

# Contributing to the scientific literature

## Citation analysis of CIFOR publications

Arild Angelsen and Baikuntha Aryal



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# Contributing to the scientific literature

## Citation analysis of CIFOR publications

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# Summary and recommendations<sup>1</sup>

This study analysed journal citations of CIFOR publications, using the ISI Web of Science database. The main findings are:

- The total number of publications on the CIFOR publication database is 1437 (to May 2004). A publication is classified as a CIFOR publication when at least one of the authors is affiliated with CIFOR, as a staff member, associate scientist or consultant.
- Refereed articles make up 24% of all publications, and together with refereed books and book chapters the refereed publications constitute one-third of all publications.
- Of the 1437 publications, 24% have been cited. In other words, three-quarters of CIFOR publications have never been cited in an academic journal.
- Seventeen publications have been cited more than 20 times, and 5 more than 50 times. One article has been referred to 192 times.
- Journal articles have a much higher chance than any other publication of being cited. Refereed books and book chapters have a surprisingly low citation frequency.
- Two of the top four publications are *not* journal articles, indicating that quality, accessibility, topic, marketing and other factors are important, besides the medium of publication.
- Empirical work and overviews/syntheses are the dominant categories among the top 43 publications (those with 10 or more citations).
- Half of the top 43 publications have non-CIFOR first authors, indicating that CIFOR (scientists) benefit from partner collaboration; but using a more narrow definition of CIFOR publication would also significantly reduce the number of publications and citations.
- Forestry journals dominate the list of journals where CIFOR work has been published, with *Forest Ecology and Management* at the top, with 33 publications. Half the journals on the 'top 24' list (five or more CIFOR publications) have an average of less than one citation per published article,

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while seven have more than five citations: three biological/conservation journals: *Conservation Biology*, *Biotropica* and *Environmental Conservation*; two economics/development journals: *World Development* and *Ecological Economics*; and two forestry journals: *Forest Ecology and Management* and *Forest Science*.

- These seven journals also figure high on the list of journals citing CIFOR work, with *Forest Ecology and Management* again at the top, with 170 CIFOR citations.
- CIFOR publications are long lived, and show no sign of falling citation rates even after 5–7 years. Fewer than 40% of the citations appear within the first four years of publication.
- There are several encouraging trends:
  - o A steady increase in the number of publications (about 200 per year for the last three years).
  - o The proportion of refereed articles is higher than ever (27–28%).
  - o Citations per cited article are higher for the latest crop of publications.

While the TOR did not include making recommendations on the publication strategy, a few suggestions follow naturally from the above findings:

- The usual recommendation of ‘*publish more journal articles, and in better journals*’ is also valid for CIFOR. In particular, many publications are appearing in low impact (and low citation probability) journals, primarily forestry journals. While this might, to some extent, reflect the quality of the papers, many of them could probably have been ‘upgraded’ and published in better-respected journals. In selecting the journal to which to submit a paper, more attention should be given to the merit of the journal, impact factor, past record of CIFOR publication and general academic reputation.
- While it is natural for many CIFOR papers to appear in forestry journals, the findings also suggest that the impact can be increased by publishing more papers in general journals within the ecological/biological/conservation and economics/social science/development fields.
- The CIFOR publication database, on which this report is based, can be improved to make it a better tool for analysing publication records and further developing the publication strategy.



# 1

## Introduction

### 1.1 Measuring impact

Do CIFOR research and publications have an impact on the scientific community? One way to answer this question is by counting citations of CIFOR publications in academic journals. Citation counting is commonly used “to assess the academic performance of individual researchers, departments and research institutions when making decisions about funding, hiring, promotion and tenure” (Leimu and Koricheva 2005: 28)<sup>2</sup>.

Such assessments are based on the assumption that citing a publication is an acknowledgement by peers about the *utility and quality* of the work. Yet there are a number of other factors that influence the number of citations that a publication receives, and these should be kept in mind when interpreting the results presented in this report<sup>3</sup>. These factors include:

- *Reputation of journal*: Papers published in well-respected journals generally receive more citations, although Leimu and Koricheva (2005) found this “journal effect” to be small for ecological papers.
- *Type of journal*: Articles in *general* journals receive more citations than those in specialised ones, in the same way that *theoretical* journals score better than applied journals.
- *Type of article*: *Review* articles (and journals) tend to be cited more often than other types of articles.
- *Subject area*: Citations (and journal impact factors) vary considerably between subject areas. For example, publication speed is much higher in the natural than the social sciences, making it more likely that a good citation count and high impact factor for the article will be achieved quickly (the commonly used impact factors refer to citation within two years of publication)<sup>4</sup>.
- *Number of authors*: The more the merrier. The reasons for this might be that the scientific network expands with multi-authored papers, self-citations increase, and – possibly – the quality of the paper improves by it having more authors.

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<sup>2</sup> Leimu, R. and Koricheva, J. 2005. “What determines the citation frequency of ecological papers?” *Trends in Ecology and Evolution* 20(1): 28-32.

<sup>3</sup> The following list is based on Leimu and Koricheva (2005) and Amin, M. and Mabe, M. 2000. “Impact factors: Use and abuse.” *Perspectives in Publishing* 1: 1-6.

<sup>4</sup> Amin and Mabe (2000) therefore recommend that journal impact factor comparisons should not be made across subject areas.

- *Reputation and institutional affiliation of cited authors*: Citation can be used to demonstrate that one is familiar with the work of prominent researchers. Reputation is, of course, also built by producing good work.
- *Network of author and marketing of publications*: Interpersonal connections play an important role ('citing friends and colleagues'), as does the author's marketing of the article (presenting at conferences, distributing the article, etc.).
- *Availability of journal (article)*: Publications available electronically on the Internet (either free or through subscription) have an advantage. Journals of professional associations, sent to all members, also have a tendency to be cited more frequently.

One objection against citation counting is that 'citing does not tell anything about impact'. One possible more refined (and 'objective') method is to weight citations based on the impact factor of the journal. However, this is more laborious and was not undertaken in this study (and would probably not have changed the overall picture). Furthermore, one would also have liked to discover the *real* impact of the publications on the academic community (e.g., in terms of changing the agenda, conceptual frameworks, theories and methods used). Is it, for example, just of the 'name dropping' type ('deforestation is a serious problem, e.g., Smith 1996; Jones 1997; Hyde 1998; Hansen 1999; ...')? Or has it led to a major change in conceptual frameworks, policy documents or the way in which empirical research is carried out? While citation counting does not reveal this, there are good reasons to believe that number of citations is an indicator of such *real* impacts.

The advantage of citation counting lies in its simplicity and objectivity. More refined methods will often include subjective and controversial judgements. As with all indicators (e.g., GDP as indicator of wealth, or life expectancy as measure of health) one can argue that the reality is more complex, which is certainly true. But that does not imply that such indicators are useless, just that they have to be used with care.

