.

Without the CIFOR research it is likely that audit processes for stakeholder consultation and indicators relevant to local stakeholder interests would have developed more slowly, therefore outcomes in the field may, initially at least, have been less consultative and less responsive to local stakeholders and risked greater conflicts of interests with local communities.

There is a strong and plausible case that certification standards and audit processes were improved, especially with regards to their treatment of social issues relating to forest-dependent communities. Broad stakeholder acceptance of Qualifor standards may have also been enhanced by the credibility afforded to them by the independent CIFOR field tests.

4.5.4 Research uptake by the Soil Association – Woodmark

The Soil Association is an environmental non-governmental organisation (NGO) with a non-profit status. Since its foundation in 1946, the Soil Association has promoted the sustainable use of land and natural resources, focussing on organic agriculture. The Soil Association established a certification and labelling system for organic foods in 1973 and entered the forestry realm with the production of the Responsible Forestry Standards in 1992, launching the Woodmark scheme in March 1994. The Soil Association 'Woodmark' generic standards reflect FSC P&C, have been through several revisions, and were last updated in 2004.

Key informant interviews with both current and former employees (Jones, Rowland and Wenban-Smith personal communication) suggested that CIFOR C&I research was important in the development of Woodmark standards. Rowland and Wenban-Smith commented that the CIFOR C&I work was important because it highlighted potential C&I and possible audit approaches to tackle key elements of the FSC P&C dealing with tenure and use rights, indigenous people's rights and community relations (e.g., stakeholder consultation tools and processes). CIFOR C&I were not used directly in the Woodmark standard, however the CIFOR Toolbox was used as an important reference text during the standards development process and helped focus the Soil Association's attention on aspects of sustainable forest management that had not been adequately dealt with in earlier standard sets. For example, the C&I dealing with biodiversity

in the generic CIFOR C&I highlighted the importance of developing C&I to capture ecological processes that are important for the retention and maintenance of biodiversity. However, the specific biodiversity C&I presented by CIFOR were regarded as being too 'academic', too costly and impractical for direct application in forest certification audits.

The CIFOR C&I research was acknowledged by Soil Association staff as having been useful and important during the early years of certification standards development. The effect of research on those standards was difficult to quantify; however, it is likely that without the CIFOR research the focus on biodiversity and social issues would have received less attention and taken longer to refine within certification standards.

Broad acceptance of the Woodmark standard may possibly have been aided by the credibility afforded by the independent CIFOR field tests of their standard sets. Presumably, without the CIFOR work such acceptance may have taken longer.

4.5.5 Research uptake by SCS

SCS is an FSC-accredited company based in the United States. SCS was established in 1984 as the first third-party certifier for testing pesticide residues in fresh produce in the United States. It expanded into forest certification, first developing its Forest Conservation Program in 1991. SCS operation guidelines were developed in 1994 and published in 1995, before the inception of the CIFOR project. SCS entered the certification scene with a focus on forest certification in North America. The most recent SCS 'Generic Interim Standards for Natural Forest and Plantation Forest Management Certification' were published in early 2002. These follow the structure of the FSC P&C. SCS was not involved in the CIFOR research project as collaborators nor were the SCS standards included in the original base sets of C&I that were tested. Evidence of direct uptake and indirect influence of CIFOR research on SCS standards is lacking, and the senior SCS forestry representative, Robert Hrubes, indicated that SCS did not consider the CIFOR research to have been influential in their standards development processes. The main reasons for this were SCS's predominant focus on North American commercial forests and CIFOR's focus on forests in tropical developing countries of the South.

4.6 Summary of uptake of CIFOR research in FSC certification standards and audit processes

The CIFOR C&I research has had a positive effect on the development of generic standards sets used by globally important FSC certifiers. The CIFOR work tested indicator sets for assessing forest management at the FMU level in multiple field settings, providing independent feedback on which C&I were broadly applicable

thus speeding the development and refinement of FSC certification bodies' standards. This testing process, coupled with CIFOR's perceived status as an independent international research organisation, helped improve the legitimacy and credibility afforded to FSC certifier standards for forest management across a wide range of stakeholders in government, industry and environmental NGOs. The methods applied demanded testing of C&I in local settings with a multidisciplinary team of experts, gaining local acceptance of the results and presenting C&I science findings in important international and national policy events as well as producing peer-reviewed publications.

Without the CIFOR research there would have been no structured scientific comparison of different indicator sets, and an absence of third-party, objective, science-based feedback to certifiers to assist their standards development processes. The utility and credibility of certifier standards would, perhaps, have been called more into question. The process of developing the forest management standards used by certifiers is not driven purely by scientific assessments of the sensitivity, reliability and relevance of the C&I they might potentially adopt. Whilst certifiers made use of the science available during the development of their standards sets and audit procedures, these processes, inevitably, involved negotiations and discussions with a range of different stakeholders and were subject to a variety of social, economic and political influences that reflected multiple interests. Decisions regarding the standards sets adopted were (and continue to be) taken largely independently of the actions of scientists and research institutes. The linkage between research and certifier standards is therefore somewhat diffuse; however, CIFOR research did play a significant role in standards development processes by involving certifiers in the CIFOR research and engaging professional staff from certification bodies in testing and appraising CIFOR C&I.

The CIFOR C&I research highlighted areas of weakness and inconsistency in certifier C&I sets and showed that it is not practicably possible to have a single set of universally applicable C&I. The research provided information on limits to the geographical generalisability of forest management standards. For example, indicators of 'social sustainability' are quite site-specific and were relatively weak in the early base sets of C&I that were tested. The CIFOR work helped bring credibility and legitimacy to social sustainability issues that were initially regarded as very difficult to incorporate in assessments of sustainable forest management and forest certification processes. The CIFOR research highlighted the need for, and provided tools to adapt, indicator sets to local conditions. The staff of certification companies in the early years of standards development often tended to lack an in-depth exposure to pragmatic social science methods that inform these aspects of sustainability. Some of the CIFOR methods were applied in the certification process (auditing) and incorporated into performance measures relating to local stakeholder consultations and 'intergenerational access to resources' in sustainable

forest management. Thus the CIFOR research helped focus the attention of certifiers on social sustainability issues in certification processes and helped speed the development of 'social' C&I. The CIFOR research similarly helped improve the focus on biodiversity issues although the C&I developed by CIFOR lacked practical utility for field audits.

SmartWood acknowledges CIFOR input to its current set of 'generic' standards for operational management of natural tropical forests. The Soil Association's Woodmark acknowledged CIFOR's input in the preparation of its operational forest management standards by highlighting key issues and weaknesses, e.g., social issues and biodiversity aspects. SGS Qualifor acknowledged CIFOR's role in improving its approaches to stakeholder consultation processes in certification and made use of CIFOR's C&I Toolbox volumes 6 & 7, which focus on human well-being. All three certifiers have made use of the CIFOR C&I Toolbox as an important reference text. There is no direct evidence of any CIFOR research influence on SCS.

The benefits derived by certifiers from the CIFOR research have, according to the key informants, been generated as much by the research process itself as by the research products. This, coupled with the range of different stakeholders involved in certifier standards development processes, has made it particularly difficult to discern the 'uptake' or 'transfer of technology' of the CIFOR research and attribute changes to the resulting certifier standards in quantitative terms. The use and influence of the CIFOR work is real and widely acknowledged, but remains nuanced and indirect. Since certifier staff found it difficult to quantify 'uptake', it is correspondingly difficult to establish and quantify counterfactuals.

However, the fact that the CIFOR C&I research occurred during the rapid early phases of the emergence of FSC certification and had a positive effect on standards development and audit procedures of key certification companies is very significant. It is significant because improvements are linked directly through the regulatory system of the certification process to improvements in forest management 'on the ground'.

Since the CIFOR study was completed, large areas of forests have been certified using generic standards to which the CIFOR work contributed. The global total of FSC-endorsed certified forest is currently over 47 million ha. **Over 79 per cent or 37.1 million ha of forest have been certified by companies that acknowledge some use of CIFOR's C&I research in their certification standards or audit processes**. Since generic certifier standards are used to derive the standards used in a specific FMU, the 'domain of application' of such standards is very widespread. 'Spillover' effects are very large because the bulk of the world's certified forests

are located in the developed countries of the North – outside the countries that are central to the Consultative Group on International Agricultural Research (CGIAR) mission.

Table 5. Summary of impact pathway via certification standards

Key components of the impact pathway	CIFOR C&I research involved key individuals and certification organisations in the project process. CIFOR conducted systematic independent testing and comparison of C&I already in use by certifiers. ➜ Test results and field methods to assess social issues and biodiversity were highlighted. ➜ The research added to general perceptions of the credibility of forest certification organisations and the utility of their C&I.
Intermediate outcomes	CIFOR C&I research helped improve FSC certifier standard sets in some aspects of their content and scope (especially 'social' C&I). In some instances, audit processes made use of CIFOR methods
Changes to on-the-ground forest management	Certifier companies apply forest management performance standards that use C&I in certification assessments. Forest management on the ground improves against the standard as managers comply with certifier performance requirements – improvements are documented in published public records.
Mission-relevant impact	Benefits from certification vary considerably for each forest – depending on what aspects of management (social, environmental, goods, services etc.) improve in response to certification. Typically, environment–worker welfare and community consultations improve.

4.7 Uptake of CIFOR's C&I research in FSC international policies and accreditation standards

The formulation of polices and decision-making processes within the FSC includes a wide array of stakeholders. Whilst the FSC's polices and decision-making processes make use of the available science, research is only one source of information among many competing sources. However, the FSC was engaged in the CIFOR C&I work from the beginning, and provided limited financial support for some of its activities.

The FSC's Executive Director, 1994–2001, Dr Tim Synnott, was an active member of the CIFOR C&I IPAP throughout the life of the project. The official minutes from the 5th IPAP meeting in 1998 record his statements. He notes that the FSC looked to CIFOR to identify simple C&I, but also demanded that they have a solid scientific basis: 'The [CIFOR C&I] Toolbox is needed to demonstrate the scientific basis of the C&I'.

The FSC refers to the CIFOR C&I research within its guidelines to certification bodies.

'FSC contributed funding leading to the preparation of a paper written under the CIFOR programme for development and evaluation of criteria and indicators for forest management. The paper 'Rational exploitations: Economic criteria and indicators for sustainable management of tropical forests' by Ruitenbeek H.J. and Cartier C. (1998), is available from CIFOR and FSC"… "Certification bodies and FSC National Initiatives are encouraged to study the CIFOR paper, especially Table 5 'Recommended Criteria and Indicators', with a view to improving the certification bodies' 'generic standards', and FSC Regional Standards. FSC does not at present recommend further specific criteria and indicators for financial evaluation.' 'FSC Guidelines for Certification Bodies' (FSC 2002a).

Generally, the FSC regarded documents produced from the CIFOR project as important science-based resources of particular relevance for national/regional initiatives developing C&I-based standards, especially those in tropical developing countries.

Box 2. FSC perspectives on CIFOR C&I research

Later reflections from the former Executive Director highlight the limited direct use and uptake of CIFOR C&I by the FSC (Synnott personal communication).

'I was a strong supporter of the project, during the IPAP process, before the whole business of independent [certification] assessments became mainstream. Since then, the CIFOR toolkit has been regularly cited and acknowledged, and sometimes quoted, in the documentation surrounding national standards or certification systems, but, … the CIFOR work was not widely "adopted".

'One reason for the limited uptake was that the CIFOR outputs appeared to be designed as research tools. They sometimes gave me the impression that they were best suited to research teams objectively assessing the level and impacts of forest operations. The world of certification is less research-oriented. The teams and committees that develop national standards have little time for intensive background reading. They are concerned with developing a consensus among people with differing knowledge bases and objectives. They are also concerned with how a small team of assessors (not researchers) can audit compliance with precisely worded thresholds like the FSC P&C, which do not necessarily involve the deeper questions covered by the [CIFOR] toolkit.'

M. Wenban-Smith – Head of the FSC Policy and Standards Unit at FSC Headquarters – commented that the CIFOR C&I Toolbox has been of use as a general reference text, a major limitation to its utility from the perspective of FSC certification being the fact that the CIFOR C&I did not correspond to the structure of the FSC P&C. In addition, the CIFOR Toolbox was rather large and detailed, making it difficult to use quickly and effectively by the small number of extremely busy professionals involved in practical certification and accreditation activities.

As recently as November 2004, the FSC Board of Directors approved an international policy on the 'Structure and Content of Forest Stewardship Standards'. In this new policy the FSC states that guidance on the development of forest certification standards is also available in the 'Pathfinder' tool that CIFOR helped to produce. CIFOR staff were also involved in consultations surrounding the formulation of the FSC's 'Social Strategy – Strengthening FSC Commitment to People' (FSC 2002b). Generally, the evidence suggests that direct CIFOR research influence on the procedures and policies of the FSC have been relatively minor.

However, there is still a potentially large global impact from CIFOR research in the offing. The FSC is currently moving to assert greater influence on how C&I are implemented by certifiers across all FSC Principles and are seeking CIFOR scientific inputs in the specification of appropriate C&I and the development of 'best-practice guidelines' for this purpose. This initiative will affect the 'implementation' of criteria, indicators and verifiers used in accredited FSC certification body standards world-wide.

4.8 Uptake of CIFOR's C&I research in FSC's national/regional standards and initiatives

The FSC's P&C for Forest Management are fixed and serve as the global foundation for the development of FSC forest-management standards. The FSC's P&C do not of themselves constitute a forest stewardship standard because they require further interpretation and the addition of indicators and verifiers in order to be implemented at the FMU level. Standards must therefore be developed to reflect local ecological, social and economic factors while adhering to FSC P&C. For this reason, the FSC has supported the development of national and local standards developed by national and regional working groups, which work to achieve consensus amongst the wide range of people and organisations involved in forest management and conservation in each part of the world (FSC 2003).

In order to ensure the consistency and integrity of standards in different regions around the world, each set of forest stewardship standards must be endorsed by the FSC Board of Directors. These requirements refer to both the content of the standard and the process used to draw it up, including compatibility with FSC P&C and a meaningful and representative local consultation process. **Once a forest stewardship standard has been endorsed by the FSC, all certification bodies must, at a minimum, use that standard in their certification processes within the geographical range (or scope) of the standard.**

Thus if research influenced the outcome of an approved national/regional FSC standard-setting process it would have a lasting effect on all forests certified in that country because FSC certification bodies are required to use the approved national/regional standard, and existing certified forests would also be required to conform within a specified timeframe. FSC-approved national/regional standards are specifically adapted to the social, environmental, administrative and economic conditions prevailing in the appropriate region, and since national standards development processes are iterative and participatory it is often challenging to establish the uptake and influence of research on such standards. CIFOR's generic C&I have often been used a starting point for C&I development. In locations where CIFOR conducted a field-based comparison of C&I performance and identified the most relevant C&I for local conditions, the potential for CIFOR research findings to influence FSC national/regional standards development processes is far greater.

Currently, the following national/subnational schemes have been endorsed by the FSC: UK, Sweden, Bolivia, Canada - Maritimes, Belgium, Germany and Brazilian Amazon. There are a number of 'affiliated' national/subnational schemes that have yet to be fully endorsed by the FSC[12]. Generally, forest certification is moving ahead more rapidly than national/regional standards development processes, so there are many countries where national initiatives are still in an embryonic stage, but there are certified forests. In such cases, certification evaluation is carried out using a 'generic' forest stewardship standard, designed by the accredited certification body but 'adjusted' to local conditions. The fact that there are relatively few FSC-approved national/regional standards in developing countries is, perhaps, the result of the high costs of the multi-stakeholder processes required to reach consensus at a national/regional level and gain formal FSC approval. In many developing countries there are allied practical difficulties in finding financial sponsorship.

National governments have also pursued the development of forest management standards for use in national legislation and regulations. Because FSC certification requires compliance with all relevant forest laws and regulations, these too can lead to impacts in certified forests.

Evidence of uptake of CIFOR C&I in national initiatives and legislation in developing countries was sought largely from publicly available documents, key informants and correspondence records of the CIFOR C&I project.

4.8.1 Brazil

Leading socio-environmental organisations collaborated with industry in 1997 to create an FSC Working Group to define nationally appropriate criteria for forest plantations and management of *terra firme* forests in the Amazon. National NGOs and certifiers were engaged in a protracted debate on the socio-environmental content of the standards, as well as in their field-testing (May 2004). After intense stakeholder involvement by industry, academia and NGO representatives, the group published its first operating norms for plantation forests in 1997. The national standards for *terra firme* forests of the Brazilian Amazon were finally formally approved by FSC International in 2002[13], after several more stakeholder consultative iterations. The standards for plantations have yet to be recognised formally. The Working Group was later transformed into an FSC-affiliated National Initiative[14].

The CIFOR Brazil test provided a practical field-based test of a wide range of C&I. These findings were important in the preparation of the FSC standards in Brazil. SmartWood's Imaflora had been very active in promoting certification in the early years of its development. As noted earlier, personal communication from Mr Tasso Rezende de Azevedo, then Director of Imaflora (a member of the SmartWood network) commented on the utility of the C&I developed during the CIFOR Brazil test forming the template for the development of a set of C&I used in the certification of Precious Woods (Mill Madereira), Manaus. Imaflora have subsequently been involved in much of the certification efforts in Latin America and were, in turn, a key organisation in the development of the FSC-approved Brazilian standards.

Critically, Bruno Martinelli (FSC Brazil) stated that 'CIFOR C&I were used in the preparation of the FSC standards for the management of *terra firme* (upland) forests in the Brazilian Amazon'. The published FSC standards for *terra firme* forests, however, contain no specific reference to or acknowledgement of the CIFOR C&I research. Walter Suiter of FSC Brazil, when interviewed in 2000 (Parasram 2000), also confirmed that the CIFOR C&I Toolbox had been used by the FSC and other members of the national working group. Several expert participants in the CIFOR C&I test in Brazil (V. Viana, N. Silva) also played an important role in the national standards development process.

CIFOR contributions to the FSC-approved standard for Brazil are acknowledged, but again counterfactuals are difficult to establish because the standard development process was highly iterative, involved many different stakeholder consultation events, and continued over a timeframe that was far longer than that of the CIFOR research project.

4.8.2 Guatemala, Honduras, Guyana, Costa Rica and Nicaragua

Centro Agronómico Tropical de Investigación y Enseñanza (CATIE) staff member B. Louman (personal communication) reports use of CIFOR's C&I and research methods to develop and validate standards in a range of situations:

- The current standard used for the tropical forests in Peten, Guatemala, as well as the Guatemalan national standards are based mostly on the work done by Román Carrera (former CATIE Mg.Sc. student), who utilised and adapted CIFOR's C&I methodology. Forest concessions within the Mayan Biosphere Reserve must achieve FSC certification within three years (Carrera *et al.* 2004). The FSC requires that management comply with national legislation.

- The same methodology was applied to develop standards for certification of protected areas in Costa Rica, Honduras and Guatemala. This work, carried out by Maria Padovan, was supported by Worldwide Fund for Nature (WWF)-Canada and CATIE. The CIFOR methodology was also adapted for the evaluation of sustainability of parts of the Mesoamerican Biological Corridor.

- In Costa Rica, Mg.Sc. students Sara Yalle and Miluzka Garay developed a standard to evaluate the effects of certification and the payment for environmental services on forest management, applying CIFOR's methodology and taking into account CIFOR's C&I. The study was an important input into the discussions about governmental support to certification and payment for environmental services in managed natural forests in Costa Rica.

- McGinley and Finegan validated the ecological C&I of the Costa Rican standard, comparing them with CIFOR's standard. This analysis helped prepare recommendations for modifications of the Costa Rican standard, some of which were applied (see McGinley and Finegan 2003). CIFOR C&I methodology was also applied in the work carried out by Andres Garcia to develop a standard for monitoring the planning of a model forest in Costa Rica.

- In Guyana, the C&I from CIFOR were considered in the development of the national standard for certification, and parts of the methodology for development and validation were applied in combination with FSC requisites.

