

FORESTS FOR LIFE

The WWF/IUCN forest policy book



IUCN
The World Conservation Union

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WWF – World Wide Fund For Nature is one of the world's largest independent conservation organisations with a network of National Organisations and Associates around the world and over 5.2 million regular supporters.



IUCN – founded in 1948, the World Conservation Union brings together States, government agencies and a diverse range of non-governmental organisations in a unique world partnership, over 800 members in all, spread across some 132 countries. The World Conservation Union builds on the strengths of its members, networks and partners to enhance their capacity to support global alliances and to safeguard natural resources at local, regional and global levels.

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Introduction

In the past, forests spread over half the world's land surface. Today, despite large scale conversion to agriculture, rangelands and desert, forests and woodlands still cover 35 per cent of the land area,¹ albeit much of this of reduced quality. They contain, proportionately, the greatest quantity of biodiversity² in terms of species, genetic material and ecological processes. Forests are an integral part of human society, philosophy and culture and provide us with an immense range of goods and services.

Forests are currently facing greater threats than at any time in history, with many areas undergoing rapid deforestation or degradation as a result of human activity. Losses of total quantity of forest cover in the tropics are being matched by a parallel loss of quality in many temperate and boreal regions. Loss of quality also increasingly affects tropical forests as well. WWF and IUCN have both recognised the critical importance of halting and reversing this cycle of destruction. In consequence, WWF has made forests one of its three priority biomes, along with oceans and freshwater ecosystems and IUCN is involved in a comprehensive array of forest initiatives and projects.

This short book summarizes a joint position regarding forest problems and the appropriate responses. It summarises the problems facing forests today, discusses how these have come about and looks at why forests are important. Suggested responses to the crisis facing global forests are outlined. The text is necessarily pessimistic in places. We are, nonetheless, heartened by the many positive steps that are being taken to address these problems.

Throughout the text, examples provide information to back up the arguments. Also included are photo sections providing a brief overview of the state of forests, the role of people in forests and a look at what IUCN and WWF are doing around the world to address forest problems. The book includes a full list of references and a glossary.

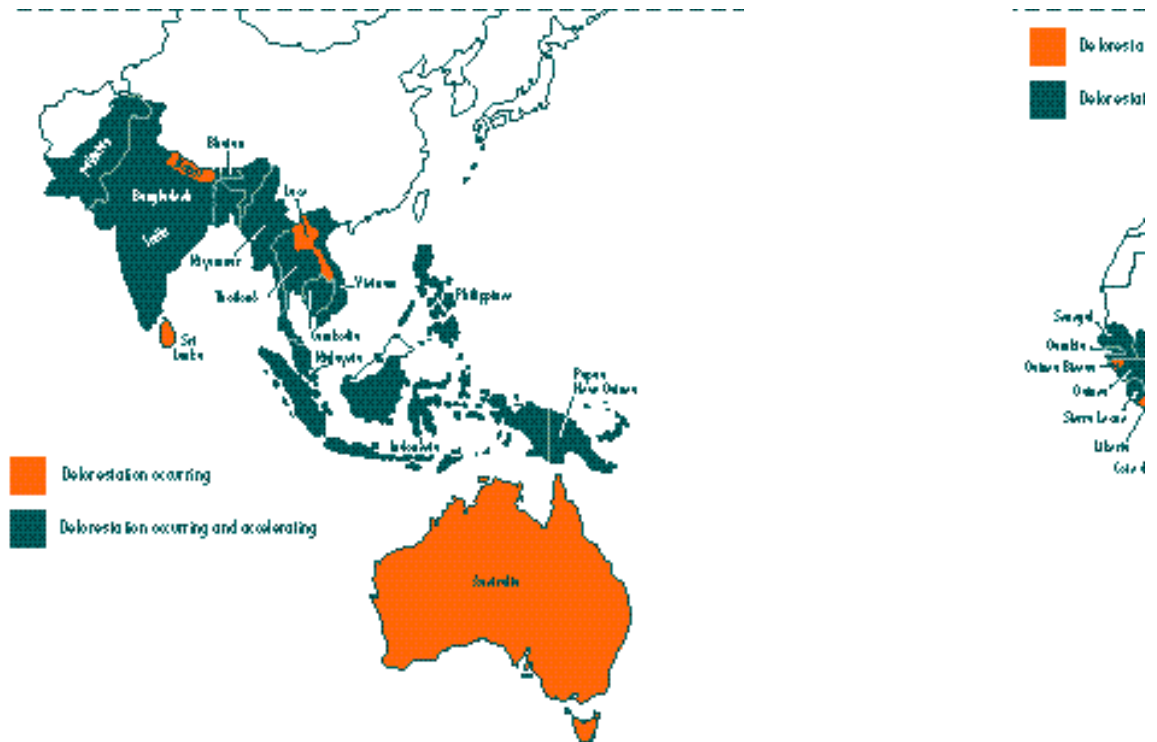
The problem

The world's forests currently face two critical problems:

- **DEFORESTATION:** natural, old-growth and semi-natural forests are being removed and replaced by non-forest vegetation;
- **LOSS OF FOREST QUALITY:** even where forest cover remains constant, degradation often occurs and natural forests are gradually weakened, converted to other land uses or are replaced by intensively managed forests or plantations, often with impaired ecological functions and reduced biodiversity.

DEFORESTATION

Natural and semi-natural forests are being destroyed all over the world, often at an accelerating rate.³ Although data sources remain inadequate and sometimes inaccurate, research by the UN Food and Agriculture Organization (FAO) suggests that forest cover is decreasing in almost all the tropical and subtropical countries of Africa, Asia and Latin America, and also in much of Oceania.⁴ Net losses occurred in at least 75 countries in 1990, and in 46 the rate of loss increased during the 1980s.⁵



ASIA

OCEANIA

Papua New Guinea 0.3%

Angola 0.7%

Kenya 0.5

Madagascar 0.8

LATIN AMERICA

Bolivia 1.1

NORTH AMERICA

even where
forest cover
remains
constant,
degradation
often occurs



Table 1 Deforestation and forest decline hotspots

Country	Main areas of concern
Europe	<p>Continuing decline in quality of Mediterranean forests in France, Spain, Italy, Greece and Turkey is occurring through tourist development, urban expansion and increased fire incidence.</p> <p>Remnant old-growth forests of Scandinavia are still being felled. In Finland only 3-4 per cent of forest cover is old-growth, and half of this has no protection; a recently discovered area of old-growth was partly destroyed by roads and logging before operations were halted by protests.</p> <p>Remnant semi-natural woodland of the UK is at risk from road building and development.</p> <p>Wetland forests of Latvia, Lithuania and Estonia are being logged for export; particularly to Germany and the UK, where imports from Latvia have increased by over 700 per cent.⁶</p> <p>Old-growth forests in European Russia, the Czech Republic, Slovakia, Poland and Bulgaria are being felled and privatisation of state forests is encouraging rapid clearance to gain cash sales.</p>
Russia	<p>After extensive over-exploitation under the Soviet regime, institutional controls for managing Siberian forests are weak and there is increasing pressure for exploitation by transnational logging companies.⁷</p>
Africa	<p>Tropical rainforests of West and Central Africa are being rapidly depleted by logging and through clearance for agriculture, with the most threatened countries including Nigeria, Cameroon, Côte d'Ivoire and Ghana. A 100 per cent increase in logging operations by European companies is taking place in Cameroon due to the devaluation of the FCA and the poor economic situation.⁸</p> <p>Felling of trees is taking place in national parks in Rwanda and neighbouring Tanzania by war refugees.</p> <p>Subtropical dry forests in East Africa including Eritrea, Ethiopia, Sudan, Somalia and parts of Kenya and Tanzania are rapidly being depleted by land clearance for agriculture, fuelwood collection and overgrazing.</p> <p>Conifer forests in Morocco, Algeria and Tunisia, are being rapidly degraded.</p> <p>Relic temperate forests in South Africa are threatened with encroachment.</p>
North America	<p>USA: Reductions in safeguards on old-growth forests have been based on poorly conceived notions of forest "health" and promoted by industry and Congress.</p> <p>Pacific Northwest coast several old-growth forest species are currently at risk.</p> <p>Subtropical forests in Florida are threatened by development and changes in the water table.</p> <p>Alaskan coastal rainforest is being logged by US timber companies, mainly for export to Japan.</p> <p>Canadian west coast forest, the largest remaining temperate rainforest, is rapidly being logged, and few watersheds over 10,000 ha remain intact. The remaining 1 per cent of Ontario's old-growth forest is at risk and boreal forests are being opened for exploitation in Alberta.</p>