## 1.2 The study

In the present study we used the citation database of the ISI Web of Science. This includes all the major journals, and is the most complete database for this purpose. It includes citations of all types of publication, but only those appearing in journal articles. Thus, a journal article citing a CIFOR Occasional Paper (OP) is registered, while the citation of a journal article in a CIFOR OP is not.

The CIFOR Library provided a list of all CIFOR publications from 1993 to mid-2004, 1437 publications in total. A CIFOR publication is defined as a publication of which at least one of the authors is affiliated with CIFOR, as a staff member,

associate scientist or consultant. The list used is identical to those presented in the Annual Reports. We have not made any corrections to the publication list, although there appear to be some incorrect data (e.g., classifications).

An important constraint on this exercise was the fact that accumulating citations takes time. Thus, 9 of the top 10 publications are from 1998 or earlier. In other words, it is too early to assess the scientific impact of publications from the last 4–5 years.

This work was carried out according to the TOR given by CIFOR, with Baikuntha Aryal being responsible for preparing the statistical material while Arild Angelsen drafted the report. The statistical work was carried out in June–July 2004. The number of citations increases weekly, and this report shows the status as at mid-June 2004<sup>5</sup>. In addition to the present report, an Excel sheet with the primary and processed data is available.

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<sup>5</sup>Two possible sources of inaccuracy in the database are misspellings of authors' names and the fact that the same publication is cited differently by different authors.

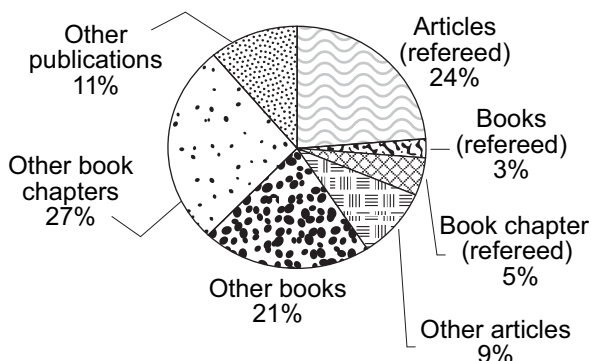
## 2

# Results and discussion

### 2.1 Total number of publications

The total number of CIFOR publications from 1993 to May 2004 was 1437; a breakdown by year of publication and record type is given in Table A1 in the Appendix.

The distribution by type of publication is shown in Figure 1. The refereed article, the most common and prestigious form of scientific communication, constituted 24% of the publications (344 in total).



**Figure 1.** CIFOR publications by category

The most common publications were, however, non-refereed book chapters (27%), which, together with non-refereed books, constituted nearly half of all publications (48%). The term ‘book’ in the CIFOR publication database is used widely, and also covers reports, papers etc.<sup>6</sup>.

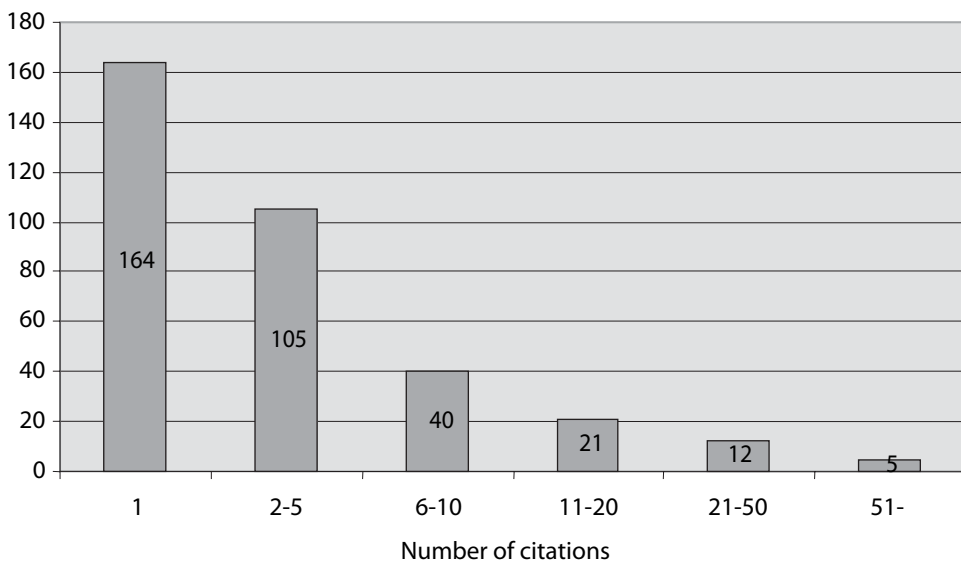
Overall, CIFOR has produced about 450 refereed publications (close to one-third of the total), which is quite a high number for an institute as young as CIFOR. However, the figures also show that most papers, reports etc. never reach the stage of externally refereed publication<sup>7</sup>.

<sup>6</sup> We suggest that the categories used and the categorisation of some publications are reconsidered in the publication database. In this report, the term Books (refereed) is included in what the database categorises as: Books refereed, Books Series Refereed and Books CD ROM refereed.

<sup>7</sup> There may be some double counting, as some ‘grey’ papers are eventually published.

## 2.2 Total citations

Most CIFOR publications are never cited in journal articles. Of the 1437 publications on the database, 1090 (76%) have never been cited in the journals covered by the ISI Web of Science. The distribution of the 347 cited publications (24%) is shown in Figure 2, with the complete data provided in Table A3 in the Appendix. Note, however, that it takes time for a journal to be cited. Thus of publications from the period 1994–2000, 31% have been cited, and this gives a more accurate picture of the citation frequency of CIFOR publications. Moreover, as seen from Table 2 (section 2.5), the citation frequency varies considerably by type of publication (43.6 % of the refereed journal articles have been cited).



**Figure 2.** Publications by frequency of citation

Almost half of the cited articles have been cited only once, while 17 have been cited more than 20 times, which is considered a very good frequency of citation. These 17 articles account for about 44% of all citations (1902 in total). The 43 top articles (10 or more citations), which are considered in more detail later, represent 62% of all citations.

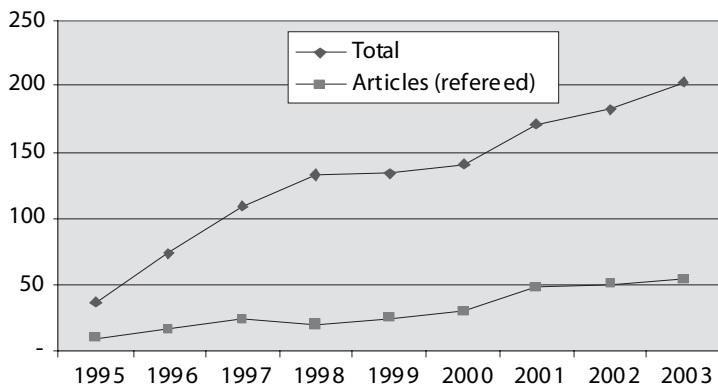
## 2.3 Publications and citation over time

Table A1 (Appendix) shows a steady increase in CIFOR publications over time. To correct for annual fluctuations and show trends over time more clearly, Figure 3 is based on rolling 3-year averages (the average for the previous three years). In 2003 CIFOR produced 214 publications, 54 of which were refereed articles.