In summary, the formulation of national standards in Costa Rica, Guatemala and Guyana benefited from the methodology and some of the C&I developed by

CIFOR. These have 'on-the-ground' consequences because certification bodies are required to audit compliance with FSC-approved national standards of government policy/legislation.

Nicaragua has elaborated proposals for national standards following the FSC guidelines. An independent case study on the development of national standards in Nicaragua is presented within 'Developing Forest Stewardship Standards – A Survival Guide' (Scrase and Lindhe 2001). The role of the CIFOR research in developing national forest management standards is described, the author of the case study, J.R. Guillen, of NICAMBIENTAL, Managua, Nicaragua, stating:

Box 3. CIFOR research influence on national forest standards in Nicaragua

'The field testing methodology for the evaluation of the indicators was elaborated by a consultant and was based on investigations developed by CATIE/CIFOR, which were revised and modified by the Standards Committee created by the Working Group. This methodology included a simple program for processing the field data that allowed a statistical evaluation of the applicability of the proposed indicators, not as a decisive factor but as input for the analysis by the evaluators.'… 'The Nicaragua initiative has learned from the initiative of Bolivia. It has investigated the functioning of other initiatives and has taken into account experiences like CATIE/CIFOR.'

http://www.piec.org/mswg_toolkit/mswg_toolkit/data/Tools/1-15/05_surv_guide.pdf

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The influence of CIFOR research on national standards in Guatemala, Honduras, Guyana, Costa Rica and Nicaragua is acknowledged and appears to have been important; however, once again, the CIFOR research input was one factor among many that shaped the national standards development process, making definitive attribution problematic.

4.8.3 Cameroon

The National Working Group on Sustainable Forest Management and Certification in Cameroon was established in 1996 within the framework of a project on the promotion of SFM and certification in Africa implemented by WWF-Belgium with funds of the European Union. Members of the national working group participated in the CIFOR C&I Phase I test in Kribi, Cameroon (Dr Mbolo Marie, Dr Eba'a Atyi, Dr Nsangou Mama and Mr Njib Nte). Chairman of the group, Mr Parfait Mimbimi Esono, wrote to CIFOR in 1997 informing the research

team that on the basis of the CIFOR research they had elaborated C&I adapted to local conditions in Cameroon, and prepared a white paper on certification in Cameroon drawing on the findings of the CIFOR research.

Segura (2004) comments that despite the important role that the forest sector plays in the economy of Cameroon, the country is still characterised by weak forestry institutions and poor technical capacity, especially for the implementation of forestry regulations and enforcement of forest laws. Illegal logging is still a major problem. Certification has, to date, had no real impact in Cameroon. The progress of the working group in developing FSC-approved national standards for Cameroon has been correspondingly limited and the group has been largely inactive for several years, in part, due a lack of financial resources (Eba'a and Simula 2002; Eba'a 2004).

However, the local acceptance of CIFOR C&I from the Cameroon C&I test and the subsequent success of the CIFOR C&I research in influencing the African Timber Organisation (ATO) C&I (see Section 6 below), suggests that any future FSC-approved national standard for Cameroon (and other ATO member countries) would be likely to draw on the CIFOR C&I work, specifically the findings from the Cameroon test and the International Tropical Timber Organisation (ITTO)/ ATO C&I.

4.8.4 Indonesia

A Memorandum of Understanding between the FSC and the Indonesian Ecolabelling Institute (LEI) , Indonesia's main organisation involved in forest certification, was agreed in 1999 and allows cooperation between the two organisations. The Joint Certification Protocol between FSC and LEI certification bodies (2001) specifies **that the LEI C&I will be used for natural forest management certification by all certification bodies operating in Indonesia**.

LEI was a key collaborator in CIFOR's C&I project, and the CIFOR C&I research was used extensively by LEI, especially in the development of its social and biodiversity C&I. Indonesian professionals at LEI and regional government institutions received training on C&I from CIFOR in the use and application of the Criteria and Indicators Modification and Adaptation Tool (CIMAT) software, the latter at the request of the Secretary General of the Ministry of Forestry. The use and influence of the CIFOR research is recorded in an official resolution from Subcommittee 3ii of the World Bank Initiative on Sustainable Forestry on 23 April 23 1998 in Jakarta. Prof. Emil Salim and Dr Mubarik Ahmad, Chair and Director of LEI, proposed and seconded a resolution adopting CIFOR's set of C&I as the definition of sustainable forest management (Letter of Indonesian Business Council for Sustainable Development, 6.5.1998).

CIFOR research made a significant contribution to LEI's certification standards. These standards are applied through the LEI's Joint Certification Protocol. However, the fact remains that the area of FSC certified forest in Indonesia is very small, and, consequently, so is the resultant CIFOR research-related impact.

4.8.5 Summary of CIFOR research influence on national/regional FSC standards

Forest certification is moving ahead more rapidly than FSC national/regional standards development processes. Many such processes are still ongoing. National/regional standards development processes are iterative and participatory and accommodate a wide range of stakeholder interests – consequently science-based information seldom has a direct influence on the outcome unless research organisations remain engaged in the long-term or succeed in achieving some 'first-mover advantage', e.g., through the CIFOR C&I field tests in Brazil and Cameroon, the former case being the only example where such influence has led to an FSC-approved standard with substantial forest areas coming under FSC-certified management. There is evidence of research influence on national standards development processes through application of C&I selection methods developed by CIFOR, e.g., Guatemala, Honduras, Guyana, Costa Rica and Nicaragua.

Indirect, and less attributable, influence has resulted from the use of the CIFOR research outputs as a general information resource for standards-setting processes. Daniel Arancibia (FSC – Bonn) stated that the FSC actively disseminated the 'Pathfinder' to all its national/regional standards development groups. The 'Pathfinder' contains CIFOR C&I research outputs and a guide written specifically for national/regional working groups developing forest management standards. The guide further acknowledges the relevance of the CIFOR work, and highlights six key resource documents for national/regional working groups, stating:

"The number of publications about forest certification and forest certification standards is growing quickly. Among the most useful will be case studies of national and regional standard-setting processes… Some general reference documents that your standards committee may find useful include:

Criteria and Indicators Toolbox Series, 1999, Centre for International Forestry Research (CIFOR), The most useful tools from this box are:
C&I Tool No. 1 Guidelines for Developing, Testing and Selecting Criteria and Indicators for Sustainable Forest Management by Prabhu, R., Colfer, C.J.P. and Dudley, R.G.

C&I Tool No. 2 The CIFOR Criteria and Indicators Generic Template, by the CIFOR C&I Team (note that the generic template is designed for natural tropical forests, but it is nevertheless useful as a checklist of issues for other types of forest).

Developing Forest Stewardship Standards – A Survival Guide (Scrase, H. and Lindhe, A. 2001).

The influence of the CIFOR research on FSC national/regional standards processes has been variable, but in all cases it has been indirect. There have been a number of instances where CIFOR research has been used by national/regional standards development groups but has not led to any impact via certification (e.g., Cameroon and Papua New Guinea), because standards development processes have not been pursued or certification has been of minor importance.

For 'on-the-ground impact' to result, national/regional standards have to be approved formally by the FSC or recognised in national legislation, and forests subsequently certified. Cases where research has influenced national standards include Honduras, Guyana, Costa Rica, Nicaragua and, most significantly, the *terra firme* forests of Brazil.

The general utility of the CIFOR methodology for testing C&I is evident from references in documents and comments from individuals associated with standards development processes. Further application of CIFOR C&I testing methods in standards development processes is likely to occur for some time to come.

5. Assessing the 'on-the-ground' impact of certification on forest management

Standards applied by certification bodies lead directly to 'on-the ground' changes in the management of forests through audit processes. This section addresses whether it is possible and practical to make field-based comparisons of 'with/without' certification situations. Does certification improve forest management? If so, what improvements result? Do changes in the management performance of certified forests show any correspondence with the acknowledged CIFOR research contributions to certification bodies' standards?

Comparing the wide range of 'sustainability attributes' in forests is extremely challenging. Sheil *et al.* (2004) raise a large number of methodological challenges in interpreting field-based comparisons of forests using Criteria and Indicators (C&I) for assessing biodiversity. These challenges are relevant to the application of C&I in general, but especially to evaluation methods attempting to compare forest management situations 'with/without' certification.

'Stork *et al.* (1997) propose setting 'threshold levels' using probability values derived from [C&I] verifier data. Scrutiny of this example reveals problems. Stork *et al.* suggest that measurements from managed areas [e.g., with certification] be compared to those from pristine areas; acceptable [managed] sites will 'reveal no significant difference'. For a normal (frequentist) statistical interpretation, this significance is 'the likelihood of obtaining these verifier data, given a true null hypothesis (i.e., equivalent forests), is less than some arbitrary level'.

Such approaches are flawed. First, 'significance' is a probability concerning only the detection of differences (not their nature, magnitudes, or practical implications [or causality]). Second, the ability to *detect* differences is determined by study design, data quantity, and data quality. Third, detection (power) varies with the *analytical procedures* used and the *decisions* made in applying them (e.g., inclusion or elimination of outliers). Fourth, results depend on the 'choice' of pristine [or other] *comparison* forest(s)… Fifth, the appropriateness of any comparison between any two pieces of forest is undermined by the fact that we are not concerned with whether the two forests are different—they always are (Hurlbert 1984, Nester 1996, Crome 1997)—but whether the differing conditions are detrimental to sustainability [or, alternatively, causally linked to certification-related interventions].' Sheil *et al.* (2004) [with author annotations]

These difficulties also arise in making comparisons between certified and uncertified planted forests or between communities living in and around certified and uncertified forests. If differences are detected between certified forests relative to some established 'comparison site', it remains difficult if not impossible to ascribe any detected differences to the presence or absence of certification without detailed site-specific knowledge and time-series information.

Additionally, there are problems in gaining a comprehensive understanding of the impact of certification. Impacts assessed as being positive at the Forest Management Unit (FMU) scale may yet be considered negative at another scale, e.g., plantation management operations may improve locally to satisfy certifier standards, yet, at the landscape level, expansion of plantation forestry might imply a reduction in biodiversity and other environmental services and/or possibly negative consequences to the livelihood options available to local communities than was formerly the case. The reverse may also be true: certification may act to increase costs and reduce revenues at the FMU scale, e.g., by increases to minimum wage levels and reducing short-term annual timber yields at the scale of the management unit, but may, simultaneously, offer significant positive impacts at larger spatial scales and/or over longer temporal scales, for example by reducing run-off and erosion maintaining connectivity between habitats for threatened species or by reducing social conflicts surrounding forest-resource management in the longer term.

Given the methodological and practical difficulties associated with field-based 'with/without' assessments of certification, a normative questionnaire-based survey approach among managers of certified forests was considered.

The initial idea was to elicit opinions from forest managers on the role of certification in relation to any changes in management practices before and after certification. In addition, managers would be asked to consider how the management of their certified forests may differ from non-certified forests managed in the same locality (i.e., 'with/without' certification). However, this approach also presented a number of serious methodological difficulties including:

- Comparability of qualitative judgments across the survey sample – the difficulty in providing a 'standard frame of reference' (in multiple languages) for all aspects relevant to sustainable management across the wide range of forest conditions found in developing countries of the South.
- The problem of 'stated' versus 'revealed' changes in the information received from respondents and the related issues of the objectivity of forest managers when commenting about their forests and those managed by others.
- Definitional problems with 'forests in the same locality' (which may be quite different in size, species composition, topography, proximity to infrastructure, management objectives, previous management histories, etc., etc.).

- The difficulty of cost-effective communication with managers of certified forests – especially certified community forests – and the associated risk of low percentage of survey returns.

For all these reasons an alternative approach was sought to interpret the impacts that certification has had at the FMU level. Ideally, such analysis should be based on time-series monitoring of specific indicators and comparison of 'with/without' certification situations. The latter has proved difficult to address, however the conditions imposed by certification audits on forest operators are a reasonable proxy for the former.

5.1 Assessing the impacts of forest certification using Corrective Action Requests (CARs)

It is possible to examine the causal effects of Forest Stewardship Council (FSC) certification in terms of changes to 'on-the-ground forest management' by examining the specific improvements in forest management that forest owners/ managers were required to make in response to the certification auditing process. These provide a means of examining 'before'/'after' situations in certified forests.

The approach used builds on those developed and applied by Thornber (1999) and Gullison (2003), and in particular follows more recent work by Newsom (2004). *Using this approach to determine certification-mediated outcomes assumes that if formal certification had not been pursued by the enterprise, management procedures would have proceeded with little change and therefore the management responses required to comply with standards for sustainable forest management express the certification-related improvements.*

The FSC forest certification audit process **requires independent third-party certifiers** (e.g., SmartWood, Société Générale de Surveillance (SGS), Soil Association, Scientific Certification Systems (SCS)) to assess forest management against consistent C&I-based standards, highlight which management aspects are in compliance and, critically, where standards are not met.

Non-compliance with the certifier standard results in issuance of **Corrective Action Requests** (CARs) otherwise known as **Preconditions and Conditions**. CARs are given when the certification standard's forest management performance criteria are not adequately met; they outline what needs to be improved to bring the operation into compliance. CARs are specified in publicly available Certification Assessment Reports[15] and define which aspects of forest production, environmental, social and economic issues etc. the operation is required to address to become certified.

CARs are classified by certifiers into:

- Major CARs (or Preconditions): These are issues that need to be rectified before certification can be achieved. They reflect an important performance gap between the observations made by the audit team and the operation standard required.
- Minor CARs (or Conditions): These issues are less severe: certificates are still granted but a 'condition' is specified. Conditions usually need to be addressed within a specified time (usually one year) after audit for certification to be retained.

The certification regulatory system (which includes follow-up audits) ensures that forest management entities must improve their management with regard to these CARs to become 'compliant' and receive or retain their official certified status. Figure 10 outlines the forest auditing components of the certification process.

Example of major CAR or Precondition:

- 'Within three months: policy and procedures regarding trees in buffer zones must be modified so as to encourage the regeneration of native species. Exotic trees may be harvested from buffers when it can be done in a manner which will enhance the regeneration of native species. Planting crop trees in the buffer zone should be progressively phased out as compartments are felled or replaced.'

Example of minor CAR or condition:

- 'Develop a proactive plan to ensure that activities do not have deleterious downstream effects particularly with regard to potential contamination of drinking water supplies, and develop mitigative measures, to prevent foreseeable problems (such as construction of latrines for contractors), and contingency plans in case of system failure, e.g., diesel spillage).'

CARs are therefore a reasonable proxy for 'before'/'after' situations in certified forests. They are independent observations made by third-party accredited certifiers within a common (FSC) assessment framework. Nevertheless, analysis of CARs cannot provide a basis for 'with/without' comparisons with regard to certified forests. This would require intensive, long-term, field-based monitoring and comparison; an impracticable approach for this study. Therefore we examine 'with/without' certification situations, to the extent possible, through published literature on forest certification; these are presented later in Section 4.3.

If used as a proxy for situations 'before' and 'after' certification, CARs will tend to **systematically underestimate certification-related improvements in forest management**. In the normal course of events, potential non-conformities are routinely communicated informally to the forest managers by the certifiers through confidential pre-certification assessments conducted in advance of the

final certification audit (Figure 10). Forest management entities (enterprises) motivated by the desire to succeed with their investment in the certification process normally implement many improvements in forest management procedures and practices prior to a certification audit. The public certification documents record only the *remaining* non-compliant aspects within the management unit at the time of the *final* audit.

Publicly Available Certification Assessment Reports
1. Specify how management must change for compliance
2. Provide a basis for before / after reflexive comparison
3. Underestimate changes (do not capture improvements made prior to field assessment)

Steps of Certification

Contact with Certifier

Scoping Visit

Report with Recommendations

Preparation for full assessment

Contract for Certification Assessment

Consultation before field assessment

Field Assessment

Assessment Report

Consultation after field assessment

Specialists' peer review

Certification Decision

Monitoring

Annual Field Audits
To remain certified - managers must respond to all Corrective Action Requests

Follow-up audit (3-6 months)
Verification - Major Corrective Action Requests met

Figure 10. Forest auditing components of the FSC certification process

5.1.1 Classifying CARs

Newsom (2004) presents a method to examine the thematic focus and language used in CARs and how these relate to required changes in forest management 'on the ground'.

Following Newsom (*op. cit.*), we examined the CARs in Public FSC Certification Assessment Reports and recorded the following information for each: 1.) which

thematic areas were addressed, 2.) whether the condition required a procedural or substantive change (or a combination thereof), and 3.) whether or not the condition contained results-based language.

5.1.2 Operational themes for CARs

Firstly, CARs were categorised into 'operational themes': the following categorisation was developed to classify the wide range of management recommendations occurring in Public Certification Assessment Reports into a smaller number of commonly occurring themes.

Table 6. Forest management, environmental, and social, cultural and economic thematic areas for classifying Corrective Action Requests

Forest management	Environmental issues	Social, cultural and economic issues
Chemical use and disposal – (storage and application)	Aquatic and riparian areas	Chain-of-custody issues
Clear cut use/size of felling coupes	Chemical use and disposal (monitoring consequences of use)	Communications and conflict resolution – local stakeholders
Exotic species and pests	Environmental Impact (lack of EIAs or lack of consideration of wider environmental impact of forest operations)	Social impacts (lack of social impact assessment), negative impacts from forest operations)
Fire control and management	Exotic species and pests, e.g., spread of exotic invasive species	Information provision to stakeholders (public access to information)
Harvesting operations	Fire – wider environmental consequences both within and outside management unit	Internal management processes
Information provision (includes monitoring and permanent sample plots)	Landscape-level considerations, e.g., wildlife corridors,	Laws and regulations
Internal management issues (including group certification and contractors)	Non-timber Forest Products	Illegal activities
Landscape-level consideration	Other wildlife	Plantation management
Laws and regulations	Protected areas	Profitability of operations
Plantation/Forest-stand Management	Soil and erosion	Non-timber Forest Products

Forest management	Environmental issues	Social, cultural and economic issues
Protected areas (includes sensitive sites and High Conservation Value Forest (HCVF)	Threatened and endangered species (includes native species considerations)	Long-term land tenure, land use and usufruct rights
Timber extraction rates (sustainable yield)	Training	Training
Regeneration, reforestation, rehabilitation and restoration	Information provision to stakeholders (public access to information	Worker safety
Roads and skid trails	Internal management processes	Worker welfare, wages and living conditions
Threatened and endangered species (side effects of operations, e.g., workers do not recognise endangered species)	Laws and regulations	
Species composition (includes native species considerations)		

5.1.3 Classifying CARs as Procedural or Substantive

Newsom, (*op. cit.*) states, '*When a thematic area was addressed in a condition [CAR], we recorded whether the wording of that condition required the operation to make changes that were procedural or substantive. That is, we recorded whether the operation was required to make direct substantive, on-the-ground changes (very similar to the 'performance-based' category used in some policy analyses) or, rather, if the operation was required to put a procedure in place to address the thematic area in a way that may or may not have substantive impacts (very similar to 'systems-based'). We also created a hybrid category to cover the situation where the operation was required to make indirect substantive changes; that is, [a requirement to implement] a procedure that definitely would have substantive 'on-the-ground impacts'*. These three categories are described in detail in Table 7 and, according to Newsom, were based on earlier work by Cashore (1997)[16].

For example, a CAR stating that 'harvesting on slopes in excess of 15 degrees will be avoided' and one required to 'initiate a process to minimise the impact of harvesting on steep slopes (>15º)' can have quite different on-the-ground implications, despite the fact that both address harvesting on steep slopes.

In following the approach adopted by Newsom (*op. cit.*) we concur that, 'the fuzziest distinction between different categories occurred between "procedural" and "substantive-indirect", following their protocol: "If the CAR required documentation of existing policies in a management plan or update of the

Table 7. Performance- and systems-based classification for conditions and preconditions

Category	Definition	Example
Substantive – direct	Operations are required to make on-the-ground changes to forest practices.	'Surround special cultural sites with a buffer during harvesting.'
Substantive – indirect	Operations are required to implement a procedure whose outcome will directly impact on-the-ground forest practices.	'Modify management plan to ensure that natural forest features are incorporated into plantations.'
Procedural	Operations are required to implement a procedure that may or may not directly impact on-the-ground forest practices.	'Provide a summary of the forest management plan to community groups.' 'Conduct an inventory of threatened and endangered species.'

