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**IUCN**  
The World Conservation Union



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## Forests and biodiversity conservation

Forests clearly have a vital role to play in biodiversity conservation, not least because they provide habitat for over two-thirds of the world's terrestrial species of flora and fauna. So how best can this forest biodiversity be conserved?

**Bush cricket in Brazil's Atlantic rainforest**

At first glance, the relationship between forest cover and biodiversity conservation seems a straightforward one: if forests are lost, so too are the species that live in them. Indeed, according to the World Bank, deforestation of closed tropical rainforests could account for the loss of up to 100 species per day. Yet, some of the implications of this relationship are not so simple. For example, simply increasing the coverage of protected forest areas is not necessarily the best solution for biodiversity conservation. This is due to several factors, including the limited resources available in many forest-rich developing countries to set aside their forests and maintain their protected areas. Indeed, natural forests at times need to be actively managed to eliminate threats to biodiversity, such as those from alien invasive species.

Another counter-intuitive implication of the forest-biodiversity conservation relationship relates to logging. Many conservationists still see logging as a major threat to biodiversity, yet studies have shown that most plant and animal species survive the highly selective logging that can be practised in the tropics. In fact, logging can provide the economic justification for retaining and managing natural forests rather than converting them to other land-uses such as plantation crops. Not that all logging is good news for biodiversity. The recent ITTO status report on tropical forest management makes sobering reading and there is much to be done before sustainable forest management becomes the norm rather than the exception. Also, just to add to the complexity, not all forest conversion is bad news. Agricultural production, when undertaken within a conservation-conscious landscape perspective, can complement forest management and support biodiversity conservation.

This edition of *arborvitæ* looks at the multiple dimensions of these complex issues and provides some pointers to realistic solutions. The bottom line is that today's forests will need to be adequately valued for the multiple functions they provide, biodiversity conservation being one of them. It is only when forests are considered more valuable standing than cleared that their biodiversity will be safe.

Duncan Pollard, WWF and Stewart Maginnis, IUCN



## Can logging save biodiversity?

**Can logging really be better for forest biodiversity than strict protection? Jeff Sayer of WWF International and Sandeep Sengupta of IUCN look at the issues.**

Only a tiny fraction of tropical forests – less than 10 percent – is included in strictly protected areas. Probably more than two-thirds of the remaining tropical forests are either already subject to logging or are likely to be in the future. Non-protected forests are home to much of the world's forest biodiversity; indeed, the fate of many rainforest species will be determined by what happens to these forests. The main threat to this rich resource of biodiversity is not logging; numerous studies have shown that most plant and animal species survive the highly selective logging practiced in the tropics. Rather, this biodiversity is threatened by the insatiable hunger for land needed to meet the world's expanding demand for palm oil, soybeans, rubber and other tropical crops, or at times by large-scale infrastructure development such as road-building and mining.

For most poor people in developing countries, forest conversion, primarily to agriculture, provides the quickest route out of poverty. It is unlikely that non-protected forests will be retained if they do not yield a flow of benefits to the people on whose land they exist. Logging can provide local employment, revenue flows and raw materials for processing industries. In the remote forested areas of the

Amazon and Congo Basins and in Borneo, forest industries are amongst the main drivers of the economy. Sustainable logging may be the best strategy for building popular support for retaining the forests. It is therefore ironic that many conservationists still see logging as a major threat to natural forest values when it could be argued that it may provide the only justification for the retention of much of this forest.

Research by the Wildlife Conservation Society, WWF and IUCN has shown that well-managed forests in Africa and SE Asia are often both rich in wildlife and important contributors to local economies. In some parts of Africa, well-managed production forests are better protected than many national parks and strict nature reserves – an additional problem is that few visitors ever go to the strictly protected areas and most governments do not have the resources to manage them. Loggers have an economic stake in protecting their forests. This leads to the counter-intuitive situation where 'paper parks' may offer less security to biodiversity than logging concessions.

Logging has got a bad image, and rightly so. Opportunistic logging at the forest frontier – in areas newly opened up by roads but where governance structures are weak and corruption is rampant – can have disastrous environmental and social impacts. But recent progress in improving forest governance and sustainable management suggests that with limited funds available for conservation there may be many situations where investing in sustainable forestry may be a better option than further extending strict protection. Combining the forces for sustainable forestry with those for conservation may be the most powerful strategy for resisting the forces for land conversion.

