Is SFM an impossible dream?

A. Sarre and C. Sabogal

The implementation of SFM, in its various guises, has been patchy.

Forestry can make a strong case as the first profession to articulate the concept of sustainability and to apply science towards its attainment, yet sustainable forest management (SFM) is still not being applied universally today. In this article we ask why. We examine what is meant by the term SFM in the modern context and how its meaning continues to change. We attempt to quantify the minimum extent of its application, and we examine the obstacles that lie in its way, especially in the tropics, where they are greatest.

FAO/G. NAPOLITANO

A researcher inspects a tree in the Yoko Forest, the Democratic Republic of the Congo

Alastair Sarre is a freelance writer specializing in forestry. **Cesar Sabogal** is Forestry Officer, FAO, Rome.

FAO/G. BIZZARRI

Forests will always be subject to perturbations, such as this forest in Grenada, which was devastated by Hurricane Ivan in 2006. A sustainably managed forest has the resilience to withstand disturbances and the capacity to adapt to longer-term environmental changes

DEFINING SFM

While the concept of forest sustainability might be relatively old (Schmithüsen, 2013), the term "sustainable forest management" is not[1], at least in English. It was absent from Westoby's *Introduction to world forestry*, published in 1989, but present in the International Tropical Timber Organization's *Guidelines for the sustainable management of natural tropical forests*, published in 1990 (ITTO, 1990), and in the Forest Principles agreed at the 1992 Earth Summit. The term emerged in common use in parallel with "sustainable development", defined by the World Commission on Environment and Development (1987) as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". One of the definitions of SFM is the management of forests according to the principles of sustainable development.

The SFM concept has proved elusive. In 2007, member countries of the United Nations Forum on Forests agreed on the Non-legally Binding Instrument on All Types of Forests (NLBI). In that document, SFM is described as:

> *a dynamic and evolving concept [that] aims to maintain and enhance the economic, social and environmental values of all types of forests, for the benefit of present and future generations.*

This is not a definition but a statement of intent: it makes clear that SFM will change over time but that its purpose, at a minimum, is to maintain all forest values in perpetuity. Turning the SFM concept into practice in a given forest management unit is demanding because it requires setting and attempting to achieve (often multiple) objectives in a milieu of multiple stakeholders, dynamic environmental, economic and social conditions and imperfect ecological knowledge. SFM becomes even more complex when scaled up to the landscape, subnational and national levels.

Drawing on the criteria identified by various international forest-related criteria and indicators processes, the NLBI sets out seven thematic elements of SFM "as a reference framework for sustainable forest management". They are: the extent of forest resources; forest biological diversity; forest health and vitality; productive functions of forest resources; protective functions of forest resources; socio-economic functions of forests; and the legal, policy and institutional framework. Collectively, these elements, and the criteria and indicators that underlie them, may be thought of as providing categories of "values" that should be monitored and maintained. To a certain extent, they underpin forest certification, which is discussed later.

Forests will always be subject to perturbations, but a sustainably managed forest has the resilience to withstand them and the capacity to adapt to longer-term environmental changes. Nevertheless, a forest that is sustainably managed today could be cleared tomorrow if the owner has a change of heart, or it might die or degrade quickly if environmental (e.g. the climate) or social conditions suddenly change. The task of

[1] Or its common use is relatively new.

A member of a community council holds honey collected in a community forest area in Chhouk District, Kampot Province, Cambodia. Local involvement in decision-making is essential for SFM

FAO/P. DEGENS/FO-6058

managing forests so that its values are maintained is a tall order, especially given inherent uncertainties: some might say it is an idealistic – and unrealistic – dream.

Society decides

In a survey of 28 forest management case studies in the Asia and Pacific region, Brown, Durst and Enters (2005) found that the fundamental principle in the pursuit of SFM was reaching societal consensus with regard to how forests should be managed and what a society wants from forests. The scale at which such consensus should be reached – community, subnational, national or global – will vary depending on the scale and nature of the resource.