(adapted from Newsom 2004)

management plan based on new information, the CAR was coded as "procedural". If the operation was required to develop a set of standards or policy in the management plan to address a certain issue, or guarantee or prevent a certain outcome, the condition was coded as "substantive-indirect".'

5.1.4 Presence of 'results-based' language

For each CAR we identified whether 'results-based' language was present. Results-based language was considered to be present when operations were given a specific 'indicator' or 'goal' towards which they must work, and was considered absent if the operation was required simply to 'address' or 'consider' a broad issue.

Table 8. Results-based language classification system for Corrective Action Requests

Category	Definition	Example
Stronger results-based language	Operations are given a goal and a measurable indicator.	'Adhere to national guidelines in the execution of harvesting and road maintenance activities.'
Weaker results-based language	Operations are given a goal without an indicator.	'Methods of fire-break preparation need to be assessed in terms of the potential for erosion.'
No results-based language	Operations are asked to 'consider' a particular issue or create their own goals.	'The management plan must adequately address social impacts.'

(adapted from Newsom 2004)

5.1.5 Public Certification Assessment Reports examined

Ninety Public Certification Assessment Reports issued by SmartWood, the Soil Association, SCS and SGS in 'CIFOR target countries' were analysed. For practical reasons, all English-language reports were included in the sample and a subset of 40 Spanish/Portuguese-language reports were selected at random. One report was unavailable, bringing the sample size down to 89. The Public Certification Assessment Reports were analysed by an independent consultant to translate (where necessary) and classify the CARs they contain according to the method described above. Figures 11, 12 and 13 show the patterns in forest type, certification body and regional location of certified forest included in the analysis.

Table 9. Public Certification Assessment Reports examined in CIFOR target countries

Country	Number of Public Certification Assessment Reports examined	Area of certified forest covered by Public Certification documents examined (ha)	% of total area of FSC-certified forest in country (ha)
Bolivia	1	119,200	68
Brazil	13	752,919	85
Costa Rica	3	19,524	46
Ecuador	1	20,000	94
Guatemala	2	9,281	88
Indonesia	1	90,240	100
Malaysia	3	77,242	100
Namibia	1	61,130	100
Nicaragua	1	3,500	97
Papua New Guinea	1	4,310	100
Solomon Island	1	39,402	100
South Africa	17	1,062,932	70
Sri Lanka	4	16,251	100
Swaziland	1	17,010	100
Thailand	1	921	100
Uganda	2	35,000	100
Zambia	2	827,005	100
Zimbabwe	4	127,485	100
			100
TOTAL	59	3,283,352	100
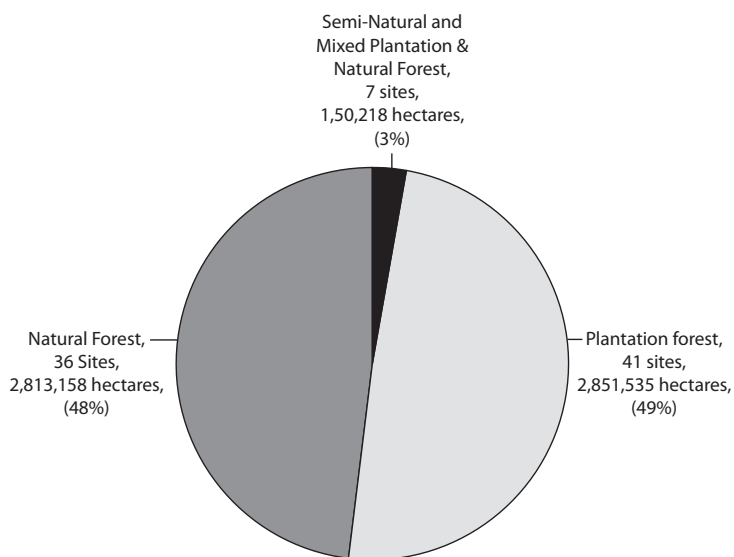
Figure 11. The distribution by forest type in the Public Certification Assessment Reports examined
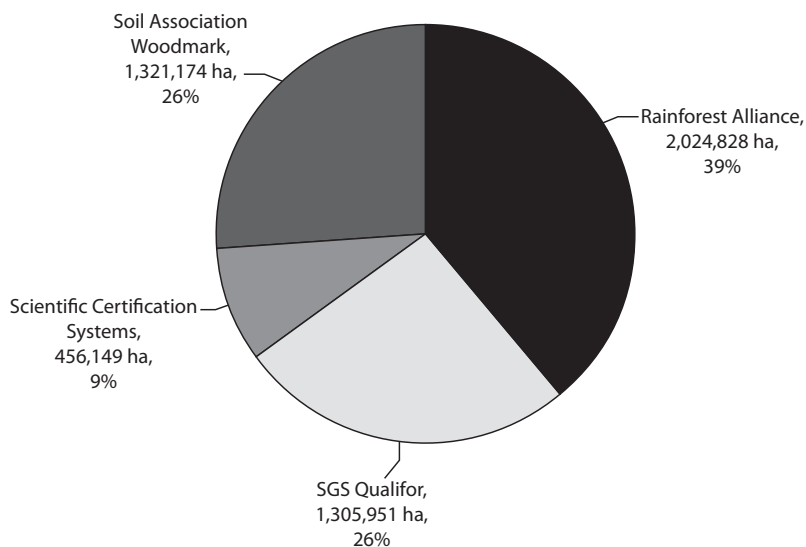
Figure 12. The distribution of Public Certification Assessment Reports examined by forest area and certification body
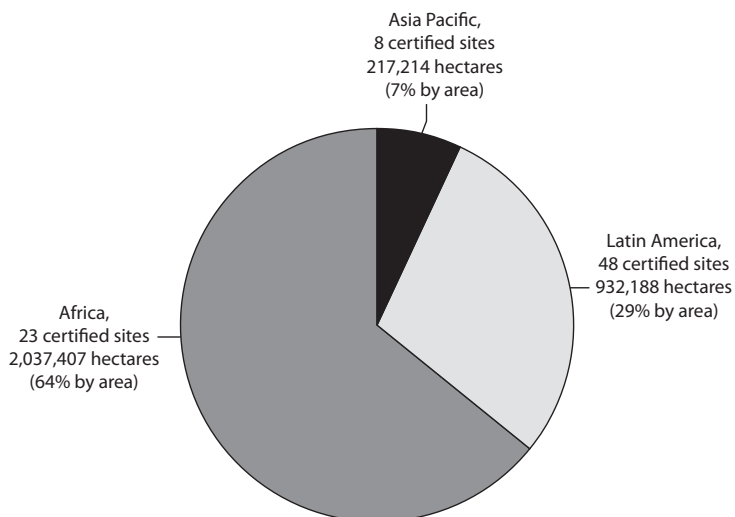
Figure 13. The distribution of Public Certification Assessment Reports examined by forest area and region

5.2 Patterns and trends in forests certification – analysis of CARs

A total of 59 Public Certification Assessment Reports from SGS, the Soil Association, SmartWood and SCS-certified forests have been analysed. The changes in forest management that certification implies have been appraised through examination and classification of 916 CARs within these reports. The changes to forest management due to certification examined in this analysis cover a total area of over 5 million ha in developing countries of the South.

Uptake of CIFOR research appeared to be absent in SCS certification standards. However, it is acknowledged that CIFOR research had some influence on the certification standards of SGS, the Soil Association and SmartWood. The Public Certification Reports from these certifiers examined in the survey sample correspond to a total forest area of 3,283,352 ha across 59 certified sites. Trends in the CARs for these forests were examined.

Figure 14 shows that for plantation forests the split of CARs among social environmental and forest management themes is fairly even, with social issues being the most frequent theme for CARs (i.e., non-compliance with the standard and a requirement to make ameliorative responses). In natural forests there is a lower proportion of CARs associated with environmental issues, whilst for 'mixed' certified forests, CARs associated with social issues appear most frequent although only seven certified forest sites fell into this category.
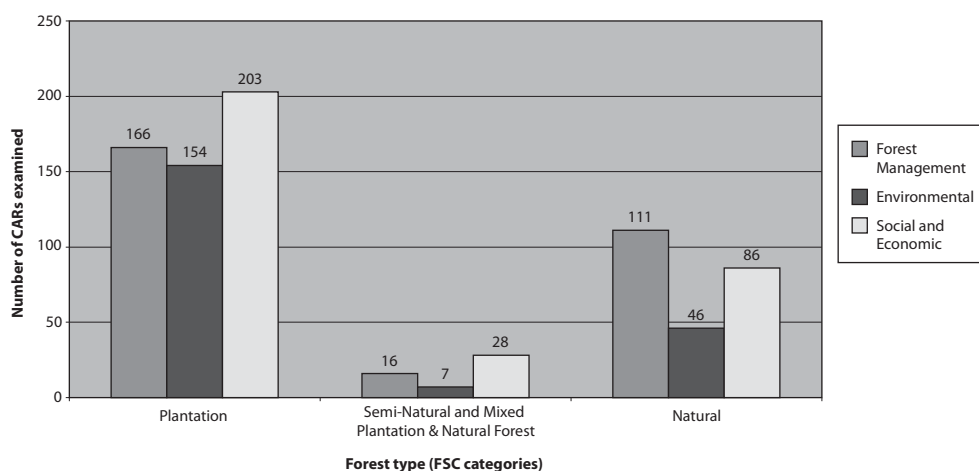
Figure 14. Numbers of Corrective Action Requests classified by forest type and thematic focus (SmartWood, SGS, SCS, and Soil Association)

Plantations represent 38 per cent of the forest area covered by the Public Certification Reports examined, yet over 64 per cent of the CARs recorded relate to forest plantation sites. This implies that plantation forests generally attract higher numbers of CARs and therefore are required to implement a larger number of management responses in order to meet the requirements of the certification standards applied.

5.2.1 Action-orientation and results-based language in CARs

Table 6 outlines the thematic categories and subcategories used for classifying CARs. Within these, CARs were additionally classified for their 'action orientation' in terms of the required management responses (Figure 15). Direct changes to forest management practices 'on the ground' are most closely associated with CARs classified as having a 'substantive direct' action orientation. The highest number and proportion of 'substantive direct' CARs address issues that are classified within the 'forest management' theme. By contrast, 'procedural' CARs are more common within the Social and Economic theme. 'Procedural' CARs make up 56 per cent of CARs across all themes whilst only 19 per cent of all CARs were classified as 'substantive direct'. 'Procedural' CARs have higher levels of uncertainty with regard to on-the-ground forest practices. Nevertheless, the procedures they demand can be critical components of Sustainable Forest Management (SFM), e.g., processes for stakeholder dialogue and conflict resolution.
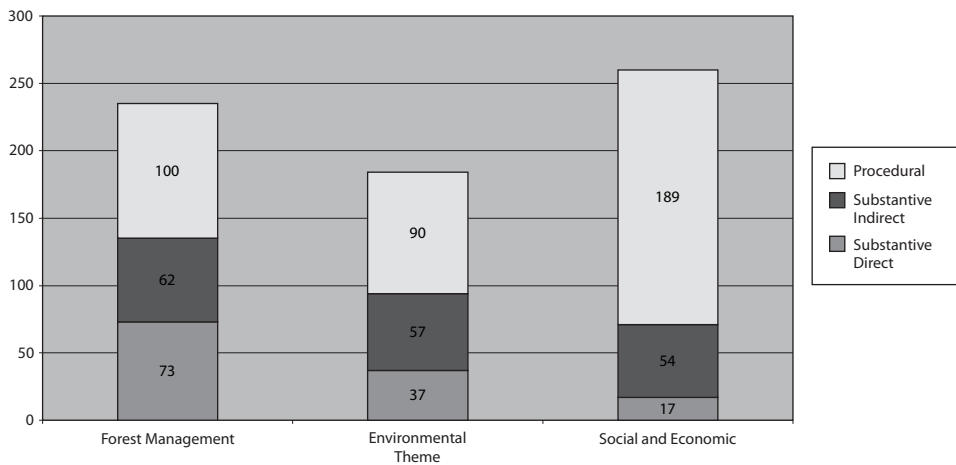
Figure 15. Corrective Action Requests classified by thematic focus and action orientation

The link between forest certification and changes in the management of forests was further explored by examining the use of results-based language in CARs. Figure 16 shows a fairly even distribution of results-based language across all CARs and within the three major themes.

Examining the classification of CARs by 'action orientation' in combination with the presence of results-based language reveals more interesting patterns (Figure 17). Whilst a large number of CARs are 'procedural' in nature, 62 per cent of these CARs contain some results-based language, with 27 per cent featuring 'strong' results-based requirements. A CAR classified as requiring a management response that is 'substantive direct' that additionally contains 'strong' results-based language defines the clearest linkages to direct change in forest management practices 'on the ground'. This is because the combination requires CARs to impact directly on management practices, and 'strong' results-based language defines management responses that would most readily be verified by certifiers in subsequent periodic forest audits. Figure 17 shows that CARs falling within both of these categories occur more frequently in association with the 'forest management' theme. By contrast, CARs that have the highest levels of uncertainty with regard to forest management practices 'on the ground' are categorised as 'procedural' and contain no results-based language.
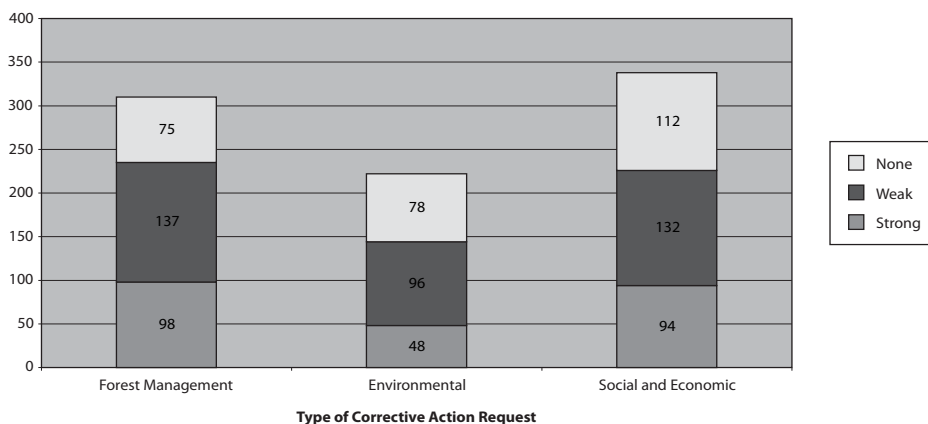
Figure 16. Corrective Action Requests classified by thematic focus and use of results-based language

Approximately 200 CARs fall into the combined category 'procedural' & 'no results-based language'; 'Forest management' and 'Environmental' themes each have approximately 25 per cent of this total, whilst approximately 50 per cent of the CARs classified as such fall within the Social and Economic theme.
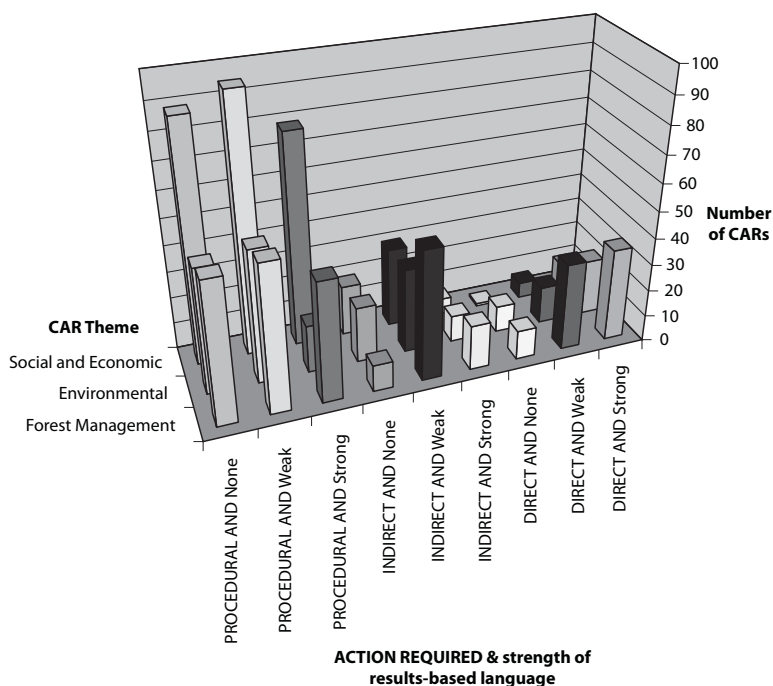
Figure 17. Corrective Action Requests classified by thematic focus, action-orientation and use of results-based language

5.2.2 Forest management CARs

The CARs relating to 'forest management' themes are shown in Figure 18. The most commonly occurring CAR category is 'Plantation/Forest-stand management'. This category encompasses quite a range of forest management recommendations including silvicultural considerations. The large number of CARs is more indicative of the broad nature of this category, rather than any specific and systematic deficiency in forest management.
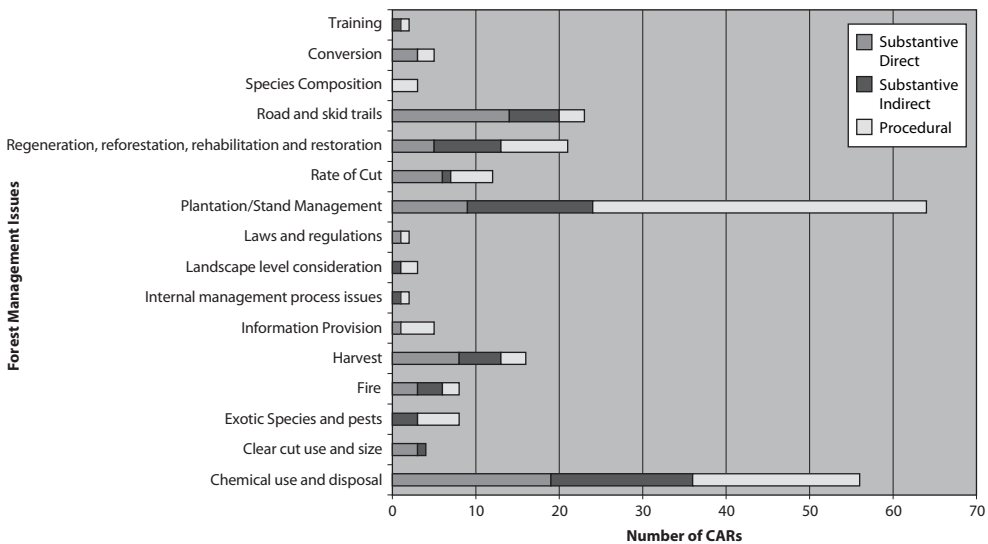
Figure 18. 'Forest Management' Corrective Action Requests (CARs) classified by subtheme and action orientation

Use and storage of chemicals was an issue where compliance was commonly lacking. Improvements to roads and skid trails were a common requirement, often being linked to the occurrence of CARs on 'aquatic and riparian zones' within the 'environmental' theme. CARs relating to the key forest management practices of harvesting, rate of cut and regeneration/reforestation were also common. Nearly all certified operations were required to improve their forest management plans and monitoring systems, but these requirements fell into a variety of categories depending on the particular planning or monitoring issue specified.

5.2.3 Environmental CARs

Five categories of environmental issues were particularly common in the public certification assessment reports examined. These related to improving protected areas, and closely linked considerations for threatened and endangered species.