Over the last twelve months, IUCN and the International Tropical Timber Organisation (ITTO) have been collaborating in developing new guidelines for biodiversity conservation in tropical production forests. These guidelines are now being tested in selected forest operations in Brazil, Cameroon, Guyana and Indonesia, to ensure they are focussing on the most important issues for conservation and are not making unreasonable demands on the logging companies. The long-term aim is to build alliances between the timber industry and biodiversity conservation groups to achieve 'multi-functional' forests. While these forests can never replace 'pure' protected areas, they can enrich the landscape mosaic in ways that are favourable for both biodiversity and the people who depend on them for their livelihoods.

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### IUCN news in brief

**Rights and resources:** IUCN is a founding member of a new international coalition, the Rights and Resources Initiative, which aims to assist governments and communities to double the global forest area under community ownership and management by 2015, to help achieve the Millennium Development Goals on poverty and environmental protection.



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## Forest concessions and conservation in the Congo Basin

**How effectively are forest concessions contributing to biodiversity conservation?**

**Cleto Ndikumagenge, of the IUCN office for Central Africa, looks at the current state-of-play in the Congo Basin.**

**Large mammals are hardest hit by hunting in forest concessions**

The forests of the Congo Basin are incredibly rich in biodiversity. They are home to 84 percent of Africa's primate species and more than 8,000 known plant species of which the vast majority are endemic to the region. The forests are also of great economic importance and private logging concessions now cover between 50 and 80 percent of the forest area. This dwarfs the ten percent covered by protected areas and gives concession managers a serious responsibility for the conservation of the region's biodiversity, as more than 80 percent of the wild fauna is found in the forest concessions.

Although the rate of deforestation of the Congo Basin forests is just 0.6 percent, relatively low compared to other regions of the world, the forest landscape is undergoing drastic changes, primarily as a result of clearance for farming and the indirect effects of logging. The forest biodiversity is under serious threat from multiple causes, many of which are beyond the control of the concessions. In Cameroon, for example, these causal factors include

- the economic crisis that has led to massive job losses in the public and private sectors and the return of jobless city dwellers to rural areas;
- the emergence of a lucrative market for bush meat in urban centres;
- the proliferation of increasingly sophisticated hunting weapons, exacerbated by armed conflicts in the sub-region;
- the opening up of new road networks by logging companies and miners, facilitating hunters' access to previously impenetrable forests; and
- serious inadequacies in law enforcement.

A recent study carried out in a forest concession in southern Cameroon showed that it is the larger mammals (elephants, gorillas and chimpanzees) that are under most pressure from hunting and represent indicators for the general integrity and conservation status of an area.

Tackling these threats is an enormous challenge. Despite the existence of several national and regional laws and strategies for the conservation and sustainable use of biological resources, biodiversity loss continues apace. The provision of tools – such as the ITTO/IUCN Guidelines for the Conservation and Sustainable Use of Biodiversity in Tropical Timber Production Forests (see page 14) – is useful but their practical application faces many challenges.

In the meantime, several concessionaires are showing real commitment to biodiversity conservation. Some concessions, such as WIJMA in Cameroon and CIB in Congo, are involved in innovative partnerships with local communities and administration officers to promote the sustainable use of the natural resources in their concessions, and have already obtained FSC certification. Their commitment to conserving biodiversity will help encourage other concessionaires to improve their practices. The specific activities undertaken by these frontrunners include inventories of fauna in the concessions, sensitization campaigns and training courses for local communities, and community participation in dialogues on biodiversity conservation in the concessions.

Some of the concessionaires have also, in close collaboration with conservation partners, laid down a set of minimum rules ('the ten commandments') to reduce biodiversity loss and wildlife loss in particular. These rules include, for example, the incorporation of wildlife management issues into forest management plans, the banning of commercial hunting or hunting using non-selective techniques within the forest concession and the promotion of alternative sources of protein for people's needs. The tenth rule is simply "Never give up!" and this is perhaps the most important. In the face of huge obstacles and challenges, stakeholders will need to continue to work in a coordinated manner to help slow down biodiversity loss in forest concessions. The participation of local people in this task will be crucial, to ensure that their rights are protected and their livelihood needs are taken into account.