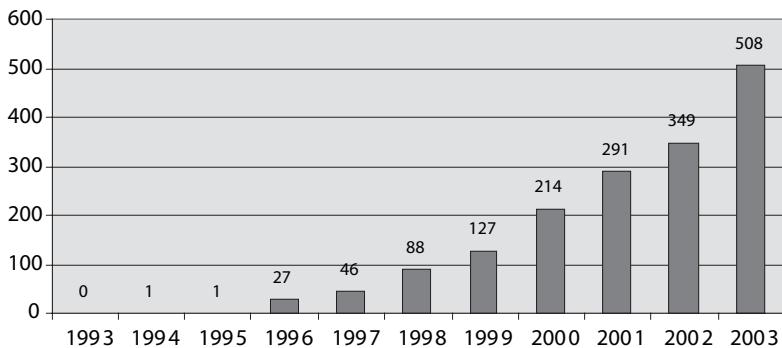
A further positive development is that for the last five years the proportion of refereed articles has been higher than ever: 27–28%.

The change in number of citations over time is shown in Figure 4. Not surprisingly, there is a sharp increase in the number of citations, reflecting two facts: first, the steady increase in the number of publications as shown in Figure 3, not least in the most-cited form of publication, namely the refereed journal article. Second, it takes time to build up citation numbers, and CIFOR publications are long lived (see section 2.11).

There are also other *possible* explanations of the sharp increase that we cannot test for in the material: CIFOR (and CIFOR researchers) may, since the institute's establishment in 1993, have built up a good scientific reputation that makes citation more likely (cf. discussion in section 1.1). The quality and usefulness of CIFOR publications may also have increased over time.



**Figure 3.** Publications by year (rolling 3-year averages)



**Figure 4.** Citations by year

## 2.4 Ten most-cited publications

A list of the 'top 10' publications is given in Table 1. The article by Young, Boyle and Brown (1996) "The population genetic consequences of habitat fragmentation for plants", published in *Trends in Ecology and Evolution*, is by far the most-cited publication with 192 citations (10% of the total). A list of the publications with more than five citations is given in Table A4 (Appendix).

**Table 1.** The 'top 10' list of cited publications

Author(s)	Title	Year	Where published	Citations
Young, A.G.; Boyle, T.J.B.; Brown, A.H.D.	The population genetic consequences of habitat fragmentation for plants	1996	Trends in Ecology and Evolution 11: 413-418.	192
Kaimowitz, D.; Angelsen, A.	Economic models of tropical deforestation: a review	1998	Bogor, Indonesia, CIFOR.	81
Pinard, M.A.; Putz, F.E.	Retaining forest biomass by reducing logging damage	1996	Biotropica 3(28): 78-295.	67
Chazdon, R.L.; Colwell, R.K.; Denslow, J.S.; Guariguata, M.R.	Statistical methods for estimating species richness of woody regeneration in primary and secondary rain forests of Northeastern Costa Rica	1998	In: Dallmeier, F. and Comiskey, J.A. (eds.) Forest biodiversity research, monitoring and modeling: conceptual background and old world case studies. Man and the Biosphere Series, Vol. 20, 285-309.	65
Parrotta, J.A.; Turnbull, J.W.; Jones, N.	Catalyzing native forest regeneration on degraded tropical lands	1997	Forest Ecology and Management 1-2(99): 1-7.	51
Guariguata, M.R.; Rheingans, R.; Montagini, F.	Early woody invasion under the tree plantation in Costa Rica: implications for forest restoration	1995	Restoration Ecology 4(3): 252-260.	45
Vanclay, J.K.	Growth models for tropical forests: a synthesis of models and methods	1995	Forest Science 1(41): 7-42.	39
Guariguata, M.R.; Chazdon, R.L.; Denslow J.S.; Dupuy, J.M.; Anderson, L.	Structure and floristic of secondary and old growth stands in lowland Costa Rica	1997	Plant Ecology 132: 107-120.	35
Lambin, E.F.; Turner, B.L.; Geist, H.J.; Agbola, S.J.; Angelsen, A.; Bruce, J.W.; Coomes, O.T.; Dirzo, R.; Fischer, G.; Folke, C.	The causes of land-use and land-cover change: moving beyond the myths	2003	Global Environmental Change 4(11): 261-269.	35
Vanclay, J.K.; Skovsgaard, J.P.	Evaluating forest growth models	1997	Ecological Modelling 98: 1-12.	34

One should note that the ‘top 10’ publications, with one exception, are from 1998 or earlier. As demonstrated later, the life of a publication is surprisingly long, and it takes time to accumulate a high number of citations. Thus, some of the more recent publications are likely to enter the ‘top 10’ list eventually.

## 2.5 Citation by type of publication

Which publication medium gives the highest probability of being cited? The answer is as one would expect: the refereed journal article (see Table 2). And the winning margin is overwhelming: close to 44% of the refereed articles have been cited, and these have been cited 8.5 times on average. Two-thirds of the citations of CIFOR work are of journal articles.

**Table 2.** Citations by type of publication

Type of publication	Total publications	Cited publications	Total citations	Percentage cited	Citations per cited publication	Citations per publication
Article (refereed)	344	150	1270	43.6%	8.5	3.7
Book (refereed)	37	3	3	8.1%	1.0	0.1
Book chapter (refereed)	70	8	9	11.4%	1.1	0.1
Other articles	134	19	63	14.2%	3.3	0.5
Other books	307	64	254	20.8%	4.0	0.8
Other book chapters	385	61	197	15.8%	3.2	0.5
Other publications	160	42	106	26.3%	2.5	0.7
Total/average	1437	347	1902	24.1%	5.5	1.3

The figures for refereed books and books chapters were surprisingly low; in fact, they were outscored by non-refereed books and book chapters. We do not have any good explanation for this. One possible reason might be that refereed books are sold by commercial publishers, and their often high prices (compared to all other categories) put them beyond the reach of many potential readers (and authors of journal articles). The figures for other (non-refereed) books and other publications were reasonably high.

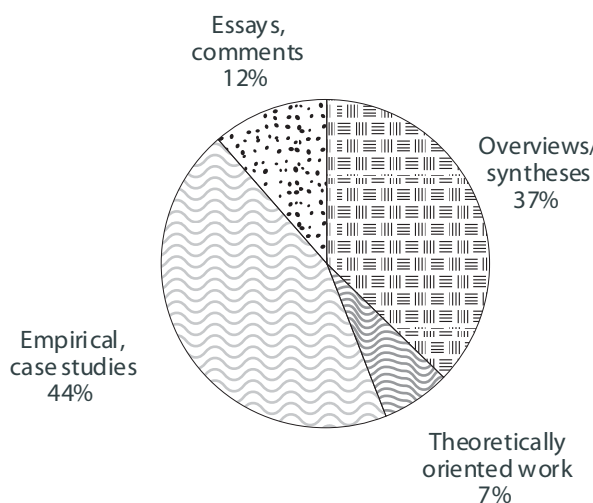
In short: journal articles ‘sell’ more than anything else! Refereed books and book chapters do not ‘sell’ well. The chances of being cited are 30–40 times higher for a refereed article than for a refereed book (chapter).