Improved management of aquatic and riparian zones and avoidance of soil disturbance and erosion were often required and as was the need for forest managers to consider the environmental impacts of forest operations. CARs for environmental issues often included requirements to establish adequate environmental monitoring procedures, hence the relatively large proportion of 'procedural' CARs (refer also to Figure 16).
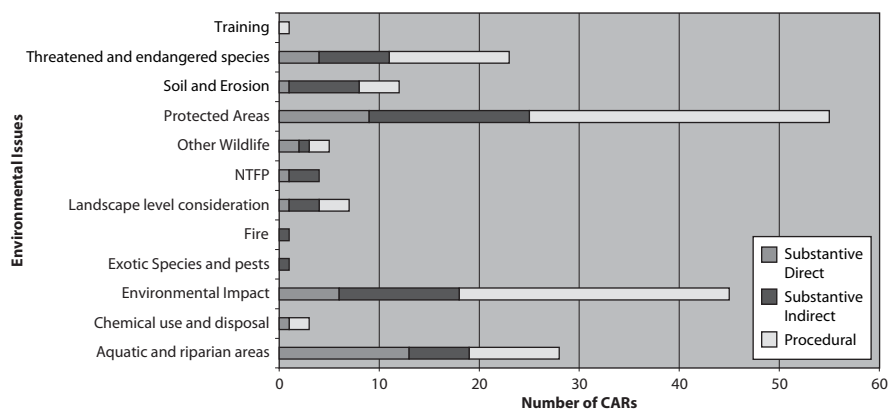
Figure 19. 'Environmental' Corrective Action Requests (CARs) classified by subtheme and action orientation

5.2.4 Social and Economic CARs – correspondence with CIFOR influence on certification standards

Social and Economic CARs that commonly occurred in the certified forests studied included the following:

1. Social impacts of forest management and the need for social impact assessments
2. Communication and conflict resolution processes involving local stakeholders
3. Public access to information (transparency/accountability)
4. Compliance with laws and regulations
5. Worker safety and worker welfare

Figure 20 shows the frequency of CARs classified within the Social and Economic theme. The issues most closely linked with CIFOR research contributions are highlighted. CIFOR made its most significant contributions to FSC certification standards and audits through the C&I research and methods focussing on 'social sustainability' issues. The thematic categories for CARs most closely associated with CIFOR research contributions include: communication and conflict

resolution issues with local stakeholders, and social impacts including the need for social impact assessment by forest managers (1 & 2 listed above); in addition the CIFOR research was linked to issues dealing with the adequate provision for local stakeholder interests, recognition of sites of cultural importance and long-term land tenure/land use and usufruct rights. These issues are classified under four subthemes in the analysis of CARs (Table 10).

Table 10. Number of Corrective Action Requests listed in the Public Certification Assessment Reports that correspond to subthemes where CIFOR research contributed to certifier standards

CAR sub-theme categories most closely corresponding with CIFOR research contributions	Number of CARs occurring in Soil Association, SGS and SmartWood certified forests in CIFOR target countries	Number of certified sites listing a CAR within category at least once	Hectares of certified forest in CIFOR target countries required to comply with CARs
Communications and conflict resolution	33	23	2,325,061
Social impacts - lack of social impact assessment and negative impacts from forest operations	44	23	1,968,852
Tenure and land use rights	5	4	217,269
Cultural sites	15	12	474,707
TOTAL	97	62	**Not applicable

**Total is not meaningful in this instance because some forests have more than one CAR in the categories listed, hence the total would be 'double counting'.

Whilst CIFOR research helped certifiers to focus on 'biodiversity' issues, the research contribution was more generalised and difficult to link to specific types of CAR within the 'environmental' theme.

In general, the CARs most closely linked to CIFOR research contributions are 'procedural', perhaps reflecting the need for flexibility and the difficulty of making specific management prescriptions to accommodate multiple interests when dealing with dynamic and temporally variable issues such as stakeholder consultation, conflict resolution and social impact assessment.
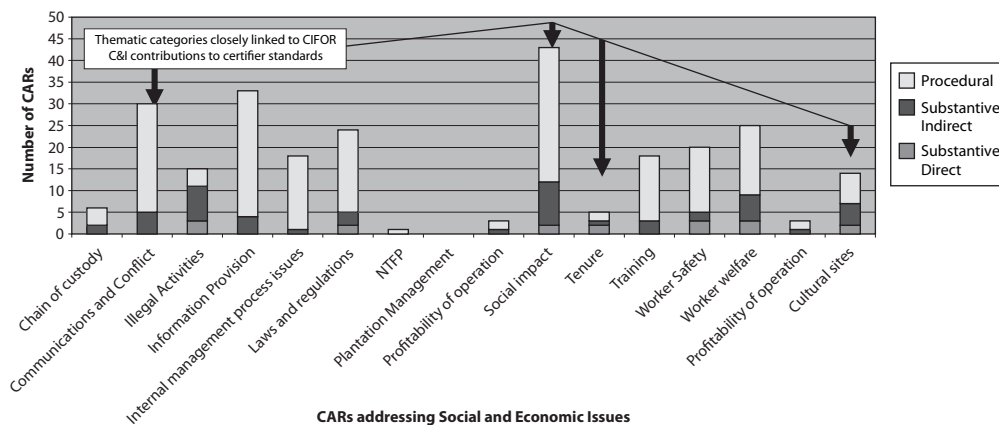
Figure 20. 'Social and Economic' Corrective Action Requests (CARs) classified by subtheme and 'action orientation'
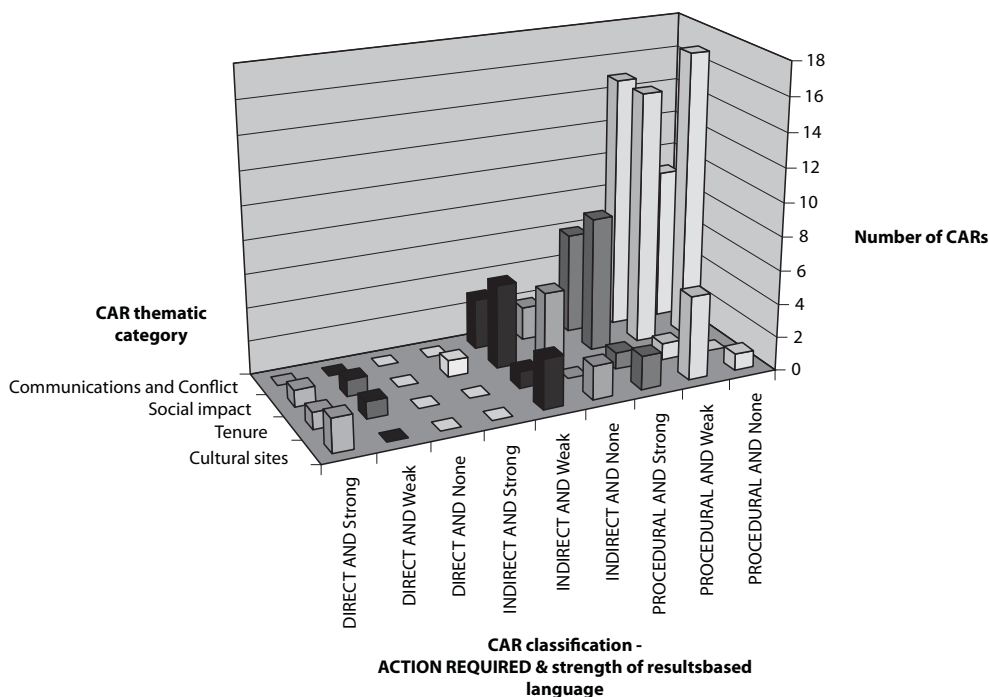
Figure 21. Corrective Action Request subthemes closely linked to CIFOR research contributions classified by action orientation and results-based language

5.2.5 Summary of CAR analysis

CARs from Public Certification Assessment Reports have been used as a proxy for before/after certification situations. CARs provide considerable detail on the aspects of forest management that are required to improve in response to certification, i.e., forest-based outcomes. CARs **systematically underestimate** the improvements to forest management made in response to the certification process.

Table 11. The most commonly occurring categories for Corrective Action Requests in certified forest in CIFOR target countries

Forest Management	Environmental issues	Social, cultural and economic issues
'Plantation/Forest-stand management'	Protected areas	Social impacts (lack of social impact assessment) negative impacts from forest operations)
Clear cut use/size of felling coupes	Threatened and endangered species	Information provision (public access to information)
Chemical use and disposal (storage and application)	Environmental Impact (lack of EI Assessments or lack of consideration of wider environmental impact of forest operations)	Communications and conflict resolution– with local stakeholders
Improvements to roads and skid trails	Aquatic and riparian areas	Worker safety and worker welfare
	Soil conservation and erosion	Compliance with laws and regulations

Forest management improved with respect to all these issues because the regulatory nature of the certification process provides this as a guarantee through third-party forest auditors. It is clear that many of the 'changes on the ground' in certified forest are consistent with the Consultative Group on International Agricultural Research (CGIAR) mission of protecting the environment; less certain is how these outcomes translate into livelihood benefits. However, given the assumed counterfactual of forest management without certification failing to make these improvements, it is reasonable to assert that the consideration of local stakeholder interests is generally higher in certified forest than it would otherwise have been.

Quantitative attribution of CIFOR's research contribution to certification standards proved problematic although it is clear that CIFOR research helped to improve the standards and audit processes applied, especially with regards to 'social' issues in developing-country settings. Substantial areas of forests have been certified, and the issues most closely associated with CIFOR research

contributions to certification standards commonly feature in CARs therefore resulting in improvements to management practices over several million hectares of forests.

5.3 Published studies on the impact of certification on forest management

The purpose of this section is to present a summary of general trends and experiences from published literature examining benefits and disbenefits that stem from forest certification in developing countries. It is intended to complement the preceding section and examine outcomes at and beyond the scale of the FMU.

There is an extensive and increasing academic literature on forest certification including studies focusing on the developing countries of the South. However, there are few examples that present the outcomes of certification using field-based methods to make structured comparisons of 'with/without' certification situations. Impacts from certification are often inferred from individual site-specific studies of certified forests and qualitative assessments and comparisons of the perceived resultant improvements.

Bass *et al.* (2001) conducted an important study examining the general impact of forest certification in developing countries of the South. They examined how FSC certification impacted on community forestry and community forest enterprises, whether it helped to 'improve responsible business practice in industrial forest product supply chains and how it contributed policy processes that lead to sustainable forest management'. In addition, important findings on the impact of certification were recently presented at a symposium entitled 'Forest Certification in Developing and Transitioning Societies: Social, Economic, and Ecological Effects' at Yale University in 2004. Sixteen case studies[17] exploring the various effects of forest certification in general within four regions, Asia-Pacific, Eastern Europe, Latin America and Africa, were presented. All case studies were based on a common set of research guidelines that included assessment of what social effects forest certification had on forest communities, economics and environment, and whether forest certification improved, or stabilised, the ecology of the regions in question.

From the analysis of published studies and Public Certification Assessment Reports it is clear that certification frequently leads to direct improvements in operational forest management practices and has had significant tangible impacts. The economic sustainability of forestry operations is often a precondition for maintaining certified status and the wide rage of additional benefits associated with it.

Specific outcomes vary significantly from one forest location to another, however some common trends across certified forests were:

- Environmental services were secured or improved in certified forests;
- Certification led to improved worker conditions within managed forests;
- Certification processes often acted to reduce social conflict in and around certified forests;
- Certification helped in securing land tenure and usufruct rights (in certified community forests);
- Certification improved the image of the forest management enterprise locally and in associated markets;
- Certification provided greater access to premium timber markets (where they exist); and
- Certification helped promote sustainable forest management more generally through dialogue between the private sector, government bodies, non-governmental organisations (NGOs) and civil society.

The effects of certification occur at a range of scales and include a wide range of attributes. The published literature is discussed in terms of changes brought about by certification presented in the following categories:

a) **Direct changes resulting from improved forest management** and consequences occurring in and around the certified forest area, e.g., improvements in long-term production potential, maintenance and enhancement of environmental goods and services (ecosystem resilience, biodiversity, access to premium timber markets (direct and indirect costs and financial benefits), local livelihoods, human well-being and improved worker conditions.

b) **Indirect on-site changes** occurring in and around the certified area, e.g., changes in management and monitoring systems, empowerment, reduced social conflicts, changes to institutional arrangements.

c) **Widespread off-site changes.** These are discussed in terms of changes caused by certification that are outside or beyond the forest management unit, e.g., certification-mediated changes in national legislation, changes in the shared understanding, acceptability and interest in sustainable forest management, increased demand for certified forests from upstream industry etc.

5.3.1 Direct on-site effects of certification

Thornber (1999), Bass *et al.* (2001) and Gullison (2003) all examine the on-site effects of certification through CARs in Public Certification Reports. Thornber's study (1999) examined Forest Stewardship Council (FSC)-certified forests in all geographic regions. At that time, three-quarters of the CARs examined in public certification reports came from boreal and temperate regions, nearly two-thirds of which were natural or semi-natural conifer forests. Developed country enterprises

had more CARs relating to environmental performance requirements, whilst developing countries had greater difficulty than developed country enterprises in complying with conditions relating to the management system, monitoring and social aspects. The following were reported as the most common categories of CAR:

- long-term commitment to FSC Principles and Criteria (P&C)
- health and safety of forest workers
- social impact evaluations and local consultation
- environmental impact assessment
- preparing written guidelines for environmental impacts
- training of employees
- incorporating data collection for monitoring in management
- documentation for monitoring

Gullison (2003) addresses the issue of whether certification helps conserve biodiversity through improved management. Thirty FSC-certified forests were randomly selected (10 each from natural, plantation and mixed forest categories), and their publicly available audit summaries were reviewed to identify specific corrective actions required during the certification process. The results reinforce those of Thornber (1999) and in the analysis presented above clearly indicate that the process of FSC-certification requires companies to make a wide variety of significant changes to management that would benefit biodiversity. They show that most FSC-certified companies have established significant protected set-asides within their borders. Mayers *et al.* (2001) and Frost *et al.* (2003) examine certification in South Africa and report significant impacts in terms of improved environmental performance among large private industrial plantation companies. Improvements commonly relate to: water monitoring, management of riparian zones, road building and maintenance, assessment of biodiversity and management of high conservation value forest patches (Frost *et al.* 2003; Ham 2004).

Carrera *et al.* (2004) adopt a scoring approach to before/after certification effects in Guatemala which indicate that the largest positive changes were: improvements in the organisation and administration of forest resources (by both community groups and private owners), improvements in safety aspects and well-being of forest workers, and improvements in the conservation of forest resources. In Bolivia, certification has prompted companies to control their concessions more effectively, and this has led to a reduction in illegal logging within the certified forest management units. Rare species and wildlife are better protected, since hunting is not allowed on certified forest lands, except in specific cases regarding indigenous people (Quevedo 2004).

The FSC-accredited certification companies Imaflora and SmartWood state that 'on-the ground' differences between certified forest enterprises and those without certification are actually quite easy to see and evaluate qualitatively in the field. Box 4 highlights differences 'with/without' certification in Amazonia.

Box 4. Certifier comparison of forests 'with/without' certification in Brazil

The following is adapted from de Azevedo, T.R., de Freitas, A.G., and Donovan, R.Z. 'Perspectives on Sustainable Forestry and Certification' (2001).

Certified operations typically make more, **higher quality and longer-term investments in training, road infrastructure, security, logging camps and inventories** compared to operations in non-certified forests. In certified forestry, safeguards are in place to maintain forest cover, structure and diversity. Certified forestry operations must demonstrate in written documents, capital investments and field actions their commitment to long-term stewardship of the forest.

In the state of Amazonas, permanent preservation areas in the two companies certified, Gethal and Precious Woods Amazonas*, have reached between 25% and 45% of the total area. Carefully selected research sites, which serve as 'controls' for comparisons with the original forest, must cover at least 5% of the total area. Other conservation zones (riparian zones, wetlands, etc.) make up the remaining percentage. Areas under certified management are carefully mapped and all commercial trees to be logged in the first and second cycles receive identification tags and are precisely plotted on the maps. Trees to be logged are selected on the basis of strict criteria such as regeneration potential, market, volume, minimum diameter, frequency of distribution, and exclusion from permanent preservation areas. Harvesting occurs at the rate of four to seven trees per hectare. A typical non-certified competitor to Precious Woods Amazonas* cuts down twice the number of trees per hectare in the same forest.

In certified forests, harvesting is conducted by well trained chain saw operators who fell the trees along a pre-determined direction in order to minimize damage to remaining trees, facilitate log removal and reduce the impact of skid trails and logging roads. Skid trails are planned in advance with the objective of not crossing watercourses. When crossing a watercourse is inevitable, bridges or similar structures are built. This rarely occurs on non-certified operations.

Log concentration yards (where logs are collected prior to extraction from the forest) are typically 70% smaller than those in traditional management systems.

The use of personal protection equipment is mandatory in certified forests. With these preventive measures, accident rates have fallen dramatically in certified (versus non-certified) operations.

In order to avoid the difficulties brought by the seasonality of forest activities (which cease during the wettest period of the year, January-May), certified companies have negotiated a flexible time system with labour unions. Workers can hold their contracts for the whole year. These are typically not options in uncertified operations.

[*Note, the certified forest Precious Woods Amazonas was certified by Smartwood using C&I that drew extensively on the CIFOR C&I Brazil test. Gethal and Precious Woods Amazonas are included in the CAR survey sample of this study.]

There have been some instances where certification has led to benefits for local people, Bass (2001) comments 'at the field level, audit processes have publicised and demonstrated claims to forest, often of marginalised groups, and have called for improved relationships as conditions to certificates. These have often improved the basis of equity in local forestry'.

Benefits in relation to social issues are experienced commonly by local communities and by forest workers. 'In all the cases of certified tropical forests, efforts have been made to provide employment to the local community and to include local community members in forest management. However, the overall impact of forest certification on local development has been limited and linked to the existence of other economic opportunities in the area' (Eba'a and Simula 2002). In Gabon, national law has provisions regarding the involvement of the local populations in the definition of the traditional usage rights, but in comparison to regular forest operations, companies managing certified forests tend to encourage true participation from the local populations and there are fewer conflicts with traditional authorities (Eba'a 2004).

5.3.1.1 Financial costs and benefits of certification

The financial costs and benefits of certification are topics that feature prominently in published literature. The direct cost of certification is the cost of the certification process itself. Indirect costs are those incurred to improve management performance to meet the required forest management standards (Bass *et al.* 2001). Direct costs vary with size of enterprise and distance that certifiers have to travel. The direct costs of certification are relatively low for large, intensively managed, industrial operations, and relatively high for small-scale extensive producers. Gullison (2003)

presents the following examples: 'Certification of large companies in Poland and the USA adds about 2–3 cents per cubic meter [of wood] to production costs. Certification of plantations in South Africa costs about 19 cents per cubic meter. Other tropical producers' costs have ranged from $0.26–$1.10 per cubic meter, with small producers paying up to $4.00 per cubic meter in Latin America'.

Indirect costs of certification can include: investments in infrastructure, machinery and training in order to harvest more efficiently with lower impacts, and higher wage costs through compliance with legally specified minimum wages. The indirect costs of certification are highly variable but 'can be significant even in developed countries, where the quality of management is already relatively high' Gullison (*op. cit.*). 'Tropical producers are faced with even higher indirect costs of certification because the general state of management is poorer than in temperate countries'… 'In addition, higher discount rates in the tropics mean that tropical timber producers have a greater opportunity cost to reducing harvest' (Rice *et al.* 1997). 'There is a general sentiment that improvements to management required by the FSC 'raise the bar' beyond what is financially viable for the average tropical concession manager' (Bass *et al.* 2001).

Even large forestry companies often engage in FSC certification by getting one area or one division certified first and then use that experience to inform further certification. Many large companies, (e.g., Klabin and AssiDoman in Brazil) undertook certification in part because it was quite evident that their current practice already matched most of the FSC's P&C (Bass *et al.* 2001). This was also the case in South Africa: large plantation-oriented companies such as SAPPI, Mondi and SAFCOL rapidly pursued certification in the late 1990s, resulting in South Africa's having 80 per cent (1 088 071 ha) of its plantations FSC certified; in 2002 the total plantation area was 1 351 402 ha (FSA 2003; Ham 2004).