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## The role of forests in biodiversity conservation: challenges for the 21st century

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**Jeffrey McNeely, IUCN's Chief Scientist, looks at the emerging trends and challenges in forest management for biodiversity conservation.**

### **Rainforest in the Solomon Islands**

Although scientists only started using the word 'biodiversity' in the mid-1980s, the term started flowing into the mainstream when the Convention on Biological Diversity entered into force in 1993. While the CBD has fallen short of its potential, being hammered on the treacherous shoals of competing national interests, considerable progress is nonetheless being made to achieve its objectives in many parts of the world.

That said, forests – the richest terrestrial habitats for biodiversity – are under greater pressure than ever before, even though forest cover is expanding in several countries (primarily in temperate regions). The CBD adopted a programme of work on forests at its Conference of Parties in The Hague in 2002, but this has not had the hoped-for effect: human impacts are growing in even the well-forested regions and the recent spread of forest fires in the Russian boreal forests is just the latest illustration of the problem. So what can be done to conserve forest biodiversity as demand for forest goods and services expand in the 21st century? Let's run through a few of the critical issues.

**Forest ecosystem services:** Forests are still valued particularly for the timber and fuelwood they provide, but are also increasingly valued for their role in watershed protection, soil formation, and cultural services such as the pleasure people receive from visiting a forest. The Millennium Ecosystem Assessment, released in 2005, well described these multiple values. The challenge in the coming decades is going to be putting the metaphor of ecosystem services into practice.

People who live in forests know better than anyone that a healthy, resilient ecosystem is essential for a productive and profitable forest. Using economic incentives to conserve ecosystem services recognizes the capacity of managers to care for the land, and supports a long-term view in management practices. With appropriate incentives, forest dwellers can become land managers as well as commodity producers, while forest managers can ensure that areas under their control are sustainably managed to provide multiple ecosystem benefits.

Recent human disasters caused by extreme natural events, including the 2004 Indian Ocean tsunami, the numerous tropical storms in the Caribbean in 2005, and the 2005 Kashmir earthquake, have demonstrated the value of intact ecosystems in reducing the impact of such events on human wellbeing. In the case of the tsunami, healthy coral reefs and mangroves greatly reduced the negative impacts of the tsunami; in the Caribbean, areas where forests had been well managed and coastal wetlands had been conserved fared better than areas where these ecosystems had been converted to other uses; and in Kashmir, slopes that remained forest-covered suffered far less landslide damage than those where forests had been over-exploited.

**Climate change:** Climate change offers both a challenge and an opportunity for forest biodiversity. Changes in weather patterns will inevitably affect forests (for example, making them more flammable and changing the distribution of species) and forests will be called upon to help sequester carbon. The carbon sequestration benefit of forests is likely to be a mixed blessing as some policy-makers will seek to develop fast-growing species, perhaps genetically modified, to sequester as much carbon as quickly as possible. Others will be using those same forests to produce biomass that is expected to increasingly replace petroleum as the source of energy for driving modern society. Already, Sweden is working toward a petroleum-free economy by developing numerous local biomass-fired power plants, often drawing on trees such as willows as the main source of energy. But biomass is not the same as biodiversity and new approaches will be needed to ensure that the rich biodiversity of forests is not depleted in the rush to sequester carbon or feed biomass power plants. One

**The invasive *Miconia calvenscens* has replaced over 70% of Tahiti's native forest**



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critically important policy measure that could be implemented is recognizing, and paying for, the carbon sequestration value of conserving old-growth forest – widely considered the most effective of the forest-based means of storing carbon (see [www.rainforestcoalition.org](http://www.rainforestcoalition.org)).

**Fragmentation:** While deforestation is recognized as a major conservation issue, the related issue of habitat fragmentation receives insufficient attention. Human impacts will continue to expand in both temperate and tropical forests as the 21st century proceeds, so areas that were once continuously forested will become increasingly fragmented. In the Brazilian Amazon alone, the area of forest that is fragmented (with forests less than 10,000 ha in area) or prone to edge effects (less than one kilometre from clearings) is already over 150 percent greater than the area that is actually deforested. Recent research has indicated that small fragments contain more light-loving species, more trees with wind – or water-dispersed seeds or fruits, relatively fewer under-storey species, a greater density of tree falls, more weedy species, and unusually abundant vines, lianas, and bamboos; thus they preserve only a highly-biased subset of the original flora and fauna that is adapted to these conditions.