Sustainability has four dimensions – economic, environmental, social and cultural[2] – that involve tradeoffs, but quantifying these is not always easy. To some extent, the economic and environmental dimensions can be assessed, but not necessarily using comparable measures by which tradeoffs can be optimized. Science, therefore, can only make a limited contribution to defining in practice the goals of SFM in a given context. Decisions on forests – and on the goals of SFM in a given context – should be made, therefore, through informed, broad-based, participatory and democratic processes. The forestry profession has made considerable progress in developing participatory models of natural resource management and could be said to have been a leader in such efforts through, for example, the social forestry and community forestry models that developed especially from the 1980s. Experience has shown that such processes can be unwieldy, long-winded and expensive, but that they are essential for SFM.

Forest multifunctionality

What issues might a society consider in deciding the objectives of SFM? Three hundred years ago, when forest science first began to blossom (Westoby, 1989), forestry was concerned predominantly with the sustainability of wood supply (Schmithüsen, 2013). Since then, the concept of SFM has broadened sufficiently to embrace virtually any forest-based objective, including the management of forests in which no products (or only non-wood products) are harvested – forests usually known as protection or conservation forests. In many contemporary societies, SFM is expected to ensure that neither biodiversity nor carbon stocks

[2] The cultural dimension may be viewed as part of the social dimension, however. United Nations General Assembly (2012) referred to the "three dimensions of sustainable development" but also acknowledged that democracy, good governance and the rule of law, at the national and international levels, as well as an enabling environment, are essential for sustainable development.

diminish over time, that the quality of water issuing from forests is perpetually high, that recreational pursuits are catered for, that the cultural heritage embodied by forests is respected, that people who have relied traditionally on forests for their livelihoods can continue to do so, that products needed or desired by society are supplied in sufficient volume with no diminution in productivity, that conflicts over the use of forests are managed in a fair and transparent way, and that the wider landscape benefits from it. This is known as managing for the multiple functions ("multifunctionality") of forests (Collaborative Partnership on Forests, 2012). Arguably, no other land use is required to meet so many simultaneous and dynamically changing objectives.

Forest management commonly falls short of the expectation that it can fully maintain all forest values at all times. In practice, however, not all forest areas can (or should) be managed for all values, although management should aim to minimize losses. Multifunctionality is best considered at a scale large enough to include a mosaic of areas in which SFM may have specialized objectives but which, in aggregate, delivers on all forest functions. While SFM should always be the goal of managers, the most that can be said at any given time is that forest management should be consistent with the concept of sustainability and the associated management objectives that are in place (ITTO, 2006). SFM should be envisaged as a co-evolutionary process between changing societal demands, changing forests, changing markets and changing industry efficiency (Nasi, 2013).

ASSESSING SFM

Despite the many difficulties associated with the concept of SFM, the management of many forests today is consistent with it. Some forests have been managed for more than one hundred years (see, for example, Küchli, 2013); while it cannot be said definitively that such forests are under SFM, the fact that they are still productive is prima facie evidence of this.

Certification as a proxy

Forest certification can be described as a process whereby an independent auditing (third party) body conducts an inspection and awards a certificate using independently developed standards and objectives (FAO, undated). According to Molnar (2003), governments and international policy-makers, including multilateral financial institutions, promote forest certification for its political and regulatory value and "as a credible and cost-effective proxy to indicate that a forest or industry is sustainably managed".

This use of forest certification as a proxy measure of SFM is flawed, yet to date there is no better survey for judging the state of forest management globally. Here, therefore, the area of certified forest is used as a proxy assessment of the *minimum* area of forest in which management is consistent with SFM.[3]

Table 1 shows that, worldwide, the total forest area certified under the two dominant global certification schemes, the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC), is about 415 million hectares (ha). According to FAO (2010), there are about 4.03 billion ha of forest globally. Therefore, using certification as a proxy, a minimum of 10.3 percent of all forests is under management that could be considered consistent with SFM. FAO (2010) estimated that 54 percent of the total forest estate (about 2.18 billion ha) was designated for production or "multiple use" in 2010.[4] Therefore, about 19 percent of forests in which timber harvesting is likely to be allowed are certified.