Improved profitability of forest operations via access to premium 'green' markets is often assumed to be one of the key benefits of (and incentives for) certification. Whilst this can sometimes be true, it is generally less common in certified forests of the South than in the North, where access to such markets is generally better. Putz (2004) observes that while much of the timber harvesting in the tropics remains unsustainable, companies motivated to obtain FSC certification have helped to substantially improve forest management practices in several countries. 'These improvements have occurred even though consumer demand for wood products from certified sustainable forestry operations has been slow to grow, especially in the United States. Similarly, the acceptance of 'green premiums' (an additional cost for wood products from well-managed forests) has been limited even in the environmentally aware markets of Europe. One reason for the slow growth in the market for certified forest products is consumer confusion: many

are unclear about what certification means, and many doubt its credibility.' Carrerra *et al.* (2004) report that some community groups in Guatemala were disappointed with certification efforts as a result of false expectations regarding price premiums for certified timber, a sentiment that was amplified when they no longer received subsidies from support organisations since they generally lacked the financial resources to pay for re-assessments, audits and compliance with conditions necessary to maintain their certificates.

One positive example appears to be Bolivia, where certification has led to access to new markets. Nebel *et al.* (2005) claim that the average price premium was between 5 per cent and 51 per cent. The proportion of certified timber product exports rose from only US$ 0.18 million (0.14 per cent of total timber exports) in 1998, to US$ 14 million (14 per cent) in 2003. Exports of non-certified timber products, meanwhile, fell from US$ 120 million in 1998 to US$ 85 million in 2003 (Quevedo 2004).

There are many cases where certification has been supported externally by governments and donors (e.g., Zambia, Guatemala and community *ejidos* in Mexico) where there is little or no price differential for wood produced from certified sources. Even in South Africa, where large-scale plantations have been certified, there has been little if any price incentive – suppliers being concerned with consolidating their bargaining positions and the maintenance of existing buyer markets in the North by improving the 'environmental acceptability' of their products (Mayers 2001; Ham 2004; May 2004) or using the process of certification to establish the 'environmental credentials' of industrial forest operations among a broad set of, often critical, public stakeholders (Ham 2004).

Although certification has led to significant on-the-ground changes, much of the certification literature highlights the fact that currently certified forests tend to be in developed countries of the North. Where forests are certified in developing countries, the better-managed forests were those that succeeded in achieving certified status. Thus enterprises where forests are managed poorly would be required to make major changes to (and investments in) their management to become compliant. According to Gullison (*op. cit.*), 'the benefits of FSC certification are slightly greater than the costs for only a relatively small proportion of producers, and those are likely to be producers who already implement relatively good management practices, and who are able to sell the majority of their products to environmentally sensitive markets in Western Europe and North America. Indeed, even for temperate producers with access to these markets, the high costs of certification are one of the top reasons that producers have chosen not to seek certification'. Whilst improvements in the profitability of certified forests can yield financial benefits, these often translate into private gains and the degree to which

monetary profits from certification are translated into 'public goods' is generally fairly limited. However, examples do exist: certified community forest initiatives (supported through donor projects) have led to better prices and improved community well-being in Papua New Guinea (Bun and Bewnag 2004).

According to van Kooten *et al.* (in press), 'in addition to economic factors that affect profits directly or indirectly (through consumers), perceived pressure from shareholders, the environmental lobby and neighbourhood/community groups, firm size, financial health, past environmental performance and regulatory threats have been linked to firms' decisions to meet environmental standards voluntarily'.

The magnitude of direct certification benefits rest on assumptions regarding counterfactual situations. In most cases it is reasonable to assume that management would be unlikely to have changed without the stimulus that certification audits provided. However, Nebel *et al.* (2005) contend that 'forest management in Bolivia has developed on the basis of an external supported law reform imposing restrictive and controlled regulations and norms, and when fulfilling the new law requirements the FSC P&C are largely met. Only little improvement was obtained through certification in itself'. In this situation, the impact of certification depends on judgements relating to the degree of law enforcement and compliance in Bolivia that would have occurred without certification.

Nevertheless, wherever forests have been FSC certified there is almost always independent evidence to suggest that certification led to 'on-the-ground' improvements in forest management – improvements that most likely would not otherwise have occurred – that are in-line with good forest stewardship and broadly accepted attributes of 'sustainability'. Public benefits in terms of non-market forest goods/services are often enhanced. Of course, the longer-term outcomes of certification at the FMU level will depend largely on maintenance of their certified status.

5.3.2 Indirect on-site effects

This category of outcomes includes improvements in systems and administration of management. Such changes may impact upon forest condition, local livelihoods and the provision of forest-based goods and services, but by indirect means. Bass *et al.* (2001) report that CARs (changes in management) of this nature are the second most common among FSC certified forests. Certification audits frequently require improvements in management/monitoring systems or necessitate training and improved supervision for implementation of management plans. A focus on, and investment in, research and data collection to assist monitoring and

assessment (often of environmental and social impacts) is frequently demanded. They conclude that FSC certification has helped to improve forest management capacity by helping to streamline management systems and procedures. Staff skills have developed through both certification-related training and through interactions with forest certification auditors, providing staff with ideas and experiences from other forest locations on sustainable forest practices.

Bass *et al*. (*op. cit.*) assert that a frequent outcome for certified community forestry enterprises has been improved administration and governance, e.g., through improved bookkeeping, reporting, management structure and relations with government and community authorities. They note that capacity development in such contexts has also been limited by CARs that: necessitate action by outsiders, and place emphasis on export markets before developing adequate capacities to handle domestic markets. Donor subsidising of the certification processes has 'meant that the community's opportunity costs for certification were low (thus affecting the choices made for capacity development)'. In Brazil, 'social accommodation with neighboring communities has tended to be a favorable result of certification'… 'The small number of certified community enterprises and their insignificant management scale minimises their overall impact on the socio-environmental sustainability of Amazon forest peoples' (May 2004).

In South Africa, certification is dominated by big industrial forestry companies, and small growers have experienced little benefit from certification. Mayers *et al*. (2001) observe that in South Africa, certification has 'provided a framework for identifying social issues and stakeholder opinion'. In Brazil 'social benefits of certification in the case of plantation forests have been fairly modest, though direct employees have been assured access to health and education'. Negative externalities also exist: 'Accusations of land concentration and expulsion of smallholders have continued in some cases. Plantation forest enterprises have embarked on outgrower schemes such as the '*fomento florestal*' system in Espírito Santo and Minas Gerais, in part as a response to such criticism. Overall, the social impacts of certification have been the most uneven' (May 2004).

However, in Bolivia, communication among timber companies and social stakeholders has improved as a result of certification-related processes. Certification has, in some cases, helped facilitate stakeholder access to forest lands, and eliminate the overlap of stakeholder rights. Social conflicts in the field have decreased as a result. The 'Lomeríos initiative', in 1996, was the first certified community-based management operation. This is cited as an example of forest certification processes leading to better consolidation and security of land ownership which still prevails

(although the certificate does not). Certification processes have generally helped to raise the public image of the indigenous forest community and legitimise their rights to their lands (Quevedo 2004).

Box 5. The impact of forest certification on local communities

Forest certification and communities: Looking forward to the next decade. Butterfield *et al*. 2003 Forest Trends.

'Certification has had some very significant benefits for communities affected by industrial forest operations in various settings. It has fostered a more participatory dialogue among stakeholders and fostered more balanced discussion of policy reforms in countries with weak attention to traditional and indigenous tenure rights in the forest estate. Communities and social change agents have used these certification models to promote more participation in their country's forest decisions more generally. Certification has had an impact, still not well documented or measured, on employment conditions for communities and worker health and safety, most evident in large-scale operations in countries with poor enforcement of legal frameworks.' … 'It has provided other indirect benefits: tenure security or tenure access, recognition that community management can be environmentally sound, technical training and support for qualified forestry professionals to improve forest management and organisation of the enterprise.'

5.3.3 Wider effects of certification beyond the FMU

The policy and other 'knock-on' effects of certification are considerable (Bass 2001; Mayers 2001; Eba'a and Simula 2002; Segura 2004). Globally, certification has helped raise and develop a practical understanding of the significance and implications of sustainable forest management. The success and further potential of certification have helped stimulate the development of national standards for sustainable forest management.

In some countries certification led to national legislation, e.g., South Africa, Mexico; in other cases legislation helped support certification, e.g., Bolivia, Guatemala. In other cases certification and standards-development processes influenced subnational regulations for forest management, e.g., IBAMA, the environmental regulation agency in Amazonia, Brazil, and the forest authorities of Kerala and Madhya Pradesh, India. In general, forest certification has led to improved regulations, monitoring and review of forest operations.

Box 6. Wider effects of forest certification

Excerpts from Bass *et al*. (2001)

'Certification's biggest role in policy change has been to heighten general awareness of sustainable forest management (SFM) and of the roles of other stakeholders. This awareness seems to derive more from the multi-stakeholder processes of developing standards, than from the cumulative impacts of individual certificates.'... 'Certification (and FSC in particular) has helped to clarify, systematise and apply precise forest management standards for real production and trade contexts… This has helped to bridge a gap between policy and practice.'… 'Nearly 20 per cent of FSC certificates are held by government agencies. Certification has, for many agencies, offered an opportunity to prove that they have operationalised policy - adding impetus and credibility to their task of tightening up regulations for private forests. Where the audit process helped government foresters through a learning process on their own land, this can have a broader influence on policy review.'… 'At the policy and market levels, the various processes of certification have also offered other means for increasing the frequency of contacts, spreading awareness, and changing the basis of trust amongst stakeholders. Whilst many community groups had hoped that certification would result in their being accorded more rights and responsibilities, in the cases studied certification was not the sole factor in any such positive developments.'… 'Certification has occasionally helped stakeholders to recognise the need for a new distribution of roles between government, communities and the private sector'... '[The] FSC encourages national and regional certification working groups, to transform the global P&C into national standards (and similar national working groups are attached to the non-FSC country-driven schemes). These global, regional and local groups have provided multi-stakeholder forestry fora in places where such facilities did not exist, or they have offered alternatives where fora were dominated by e.g. government. Their work has highlighted many issues and needs beyond those specific to certification.' … 'Forest policy seems to have been influenced most where governments have had some involvement in the [certification] process.' 'The presence of in-country certifiers appears to have strengthened the policy impacts of national groups, by providing professional inputs and evidence from field experience of certification e.g. Imaflora in Brazil.'

Bass, S., Thornber, K., Markopoulos, M., Roberts, S. and Grieg-Gran, M., 2001. Certification's Impacts on Forests, Stakeholders and Supply Chains. Instruments for Sustainable Private Sector Forestry Series. International Institute for Environment and Development, London. 134p.

FSC Principle No. 1 requires forest operations to comply with applicable laws. Certification audits therefore complement and act to strengthen forest law enforcement. However, since certification is often voluntary the effectiveness of certification as a widespread law enforcement tool is limited in extent to those choosing to seek certification. There is no published or anecdotal evidence to suggest wider impacts on forest law enforcement.

In some cases certification has been promoted by governments as means to achieve greater compliance with national laws and management regulations. There are many examples supporting this, e.g., in Mexico (Segura 2004 – Box 7 below), and Bolivia (Quevedo 2004), where less direct control and monitoring are required by the public forestry authorities for certified timber companies, since certifiers systematically verify the field management activities of foresters, and check compliance with existing laws and regulations. In South Africa, certification against national standards is now mandatory within two years of commencement of a forest management lease on government land (Mayers 2001; Ham 2004), and in Guatemala, forest concessions within in the Mayan Biosphere Reserve must achieve FSC certification within three years (Carrera *et al*. 2004).

Box 7. Certification and government policies in Mexico

'The Mexican government has been an active supporter of external third-party certification since the FSC system was introduced in Mexico in 1997 by the accredited SmartWood Program of Rain Forest Alliance, and through their in-country representative, the Consejo Civil Mexicano para la Silvicultura Sostenible (CCMSS). The government has seen the value of certification in stimulating compliance with national and state and municipal regulations and the possibility of reducing currently high levels of illegal logging in targeted regions of the Country. A unique condition of the Mexican forest sector is that more than 80% (approx. 44 million ha) of its forest lands are legally owned by ejidos (land reform farmer groups) and indigenous communities. This collective form of land ownership results from a long forest land devolution process initiated after the 1910 revolution and supported by an agrarian reform that continued into the mid 1990s. As of August 2004, 596,631 ha of mostly communal forests lands (36 communities and 1 small private owner) had been certified in México under the FSC system since 1997. An estimated additional area of 50,000-100,000 ha is currently being evaluated. This represents only 2.8% of the total commercial area and approximately 9% of the total national annual timber volume production. Certified timber production is currently not differentiated from non-certified timber in local markets and a very small percentage of it is being exported to

specialized markets demanding certified wood (mainly to North America and Europe).

A new forest law was approved in 2002, which considers offering different incentives to forest land owners to recognize and compensate their efforts and costs of certification (Ley General de Desarrollo Forestal Sustentable; Article 114). Mexican forest regulations contain principles, criteria and indicators of SFM, which closely mirror FSC standards and certification has also been directly or indirectly subsidized through different federal and state government programs.' Segura G. (2004).

In many countries certification has acted to improve the image of the forestry sector in general and the forest industry in particular, often at a national level. Certification has ensured that forest management and timber harvesting are undertaken in a responsible manner, and certified operations receive more attention from the national government, NGOs and the international community. In Bolivia, the timber industry made considerable gains in credibility through forest certification, and banks are now more willing to give loans to certified firms (Quevedo 2004). Ham (2004) reports that SAFCOL, the South African parastatal forestry company which operated government plantations during the 1990s, opted for certification as a way of demonstrating its social and environmental credentials. SAFCOL had faced considerable criticism from local NGOs. In Guatemala 'the forest sector has traditionally been considered as the enemy of the conservation sector. With half a million ha certified, the image of the forest sector has considerably improved, and has brought together conservation groups and forest management' (Carrera *et al.* 2004).

Certification has led to supply chain effects: Mayers (2001) notes that in the South African context, 'powerful buyers have seen the opportunity for improving corporate reputation and reducing risk and have sent sustainability messages 'back down' supply chains'. … 'Manufacturers have urged certification of their forestry suppliers when they see potential loss of contracts or possible market advantages'. In these situations forest-based industries 'bear most of the costs of certification and buyers reap most of the benefits'. Presumably some public goods are also generated.

Forest certification has, however, not been an effective means of addressing wider-scale problems of tropical deforestation. Deforestation is driven largely by conversion to other land-uses (e.g., FAO 1997, 2001) and will therefore be little influenced by certification which focuses on improving the management of existing forest. Similarly, certification cannot properly address problems such

as biodiversity loss simply because certification operates at the management unit level and as such cannot comprehensively address issues that occur at a landscape scale (Ghazoul 2001).

5.3.4 Certification 'spillovers'

The global area of FSC-certified forest continues to increase. Large areas of FSC-certified forest (over 40 million ha) occur in temperate and boreal forests in industrialised countries of the North. These forests are assessed by certification bodies against management standards that, in part, made use of CIFOR research. However, many of the social issues closely associated with specific CIFOR research contributions to certifier standards (e.g., land tenure, conflict with local communities and stakeholders) tend to feature less frequently in CARs of certified forests in temperate and boreal regions. Nevertheless, relatively small improvements to certification standards are significant because they apply over very large areas of forests.

Additional 'spillovers' may also result from new certification initiatives. There are several nascent certification initiatives emerging in the oil palm industry, in coffee, soya, banana and citrus production. These are drawing upon the experiences gained with forest certification, and, in the case of oil palm, are currently developing C&I for sustainable production using the FSC P&C as a model. The recent international Round Table on Sustainable Oil Palm met in Jakarta in November 2004, and delegates discussed possible performance standards (The Oil Palm Sustainability Initiative on C&I[18]). The process was facilitated by Proforest, with staff formerly involved with the development of SGS Forest Certification standards (R. Nussbaum). CIFOR's work on C&I, particularly issues relating to community conflicts and traditional land use rights, may yet spill over into standards for the sustainable production of oil palm, and possibly other plantation crops with potentially very large impacts.

6. Evidence of CIFOR Criteria and Indicators (C&I) research uptake and influence through other impact pathways

This section provides further documented examples of uptake from the CIFOR C&I research, including uptake by key policy audiences and influence on international and national forest C&I-related processes and initiatives. This is not intended to be an analysis of research impact but does attempt to 'trace' the wider use and influence of the research along a variety of 'impact pathways' in addition to the specific Forest Stewardship Council (FSC) certification impact pathways discussed above. The collated evidence is intended to highlight the broad strategic relevance and international public goods nature of the CIFOR C&I research through documented examples of research uptake in many different countries.

In some cases the evidence points to clear outcomes suggesting that the CIFOR C&I led to 'changes on the ground' and the generation of mission-relevant benefits.

6.1 CIFOR C&I influence on the global policy agenda

A small number of global institutions and processes strongly influence what happens to tropical forests and those that depend on them (Spilsbury and Kaimowitz 2000). These include: the World Bank, the Global Environment Facility (GEF), the United Nations Framework Convention on Climate Change (UNFCCC), the Food and Agricultural Organisation of the United Nations (FAO), the United Nations Forum on Forests (UNFF), the Convention on Biodiversity (CBD) and the International Tropical Timber Organisation (ITTO). CIFOR C&I research helped advance the international discussion on sustainable forest management by providing a methodology for moving towards consensus about what C&I to use.

Examination of over 304 policy-relevant documents produced by major donors supporting forest-related initiatives showed that CIFOR C&I research was cited regularly. These documents either define the investment/intervention policies of these organisations or help to shape investments in forest initiatives.

CIFOR C&I research was cited in World Bank Forest Policy: Striking the right balance (2000), some of the background documents surrounding its preparation and in the Brazil case study of the Operations and Evaluation Department (OED)'s 2002 evaluation of World Bank 1991 forest policy. CIFOR C&I research was cited by the GEF's – Roundtable on Forests, the CBD's Subsidiary Body on Scientific,

Technical and Technological Advice (SBSTTA) report to the Conference of the Parties (COP) 5, in guidelines for best practice in integrating biodiversity into national forest planning, and the Intergovernmental Panel on Climate Change (IPCC) Special Report on Climate Change - Land Use and Land Use Change Forestry (LULUCF) 2002. CIFOR C&I research was also cited in FAO's high profile publication 'State of the World's Forests' in 1999, 2001 and 2003.

Box 8. CIFOR C&I research influence in UN forest processes

The C&I work was prominent at intersessional meetings of the United Nations Intergovernmental Panel on Forests (IPF) in 1997. The United Nations Intergovernmental Panel on Forests report under the Proposals for Action on Certification and Labelling 133 (IPF 3 1997) stated:

'that the Panel: (e), Invited countries to consider the relevance to certification schemes of the CIFOR project on criteria and indicators for sustainable forest management'.

And more recently in the UN Secretary General's Report for UNFF-4 on 'Scientific Forest-related Knowledge' 2004.

'Science and technology have made significant contributions to enhancing knowledge about the priority issues recognized at the various levels. For example, science has contributed through various activities to the development and further improvement of the concept of Criteria and Indicators (C&I) for SFM, e.g. concerning its application at the forest management unit level. Reference can be made to the activities of CIFOR and the former IUFRO Task Force on Sustainable Forestry.'

http://daccess-ods.un.org/TMP/7924227.html

There are anecdotal reports of participants in the C&I tests in Austria, Germany and the United States having apparently gone on to significantly influence policies related to C&I in those countries, and presumably they have incorporated results from CIFOR's C&I work in their recommendations.

In general, the CIFOR C&I research has been highly regarded at the international level, and has been acknowledged in key documents that have helped to shape the international forestry agenda. However, this type of research influence, although important in shaping international debate and policy, has very indirect links to the generation of 'mission relevant benefits'.

Table 12. Summary of impact pathways via the global forest agenda

Key components of the impact pathway	CIFOR C&I research involved key individuals and organisations in the project process. Research presented at key international forest events and to powerful organisations. Unique CIFOR C&I testing and comparison coupled with the legitimacy and 'profile' of a new international research organisation – Context: C&I already a focus of international attention ➜ Acknowledgement and citation in policy documents of influential organisations and processes.
Outcomes	CIFOR C&I research helps shape polices and investments of key actors and organisations.
Changes to on-the-ground forest management	Difficult to determine causality, but quite a number of donor projects pursued local sustainable forest management initiatives using CIFOR methods or drawing on CIFOR research.
(Potential for) mission-relevant impact	Actual quantifiable impact is low. However, indirect effects are likely to very widespread (global).