**Invasive alien species:** As the global movement of people and products has expanded, so too has the movement of plant and animal species from one part of the world to another. When a species is introduced into a new habitat, such as the introduction of oil palm from Africa to Indonesia, eucalyptus from Australia to California, or rubber from Brazil to Malaysia, the alien species typically requires human intervention to be able to survive and reproduce. Indeed, many of the most popular agroforestry trees are non-native species that prosper in their new environments, at least partly because they no longer face the same competitors, predators and pests that they did at home. Such alien species have been very important economically and have enhanced the production of various forest commodities in many parts of the world.

In some cases, however, introduced species have become a significant problem by becoming established in the wild and spreading at the expense of native species and entire ecosystems. Notorious examples of this 'invasive alien species' problem include the ecological take-over of the Polynesian island of Tahiti by *Miconia calvenscens*; the spread of various species of Northern Hemisphere pines and Australian acacias in southern Africa; the invasion of Florida's Everglades National Park by *Melaleuca* from South America; and the introduction of Kudzu (*Pueraria lobata*) from Japan and China into the US where it now infests over two million ha. Of the 2000 or so species used in agroforestry, perhaps as many as 200 are invasive, but only about 20 are highly so, including some very popular species such as *Casuarina glauca*, *Leucaena leucocephala*, and *Pinus radiata*. Great care is required to ensure that such species serve the economic purposes for which they were introduced, and do not escape to cause unanticipated negative impacts on native ecosystems.



## Some promising directions

### Forest dwellers, Indonesia

While timber production often dominated forest management objectives in the 20th Century, new pressures for the delivery of multiple goods and services now demand a more nuanced approach to management. The public will expect forestry plans to adequately provide for the protection of watersheds, the rights of indigenous peoples to occupy their traditional homelands even if they are in economically valuable forests, a system of protected areas that covers all major ecosystem types in the country, and the adoption of sustainable methods for any exploitation of timber and other forest products. Sustainable forest management based on ecosystem principles (such as maintaining healthy breeding populations, conserving soils, avoiding erosion, allowing natural fire regimes, and carefully planning roads to minimize impacts) is entirely consistent with the needs of biodiversity conservation.

Intensifying the management of natural forests and plantations has often involved eliminating competing species, draining wetlands, suppressing natural fires, and greatly accelerating rotation cycles. All of these have led to an overall increase in productivity, at least in the short run, but often at the cost of a decline of forest quality, including

threats to forest-dwelling fauna and increasing vulnerability to pests. 'Sustained yield forestry' designed to provide a steady stream of timber is not synonymous with 'sustainable forest management' required for the 21st century, as the latter gives greater attention to sustaining various ecological processes, producing a range of other goods and services, and conserving forest biodiversity.

Converting the potential benefits of forest biodiversity conservation into real and perceived goods and services for society at large (and especially for local people) requires a systems approach that will include:

- At the national level, an integrated set of protected areas encompassing various levels of management and administration, including the national, provincial, and local governments, non-governmental organizations, local communities and indigenous peoples, the private sector, and other stakeholders.
- Within the framework of the market-based economic systems that are becoming increasingly widespread, greater participation by civil society in economic development that extends to the management of production forests, plantations, and protected areas, especially for tourism and the sustainable use of certain natural resources.
- A fairly large geographical scale (sometimes called a 'bioregion' or a 'landscape') for resource management programmes, within which protected areas are considered as components in a diverse landscape, including farms, harvested forests, fishing grounds, human settlements, and infrastructure.
- Cooperation between private landowners, indigenous peoples, other local communities, industry and resource users; the use of economic incentives, tax arrangements, land exchanges and other mechanisms to promote biodiversity conservation; and the development of administrative and technical capacities which encourage local stakeholders, universities, research institutions, and public agencies to harmonize their efforts.

The values which different sectors of society attach to the different goods and services provided by forests may change more rapidly and profoundly in the coming decades than ever before. The impacts of climate change, forest fragmentation, and invasive alien species have already increased remarkably. We cannot reasonably expect these changes to slow down, and many experts expect them to continue accelerating. Therefore, the challenges facing local communities, scientists, conservationists, and foresters are likely to be very different in the future. Society needs a diversity of approaches to forest management, in order to provide multiple benefits to a wide variety of interest groups – all with a legitimate interest in conserving forest biodiversity and using forests sustainably.