This estimate comes with important caveats, including the following:

- The estimate is for a *minimum* area of forest under management that is consistent with SFM, because a large area of forest that has not been certified (for example, where managers see no commercial advantage in attaining certification, or where the cost of certification is probably greater than the benefit) is likely to be managed as well or better than many certified forests.
- The pursuit of certification makes more financial sense in forests where the harvested timber is to be sold into markets where certification is a prerequisite for doing business or provides some other market advantage. Relative to temperate forests, only a small proportion of the timber harvested in the tropics is sold into such markets, so it might be expected that certification would be pursued less often there.
- Certification is usually applied to forests subject to harvesting, mostly for timber. Therefore, a very large area of protection/conservation forests, and forests otherwise not subject to timber harvesting, are not included in the survey. In Australia, for example, only about 113 million ha of the 149 million ha of forest countrywide are legally available for wood harvesting, and much of that area contributes little to wood supply (Montreal Process Implementation Group for Australia, 2008).
- Not everyone agrees that certification is a good indicator of management that is consistent with SFM. For example, standards of certification, even within the same scheme, may vary widely among (and even within) countries. Auld, Gulbrandsen and McDermott (2008) noted scepticism that certification can assist in achieving forest conservation goals at the landscape level. Zimmerman and Kormos (2012) claimed that "industrial-scale" forest management (of which some examples are certified) "guarantees the commercial and biological depletion of high-value timber species within three

[3] However, the Forest Stewardship Council, a major certification body, uses terms such as "responsible management" and "environmentally appropriate, socially beneficial, and economically viable management" rather than SFM.

[4] The remainder was designated for the protection of soil and water, the conservation of biodiversity, social services, "other", or "none or unknown".

harvest rotations in all three major tropical forest regions".

Less progress in the tropics

Given that the forest certification concept arose only in the early 1990s (the FSC, the world's first forest certification body, was established in 1993), the fact that about one-fifth of the world's production and multiple-use forests are certified is a considerable and laudable achievement. As a number of authors have pointed out (e.g. Auld, Gulbrandsen and McDermott, 2008), however, the distribution of certified forests is very uneven. Table 1 shows that 384 million ha of the 415 million ha of certified forest are located in temperate, mostly developed countries – Australia, Chile, New Zealand, Republic of Korea, United States of America and the countries of Europe. Only 31 million ha are in developing (mostly tropical) countries; this is equivalent to only 1.9 percent of the total forest estate in developing countries.

Blaser *et al*. (2011) reported on the extent of SFM in 33 tropical countries that account for about 85 percent of the world's closed tropical forests and 35 percent of all forests worldwide. Focusing on the "permanent forest estate" (PFE, defined as "land, whether public or private, secured by law and kept under permanent forest cover"), they estimated the area of natural forest under SFM in 2010 at 53.3 million ha, comprising 30.6 million ha of production PFE and 22.7 million ha of protection PFE. This was about 7 percent of the total PFE.

Although the data are patchy, the survey by Blaser *et al*. (2011) and the data on forest certification (admittedly subject to a number of important caveats) are sufficient to show that SFM is less established in the tropics than in the temperate zone (nevertheless, there is evidence that SFM can be applied successfully in the tropics – see box). What is holding it back? While the following discussion focuses on some of the obstacles to SFM in the tropics, this should not be taken to imply that the situation is always rosy elsewhere.