6.2 CIFOR C&I influence on regional C&I-related initiatives

A number of other organisations and initiatives outside of the FSC system have also been active in promoting sustainable forest management through the use of C&I. A common application of national C&I is to measure national progress towards Sustainable Forest Management (SFM). A number of C&I processes have been initiated in tropical countries for this purpose.

Table 13. Government-led regional C&I processes for tropical forests

Tarapoto process	Brazil, Bolivia, Colombia, Ecuador, Guyana, Peru, Suriname and Venezuela
Dry-zone Africa	27 countries in Dry Africa (includes SADC)
Dry forests in Asia	Bangladesh, Bhutan, China, India, Myanmar, Mongolia, Sri Lanka and Thailand
Near East	30 countries in the near-east
Lépaterique process	Central American Countries
ATO Initiative	Angola, Cameroon, Central African Republic, Congo, Ivory Coast, Equatorial Guinea, Gabon, Ghana, Liberia, Nigeria, Sao Tome e Principe, Tanzania and Zaire
ITTO	World-wide

The CIFOR work is often cited in documents relating to these processes.

6.2.1 Harmonisation of ITTO C&I with the African Timber Organisation (ATO) C&I

The ITTO is an intergovernmental organisation promoting sustainable development through the sustainable management, use and conservation of tropical forests. It has 56 member governments (and the European Community), which collectively represent 90 per cent of the world's tropical timber trade and

about 80 per cent of the world's tropical forests. Since the ITTO first introduced C&I in 1992 as part of its drive to ensure that all tropical timber entering international trade came from sustainably managed sources, some form of C&I have been used in most tropical countries. A number of ITTO producer countries have developed national-level criteria and indicators for SFM, but the majority of countries still rely on the general ITTO C&I. Over 75 countries have adopted official sets of C&I.

ITTO has developed a series of internationally agreed policy documents for achieving sustainable forest management and forest conservation and assists tropical member countries to adapt these to local circumstances and to implement them in the field. In Africa, ITTO C&I have been rationalised with those of the ATO.

The ATO is an intergovernmental organisation created in 1976 for cooperation on forestry issues relating to its 14 member countries[19], which between them contain over 75 per cent of the tropical natural forests on the African continent. One of the major objectives of the ATO is to promote the production and trade of African timber within the framework of sustainable forest management. The ATO and ITTO harmonised the regional C&I for SFM in 2002 and published them as ATO/ITTO Principles, Criteria and Indicators (ITTO Policy Series 14). The ATO C&I are based largely on C&I developed by CIFOR in their field tests in Cameroon.

In 1998 the ATO held an event specifically to 'synthesise the CIFOR C&I' for use by its member countries. This led to the development of ITTO/ATO C&I.

Box 9. CIFOR C&I adopted by ITTO/ATO

'The awareness of the need for environment protection raised during the Rio Summit was followed by calls for a boycott of tropical timber by some environmental NGOs, who deemed the harvesting of tropical timber for trade and industrial purposes to be a prime cause of forest degradation in the tropics. The response of the African Timber Organization (ATO) was to develop, with the financial assistance of the European Union and the technical collaboration of the Center for International Forestry Research (CIFOR), a set of principles, criteria and indicators (PCI) to promote the sustainable management of African forests. In the meantime, ITTO had revised and updated its 1992 set of C&I based on experiences acquired in the implementation of sustainable forest management in tropical countries and research advances in this field, publishing a new set in 1998. Thus, African member countries of ATO and ITTO found themselves with

two sets of C&I; it made sense to build on these sets to develop a unique and harmonized set applicable to African tropical forests.

Decision 4(XXIX), adopted during the 29th Session of the International Tropical Timber Council (ITTC) held in Yokohama, Japan in November 2000, called for collaboration between ATO and ITTO in order to refine the ATO PCI and make them consistent with the ITTO C&I. This work combined the strengths of each in a draft of harmonized PCI for African tropical forests. During a regional ATO/ITTO workshop in Yaoundé, Cameroon, … the draft was finalized as the ATO/ITTO Principles, Criteria and Indicators for the Sustainable Management of African Natural Tropical Forests.'

[ATO/ITTO principles, criteria and indicators for the sustainable management of

There are now harmonised C&I that the African member countries of ATO and ITTO can use to guide them in the promotion and implementation of sustainable management in their natural tropical forests. ATO and ITTO, in collaboration with other partners, continue to assist their members to use this tool for promoting the sustainability of African tropical forests. ITTO initiatives for sustainable forest management in ATO countries are likely to make direct use the C&I developed by CIFOR, and national legislations and regulations are also likely to draw upon them.

Table 14. Summary of impact pathway via the ITTO/ATO C&I

Key components of the impact pathway	CIFOR C&I tests in Cameroon ➜ Involvement of key individuals and organisations in finalising C&I ➜ Ownership and adoption by ATO ➜ Harmonisation with ITTO C&I.
Outcomes	C&I for sustainable forest management provide a common framework for legislation and regulation of forest management in ATO countries. CIFOR contribution to ATO C&I was significant.
Changes to on-the-ground forest management	Unknown, but regulation and enforcement of forest management standards is often weak in ATO countries. Some local ITTO projects are implemented using these C&I to guide forest management.
(Potential for) mission-relevant impact	Actual impact low. There is still a large 'latent' impact that would stem from effective regulation of forest management using ATO/ITTO C&I.

6.3 CIFOR C&I research influence at national or subnational level

6.3.1 India

In India, CIFOR's C&I research led to changes in national forest policy and management guidelines implemented at state level through its use in a follow-on project conducted by the Kerala Forest Research Institute, Peechi, Kerala, in collaboration with the Indian Institute of Forest Management, Bhopal, in Madhya Pradesh.

CIFOR scientists were invited to participate in a workshop organised at Bhopal in early 1999 with the aim of developing C&I for sustainable forest management relevant for India. This workshop resulted in an initiative known as the 'Bhopal-India Process' (Prabhu and Ferguson 1999). The Bhopal-India Process led to an ITTO-funded research project that provided an opportunity for forestry scientists, forest managers, local communities and non-governmental organisations (NGOs) in Kerala and Madhya Pradesh to participate in the testing and evaluation of C&I of sustainable management of plantations based on the iterative filtering-and-generation method developed for natural forests by CIFOR. Stakeholder participation during the field tests and final workshops, which included local communities and NGOs, played an essential role in shaping C&I related to social and economic concerns. This raised a number of important issues including impact of plantation development on water supplies to villages and settlements. Minimum sets of C&I applicable to the three sites included in this project and considered to be more widely relevant to plantation forestry across India were identified (Sankar *et al.* 2000). The results from the project demonstrated the importance of testing and evaluating C&I at the Forest Management Unit (FMU) level to ensure that local issues pertaining to the sustainable management of forest plantations are addressed. The project identified 8 national level criteria and 51 related indicators for SFM (IIFM 2000).

In parallel to the research, the Indian Institute of Forest Management and its partners made a conscious effort to reach and influence key policy audiences through publications, workshops and seminars (IIFM 2001; Prasad 2001), and through continued inputs from CIFOR (Prabhu 2001). As the literature was generated there were several workshops and training programmes for Indian and south Asian audiences. The World Bank-WWF Global Alliance for Sustainable Use of Forests also collaborated to prepare a manual and organise training programmes for the members of the Indian Forest Service, NGOs and communities; the programme trained more than 300 key stakeholders across the country. The FAO acknowledged these efforts, which then fed into the development of C&I for dry-zone Asia (Castañeda 2000; Prasad 2001). These initiatives in combination

succeeded in generating enough interest among policy makers to persuade the Government of India to appoint a Task-Force on Sustainable Forest Management led by the Director of IIFM (Pandey personal communication). The task force designed C&I for SFM that featured livelihoods issues prominently among eight criteria and 43 indicators for the national-level assessment of sustainable forest management (Prasad 2000).

This process led the Ministry of Environment and Forests of the Government of India to release guidelines on sustainable forest management to various State Forest Departments. There are indications that field functionaries in State Forest Departments now incorporate these guidelines in their routine planning and implementation of forest management (Pandey personal communication).

6.3.2 South Africa

Governments can use C&I either to guide management practices in state-owned forests or to help them regulate the activities of other forest managers.

In 2001 the Committee for Sustainable Forest Management (subcommittee of the National Forestry Advisory Council, which advises the Minister on forestry matters) appointed a group of experts (including CIFOR staff) to develop a national set of Principles, Criteria, Indicators and Standards (PCI&S) for sustainable forest management in South Africa. The process was funded by the UK Department for International Development (DFID). The national standards development process centred on an intensive series of consultations; stakeholders from forestry, environmental groups, labour unions, etc. were consulted (Ham 2004). The process was completed in 2002: the PCI&S provide a framework for devolving the management of state-owned forests to other stakeholders and are currently being tested. These are soon likely to become a part of national legislation and lead to enforceable regulations regarding forest management practice. http://www.dwaf.gov.za/Forestry/SFM/.

CIFOR researchers acted as advisors to the process of designing C&I in South Africa. CIFOR C&I testing methods and the Criteria and Indicators Modification and Adaptation Tool (CIMAT) software were applied in the development of the Directorate of Forestry in the Department of Water Affairs and Forestry (DWAF)'s national criteria, indicators and standards for SFM. The DWAF C&I development process also involved facilitation by CIFOR's Ravi Prabhu. Prabhu helped facilitate the process using the experience and methods developed during the CIFOR research. Cori Ham, an independent consultant in certification, was a part of the process and commented that 'the multi-stakeholder C&I development process was more efficient as a result of CIFOR's input and experience' (Ham

personal communication). Compliance with national legislation on forest management is a requirement within FSC certification schemes.

Table 15. CIFOR influence on South African standards for forest management

Key components of the impact pathway	CIFOR C&I testing and consultation methods known and respected in S. Africa ➡ CIFOR invited to help facilitate multi-stakeholder consultation processes for C&I national forestry C&I ➡ DWAF C&I produced ➡ National legislation.
Outcomes	Approved national forest management standards – but yet to become legislation. CIFOR contribution: application of methods and facilitation experience, making process more efficient and effective.
Changes to on-the-ground forest management	Management standards to be applied nationally. Improvements to management likely as law enforcement likely to be relatively good – and certified forests also must comply with national legislation.
(Potential for) mission-relevant impact	Widespread impact of environmental benefits – more limited social benefits (Component attributable to CIFOR efforts relatively minor).

6.3.3 Developing locally-relevant C&I for community forests in Mexico

CIFOR research has been used in a United States Forest Service (USFS) initiative to develop C&I for assessing local-level sustainable management for 7.09 million ha of the cool temperate forests of Ejido el Largo, Chihuahua, Mexico[20].

In 1998 the USFS Research and International Programs, in cooperation with CIFOR, sponsored a North American test of CIFOR C&I in Boise, Idaho, with government, industry and NGOs from Canada, Mexico and the United States participating. The Boise test refined and adapted the CIFOR C&I to the social, economic and ecological conditions of North America (Woodley *et al*. 1999). The Mexico Local Unit Criteria and Indicators Development Project (LUCID) pilot test expanded on the CIFOR North American test (see section 5.4.1 below) by examining and evaluating a set of C&I developed at the local forest level to assess sustainable ecosystem management in the cold temperate forests of Ejido El Largo in the state of Chihuahua. The Chihuahua pilot test examined a range of different indicators, including those from Boise and the USFS LUCID tests. 'Many of the [CIFOR] C&I set that was used as input to the CIFOR-NA test were a good fit for the situation in Chihuahua C&I, particularly the social C&I.'

6.3.4 Community-based C&I to support forest policy in Thailand

Thailand's natural forests have been subject to a logging ban since 1989. National policy is to afforest the country to 40 per cent forest cover with 25 per cent as

protected forest and 15 per cent for production. To achieve this target, a large number of wildlife sanctuaries and national parks have been gazetted, and land availability for public companies is severely restricted. The government set up a grant scheme for private afforestation. Human settlements, logging or other utilisation of forest products were deemed illegal in the protected areas. It is estimated that more than 1.2 million families illegally inhabit forest areas and, as law-enforcement has become stricter, there have been increasing tensions and conflicts between the Royal Forest Department, the communities and NGOs supporting the latter. The World Bank's Environment Department and Danish International Development Agency (DANIDA) funded a study conducted by the Danish Forest and Landscape Research Institute and Chiang Mai University. Two sets of C&I based on pilot studies at Doi Inthanon National Park and the Mae Moh Teak Plantation were developed and drew substantially of CIFOR C&I for community-based management and technical inputs from CIFOR staff (Rasmussen *et al.* 2000).

6.3.5 Brazil

The Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA) is the government organisation charged with responsibility for the environment. IBAMA enforces compliance with the Forest Code through its regional offices in each state, and has made use of the CIFOR C&I and, especially the CIFOR C&I Brazil test findings, to revise guidelines to audit the activities of companies involved in the timber business in Para. Through CIFOR's work in Brazil with our host partner EMBRAPA, IBAMA have continued to use CIFOR's framework to develop their monitoring systems.

6.3.6 Vietnam

The CIFOR methods for developing and selecting C&I with local community involvement have also been applied in an International Development Research Centre (IDRC) community forestry project in Vietnam.

Box 10. Use of CIFOR methods in a development-assistance project in Vietnam

'Once the existing forest management approaches had been delineated, the researchers assessed them using a series of criteria and indicators (C&Is) for sustainable forestry. Various C&Is have recently been formulated in major international arrangements such as the Montreal Process of 1994. A comprehensive and thorough study of C&Is of sustainable forestry has also been carried out by CIFOR. During the PRA process, various C&Is were tested in the field and a final set selected. Through this assessment process, the number of C&Is dropped from an

initial 113 to 52 and finally to 10. These covered ecology, institutions and policy, social context, economics & finance and sustainable production. Two scenarios were used to compare the different forest management schemes against these C&Is. The first assumed that all the criteria had the same importance. The other ranked the criteria depending on their level of importance in each study site and gave relevant weighting to each.'

http://www.eepsea.org/ev.php?ID=8766_201&ID2=DO_TOPIC

6.3.7 Use of C&I research methods: Honduras, Colombia, Chile

James Smyle, Sr Natural Resource Specialist, LCSER/World Bank, received correspondence, later forwarded to CIFOR, regarding a project in Honduras. The C&I developed for a pine forest management unit in Yoro, Honduras, cite the CIFOR C&I materials as their most important source of methodological guidance. CIFOR research was also heavily used in C&I standards development in Colombia in the project entitled, 'Aplicación y evaluación de Criterios e Indicadores para la ordenación sostenible de los bosques naturals'. The outcomes from these projects are unknown.

CIFOR C&I research methods were used within another research effort targeted at influencing the national standards for FSC Certification of Small Landowners in the Valdivian Ecoregion of Southern Chile. The research aimed to incorporate a biodiversity conservation component into current forest management projects in Southern Chile and investigate the possibility of group-certifying small landowners in the Valdivian Ecoregion under the Iniciativa Chilena de Certificación Forestal Independiente (ICEFI) (FSC) standard (Medwidsky 2004).

Box 11. Use of CIFOR methods in identifying suitable biodiversity indicators in Chile

'The CIFOR C&I evaluation process and suitability criteria were chosen for evaluating the ICEFI Standard because the process and suitability criteria are considered to be the best developed, best embodied the principles of SFM, and most conducive in achieving the desired objectives of this analysis. ICEFI C&I were scrutinized against two sets of suitability criteria. The first set of suitability criteria test the scientific and logistic basis of the criteria in order to determine whether the C&I are conducive to biodiversity conservation. The second set of suitability criteria determine whether the C&I are applicable to, implementable and monitorable by the small landowners of the Ecoregion.'

6.4 Spillover influences in non-target domains

There is evidence of uptake and impact of CIFOR C&I research outside the centre's main 'target domains'. In some instances these spillovers appear to be large.

6.4.1 USFS standards for Federal Forests

The CIFOR research has had a significant impact on United States Department of Agriculture (USDA) Forest Service standards for Federal Forests. The USFS tested the CIFOR C&I in the state of Idaho with CIFOR collaboration and developed a standard framework for the monitoring of the sustainability of the United States Federal Forests. The C&I test in Boise, Idaho, led to the creation of a 3-year programme entitled, 'Local Unit Criteria and Indicators Development (LUCID) Project: Monitoring for Forest Management Unit Scale Sustainability'. This USFS initiative has been influential in the development of monitoring systems for forest management in the United States, Canada and Mexico (see Box 12 below).

The CIFOR test in Idaho led directly to testing of LUCID monitoring approaches in more than **7.5 million ha of US and Canadian forests**[21]. This approach is likely to have continued, widespread influence on monitoring of public forests in the United States and Canada.

Box 12. Extracts from United States Forest Service reports on the LUCID project

BARBARA C. WEBER, Associate Deputy Chief for Research & Development, USDA Forest Service, Washington, DC[22]. http://www.fs.fed.us/institute/cifor/cifor_2.html

'This final report of the North American test of criteria and indicators at the forest management unit level has exceeded my expectations.

In 1995, I first proposed the idea of the United States participating in the CIFOR research study as one of the official sites for an on-the-ground evaluation of a set of criteria and indicators of sustainable forest management. The need for such an assessment was obvious to me, and I only suspected its relevance to broader issues of accountability and performance measures, which have become more evident as the study results emerged. The study results also have relevance to broad-based efforts for engaging people in discussions of sustainability and what it means to them.

Collaboration and involvement were key factors in the success of the North

American test. This became the "North American test" because of the collaboration and involvement of Canada, Mexico, and the United States. Collaboration and involvement were further demonstrated, because participants in the North American test included not only scientists from all three North American countries, but also managers and on-the-ground specialists from the Boise Cascade Corporation, the Idaho Department of Lands, and the USDA Forest Service. Idaho State University, the University of Idaho, and the Bureau of Land Management were also engaged as partners in the test.

Sustainability is about values. Values, however, are difficult to define, because words often seem inadequate for expressing a value's true meaning. I believe the CIFOR research project is providing an important means by which to engage more people about what sustainability means. The CIFOR project is helping to provide the words, and even the language, with which to define and discuss personal and societal values through the tests of the various criteria and indicators. The local level is where the majority of people can begin to understand how various forest management practices do or do not contribute to sustainability. Therefore, the CIFOR North American test is defining the boundaries of the values related to sustainable forest management that are most important to people at the local level in North America.

The North American test of criteria and indicators of sustainable forest management is an excellent contribution to the state of knowledge about criteria and indicators at the forest management unit level. It is also an important contribution to an understanding of sustainability as a statement of values.'

The final report from the 3-year LUCID initiative states:

'The LUCID Project was initiated as a result of the CIFOR-NA test in Boise in 1998. The United States Department of Agriculture Forest Service Research and International Programs, who sponsored the original CIFOR-NA test, continued to advocate for, and support, the LUCID Project from the outset. We benefited in many ways from the strong work of the Center for International Forestry Research, particularly the assistance of Dr. Ravi Prabhu.'

http://www.fs.fed.us/institute/lucid/final_report/LUCID_Management_Edition.pdf

6.5 Simple break-even analysis of monetary benefits required to offset research costs

The cost effectiveness of the CIFOR C&I research can be illustrated through a simple economic break-even analysis based on aggregate areas of C&I research influence combined with an examination of the plausibility of attaining such levels of benefit. The minimum levels of average per hectare monetary benefits required

to justify investment in the research are shown for different sets of aggregated outcomes (Tables 16a and 16b).