One should note, however, that the top four publications included one book published by CIFOR and one book chapter. This indicates that factors such as quality, topic, marketing, accessibility and author reputation are also important factors in being cited.

## 2.6 Citation by type of work

The top 43 publications were classified according to type of work, as indicated in Figure 5: overview/synthesis; theoretically oriented work; empirical, case studies; essays/comments. Obviously, such a classification is subjective and some publications could have been placed in several categories. The results are therefore indicative.



**Figure 5.** Distribution of top 43 citations by type of work

Empirical studies and overviews/syntheses predominate, which is not surprising. As CIFOR is an applied research institute, one would expect empirical work to figure high among the publications. Also, as a global institute CIFOR is also in a good position to synthesise results and provide overviews of the fields. There are no large differences in the average number of citations between the different categories, except that essays/comments have a lower citation rate than the others.

## 2.7 Affiliation of first author

CIFOR actively encourages partnership and joint projects with other institutions ('centre without walls'). Many publications are the result of such collaboration, and half of the top 43 publications have non-CIFOR scientists as their first

author (see Table 3). By ‘first author CIFOR’ we mean CIFOR staff, CIFOR associate scientists (e.g., Putz), and CIFOR-commissioned work (e.g., Neumann and Hirsch).

**Table 3.** Publications by affiliation of first author

	<b>Publications</b>	<b>Citations</b>	<b>Citations per publication</b>
First author CIFOR	22	470	21.4
First author non-CIFOR	21	713	34.0
Total/Average	43	1183	27.5

The fact that half of the top 43 publications are by first authors not affiliated with CIFOR (but include CIFOR scientists as one of the authors) can be interpreted in different ways. It could be seen as an indication of the value and benefits of such collaboration. CIFOR scientists are able to establish partnerships with other scientists who publish and are cited. However, it could also be taken as an indication that CIFOR scientists are not able to produce top-quality academic publications on their own. And, obviously, the overall publication record would have been much poorer if publications with non-CIFOR first authors had been excluded.

## 2.8 Publications by CIFOR researcher

Who are the authors on the ‘top 10’ list and on the more comprehensive list of publications with more than five citations (top 91)? The list of these 20 researchers with two or more publications on the latter list is presented in Table 4. A few aspects are worth highlighting: many (almost half) of the individuals on the list are former scientists, which is not surprising given the time it takes to build up citation numbers. Associates (of whom some are former scientists) are also well represented. Further, there is a natural-science dominance, particularly at the top of the list (Putz, Guariguata, Sheil, Boyle). It is also clear that CIFOR lost some of its ability to produce well-cited publications drawing from biophysical research when Putz, Guariguata, Boyle, Vanclay, Gillison and others left. But again, one must take into account the length of time it takes to build up citation numbers, and should not conclude that ‘it was better in the old days’. There are several current scientists and associates who will climb further up the list as they accumulate publications and citations.

**Table 4.** Number of publications by CIFOR scientists and associates

Name	Publications on 'top 91' list	Publications on 'top 10' list	Position
Jack Putz	9	1	Associate
Manuel Guariguata	8	3	Associate
Doug Sheil	8		Scientist
Tim Boyle	6	1	Former scientist
David Kaimowitz	6	1	Scientist, DG
Arild Angelsen	5	2	Former scientist, now Associate
Jeff Sayer	5		Former DG
Jerry Vanclay	5	2	Former scientist
Andy Gillison	4		Former scientist
Ravi Prabhu	4		Scientist
William Sunderlin	4		Scientist
Lini Wollenberg	4		Scientist
Bruce Campbell	3		Scientist
Manuel Ruiz Perez	3		Former scientist, now Associate
John Turnbull	3	1	Former scientist
Sven Wunder	3		Scientist
Carol Colfer	2		Scientist
Dennis Dykstra	2		Former scientist
David Edmunds	2		Former scientist
Ousseynou Ndoye	2		Scientist
Plinio Sist	2		Former scientist

## 2.9 Journals publishing CIFOR work

CIFOR publications have appeared in 180 different journals. Of these, 115 have published only one CIFOR work, while 24 journals have published five or more. These are listed in Table 5. Perhaps not surprisingly, the top eight journals on the list – and 14 of the 24 - are forestry journals.

The citation frequency of an article is determined by several factors, including the journal in which it is published. In Table 6 the journals are sorted by the number of citations per published article. Journals with fewer than five CIFOR publications are shown in *italics*, indicating that the statistical basis for firm conclusions is weak.

*Trends in Ecology and Evolution*, which has published the most-cited articles, is top of the list, but has had only three CIFOR publications. Among those with five or more CIFOR publications, *Biotropica* scores highest.

**Table 5.** Journals with five or more CIFOR publications

Journal	Total publications	Cited publications	Number of times cited	Percentage cited	Citations per cited article (avg.)	Citations per published article (avg.)
Forest Ecology and Management	33	16	182	48%	11.4	5.5
International Forestry Review (& under former title: Commonwealth Forestry Review)	25	13	42	52%	1.7	3.2
Journal of Tropical Forest Science	23	9	33	39%	3.7	1.4
Bois et Forêts des Tropiques	21	4	6	19%	1.5	0.3
ETFRN News <sup>1)</sup>	16	0	0	0%		
Forests, Trees and Livelihoods (& under former title: International Tree Crops Journal)	13	4	7	31%	1.8	0.5
Unasylva	12	4	6	33%	1.5	0.5
ITTO Tropical Forest Update <sup>1)</sup>	12	4	7	33%	1.8	0.6
Revista Forestal del Peru	11	0	0	0%		
World Development	11	8	57	73%	7.1	5.2
Small-scale Forest Economics, Management and Policy	9	0	0	0%		
International Journal of Agricultural Resources, Governance and Ecology	9	1	2	11%	2.0	0.2
Gender, Technology and Development	7	0	0	0%		
Agroforestry Systems	7	2	5	29%	2.5	0.7
Ecological Economics	7	6	49	86%	8.2	7.0
Zimbabwe Science News	6	0	0	0%		
Borneo Research Bulletin	6	2	2	33%	1.0	0.3
Society and Natural Resources	6	3	16	50%	5.3	2.7
Conservation Biology	6	4	44	67%	11.0	7.3
Biotropica	6	6	112	100%	18.7	18.7
Forest Science	5	2	47	40%	23.5	9.4
Environmental Conservation	5	4	37	80%	9.3	7.4
<b>Total /Average</b>	<b>478</b>	<b>169</b>	<b>1333</b>	<b>35%</b>	<b>7.9</b>	<b>2.8</b>

<sup>1)</sup> These are not refereed journals, although classified as such on the CIFOR database.