TABLE 1. Global area of forest certified by FSC and PEFC, 2012

Country	Area of forest ('000 ha) certified by:		Total area of certified forest ('000 ha)	Total area of forest ('000 ha)	% of total forest certified
	FSC	PEFC			
Argentina	305	0	305	29 400	1.0
Australia	895	10 100	10 995	149 300	7.4
Belize	170	0	170	1 393	12.2
Bolivia (Plurinational State of)	1 270	0	1 270	57 196	2.2
Brazil	7 200	1 230	8 430	519 522	1.6
Cameroon	728	0	728	19 916	3.7
Canada	54 300	109 000	163 300	310 134	52.7
Chile	508	1 910	2 418	16 231	14.9
China	2 520	0	2 520	206 861	1.2
Colombia	94	0	94	60 499	0.2
Congo	2 480	0	2 480	22 411	11.1
Costa Rica	41	0	41	2 605	1.6
Ecuador	54	0	54	9 865	0.5
Europe*	72 900	83 500	156 400	998 370	15.7
Gabon	1 879	0	1 879	22 000	8.5
Ghana	2	0	2	4 940	0.0
Guatemala	502	0	502	3 657	13.7
Honduras	153	0	153	5 192	2.9
India	40	0	40	68 434	0.1
Indonesia	1 450	0	1 450	94 432	1.5
Japan	397	0	397	24 976	1.6
Kenya	1	0	1	3 467	0.0
Republic of Korea	371	0	371	6 222	6.0
Lao People's Democratic Republic	83	0	83	15 751	0.5
Madagascar	1	0	1	12 553	0.0
Malaysia	504	4 590	5 094	20 456	24.9
Mexico	601	0	601	64 802	0.9
Mozambique	5	0	5	39 022	0.0
Namibia	275	0	275	7 290	3.8
Nepal	14	0	14	3 636	0.4
New Zealand	1 452	0	1 452	8 269	17.6
Nicaragua	22	0	22	3 114	0.7
Panama	14	0	14	3 251	0.4
Papua New Guinea	33	0	33	28 726	0.1
Paraguay	19	0	19	17 582	0.1
Peru	818	0	818	67 992	1.2
Solomon Islands	64	0	64	2 213	2.9
South Africa	1 552	0	1 552	9 241	16.8
Sri Lanka	32	0	32	1 860	1.7
Suriname	89	0	89	14 758	0.6
Swaziland	80	0	80	563	14.2
United Republic of Tanzania	113	0	113	33 428	0.3
Thailand	24	0	24	18 972	0.1
Turkey	95	0	95	11 334	0.8
Uganda	107	0	107	2 988	3.6
United States of America	14 100	35 300	49 400	304 022	16.2
Uruguay	836	0	836	1 744	47.9
Venezuela (Bolivarian Republic of)	140	0	140	46 275	0.3
Viet Nam	45	0	45	13 797	0.3
Total	**169 378**	**245 630**	**415 008**	**3 390 662**	**12.2**

Notes: FSC data current as of November 2012; PEFC data current as of 13 November 2012; * "Europe" comprises Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, the Russian Federation, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, and the United Kingdom of Great Britain and Northern Ireland. The five European countries with the most certified forests are the Russian Federation (33.7 m ha), Sweden (22.1 m ha), Finland (21.5 m ha), Belarus (13.1 m ha) and Norway (9.38 m ha).

Sources: FSC, 2012; PEFC, 2012; FAO, 2010.

Biodiversity – obstacle and asset. A butterfly feeds on a flower in Ecuador

FAO/R. FAIDUTTI/CFU000782

OBSTACLES IN THE TROPICS

Less is known about tropical forests. In Europe in particular, forest science has a 300-year history, and the practice of SFM is well advanced. Forest science has had a more chequered history in the tropics. In general, the primary concern of colonial forest services was the supply of timber; rarely were resources devoted specifically to learning how tropical forest ecosystems might be managed on a sustainable basis (Westoby, 1989). While much research of this type has been conducted in the last several decades, there is still plenty to learn and apply. On the other hand, a great deal of traditional knowledge and practices held by customary owners, which ensured certain levels of resource sustainability, is yet to be incorporated into modern forest management systems (Tongkul *et al*., 2013).

After the Second World War, many foresters in the newly independent countries of the tropics were well-trained in classical forestry but less so, perhaps, in dealing with "the real forestry problems confronting their own people" (Westoby, 1989). Many broad social issues with profound implications for tropical forests – such as poverty, the quest for agricultural land, the duality of land tenure, and ethnic conflicts – could not be solved by foresters alone, and institutional capacity to tackle such issues was lacking. This lack of attention to social issues could be said to be a common failing of classical forestry, one that was identified by Westoby (1987), and by Poore *et al*. (1989) in the tropics. It remains a challenge for the forestry profession today and requires much stronger intersectoral cooperation.