For the purposes of this analysis we assume that the CIFOR research advanced the development of C&I by between one and five years than would otherwise have been the case. Thus if the C&I research speeded the development of C&I by five years over the counterfactual situation, the level of benefit required to break-even can be spread across five years. It is reasonable to assume the CIFOR research moved the development of C&I forward, especially on social issues, by at least two to three years. Thus the level of benefit per hectare due to CIFOR research required for break-even among forests certified by Smartwood, the Soil Association or Société Générale de Surveillance (SGS) globally is approximated $0.03 per hectare. For certified forest in CIFOR target countries that were audited as being non-compliant with C&I that link to CIFOR research, marginal benefits of $0.24 per hectare would justify the entire research investment. Given the frequency with which social issues appear in the Corrective Action Requests (CARs) of FSC-certified forest areas more generally, it is reasonable to assert that the benefits

Table 16a. Brief description of SFM outcomes linked to CIFOR research

1. FSC-certified forests: SmartWood, SGS, Soil Alliance (Global)	Influence of CIFOR research on certified standards via FSC accreditation – very low. Influence of CIFOR research on certifier generic standards evident – reasonable likelihood that research led to widespread but marginal improvements in forest management.
2. FSC total certified forest in Asia, Africa LAC	As above but figures relate to Asia, Africa and Latin America – reasonable likelihood that research led to widespread but marginal improvements in forest management.
3. United States Forest Service LUCID project. Piloted in State Forests in the US and Canada	Area of national forest utilizing monitoring approaches directly derived from CIFOR research methods.
4. FSC total forest certified by Smartwood, SGS, Soil Association (in CIFOR target countries)	As in 1 above but figures relate only to certified forests in CIFOR target countries– reasonable likelihood that research led to widespread but marginal improvements in forest management.
5. Smartwood, SGS, Soil Association (forests in CIFOR target countries with CARs showing non-conformance on social issues)*	As in 1 above but figures relate only to certified forests in CIFOR target countries that have CARs closely linked to CIFOR research contributions on social issues.– high likelihood that research led to widespread but marginal improvements in forest management.

Table 16b. Simple break-even analysis of marginal monetary benefits required from forests influenced by CIFOR C&I research to warrant the research investment

	CIFOR research influence on SFM outcome	Hectares	1 year ($)	2 years ($)	3 years ($)	4 years ($)	5 years ($)
1. Smartwood, SGS, Soil Alliance (Global)	low	37,100,000	0.09	0.04	0.03	0.02	0.02
2. FSC Asia, Africa LAC	moderate	8,460,000	0.39	0.20	0.13	0.10	0.08
3. USFS*	high	7,500,000*	0.44	0.22	0.15	0.11	0.09
4. Smartwood, SGS, Soil Alliance (CIFOR target countries)	moderate	5,800,000	0.57	0.28	0.19	0.14	0.11
5. Smartwood, SGS, Soil Alliance (forests in target countries non-conformant on social issues)*	moderate	4,500,000*	0.73	0.37	0.24	0.18	0.15

*Underestimated areas

derived from improvements in C&I applied by certifiers and manifested in the consequent management responses would exceed these modest levels.

In reality, much of the benefit derived from the use and application of the CIFOR C&I research is of a non-monetary nature and is not evenly distributed by area. For example, an important contribution of the CIFOR C&I research relates to improvements in certification C&I that relate to stakeholder consultation processes, 'intergenerational access to resources'– land tenure and rights of local and indigenous communities. Benefits accruing from the application of such C&I might include: avoidance of conflicts, securing of tenurial rights, improved communication between communities and forest managers etc. Such outcomes are not readily converted to a per-hectare monetary value.

Nevertheless, the low levels of monetary benefit required per hectare to justify the research investment suggest a high degree of plausibility that the research has generated mission-relevant benefits that far exceed the costs. In this regard, the

CIFOR research had been completed and has had influence on certifier standards at a time when global totals of certified forest were still low but rising rapidly (see Figure 4). Additionally, this analysis only addresses use of CIFOR C&I in FSC certification and its application in the USFS LUCID initiative; other documented research uptake and use events, e.g., influence of forest policy in India or S. Africa, or monitoring in Brazil and Mexico, are excluded and thus the areas over which the C&I research has had some influence are underestimated.

7. Conclusions

The CIFOR Criteria and Indicators (C&I) research responded to an international demand for science to help clarify the assessment of sustainable forest management through development and improvement of C&I. C&I help define standards for sustainable forest management and are now being used by many different groups. Governments are using C&I to help them regulate the practices of forest users and report on the status of their forests to international processes and fora. Forest certifiers depend on C&I to assess whether companies are managing their forests in a sustainable manner. Forest management companies themselves often use C&I to improve the quality of their management, and, similarly, local communities can use C&I to improve their own management practices and hold to account others who share their forests.

CIFOR's was the first international research effort that sought to test and compare the effectiveness of C&I for sustainable forest management at the Forest Management Unit (FMU) level. The research made use of multidisciplinary teams in a series of comparisons of indicator sets in various (often tropical) forest settings. The case study shows that the research achieved widespread influence and uptake across many different types of organisations. This uptake has led to the generation of significant international public goods.

Whilst CIFOR was not a prime-mover in the emergence and eventual global acceptance of forest certification, it did make substantial positive contributions to this process by independent testing of C&I used to assess sustainable forest management.

The global total of Forest Stewardship Council (FSC)-endorsed certified forest is steadily increasing and currently stands over 47 million ha. The area of forests certified in Asia, Africa and Latin America represents 18 per cent of the total certified area. Within this, the area of certified forests that occur within CIFOR 'mandate countries' exceeds 5.84 million ha. Official statistics from the United Nations Environment Programme (UNEP) and the FSC show that the most active certification companies globally in terms of the areas of forest certified have been Société Générale de Surveillance (SGS) Qualifor, Rainforest Alliance, Scientific Certification Systems (SCS) and the Soil Association. These four companies are responsible for auditing over 96 per cent of the world's current FSC-certified

forest operations and are far more important than other certification agencies with regard to tropical forests and forests certified in the South.

Three of the four key FSC certification bodies acknowledge benefiting from the CIFOR work on C&I in developing their generic certification standards or auditing processes. Therefore, over 79 per cent of the global total of certified forest – or 37.1 million ha of forest – has been certified by companies that acknowledge some use of CIFOR's C&I research in their certification standards or audit processes. 'Spillover' effects are therefore large because the bulk of the world's certified forests are located in the developed countries of the North – outside of the countries that are central to the Consultative Group on International Agricultural Research (CGIAR) mission.

The standards developed and used by certification bodies did not adopt CIFOR's C&I in a 'wholesale' manner, and quantitative attribution of CIFOR's research contribution to certification standards proved problematic. Nevertheless, there was broad agreement among three of the four major FSC certification bodies that CIFOR C&I research highlighted general areas of weakness and inconsistency in SFM standards and showed that it is not practically possible to have a single set of globally applicable C&I. Prior to the CIFOR research effort, C&I dealing with 'social sustainability' issues were relatively weak in the standards used by FSC certification bodies. The CIFOR work helped bring credibility and legitimacy to social sustainability issues that were initially regarded as very difficult to incorporate in assessments of SFM and forest certification processes. The CIFOR research provided information on limits to the geographical generalisability of forest management standards, highlighting in particular the site-specific nature of indicators for 'social sustainability'. The research highlighted the need for, and provided tools to adapt, indicator sets to local conditions.

Thus the CIFOR research helped focus the attention of certifiers on social sustainability issues and helped speed the development of certification standards in this regard. CIFOR's contribution in the realm of 'social' C&I was associated with stakeholder consultation methods, mitigation of conflicts with indigenous or local communities and consideration of their tenurial and land-use/usufruct rights. The research also helped draw increased attention to biodiversity issues although the C&I developed by CIFOR lacked practical utility for certification field audits.

SmartWood standard sets specifically acknowledge CIFOR's research. Study findings suggest that the CIFOR research also helped SmartWood to focus its certification standards development processes on C&I that performed well in a range of conditions and helped speed the development of C&I by highlighting areas

where more effort in C&I development was required. In developing its standards it is clear that SmartWood made use of CIFOR research: this is acknowledged on its official website and appears in the published text of its current generic standards set and in several published national standard sets.

The CIFOR work was of utility in helping the FSC- accredited certifier SGS Qualifor to develop its stakeholder consultation processes. The CIFOR C&I research helped to inform the SGS standards development process, particularly with regard to social issues relating to stakeholder consultation and 'intergenerational access to resources' in sustainable forest management, but there was no 'wholesale adoption' of CIFOR's generic C&I.

CIFOR C&I research was also important in the development of Woodmark standards. Key informant interviews suggest that the C&I work was important for raising awareness and highlighting topics such as social issues, e.g., stakeholder consultation and biodiversity. The indicators developed through the CIFOR research, although not used directly in the Woodmark standard, helped focus the Soil Association's attention on aspects of sustainability that had not been adequately dealt with in earlier standard sets.

The study shows, through examination of public assessment reports, that certification, in turn, has led to large improvements in SFM on the ground. Substantial areas of forests have been certified, and the issues most closely associated with CIFOR research contributions to certification standards commonly feature in Corrective Action Requests (CARs). These commonly occurring CARS demand improvements in forest management in relation to stakeholder consultation processes and 'intergenerational access to resources'– land tenure and rights of local and indigenous communities – which result from research-related improvements to management practices; these occur in more than 3.2 million ha of forests in CIFOR target countries.

The analysis of Public Certification Assessment Reports coupled with review of findings published in recent literature show that certification in developing countries has:
• helped secure or improve environmental services in certified forests
• improved worker conditions within certified forests
• acted to reduce social conflict in and around certified forests
• helped in securing land tenure and usufruct rights (in certified community forests)
• improved the image of the forest management enterprise locally and in associated markets
• provided greater access to premium timber markets (where they exist)

- helped promote sustainable forest management more generally through dialogue between the private sector, government bodies, NGOs and civil society

Such improvements clearly contribute to the CGIAR goals over large areas, but the magnitude and distribution of benefits remain difficult to quantify and compare.

The CIFOR research effort was timely because certification in general, and FSC certifier indicator sets in particular, were developing quickly during the life of the CIFOR research project. In the period since the completion of the CIFOR C&I research, large areas of forests have been certified under the FSC system using C&I-based standard sets and audit processes.

The FSC itself has made limited use of the CIFOR C&I yet key documents such as 'FSC Guidelines for Certifiers' encourage certifiers and national working groups to refer to CIFOR research regarding financial C&I for SFM: *'Certification bodies and FSC National Initiatives are encouraged to study the CIFOR paper, especially Table 5 'Recommended Criteria and Indicators', with a view to improving the certification bodies' 'generic standards', and FSC Regional Standards.'*

Regional/national FSC standards development processes are iterative, participatory and accommodate a wide range of stakeholder interests – consequently direct research influence on such processes is challenging and requires research organisations to remain engaged in the long-term or succeed in achieving 'first-mover advantage'. There are examples of CIFOR research influencing national/regional FSC standards development processes through the CIFOR C&I field tests in Brazil and Cameroon; these tests were conducted when certification processes were nascent in these countries. In the case of Brazil, CIFOR played a key role early in the process of developing standards for *terra firme* forests. Substantial forest areas have come under FSC-certified management in Brazil, however much of it is outside the Brazilian Amazon where the CIFOR work had its greatest relevance and influence.

There is evidence of influence on FSC national standards development processes in Nicaragua, Honduras, Costa Rica, Guyana and Guatemala through application of C&I selection methods developed by CIFOR and the Centro Agronómico Tropical de Investigación y Enseñanza (CATIE). More indirect and less attributable, influence has resulted from the use of the CIFOR research outputs as a general information resource for standard-setting processes, and through use of the Pathfinder tools by national working groups in Chile and Cameroon. Generally, research uptake in FSC working groups has been patchy, and many FSC

national standards development processes have yet to be completed in developing countries. This fact alone largely constrains the possible impact generated through this pathway to date. In some instances, e.g., Cameroon, there may be research impact through this pathway in the future.

In addition to certification-related uptake and impact, the study highlights a number of uptake events across a wide range of organisations at international regional, national and subnational levels. In some cases these events have led to significant outcomes and impacts.

CIFOR research from the Cameroon C&I test was used extensively in the development of C&I by the African Timber Organisation (ATO). These C&I were later harmonised with those of the International Tropical Timber Organisation for use in ATO countries.

Thorough examination of a large number of key policy documents produced by major donors supporting forest-related initiatives showed that CIFOR C&I research was frequently cited. Notable examples included: World Bank Forest Policy, the Global Environment Facility (GEF) - Roundtable on Forests, the Convention on Biodiversity (CBD)'s Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) report to COP5 and in guidelines for best practice in integrating biodiversity into national forest planning, and in United Nations Intergovernmental Panel on Forests (IPF)/United Nations Forum on Forests (UNFF) decisions. In general, the CIFOR C&I research has been highly regarded at the international level, and has been acknowledged in key documents that have helped to shape the international forestry agenda.

CIFOR C&I research played an important role in shaping national and state policies in India. CIFOR experience with multi-stakeholder processes and methods for selection of C&I was important in the formulation of national forest management standards in South Africa. In Brazil the Brazilian Institute for the Environment and for Natural Renewable Resources (IBAMA) enforces compliance with the Forest Code through its regional offices in each state, and has made use of the CIFOR C&I and, especially, the CIFOR C&I Brazil test findings, to revise guidelines to audit the activities of companies involved in the timber business in the state of Para.

The United States Forest Service (USFS) tested the CIFOR C&I in the state of Idaho and developed a standard framework for the monitoring of the sustainability of the United States Federal Forests. This framework, which draws extensively on CIFOR research, has been further applied in test areas that cover more than 7.5

million ha of forest in the USA. The USFS initiative has also been influential in standards development for forest management in Canada and Mexico.

There is potential for additional 'spillovers' in coming years from new certification initiatives emerging in the oil palm industry, in coffee, soya, banana and citrus production. These are drawing upon the experiences gained with forest certification, and in the case of oil palm, are currently developing C&I for sustainable production using the FSC Principles and Criteria (P&C) as a model. CIFOR's work on C&I (particularly issues relating to community conflicts and traditional land-use rights) may yet spill over into standards for the sustainable production of oil palm, and other plantation crops, with potentially large impacts. Development of C&I for resource management is an area that remains of strategic importance for CIFOR and the CGIAR more generally.

The variety of cases of research uptake and widespread research influence highlight the strategic relevance of CIFOR C&I research and the range of 'pathways' through which outcomes can result. The variety and number of positive outcomes highlight the international public goods nature of the CIFOR C&I research.

7.1 Enhancing research uptake and impact: lessons learned from the CIFOR C&I research experience

The experience gained from the CIFOR C&I research coupled with findings from literature on effective means of promoting research uptake has been used to help formulate best practice guidelines for research practitioners and managers. Empirical findings from the C&I research were distilled (Spilsbury and Nasi in press) and the general conclusions are summarised below:

The supporting processes of clear communication, good dissemination, 'marketing' and effective 'targeting' enhance research uptake, but with highly variable effectiveness regardless of problem focus or scientific discipline. Research can be disseminated using a variety of communication channels and media. Mass media channels are more effective for widespread awareness-raising about innovations, whereas interpersonal channels and networks are more effective in forming and changing attitudes toward a new idea or innovation, and thus in influencing the decision to adopt or reject it. Therefore, the processes chosen to promote or adapt or otherwise disseminate research findings are a key consideration for achieving significant uptake, influence and impact.

In general terms, research approaches that seek direct engagement with the intended users (e.g., participatory approaches and 'action' research) reduce the gap between innovation suppliers and innovation users by making them a part

of the same process and allowing two-way communications in the development of research-based solutions. Thus 'technology transfer' should be regarded as the process by which research solutions and innovations can be modified and adapted to better meet the needs of the intended target audience. The C&I project actively engaged key users through its advisory panels, and this helped to enhance research uptake, especially among certification bodies and the FSC.

The literature on research diffusion and uptake is very extensive and spans a wide range of disciplines and applications. Important strategies to enhance the use of research-based innovations and their influence/impact are highlighted (Bero *et al.* 1998; Tabor and Faber 1998; Sizer 2001; Douthwaite 2002), and include:

- Seeking out powerful or influential alliances/partnerships for uptake and 'promotion' from the outset, select a strong and credible lead agency.
- Ensure that the innovation has a volunteer 'champion' in key 'impact pathways' through the entire process from initiation of research to eventual impact.
- Adopt a pluralistic attitude to the research process and encourage multi-institutional ownership of insights and innovations.
- Invest in 'market research' and learn from the audience through: advisory groups, planning workshops, partnerships and networks.
- Build the intended audience into the research process and seek feedback at all stages.
- Translate research into 'operational' language, e.g., management suggestions or policy decision options.
- Embed research within influential 'change processes' (e.g., policy change processes or development initiatives).
- Invest in outreach processes, making use of a combination of approaches to enhance uptake such as:
  a) Use 'launch events' for key products and findings.
  b) Use mass media to reach large but important constituencies.
  c) Develop good interpersonal channels of communication with key influential individuals (or make use of partners who can do this).
  d) Use internet and email list servers as communication tools not as a dissemination strategy.
  e) Send frequent reminders or conduct repeated demonstrations to intended users about the innovation.
  f) Invest in interactive 'educational' meetings (e.g., 'best practice' discussion fora) that involve researchers and users/practitioners.

Clearly, producing research outputs and relying on passive dissemination approaches is not sufficient to maximise uptake and impact. Processes for technology and policy adoption are similar in that nearly all are complex and iterative. Because passive dissemination of information is generally ineffective, greater emphasis

on building 'ownership' of research innovations or policy recommendations is required. This implies understanding user or 'target audience' needs and the use of networks or formation of alliances or partnerships to help communicate and promote research-based innovations.

Endnotes

1   http://www.cifor.org/acm/pub/toolbox.html
2   http://www.piec.org/pathfinder/pages/background.htm
3   http://www.certified-forests.org/
4   http://www.pefc.org/internet/html/about_pefc.htm
5   http://www.aboutsfi.org/core.asp
6   Details on the various accreditation and certification initiatives are available at http://www.sfcw.org/mutualrecognition/doc-pdf/pub_a15.pdf.
7   Target countries are defined in CIFOR's Strategic Plan and focus on developing countries in tropical and sub-tropical regions.
8   http://www.fsc.org/en/how_fsc_works/policy_standards/princ_criteria
9   http://www.rainforest-alliance.org/programs/forestry/smartwood/certification/documents/fmgenericguidelines.pdf
10 http://www.rainforest-alliance.org/programs/forestry/smartwood/certification/regional-standards.html area data from http://www.fsc.org
11 The meaning of intergenerational being that the resources in question are for the benefit of both the present and subsequent generations, and that the future will not involve a significant reduction in people's access. Access implies three qualities: that the resource remains (sufficient quantity and quality); that the people can use it, as needed or to the same extent as in the past; and that 'fairness', or equity, exists in regulations governing its use and distribution. (Colfer *et al*. 1997). Common certification issues are security of land tenure, user rights to forest products, and fair distribution of forest benefits.
12 FSC Regional Standards in Canada (3); United States Regional Standards (7); Mexico; Nicaragua; Colombia; Peru – Timber, Brazil Nuts; Ecuador; Chile; Plantations; Bolivia – Brazil Nut; Ireland; Belgium; Denmark; Netherlands; Spain; Estonia; Latvia; Russia; Poland; Hungary; Romania; New Zealand; Papua New Guinea; Indonesia; Vietnam; Cameroon; Ghana; Zimbabwe.
13 http://www.fsc.org.br/ingles/standarts.htm
14 www.fsc.org.br
15 See the following websites for Public Certification Summaries: http://www.rainforest-alliance.org/programs/forestry/smartwood/public-summary-reports.html
http://www.qualifor.sgs.com/home_qualifor/forest_management_certification/forest_management_reports.htm
http://www.scscertified.com/forestry/forest_certclients.html
16 Cashore, B. 1997 Governing Forestry: Environmental Group Influence in

British Columbia and the US Pacific Northwest. Ph.D. thesis, University of Toronto, Toronto.

[17] Http://www.yale.edu/forestcertification/symposium Note: Draft symposium papers are still formally 'not for citation', however the source papers are included in the references and marked '*'.