**Table 6.** Journals sorted according to citations per published CIFOR article

Journal	Total published	Cited published	Times cited	Percentage cited	Citation per cited article (avg.)	Citations per published article (avg.)
<i>Trends in Ecology and Evolution</i>	3	3	201	100%	67.0	67.0
<i>Global Environmental Change</i>	2	2	39	100%	19.5	19.5
Biotropica	6	6	112	100%	18.7	18.7
<i>World Bank Research Observer</i>	2	1	28	50%	28.0	14.0
<i>Ecological Modelling</i>	3	3	37	100%	12.3	12.3
<i>Plant Ecology</i>	4	4	48	100%	12.0	12.0
Forest Science	5	2	47	40%	23.5	9.4
<i>Oecologia</i>	2	2	17	100%	8.5	8.5
<i>Forestry</i>	2	1	16	50%	16.0	8.0
Environmental Conservation	5	4	37	80%	9.3	7.4
Conservation Biology	6	4	44	67%	11.0	7.3
Ecological Economics	7	6	49	86%	8.2	7.0
<i>Journal of Forestry</i>	4	3	24	75%	8.0	6.0
<i>Mitigation and Adaptation Strategies for Global Change</i>	2	2	12	100%	6.0	6.0
Forest Ecology and Management	33	16	182	48%	11.4	5.5
World Development	11	8	57	73%	7.1	5.2
<i>Human Ecology</i>	4	2	18	50%	9.0	4.5
<i>Development and Change</i>	3	3	13	100%	4.3	4.3
<i>Agriculture, Ecosystems and Environment</i>	3	2	11	67%	5.5	3.7
<i>Ecological Applications</i>	2	1	7	50%	7.0	3.5
<i>Science</i>	2	2	7	100%	3.5	3.5
<b>Total /Average</b>	<b>478</b>	<b>169</b>	<b>1333</b>	35%	7.9	2.8

*Forest Ecology and Management*, the most popular target journal for CIFOR work, has a respectable citation frequency. The same is *not* true for the other forestry journals on the 'top 22' list, with the notable exception of *Forest Science* and to some extent also *International Forestry Review* (formerly: *Commonwealth Forestry Review*). Among the top 22 journals listed in Table 5, only seven have a reasonably high citation frequency (more than five citations per published CIFOR article): three biological/conservation journals: *Conservation Biology*, *Biotropica* and *Environmental Conservation*; two economics/development journals: *World Development* and *Ecological Economics*; and two forestry journals: *Forest Ecology and Management* and *Forest Science*.

A clear conclusion is that a high proportion of the CIFOR research that is published in journals appears in journals that have a low probability of being cited. This probably reflects, to some extent, the simple fact that it is more difficult to have papers accepted in the more respected journals (with high citation frequency). And while there might be other reasons for publishing in some of these minor journals, it might also reflect the fact that CIFOR (scientists) do not have a clear strategy for getting their papers published in the well-respected journals. Simple measures such as counting journal publications hide the enormous variation in status, citation-probability and impact of the various journals.

Furthermore, it seems that the probability of being cited is relatively lower in forestry journals than in general development/economics/social science and biology/ecology/conservation journals. This corresponds with a general finding in the citation literature (cf. section 1.1).

## 2.10 Journals citing CIFOR publications

Where is CIFOR work cited? Table 7 shows the journals with the most frequent CIFOR citations, while Table 8 shows the citations by disciplinary category of journal. Not surprisingly, forestry-related journals again top the list, with *Forest Ecology and Management* being by far the journal most frequently citing CIFOR publications. This is also the journal with the highest number of CIFOR publications, indicating some 'intra-journal-citation'.

There is, nevertheless, a high uptake in both ecological and biological journals, with *Conservation Biology* taking a good second place; furthermore, ecological and biological journals combined outscore forestry journals. Development/economics journals, the third group, cite CIFOR publications relatively less frequently, although the citation in respected journals such as *World Development* and *Land Economics* is reasonably high.

**Table 7.** Journals citing CIFOR publications<sup>8</sup>

Journal	Number of citations of CIFOR publications
Forest Ecology and Management	170
Conservation Biology	60
Biological Conservation	34
Molecular Ecology	32
Biotropica	31
Biodiversity and Conservation	25
World Development	23
Land Economics	22
Ecological Modelling	22
Ecological Economics	20
Restoration Ecology	19
Journal of Tropical Ecology	19
Environmental Conservation	18
Agriculture Ecosystems & Environment	18
Journal of Applied Ecology	16
American Journal of Botany	16
Environment and Development Economics	15
Ecological Applications	15
Oecologia	14
Forest Science	13
Canadian Journal of Forest Research – Revue Canadienne De Recherche Forestière	13

**Table 8.** Types of journals citing CIFOR publications

Journal discipline	Number of citations
Forestry and Vegetation	271
Ecology, Ecography, Ecosystems and Evolution	226
Biology, Microbiology	167
Economics and Development, Marketing	118
Botany, Plant and Trees	65
Environment	65
Agriculture and Land	43
Nature, Climate and Biodiversity	34
Science	34
Geography	23
Human Science	20
Entomology	17
Social, Sociology and Anthropology	14
Genetics	12
Hydrology and Remote Sensing	9
Physics	6
Aquatic	5
Zoology	4
Soil	4

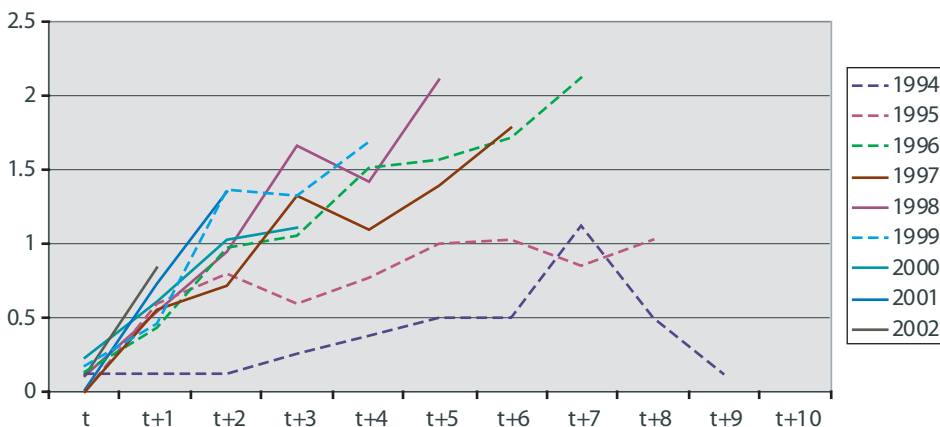
<sup>8</sup> This table refers to the top 43 publications (10 or more citations).

## 2.11 Lifespan of publications

What is the lifespan of a publication? We checked this for all cited publications by breaking down the citations by year. The results are presented in Figure 6, where publications have been classified by year of publication. Naturally, there is a build-up in citations, with a steep increase in the first couple of years. The surprise, however, is that the number of citations levels off quite slowly. Except for the 1994 crop (only eight articles cited), there is no sign of a drop in citation frequency, even after 5–7 years (see also Table A2). In other words, CIFOR publications are long-lived.