High levels of biodiversity. Maintaining a high level of biodiversity, such as that found in natural tropical closed forests, complicates the silviculture and management of SFM.[5] It can also compromise the profitability of timber harvesting under an SFM regime because the density of marketable species is often low. Considerable effort has been made to increase the marketability of diverse tropical forest tree species – often called lesser-used species –with only limited success (e.g. Rivera *et al*., 2003; Pederson and Desclos, 2005). Silvicultural efforts to increase the density of commercially valuable species may compromise the maintenance of biodiversity. On the other hand, the increased use of lesser-used species would enable the more intensive – but potentially sustainable – use of mixed tropical forests, with the effect that less forest overall would be subject to harvesting. Such intensive use is the norm in the often lower-diversity temperate forests.

Unresolved tenure disputes. A lack of clarity on forest ownership, and injustices in the allocation of rights over forests, are major obstacles to SFM. For example, the Government of Liberia (2008) reported that "the most pressing issue affecting all land use in Liberia is the lack of legal clarity over property ownership and use rights. ... Rights of access to and use of

[5] It also complicates their management in a broader sense because it can lead to increased legal restrictions and brings a wide range of cultural issues and the close scrutiny of conservationists, which may or may not be obstacles to good management.

natural resources, including land, minerals, forests and water, are shrouded in a state of tenure insecurity, vague and ambiguous legislation, conflicting and competing tenure arrangements, and constant and persistent clashes of customary and statutory rights over the management, authority and control of these resources".[6] This is a problem in many parts of the tropics, although significant reforms have been achieved in some countries and reform processes are under way in some others (Rights and Resources Initiative, 2013).

Corruption. Corruption can be a major hindrance to SFM because it hampers the enforcement of forest-related laws. Cerutti *et al*. (2012), for example, describe corrupt practices in the small-scale logging sector in Cameroon, which arose partly as a result of poor policy decisions made in 1999 (to suspend small-scale logging licences) and in 2006 (to centralize the allocation of such licences, when the suspension was lifted). Cerutti *et al*. (2012) showed that corruption was systemic and that a small number of officials actively perpetuated it because it served their interests. This is having "rippling negative effects that extend from the morale and professional performance of state officials to the efficacy of state institutions" and undoubtedly reduces the likelihood of SFM.

Uncompetitiveness of SFM as a land use. Appanah (2013) suggested that the quest for quick profits was one of the main reasons why adequate silviculture has been rare in the natural forests of Southeast Asia. Pearce, Putz and Vanclay (2003) reviewed evidence and arguments for the viability and desirability of SFM in the natural tropical forests and found that forest companies should not be expected to adopt it without additional incentives to improve its profitability. High transaction costs for timber and (even more so) non-timber forest products due to inefficient and sometimes corrupt legal, institutional and administrative arrangements also act to reduce profitability. Given current prices for most tropical timbers (kept low, at least in some markets, in part by the availability of illegally harvested wood) and the low density of marketable species, timber alone is rarely sufficient to make SFM competitive with other land uses. This is perhaps the fundamental obstacle to the pursuit of SFM, at least in moist tropical forests: the land occupied by forests has other uses that many landholders (community, state and private) perceive to be more in their interests. When the land on which forests stand is seen to be more valuable than the trees and other biodiversity on it, the forest inevitably disappears.

[6] A law was passed in Liberia in 2009 aimed at addressing this lack of clarity, but tensions over land-grabbing persist there and elsewhere (Rights and Resources Initiative, 2013).

FAO/M. KASHIO/ FO-6365

Land-use change from tropical rainforests to rubber or oil-palm plantations, Peninsular Malaysia. When the land on which forests stand is seen to be more valuable than the trees and other biodiversity on it, the forest inevitably disappears

FAO/C. SABOGAL

A forest harvesting operation in the Amazon using reduced impact logging

PREREQUISITES FOR SFM

Douglas and Simula (2010) suggested that bringing about SFM required linking finance and capital with natural forest systems, and with ongoing human interactions with those systems, to shift the dynamic towards sustainability. In other words, tropical forest management must become more profitable. This may involve better prices for timber and non-timber products, greater use of currently unmarketable species, payments for ecosystem services, subsidies, or some other financing mechanism. In our view, the following are also necessary:

- competent institutions at all levels (community, subnational and national);
- clarity on tenure and the resolution of tenure conflict;
- the use of participatory, democratic management models to define the objectives of SFM at various scales and enable the participation of stakeholders in management and the equitable sharing of benefits and costs;
- efforts to convince users of the advantages of SFM practices – such as greater efficiency, better working conditions and less long-term risk;
- capacity and institution strengthening at the local level coupled with adequate and timely information and effective technical and extension support services;
- the continued development of silvicultural approaches to maintain, increase or restore vital ecological functions, including productivity and regeneration capacity;
- much greater interorganizational and intersectoral cooperation to ensure the maintenance of forest values at the landscape scale;
- effective monitoring and evaluation of forest management to enable the adaptation of management as circumstances and expectations change;
- at the national scale, the political will to encourage SFM through tenurial, institutional, regulatory and market reforms and the provision of incentives to compensate landholders for the ecosystem services they provide.

As they grow economically and achieve further institutional improvements, many tropical countries are likely to make incremental progress in all or most of the above areas in coming years, and, globally, forest management will become more consistent with SFM principles over time. The world's rich could expedite the process by helping to increase the financial viability of SFM, such as through payments for locally-to-globally important ecosystem services.

CONCLUSION

SFM is not just an idealistic dream: it embodies a process that is the best bet we have for maintaining and increasing the contributions of forests to global

Exemplary cases of SFM

FAO has compiled and documented almost 80 cases of successful SFM in action, demonstrating the economic, social and environmental benefits that can be achieved under SFM. Using varied approaches and strategies in multiple contexts, these examples show that good forest management is a powerful conservation practice that can reduce deforestation and maintain ecosystem services, and that it is a potent development option that can help reduce rural poverty and improve living conditions.

The FAO initiative, called *In search of excellence: exemplary cases of sustainable forest management*, sought to: identify a broad cross-section of exemplary forest management in Central Africa (FAO, 2003), Asia and the Pacific (Durst *et al.*, 2005), and Latin America and the Caribbean (Sabogal and Casaza, 2010); showcase forest management efforts that display promise for the future; and highlight examples across a variety of forest types and ecosystems from many countries in the tropical regions.

well-being. The risks posed by resource degradation and depletion and by climate change make SFM imperative; more than ever, humanity will need the products and ecosystem services provided by forests (Blaser and Gregersen, 2013). Undoubtedly, given its dynamic nature, the SFM concept will continue to be debated, but we should not allow its ambiguity to slow our ground-level pursuit of it. ◆

References

Appanah, S. 2013. The search for a viable silviculture in Asia's natural tropical forests. *Unasylva*, 64(240): 35–40.

Auld, G., Gulbrandsen, L.H. & McDermott, C.L. 2008. Certification schemes and the impacts on forests and forestry. *Annual Review of Environment and Resources*, 33: 187–211.

Blaser, J. & Gregersen, H. 2013. Forests in the next 300 years. *Unasylva*, 64(240): 61–73.

Blaser, J., Sarre, A., Poore, D. & Johnson, S. 2011. *Status of tropical forest management 2011*. ITTO Technical Series No 38. Yokohama, Japan, International Tropical Timber Organization.

Brown, C., Durst, P. & Enters, T. 2005. Perceptions of excellence: ingredients of good forest management. *In* P. Durst, C. Brown, H.D. Tacio & M. Ishikawa, eds. *In search of excellence: exemplary forest management in Asia and the Pacific*. Bangkok, FAO and the Regional Community Forestry Training Center for Asia and the Pacific.

Cerutti, P.O., Tacconi, L., Lescuyer, G. & Nasi, R. 2012. Cameroon's hidden harvest: commercial chainsaw logging, corruption, and livelihoods. *Society & Natural Resources: An International Journal*, DOI: 10.1080/08941920.2012.714846.

Collaborative Partnership on Forests. 2012. *SFM and the multiple functions of forests*. CPF fact sheet No. 1 (available at www.cpfweb.org/32819-045ba23e53cbb67809cef3b724bef9cd0.pdf).

Douglas, J. & Simula, M. 2010. *The future of the world's forests: ideas vs ideologies*. Dordrecht, the Netherlands, Springer.