[18] http://www.sustainable-palmoil.org/criteria.htm
http://www.rainforest-alliance.org/programs/agriculture/certified-crops/get-certified.html

[19] Angola, Cameroon, Central African Republic, Congo, Cote d' Ivoire, Equatorial Guinea, Gabon, Ghana, Liberia, Sao Tome e Principe, Tanzania and Zaire.

[20] http://www.fs.fed.us/institute/mexican_lucid/workshop_1.htm

[21] Eight National Forests participated in the LUCID Project including the Ottawa National Forest in the Upper Peninsula of Michigan; the Allegheny National Forest in northwestern Pennsylvania; the Modoc National Forest in northern California; the Blue Mountain Province Forests of eastern Oregon (including the Wallowa-Whitman, Malheur, and Umatilla National Forests); the Mt. Hood National Forest in northwestern Oregon; and the Tongass National Forest in southeastern Alaska.

[22] Additional evidence of significant CIFOR research uptake by the USFS can be found on the following sites:
http://www.fs.fed.us/institute/lucid/final_report/
http://www.fs.fed.us/institute/lucid/
http://www.fs.fed.us/institute/cifor/cifor_201.html
http://www.fs.fed.us/institute/lucid/forests.html
http://www.fs.fed.us/institute/cifor/cifor_100.html

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*Denotes draft conference proceedings – papers available online but not yet approved for formal citation.

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Appendices

Appendix 1: C&I Processes

http://www.tropenbos.nl/DRG/standards.htm

Process	Region
Government-led/regional processes (only tropical processes mentioned)	
Tarapoto process	Brazil, Bolivia, Colombia, Ecuador, Guyana, Peru, Suriname, Venezuela
Dry-zone Africa	27 countries in Dry Africa (CILSS, IGADD and SADC subregions)
Dry forests in Asia	Bangladesh, Bhutan, China, India, Myanmar, Mongolia, Sri Lanka, Thailand
Near East	30 countries in the near-east
Lépaterique process	Central American Countries
ATO Initiative	Angola, Cameroon, Central African Republic, Congo, Ivory Coast, Equatorial Guinea, Gabon, Ghana, Liberia, Nigeria, Sao Tome e Principe, Tanzania, Zaire
ITTO	World-wide
Research-oriented approaches	
CIFOR	World-wide
Linked to certification schemes (only tropical ones)	
FSC	World-wide
PEFC	Europe, Brazil, Malaysia
ISO-14000	World-wide
Smartwood	World-wide
SGS-Qualifor	World-wide
SCS	World-wide
Soil Association/ Woodmark	World-wide
National initiatives	
Bolivia	National
Brazil	National
Cameroon	National
Costa Rica	National
Indonesia	National
Mexico	National
Peru	National
Malaysia	National
Ghana	National
Non-timber forest product standards	
Country	**Standard**
Bolivia	Brazil nut
Peru	Brazil nut

Appendix 2: Third-party Recognition of the CIFOR Research

Commonwealth Forestry Association – Queen's Award for Forestry 2005

Ravi Prabhu is the 2005 recipient of the Queen's Award for Forestry given by the Commonwealth Forestry Association. The award is given to an individual of a Commonwealth country who has made an outstanding contribution to forestry.

'Dr. Ravi Prabhu has made outstanding contributions to work on the Criteria and Indicators of Sustainable Forest Management, both globally and in many specific countries. He has also been a pioneering champion of moving from a rule based approach to forest management to an adaptive approach, where how one manages a forest changes over time as the objectives, context, and condition of the forest change. Dr. Prabhu has a firm commitment to and belief in transforming public sector forestry institutions into more dynamic, transparent and accountable, learning–based organizations.'

http://www.cfa-international.org/Queen's%20Award%202005.html

International Tropical Timber Organisation (ITTO)

Markku Simula and Baharuddin Haji Ghazali. *Timber Certification Progress and Issues*, published by ITTO in 1998:

'The CIFOR's project is, as yet, the only international effort to evaluate and develop C&I at the forest or FMU level for SFM, not just for good forest stewardship….

The CIFOR initiative is a bold and creditable effort in promoting the development of SFM, particularly in the face of the highly varied and complex tropical rainforest environment, where most of the difficulties are encountered. The guidelines that CIFOR is producing will have an important bearing in this direction as they form a workable baseline for determining the state of the art of the forest. It could provide an excellent basis for designing an instrument to carry out forest rating, i.e. a measurement of how close the forest is in approaching sustainability….

Due credit must be given to CIFOR for successfully developing C&I and the toolbox to enable adaptations of use in different situations. The acid test lies in their application which calls for sound decision making and consistency in judgement at the fieldworkers' level. The most challenging situations will lie in the evaluative aspects of assessment, especially of social impacts and implications where different disciplines and varying training backgrounds could possibly lead to a host of divergent mindsets among the assessors.'

CIFOR's First External Programme and Management Review (EPMR) 1998

Independent evaluation of C&I research by CGIAR EPMR Panel (including the current SPIA Chair). The CGIAR EPMR panel for CIFOR in 1998 appraised the work and progress of the C&I work and commented:

'The first phase of the project, completed in 1996, had substantial effects at national and international levels.'

On the relevance and priority of the work they further commented:

'The concentration of CIFOR's project on C&I at the forest management unit level responds to the need for a neutral institution to participate in this process. Also, as an international centre, it has been capable of developing comparative studies on the initiatives accomplished in various countries, and on the approaches that support them. The study had a positive impact on the international debate on C&I, as was shown by the importance accorded to the work presented by CIFOR in three inter-sessional meetings of the [United Nations] Intergovernmental Panel on Forests (IPF). The C&I have been recommended by the African Timber Organization, the Intergovernmental Panel on Forests, and the Forest Stewardship Council, and noted in several journals and consultancies. These studies have allowed the Centre to present recommendations, methodologies, guides, etc., so that the various initiatives become capable of defining C&I that are relevant at a local level, have solid scientific support and are internationally compatible.'

In addition they concluded:

'In its initial phase it had significant impact at international and national levels. Its second phase, similarly to phase 1, implies the production of relevant and original international public goods, employing frontier science on the subject.'

Appendix 3: Table Showing Forests for which Corrective Action Requests were Analysed from Public Certification Assessment Reports

	Client	Certificate Number	Certification Body	Land Ownership	Forest Type	Area (ha)
Belize	Programme for Belize	SW-FM/ COC-031	Rainforest Alliance	Private	Natural	95,800
Bolivia	Aserradero San Martín S.R.L. Concesion Cinma-San Martin (Cerro Pelao)	SW-FM/ COC-086	Rainforest Alliance	Private	Natural	119,200
Bolivia	CIMAL/IMR LTDA (Concesión CIMAL/IMR Marabol)	SW-FM/ COC-260	Rainforest Alliance	Private	Natural	75 500
Bolivia	CIMAL/IMR LTDA (Concesión Forestal CIMAL/ IMR Guarayos)	SW-FM/ COC-142	Rainforest Alliance	Private	Natural	181,750
Bolivia	CIMAL/IMR LTDA (Concesión Forestal CIMARL/ IMR Velasco)	SW-FM/ COC-036	Rainforest Alliance	Private	Natural	154,496
Bolivia	Empresa Agroindustrial La Chonta Ltda Concesión Lago Rey	SW-FM/ COC-050	Rainforest Alliance	Private	Natural	120,000
Bolivia	Industria Maderera San Luis S.R.L	SW-FM/ COC-116	Rainforest Alliance	Private	Natural	60,588
Brazil	Cikel Brasil Verde S.A.	SCS-FM/ COC-00031N	SCS	Private	Natural	140,658
Brazil	Duratex S.A.	SCS-FM/ COC-00029P	SCS	Private	Plantation	60,924
Brazil	EMAPA - Exportadora de Madeiras do Para LTDA	SCS-FM/ COC-00061N	SCS	Private	Natural	12,000
Brazil	Eucatex S.A.	SCS-FM/ COC-00040P	SCS	Private	Plantation	47,704

	Client	Certificate Number	Certification Body	Land Ownership	Forest Type	Area (ha)
Brazil	Floresteca Agroflorestal Ltda.	SGS-FM/COC-0079	SGS	Private	Plantation	11,405
Brazil	Gethal Amazonas S.A.	SW-FM/COC-119	Rainforest Alliance	Private	Natural	40,862
Brazil	Jurua Forestal Ltda - Fazenda Aratau	SCS-FM/COC-00045N	SCS	Private	Natural	25,000
Brazil	Klabin Fabricadora de Papel e Celulose SA	SW-FM/COC-038	Rainforest Alliance	Private	Plantation	218,545
Brazil	Klabin Riocell S.A.	SW-FM/COC-167	Rainforest Alliance	Private	Plantation	66,733
Brazil	Lisboa Madeira Ltda.	SW-FM/COC-182	Rainforest Alliance	Private	Natural	76,390
Brazil	Madepar Indústria e Comércio de Madeiras Ltda	SCS-FM/COC-00048P	SCS	Private	Plantation	2,654
Brazil	Mil Madeireira Itacoatiara Ltda, (Precious Woods Amazon)	SW-FM/COC-019	Rainforest Alliance	Private	Natural	80,000
Brazil	Pisa Florestal S.A.	SCS-FM/COC-00038P	SCS	Private	Plantation	103,036
Brazil	Plantar S.A.	SCS-FM/COC-0004P	SCS	Private	Plantation	13,414
Brazil	Rohden Artefatos de Madeira Ltda. – FM.	SW-FM/COC-136	Rainforest Alliance	Private	Semi-natural and Mixed Plantation & Natural Forest	714
Brazil	Rohden Industrai Lignea Ltda.	SCS-FM/COC-00063N	SCS	Private	Natural	25,100
Brazil	Seiva S/A.	SGS-FM/COC-1368	SGS	Private	Plantation	13,799
Brazil	Sincol	SGS-FM/COC-1135	SGS	Private	Plantation	11,571

	Client	Certificate Number	Certification Body	Land Ownership	Forest Type	Area (ha)
Brazil	Terranova Brasil Ltda.	SGS-FM/ COC-0999	SGS	Private	Semi-natural and Mixed Plantation & Natural Forest	13,206
Brazil	V&M Florestal Ltda,	SGS-FM/ COC-0212	SGS	Private	Plantation	198,801
Costa Rica	Empresa Cosechadora FIBERICA S.A.	SGS-FM/ COC-1144	SGS	Private	Plantation	76
Costa Rica	Flor y Fauna S.A.	SW-FM/ COC-06	Rainforest Alliance	Private	Plantation	3,338
Costa Rica	Fundación para el Desarrollo de la Cordillera Volcánica Central –FUNDECOR	SGS-FM/ COC-1079	SGS	Private	Semi-natural and Mixed Plantation & Natural Forest	8,500
Costa Rica	Reforestation Industrial Los Nacientes	SGS-FM/ COC-0627	SGS	Private	Plantation	10,948
Equador	Face Foundation/ Profafor	SGS-FM/ COC-0879	SGS	Private	Semi-natural and Mixed Plantation & Natural Forest	20,000
Guatemala	Asociación de Productores de San Miguel (APROSAM)	SW-FM/ COC-075	Rainforest Alliance	Communal	Natural	7,039
Guatemala	Asociación Forestal Integral San Andrés (AFISAP)	SW-FM/ COC-160	Rainforest Alliance	Communal	Natural	51,940
Guatemala	Associación de Productores Agroforestales de la Pasadita	SW-FM/ COC-074	Rainforest Alliance	Communal	Natural	18,217
Guatemala	Barrios Enlace Comercial Cía. Ltda. (Baren Comercial) - "La Gloria"	SW-FM/ COC-254	Rainforest Alliance	Private	Natural	66,458

	Client	**Certificate Number**	**Certification Body**	**Land Ownership**	**Forest Type**	**Area (ha)**
Guatemala	Cooperativa Integral de Comercialización Carmelita R.L.	SW-FM/ COC-100	Rainforest Alliance	Communal	Natural	53,797
Guatemala	Ecoforest S.A .	SGS-FM/ COC-0984	SGS	Private	Plantation	2,242
Guatemala	GIBOR S.A. Paxban	SW-FM/ COC-158	Rainforest Alliance	Private	Natural	64,869
Guatemala	Sociedad Civil Organizacion, Manejo y Conservación, Comunidad Uaxactun (OMYC)	SW-FM/ COC-161	Rainforest Alliance	Communal	Natural	83,558
Guatemala	Sociedad Civil para el Desarrollo Arbol Verde	SW-FM/ COC-219	Rainforest Alliance	Communal	Natural	64,973
Honduras	La Cooperativa Regional Agroforestal, Colón, Atlántida, Honduras Ltda. (COATLAHL)	SW-FM/ COC-024	Rainforest Alliance	Communal	Natural	31,379
Indonesia	PT Diamond Raya Timber	SGS-FM/ COC-0659	SGS	Private	Natural	90,240
Malaysia	Golden Hope Plantations Berhad	SCS-FM/ COC-00044P	SCS	Private	Plantation	12,434
Malaysia	Perak ITC Sdn. Bhd.	SCS-FM/ COC-00046N	SCS	Public	Natural	9,725
Malaysia	Sabah Forestry Department - Deramakot Forest Reserve	SGS-FM/ COC-0065	SGS	Public	Natural	55,083
Mexico	Comunidad Ejidal El Tarahumar y Bajíos	SW-FM/ COC-245	Rainforest Alliance	Communal	Natural	20,945
Mexico	Comunidad Santiago Textitlán	SW-FM/ COC-165	Rainforest Alliance	Communal	Natural	17,400
Mexico	Ejido El Largo y Anexos	SW-FM/ COC-170	Rainforest Alliance	Communal	Natural	187,129

	Client	Certificate Number	Certification Body	Land Ownership	Forest Type	Area (ha)
Mexico	Ejido Noh Bec	SW-FM/COC-066	Rainforest Alliance	Communal	Natural	17,300
Mexico	Ejido San Diego De Tensaenz	SW-FM/COC-156	Rainforest Alliance	Communal	Natural	16,800
Mexico	Ejido San Esteban	SW-FM/COC-157	Rainforest Alliance	Communal	Natural	6,128
Mexico	Sociedad Civil 'Sierra del Nayar'	SW-FM/COC-195	Rainforest Alliance	Private	Natural	13,748
Namibia	Jumbo Charcoal Group	SA-FM/COC-1182	Soil Association (SA)	Private	Natural	61,130
Nicaragua	Hermanos Ubeda	SCS-FM/COC-00039N	SCS	Private	Natural	3,500
Nicaragua	Prada S.A., El Cascal-Layasiksa	SW-FM/COC-271	Rainforest Alliance	Private	Natural	9,232
Papua New Guinea	EU-IRECDP	0755/6131/0169	SGS	Communal	Semi-natural and Mixed Plantation & Natural Forest	4,310
Solomon Islands	Kolombangara Forest Products Ltd.	SA-FM/COC-1070	SA	Private	Semi-natural and Mixed Plantation & Natural Forest	39,402
South Africa	African Environmental Services Group Certification Scheme (AES)	SGS-FM/COC-1337	SGS	Private	Plantation	13,967
South Africa	Department of Water Affairs and Forestry Directorate: Indigenous Forest Management - Southern Cape	SGS-FM/COC-1231	SGS	Public	Semi-natural and Mixed Plantation & Natural Forest	35,000
South Africa	Global Forest Products Pty Ltd	SGS-FM/COC-0809	SGS	Private	Plantation	92,023

	Client	Certificate Number	Certification Body	Land Ownership	Forest Type	Area (ha)
South Africa	Komatiland Forests (Pty) Limited	SGS-FM/ COC-0068	SGS	Public	Plantation	200,077
South Africa	Masonite (Africa) Limited	SGS-FM/ COC-1015	SGS	Private	Plantation	21,925
South Africa	MTO Forestry (Pty) Ltd Western Cape Region	SGS-FM/ COC-0133	SGS	Public	Plantation	53,953
South Africa	NCT Forestry Co-operative Ltd.	SGS-FM/ COC-0348	SGS	Private	Plantation	43,760
South Africa	NCT SLIMF	SGS-FM/ COC-1598	SGS	Private	Plantation	1,841
South Africa	North East Cape Forests	SGS-FM/ COC-1338	SGS	Private	Plantation	76,893
South Africa	Northern Timbers	SGS-FM/ COC-0561	SGS	Private	Plantation	940
South Africa	SAFCOL	SGS-FM-COC-0123	SGS	Private	Plantation	42,714
South Africa	SAPPI Forest Products	SGS-FM/ COC-0442	SGS	Private	Plantation	48,507
South Africa	SAPPI Forests Pty Ltd	SA-FM/ COC-1230	SA	Private	Plantation	377,602
South Africa	Singisi Forest Products (Pty.) Ltd. - Baziya	SGS-FM/ COC-1503	SGS	Private	Plantation	10,683
South Africa	Singisi Forest Products Pty (Ltd)	SGS-FM/ COC-0780	SGS	Private	Plantation	31,897
South Africa	Steinhoff Southern Cape (Pty) Ltd	SGS-FM/ COC-1143	SGS	Private	Plantation	8,500
South Africa	TWK Group Scheme	to be completed (only certified April 2004)	SGS	Private	Plantation	2,650
Sri Lanka	Agalawatte Plantations	SGS-FM/ COC-0799	SGS	Private	Plantation	5,099
Sri Lanka	Horana Plantation s Ltd	SGS-FM/ COC-0045	SGS	Private	Plantation	2,915
Sri Lanka	Kegalle Plantations Ltd	SGS-FM/ COC-0046	SGS	Private	Plantation	3,546
Sri Lanka	Kelani Valley Plantations Ltd	SGS-FM/ COC-0047	SGS	Private	Plantation	4,691

	Client	Certificate Number	Certification Body	Land Ownership	Forest Type	Area (ha)
Swaziland	Shiselweni Forestry Company	SA-FM/ COC-1171	SA	Private	Plantation	17,018
Thailand	Metro MDF	SGS-FM/ COC-0989	SGS	Private	Plantation	921
Uganda	UWA FACE Foundation - Kibale National Park	SGS-FM/ COC-0979	SGS	Private	Semi-natural and Mixed Plantation & Natural Forest	10,000
Uganda	UWA FACE Foundation - Mount Elgon National Park	SGS-FM/ COC-0980	SGS	Private	Semi-natural and Mixed Plantation & Natural Forest	25,000
Zambia	Muzama Crafts Ltd.	SA-FM/ COC-	SA	Private		826,022
Zambia	Ndola Pine Plantations Ltd.	SGS-FM/ COC-1398	SGS	Public	Plantation	983
Zimbabwe	Border Timbers Ltd.	SGS-FM/ COC-0293	SGS	Private	Plantation	47,654
Zimbabwe	Durawood Products	SGS-FM/ COC-0001	SGS	Private	Natural	41,574
Zimbabwe	Forestry Company of Zimbabwe	SGS-FM/ COC-0467	SGS	Public	Plantation	19,085
Zimbabwe	Wattle Company, The	SGS-FM/ COC-0655	SGS	Private	Plantation	18,972

The sustainability of forest management

The Center for International Forestry Research's work on Criteria and Indicators (C&I) resulted from international calls for science to clarify the assessment of sustainable forest management through developing and improving C&I. Many different forest stakeholders now employ C&I as an important component of their forest management strategies. Governments use them to help regulate and report on the practices of forest users. Forest certification bodies use them to assess if forest management companies or groups are sustainably managing their forests. This case study shows CIFOR's C&I research, particularly in the area of certification, has archived widespread influence and uptake across many different types of organisations.

The Center for International Forestry Research (CIFOR) is a leading international forestry research organization established in 1993 in response to global concerns about the social, environmental, and economic consequences of forest loss and degradation. CIFOR is dedicated to developing policies and technologies for sustainable use and management of forests, and for enhancing the well-being of people in developing countries who rely on tropical forests for their livelihoods. CIFOR is one of the 15 Future Harvest centres of the Consultative Group on International Agricultural Research (CGIAR). With its headquarters in Bogor, Indonesia, CIFOR also has regional offices in Brazil, Burkina Faso, Cameroon and Zimbabwe, and works in over 30 other countries around the world.

FUTURE HARVEST

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