Country	Main areas of concern
Latin America	<p>Forests of Central America are probably being cleared faster than almost anywhere else in the world, with those of Costa Rica, El Salvador, Guatemala, Panama and Nicaragua being at particular risk.</p> <p>There are plans for large-scale logging in virgin forests of Suriname and Guyana.⁹</p> <p>Caribbean forests are suffering rapid decline in places; Jamaica has the world's fastest rate of deforestation and losses are also severe in Haiti and the Dominican Republic.</p> <p>Losses to the Amazon reached almost 90 million ha from 1960 to 1990, and large scale clearance continues. Deforestation is reaching critical levels in the Amazon region of Bolivia.</p> <p>Temperate beech forests of Chile and Argentina are being logged and chipped for pulp and paper, including operations by US timber companies, encouraged by the existence of weaker conservation legislation than in the USA.¹⁰</p>
Oceania	<p>Old-growth forests in Australia are being logged. Many areas are clearcut prior to proper environmental assessment. Eucalypt forests and open woodlands are being cleared for grazing. Chipping operations are taking place on the edge of reserved areas in Tasmania.</p> <p>Tropical forests in Papua New Guinea, the Solomon Islands and Vanuatu are being logged, including illegal operations.</p>
Asia	<p>The Himalayan-Hindukush-Karakorum mountain region from Afghanistan to Bangladesh is being logged, degraded by excessive grazing, fodder and fuelwood collection and experiencing the impact of refugees and political disturbance.</p> <p>Lowland terrai forests of India and Nepal are rapidly being logged and cleared, often illegally.</p> <p>Forests of China have been badly depleted and losses continue, especially within Tibet.</p> <p>Rainforests and mangroves in the Philippines have been reduced to fragments but are still being illegally logged.</p> <p>Forests in Indonesia are rapidly being logged and cleared often to establish exotic plantations. Large areas of Kalimantan's forests have been burnt, with the worst forests fires ever known on the island occurring in 1994.¹¹</p> <p>Thailand's forests have already been reduced to fragments over much of the country and a logging ban has increased pressure on neighbouring countries such as Vietnam, Myanmar (formerly Burma), Cambodia and Laos.</p>

Compiled by EQUILIBRIUM

Sources: (in addition to those listed in the endnotes) Collins, N Mark, Jeffrey A Sayer and Timothy C Whitmore [editors] (1991): *The Conservation Atlas of Tropical Forests: Asia and the Pacific*, IUCN with MacMillan, London and Basingstoke;

Sayer, Jeffrey A, Caroline S Harcourt and N Mark Collins [editors] (1992): *The Conservation Atlas of Tropical Forests: Africa*, IUCN with MacMillan, London and Basingstoke.



Major vegetation types of the world

These figures still underestimate the scale of the problem of natural forest loss. In many countries where the area under trees is constant, natural and old-growth forests are being logged and replaced by plantations or regrowth as described below in the section on loss of quality.

Rates of loss are often dramatic. The highest annual forest loss from 1980-1990 was 5.3 per cent in Jamaica.¹² Countries such as the Côte d'Ivoire and the Philippines¹³ in the tropics, and Scotland,¹⁴ Iceland¹⁵ and Denmark¹⁶ in the temperate regions, have already lost almost all their natural and semi-natural forests. Even countries that still have large forest areas are suffering. Cameroon has some of the most ecologically-important forest in West Africa, but 0.4 per cent of its rainforest disappeared every year during the 1980s, and the rate of felling has increased 400 per cent in the last few years.¹⁷ A recent analysis suggested that there is no sustainable logging in the country.¹⁸ Over the same period, Malaysian forests declined at a rate of 1.8 per cent per year.¹⁹ In Brazil, 8-10 per cent of the rainforest has already gone with at least 60 million hectares cleared or burnt by 1988.²⁰ After a few years in which burning declined, huge areas were again reported to be on fire in October 1995.²¹ Worldwide, current forest protected areas (including national parks) are too small, and not representative enough, to protect many forest ecosystems.

LOSS OF FOREST QUALITY

Almost as important as reduction in forest area, from a social and environmental point of view, is the continuous degradation of existing forests, through the effects of, for example: badly managed industrial forestry operations; pollution damage; introduced pests and diseases; fuelwood collection; overgrazing; recreational pressure; and changes in fire incidence. Some issues are examined in more detail below.

IMPACTS OF INDUSTRIAL FORESTRY. Forestry can and should play a beneficial role in helping to maintain high quality forests. Unfortunately, in practice the reverse is often true, and forestry operations are destroying natural forests, establishing environmentally-damaging plantations and intensifying the management of semi-natural forests to the extent that other forest functions are lost.

Natural and old-growth forests are currently being felled in many areas, and replaced by plantations or by young regrowth. In Canada, two forest operations, have been granted felling licences over 17.5 per cent of the province of Alberta.²⁶ In the USA, only about 1-2 per cent of the virgin native forest remains and much of this is currently threatened by timber operations.²⁷ Washington and Oregon have 13 per cent old-growth forest, but recent political changes have put these areas under acute threat.²⁸ Similar changes are taking place in developing countries, for example in Chile and Kalimantan.