Another encouraging finding is the increase in citation frequency for the more recent publications (remembering that 1996 was the year of the most-cited publication).

The last column of Table A4 in the Appendix gives the percentage of citations from the first four years after publication. Naturally, there is a huge variation. Eight of the 43 publications were not cited during the first four years, but then appear to have been ‘discovered’ by fellow researchers. On average (weighted), only 39% of the citations appear during the first four years. Thus, it may be expected that many of the publications from the early 2000s will eventually climb high on the list of most-cited publications; for example, the three World Development articles by Mertens *et al.* (2000), Campbell *et al.* (2001) and Wunder (2001).



**Figure 6.** Citations by year after publication (citations per year for articles that have been cited)



# 3

## Recommendations

The TOR did not include making recommendations on the publication strategy. We have, however, taken the liberty of making a few suggestions and present some thoughts based on our findings.

### 3.1 Publication strategy

CIFOR is aiming for impacts on several audiences, which might be grouped as follows<sup>9</sup>:

1. The global forest policy world (international organisations and processes and donors).
2. National research partners in developing countries.
3. The academic community, mostly in developed countries.

This report clearly deals with the third group. The first two groups read very few academic journals, and publish in even fewer. To reach these audiences it may be more important to publish in fora such as *Unasylva*, *ITTO Tropical Forest Update*, *Zimbabwe Science News*, *Revista Forestal de Peru* and CIFOR publications rather than in academic journals.

There is rather limited overlap between the publications figuring high in this report (academic impact) and those found to have an impact on policy makers, as described in the CIFOR report by Spilsbury and Bose (2004)<sup>10</sup>. Over time, however, there are probably some trickle-down effects: in international organisations such as FAO and the World Bank, in particular, a shorter route might be expected from academic research to policy formulation than in national (and local) governments. CIFOR should think in terms of addressing the different audiences separately, and research projects should have strategies to reach all audiences through different forms of publications.

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<sup>9</sup> We acknowledge the inputs from David Kaimowitz to this sub-section.

<sup>10</sup> Spilsbury, M.J. and Bose, P. 2005. "Influencing the Global Forest Policy Agenda - An Evaluation of CIFOR Research". Impact Assessment Papers Series No. 2. CIFOR, Bogor, Indonesia.

### 3.2 Selection of journals

The usual recommendation to any research institution is to ‘*publish more journal articles, and in better journals*’. This is also valid for CIFOR. In particular, many publications are appearing in low impact (and low citation probability) journals, primarily forestry journals. While this might, to some extent, reflect the quality of the papers, many of them could probably have been ‘upgraded’ and published in better-respected journals.

In selecting the journal to which to submit a paper, more attention should be given to the journal, impact factor and past record of CIFOR publication. The reputation of a journal is also important, although there is a close correlation: one study found that 60% of the variations in journal-quality perceptions formed by economists are explained by the SSCI impact factor<sup>11</sup>.

While it is natural for many CIFOR papers to appear in forestry journals, the findings also suggest that the impact can be increased by publishing more papers in general journals within the ecological/biological/conservation and economics/social science/development fields. It is also becoming increasingly important that the journal is included in a publisher/consortia bundle, and that electronic downloads are possible (preferably free, although this is not common).

One possibility is for CIFOR to make a ‘list of recommended journals’ to aid researchers in the publishing process. The results of this report would serve as an important input into making such a list.

### 3.3 Publication database

The CIFOR publication database, on which this report is based, can be improved to make it a better tool for analysing publication records and further developing the publication strategy. Our recommendations include:

1. The ‘record type’ field (type of publication) contains too many categories, and the publications do not always seem to be classified correctly.
2. A classification of journals based on merit and impact would also be useful; this could also guide authors in selecting journals to which to submit a paper.
3. Another useful variable would be the type of research leading up to the publication: field projects, syntheses, commissioned work by consultancies, partnerships (where CIFOR is not in the driving seat), etc.

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<sup>11</sup> Ellis, L.V. and Durden, G.C. 1991. “Why economists rank their journals the way they do.” *Journal of Economics and Business* 43: 157-170.

# Appendix 1. Tables

**Table A1.** CIFOR publications by year and record type (to May 2004)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Articles		6	6	9	11	23	6	17	26	3	23	4	134
Articles refereed		6	24	18	30	14	32	44	70	40	54	12	344
Book	2	7	14	31	39	42	21	51	46	29	16	8	306
Book refereed						1		1	1	2	24	6	35
Book, Thesis											1		1
Book, CD ROM refereed											1		1
Book, Series refereed											1		1
CD ROM				2	1		1	1	3	4			12
Chapter		7	22	41	38	58	32	18	85	54	20	10	385
Chapter refereed										10	55	5	70
CIFOR publications			6	3	6		8						23
Papers			2	1			4	1	4	2	3	1	18
PhD dissertation					1								1
Report					1		1				3		5
Series		2	6	4	4	7	7	18	10	6	4	1	69
Series refereed		1					1				8		10
Software CD ROM refereed											1		1
Other				2	4	8	2	3	1			1	21
<b>Total</b>	<b>2</b>	<b>29</b>	<b>80</b>	<b>111</b>	<b>135</b>	<b>153</b>	<b>115</b>	<b>154</b>	<b>246</b>	<b>150</b>	<b>214</b>	<b>48</b>	<b>1437</b>

**Table A2.** Breakdown of citations by year of publication and years cited (to mid-June 2004)*(Rows show the publication year and columns the years in which the publication was cited.)<sup>12</sup>*

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
1993	<b>0</b>	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	<b>1</b>	1	1	2	3	4	4	9	4	1	4	34
1995	0	0	<b>0</b>	20	27	20	26	34	35	29	35	16	242
1996	0	0	0	<b>5</b>	17	38	41	59	61	67	83	38	409
1997	0	0	0	1	<b>0</b>	23	30	56	47	59	75	21	312
1998	0	0	0	0	0	<b>4</b>	20	35	63	53	80	33	288
1999	0	0	0	0	0	0	<b>6</b>	15	45	44	56	20	186
2000	0	0	0	0	0	0	0	<b>11</b>	30	50	54	23	168
2001	0	0	0	0	0	0	0	0	<b>1</b>	35	65	45	146
2002	0	0	0	0	0	0	0	0	0	<b>3</b>	25	16	44
2003	0	0	0	0	0	0	0	0	0	5	<b>34</b>	34	73
2004	0	0	0	0	0	0	0	0	0	0	0	<b>0</b>	0
<b>Total</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>27</b>	<b>46</b>	<b>88</b>	<b>127</b>	<b>214</b>	<b>291</b>	<b>349</b>	<b>508</b>	<b>250</b>	<b>1902</b>

**Table A3.** Publications in terms of number of times cited

Times cited	Number of publications	Times cited	Number of publications	Times cited	Number of publications	Times cited	Number of publications
0	1090	9	8	19	1	39	1
1	164	10	5	20	2	45	1
2	50	11	5	21	1	51	1
3	26	12	2	25	1	65	1
4	16	13	3	27	2	67	1
5	13	14	1	28	2	81	1
6	17	15	1	29	1	192	1
7	6	16	5	34	1		
8	4	18	1	35	2		

<sup>12</sup> An attempt has been made to correct the few inaccuracies in the publication years in the list. In one case an article (published in 2003) was cited before it was published (2002). This might refer to citation of a draft version of the article.