Durst, P., Brown, C., Tacio, H.D. & Ishikawa, M. 2005. *In search of excellence: exemplary forest management in Asia and the Pacific*. Bangkok, FAO and the Regional Community Forestry Training Center for Asia and the Pacific.

FAO. undated. FAOTERM website (available at: http://termportal.fao.org/faoterm/main/start.do?lang=en).

FAO. 2003. *Sustainable management of tropical forests in Central Africa: in search of excellence*. FAO Forestry Paper No. 143. Rome.

FAO. 2010. *Global forest resources assessment 2010*. Main report. FAO Forestry Paper No. 163. Rome.

FSC. 2012. Global FSC certificates: types and distribution. Forest Stewardship Council (available at: https://ic.fsc.org/download.facts-and-figures-december-2012.a-1258.pdf).

Government of Liberia. 2008. Readiness program idea note (R-PIN) for reducing emissions from deforestation and degradation (REDD). Submission to the World Bank Forest Carbon Partnership Facility (available at www.forestcarbonpartnership.org/fcp/node/72).

ITTO. 1990. *Guidelines for the sustainable management of natural tropical forests*. ITTO Policy Development Series No. 1. Yokohama, International Tropical Timber Organization.

ITTO. 2006. *Status of tropical forest management 2005*. ITTO Technical Series No. 24. Yokohama, International Tropical Timber Organization.

Küchli, C. 2013. The Swiss experience in forest sustainability and adaptation. *Unasylva*, 64(240): 12–18.

Molnar, A. 2003. *Forest certification and communities: looking forward to the next decade*. Washington, DC, Forest Trends.

Montreal Process Implementation Group for Australia. 2008. *Australia's state of the forests report 2008*. Canberra, Bureau of Rural Sciences.

Nasi, R. 2013. Is financing sustainable forest management an inappropriate use of public funding? CIFOR Forest News, blog site (available at: http://blog.cifor.org/13757/is-financing-sustainable-forest-management-an-inappropriate-use-of-public-funding/#.UWX-taJTZ8E).

PEFC. 2012. PEFC website (available at: http://pefcregs.info/statistics.asp) (accessed January 2013).

Poore, D., Burgess, P., Palmer, J., Rietbergen S. & Synott, T. 1989. *No timber without trees: sustainability in the tropical forest*. London, Earthscan Publications.

Pearce, D., Putz, F.E. & Vanclay, J.K. 2003. Sustainable forestry in the tropics: panacea or folly? *Forest Ecology and Management*, 172: 229–247.

Pederson, O. & Desclos, P. 2005. Review of the French timber market. Preproject report. Yokohama, Japan, International Tropical Timber Organization.

Rights and Resources Initiative. 2013. *Landowners or laborers? What choice will developing countries make?* Rights and Resources Initiative Annual Review, 2012–2013. Washington, DC.

Rivera, R., Vindel, C., Flores, J. & Tovar, O. 2003. Increasing the value. *Tropical Forest Update*, 13(1): 3–4.

Sabogal, C. & Casaza, J. compilers. 2010. *Standing tall: exemplary cases of sustainable forest management in Latin America and the Caribbean*. Rome, FAO.

Schmithüsen, F. 2013. Three hundred years of applied sustainability in forestry. *Unasylva*, 64(240): 3–11.

Tongkul, F., Lasimbang, C., Lasimbang, A. & Chin Jr, P. 2013. Traditional knowledge and SFM: experience from Malaysia. *Unasylva*, 64(240): 41–49.

United Nations General Assembly. 2012. The future we want. Resolution A/RES/66/288.

Westoby, J. 1987. *The purpose of forests: follies of development*. Oxford, UK, Basil Blackwell Inc.

Westoby, J. 1989. *Introduction to world forestry*. Oxford, UK, Basil Blackwell Inc.

World Commission on Environment and Development. 1987. *Our common future*. Oxford, UK, Oxford University Press.

Zimmerman, B.L. & Kormos, C.F. 2012. Prospects for sustainable logging in tropical forests. *BioScience*, 62(5): 479–487. ◆