**Table A4.** CIFOR publications cited more than five times

Author	Title	Record type	Publication date	Source	Times cited	% cited in first 4 years
Young, A.G.; Boyle, T.J.B.; Brown, A.H.D.	The population genetic consequences of habitat fragmentation for plants	Articles (Refereed)	1996	Trends in Ecology and Evolution (11): 413-418.	192	23.4
Kaimowitz, D.; Angelsen, A.	Economic models of tropical deforestation: a review	Book	1998	Bogor, Indonesia, CIFOR. 139p.	81	53.1
Pinard, M.A.; Putz, F.E.	Retaining forest biomass by reducing logging damage	Articles (Refereed)	1996	Biotropica 3(28): 78-295.	67	14.9
Chazdon, R.L.; Colwell, R.K.; Denslow, J.S.; Guariguata, M.R.	Statistical methods for estimating species richness of woody regeneration in primary and secondary rain forests of Northeastern Costa Rica	Chapter	1998	In: Dallmeier, F. and Comiskey, J.A. (eds.) Forest biodiversity research, monitoring and modeling: conceptual background and old world case studies. Man and the Biosphere Series, Vol. 20, 285-309.	65	40.0
Parrotta, J.A.; Turnbull, J.W.; Jones, N.	Catalyzing native forest regeneration on degraded tropical lands	Articles (Refereed)	1997	Forest Ecology and Management 1-2(99): 1-7.	51	37.3
Guariguata, M. R.; Rheingans, R.; Montagini, F.	Early woody invasion under the tree plantation in Costa Rica: implications for forest restoration	Articles (Refereed)	1995	Restoration Ecology 4(3): 252-260.	45	24.4
Vanclay, J.K.	Growth models for tropical forests: a synthesis of models and methods	Articles (Refereed)	1995	Forest Science 1(41): 7-42.	39	20.5

Author	Title	Record type	Publication date	Source	Times cited	% cited in first 4 years
Lambin, E.F.; Turner, B.L.; Geist, H.J.; Agbola, S.J.; Angelsen, A.; Bruce, J.W.; Coomes, O.T.; Dirzo, R.; Fischer, G.; Folke, C.	The causes of land-use and land-cover change: moving beyond the myths	Articles (Refereed)	2003	Global Environmental Change 4(11): 261-269.	35	100.0
Guariguata, M.R.; Chazdon, R.L.; Denslow, J.S.; Dupuy, J.M.; Anderson, L.	Structure and floristic of secondary and old growth stands in lowland Costa Rica	Articles (Refereed)	1997	Plant Ecology 132: 107-120.	35	48.6
Vanclay, J.K.; Skovsgaard, J.P.	Evaluating forest growth models	Articles	1997	Ecological Modelling 98: 1-12.	34	23.5
Zuidema, P.A.; Sayer, J.A.; Dijkman, W.	Forest fragmentation and biodiversity: the case for intermediate-sized conservation areas	Articles (Refereed)	1996	Environmental Conservation 4(23): 290 -297.	29	20.7
Angelsen, A.	Agricultural expansion and deforestation: modelling the impact of population, market forces and property rights	Articles (Refereed)	1999	Journal of Development Economics 58: 185-218.	28	71.4
Angelsen, A.; Kaimowitz, D.	Rethinking the causes of deforestation: lessons from economic models	Articles (Refereed)	1999	World Bank Research Observer 1(14): 73-98.	28	53.6
Guariguata, M.R.; Manuel, R.; Dupuy, J.M.	Forest regeneration in abandoned logging roads in lowland Costa Rica	Articles (Refereed)	1997	Biotropica 1(29): 15-28.	27	51.9
Soares, P.; Torne, M.; Skovsgaard, J.P.; Vanclay, J.K.	Evaluating a growth model for forest management using continuous forest inventory data	Articles (Refereed)	1995	Forest Ecology and Management 3(71): 251-265.	27	0.0

Author	Title	Record type	Publication date	Source	Times cited	% cited in first 4 years
Ghazoul, J.; Liston, K.A.; Boyle, T.J.B.	Disturbance-induced density-dependent reproductive success in a tropical forest tree	Articles (Refereed)	1998	Journal of Ecology 3(86): 462-473.	25	48.0
Pinard, M. A.; Putz, F.E.; Tay, J.; Sullivan, T.E.	Creating timber harvest guidelines for a reduced-impact logging project in Malaysia	Articles (Refereed)	1995	Journal of Forestry 10(93): 41-45.	21	28.6
Mertens, B.; Sunderlin, W.D.; Ndoye, O.; Lambin, E.F.	Impact of macroeconomics change on deforestation in South Cameroon: integration of household survey and remotely-sensed data	Articles (Refereed)	2000	World Development 6(28): 983-999.	20	85.0
Pinard, M.A.; Putz, F.E.	Vine infestation of large remnant trees in logged forest in Sabah, Malaysia: biomechanical facilitation in vine succession	Articles (Refereed)	1994	Journal of Tropical Forest Science 3(6): 302-309.	20	0.0
Iremonger, S.; Ravilious, C.; Quinton, T.	A global overview of forest conservation: Including GIS digital files of forest and protected areas	CD ROM	1997	WCMC, Cambridge UK and CIFOR	19	36.8
Bertault, J.G.; Sist, P.	An experimental comparison of different harvesting intensities with reduced-impact and conventional logging in East Kalimantan	Articles (Refereed)	1997	Forest Ecology and Management 1-3(94): 209-218.	18	16.7
Putz, F.E.; Blate, G.M.; Redford, K.H.; Fimbel, R.; Robinson, J.	Tropical forest management and conservation of biodiversity: an overview	Articles (Refereed)	2001	Conservation Biology 1(15): 7-20.	16	106.3*

Author	Title	Record type	Publication date	Source	Times cited	% cited in first 4 years
Putz, F.E.; Dykstra, D.P.; Heinrich, R.	Why poor logging practices persist in the tropics	Articles (Refereed)	2000	Conservation Biology 4(14): 951-956.	16	75.0
Jennings, S.B.; Brown, N.D.; Sheil, D.	Assessing forest canopies and understorey illumination: canopy closure, canopy cover and other measures	Articles (Refereed)	1999	Forestry 1(72): 59-73.	16	62.5
Sist, P.; Nolan, T.; Bertault, J-G.; Dykstra, D. P.	Harvesting intensity versus sustainability in Indonesia	Articles (Refereed)	1998	Forest Ecology and Management 108: 251-260.	16	31.3
Gillison, A.N.; Schulze, W.; Schulze, E.D.; Pate, J.S.	The nitrogen supply from soils and insects during growth of the pitcher plants <i>Nepenthes mirabilis</i> , <i>Cephalotus follicularis</i> and <i>Darlingtonia californica</i>	Articles (Refereed)	1997	Oecologia 112: 464-471.	16	0.0
Kiker, C.F.; Putz, F.E.	Ecological certification of forest products: economic challenges	Articles (Refereed)	1997	Ecological Economics 20: 37-51.	15	33.3
Guariguata, M.R.; Pinard, M.A.	Ecological knowledge of regeneration from seed in neotropical forest trees: implications for natural forest management	Articles (Refereed)	1998	Forest Ecology and Management 1/2(112): 87 - 89.	14	28.6
Angelsen, A.; Kaimowitz, D.; (eds.)	Agricultural technologies and tropical deforestation	Book	2001	Wallingford, Oxon, UK, CABI Publishing in association with Center for International Forestry Research (CIFOR). xiv, 422p.	13	92.3



Author	Title	Record type	Publication date	Source	Times cited	% cited in first 4 years
Pinard, M.A.; Putz, F.E.; Rumíz, D.; Guzman, R.; Jardim, A.	Ecological characterization of tree species for guiding forest management decision in seasonally dry forests in Lomerío, Bolivia	Articles (Refereed)	1999	Forest Ecology and Management 113: 201-213.	13	84.6
Sheil, D.	Tropical forest diversity, environmental change and species augmentation: after the intermediate disturbance hypothesis	Articles (Refereed)	1999	Journal of Vegetation Science 10: 851-860.	13	66.7
Wickramasinghe, A.; Ruiz Perez, M.; Blockhus, J.M.	Non-timber forest product gathering in Ritigala forest (Sri Lanka): household strategies and community differentiation	Articles (Refereed)	1996	Human Ecology 4(24): 493-519.	12	0.0
Dykstra, D.P.; Heinrich, R.	FAO model code of forest harvesting practice	Book	1996	Rome, Food and Agriculture Organisation. 85p.	12	0.0
Campbell, B.M.; Mandondo, A.; Nemarundwe, N.; Sithole, B.; de Jong, W.; Luckert, M.; Matose, F.	Challenges to proponents of common property resource system: despairing voices from the social forests of Zimbabwe	Articles (Refereed)	2001	World Development 4(29): 589-600.	11	100.0*
Ostrom, E.	Self-governance and forest resources	Series	1999	Bogor, Indonesia. CIFOR Occasional Paper, No. 20. 15p.	11	54.5

Author	Title	Record type	Publication date	Source	Times cited	% cited in first 4 years
Doran, J.C.; Turnbull, J.W.; (eds.)	Australian trees and shrubs: species for land rehabilitation and farm planting	Book	1997	Canberra, Australia. ACIAR Monograph, No. 24. 384p.	11	0.0
Dickinson, M.B.; Dickinson, J.C.; Putz, F.E.	Natural forest management as a conservation tool: divergent opinions on constraints, possibilities, and alternatives	Articles (Refereed)	1996	Commonwealth Forestry Review 4(75): 309-315.	11	0.0
Sunderlin, W.D.	Managerialism and the conceptual limits of sustainable development	Articles (Refereed)	1995	Society and Natural Resources (8): 481-492.	11	0.0
Wunder, S.	Poverty alleviation and tropical forests - what scope for synergies?	Articles (Refereed)	2001	World Development 11(29): 1817-33.	10	100.0
Neumann, R.P.; Hirsch, E.	Commercialisation of non-timber forest products: review and analysis of research	Book	2000	Bogor, Indonesia, CIFOR. 176p.	10	80.0
Smith, J.; van de Kop, P.; Reategui, K.; Lombardi, I.; Sabogal, C.; Diaz, A.	Dynamics of secondary forests in slash-and-burn farming: interactions among land use types in the Peruvian Amazon	Articles (Refereed)	1999	Agriculture, Ecosystems and Environment 2/3(76): 85-98.	10	40.0
Ndoye, O.; Ruiz Perez, M.; Eyebe, A.	The markets for non-timber forest products in the humid forest zone of Cameroon	Chapter	1998	London, Overseas Development Institute (ODI). ODI RDFN Paper, No. 22c. 20p.	10	40.0
Pinard, M.A.; Putz, F.E.	Monitoring carbon sequestration benefits associated with a reduced-impact logging project in Malaysia	Articles (Refereed)	1997	Mitigation and Adaptation Strategies for Global Change 2: 203-215.	10	60.0

Author	Title	Record type	Publication date	Source	Times cited	% cited in first 4 years
Arnold, J.E.M.; Ruiz Perez, M.	Can non-timber forest products match tropical forest conservation and development objectives?	Articles (Refereed)	2001	Ecological Economics 39: 437-47.	9	
van Nieuwstadt, M.G.L.; Sheil, D.; Kartawinata, K.	The ecological consequences of logging in the burned forests of East Kalimantan, Indonesia	Articles (Refereed)	2001	Conservation Biology 4(15): 1183-1186.	9	
Wunder, S.	Ecotourism and economic incentives: an empirical approach	Articles (Refereed)	2000	Ecological Economics 3(32): 465-480.	9	
Campbell, B.M.; Dore, D.; Luckert, M.; Mukamuri, B.; Gambiza, J.	Economic comparisons of livestock production in communal grazing lands in Zimbabwe	Articles (Refereed)	2000	Ecological Economics 3(33): 413-438.	9	
CIFOR C&I Team	The CIFOR criteria and indicators generic template	Book	1999	Bogor, Indonesia, CIFOR. Criteria and Indicators Toolbox Series, No. 2.	9	
Guariguata, M.R.	Response of forest tree samplings to experimental mechanical damage in lowland Panama	Articles (Refereed)	1998	Forest Ecology and Management 2/3(102): 103-111.	9	
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## **Contributing to the scientific literature**

This study examines the frequency of citations of CIFOR publications in order to provide a useful indicator of CIFOR's research impact. Out of the 1437 publications registered in CIFOR's publication database up until May 2004, 24 % have been cited in scientific journals. Seventeen publications have been cited more than 20 times, and five more than 50 times, with one article being cited 192 times.

Refereed articles make up 24% of CIFOR's publications and have a 30-40 times greater likelihood of being cited than a refereed book or chapter. Forest Ecology and Management tops the list of most articles by CIFOR researchers (33) and citations of CIFOR work (170). The first author of about half of the most cited CIFOR publications are non-CIFOR researchers in joint authorship with CIFOR staff, indicating CIFOR and its scientists benefit from partner collaboration.

The study shows that CIFOR publications remain a useful reference and source of information for long periods, with no sign of falling citation rates even after 5-7 years. Less than 40 % of the citations appear within the first four years of publication. Many papers appear in low impact journals, but with a bit more 'upgrading' many could have appeared in higher quality journals. While it is natural for many CIFOR papers to appear in forestry journals, the study also suggests CIFOR's impact can be increased by publishing more papers in broader journals related to biology, ecology, conservation, social sciences, economics and development.

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.