Tree plantations have an important role to play in the global timber supply. However, they are currently often causing a net decline in environmental quality as compared with natural forests. Replacement of natural forest with plantations, often of non-native species, is occurring throughout the world, and in a growing number of countries the majority of "forest" is actually plantation. For example, although France has lost most of its natural forests, the area under trees has doubled since the mid-nineteenth century, mainly through plantation establishment.²⁹ In Bulgaria, the proportion of conifer plantations in the forest estate has also virtually doubled in the last 30 years, from 17.7 per cent in 1960 to 34 per cent in 1990.³⁰ Over 70 per cent of the UK forest consists of exotic monoculture plantations.³¹ Similar changes are now taking place in the tropics. The government of Indonesia plans to establish 6.2 million hectares of plantations by the year 2000, mainly for the international pulp market. Over 2 million hectares of tropical rainforest have already been felled and replaced by pulp plantations of acacia and eucalyptus and the government intends to cover 10 per cent of the land area with pulp plantations.³² In addition to the loss of natural habitat, plantations can also have a range of environmental problems, as discussed in *Causes of Forest Decline* below.

Many natural forests are also managed primarily for timber production. Whilst this can work well if carried out sensitively, in many cases intensification of timber exploitation is causing environmental and social problems. Sweden currently has 58 per cent forest cover, and this is still

Natural forest reserves:

The UN Food and Agricultural Organization (FAO) claims that around 5 per cent of the world's forests are under protection.²² However, in 1990, the United Nations estimated that there were 87 million hectares of forest reserves in the tropics and 58 million hectares in Europe, North America and the former USSR,²³ representing less than 3 per cent of global forests. Furthermore, many "forest reserves", particularly but not exclusively in the tropics, continue to be sites for logging, oil drilling, tourism development and other forms of encroachment. Protected temperate and boreal forests tend to be concentrated in areas with little economic potential. Australian studies found relatively small areas of wet eucalypt and temperate grassy forests in reserves, as compared with rainforest and shrubby and healthy eucalypt forest, and "reservation is biased towards the forest ecosystems with the lowest commercial potential".²⁴ Scandinavian forest reserves are concentrated in the northern boreal regions, on barren land, where trees are less economic to cut.²⁵ Many forest types remain unprotected, or inadequately protected and there is an urgent need for further protected areas.

the real causes
of forest
destruction
can occur far
away from the
forest itself

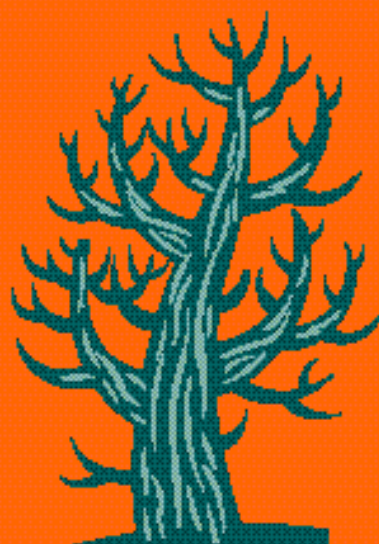
increasing. However, the vast majority of the forest is intensively managed for timber, and has less value for people and wildlife than a more natural forest. Outside the mountainous areas of the north only around 0.5 per cent of forests are protected from exploitation,³³ and many forest dwelling species are endangered as a result of forestry practices. Several large Swedish timber companies are currently investigating forest management methods that will leave more space for wildlife.

DECLINE IN TREE HEALTH. Many European forests are undergoing a form of decline caused at least in part by air pollution. Similar effects are also seen in North America and Asia.³⁴ Decline is often intensified by drought and bad forest management; however research has shown clear links with levels of several pollutants. Ozone is particularly important in western Europe, while sulphur and nitrogen oxides are more significant in central and eastern Europe.³⁵ In general, older trees, isolated individuals, and those on the edges of stands are the most badly affected. Symptoms include discolouration of leaves, premature leaf and needle fall, erratic twig branching, and changes in crown density.³⁶ The decline in vitality and loss of health can in occasional cases result in tree death.

Surveys undertaken by the UNECE/CEC for the *Convention on Long Range Transport of Air Pollution*, currently cover 34 European countries, and involve analysis of 33,000 sample plots and around 620,000 sample trees. In 1994,³⁷ 26.4 per cent of the total sample had defoliation greater than 25 per cent, thus being classified as damaged, an increase of 3.8 per cent on the previous year. Amongst those countries suffering the worst air pollution were the Czech Republic and Poland. The sequence of survey results since 1988 shows that damage to 11 of the 12 commonest trees in Europe has been increasing continuously over that period.

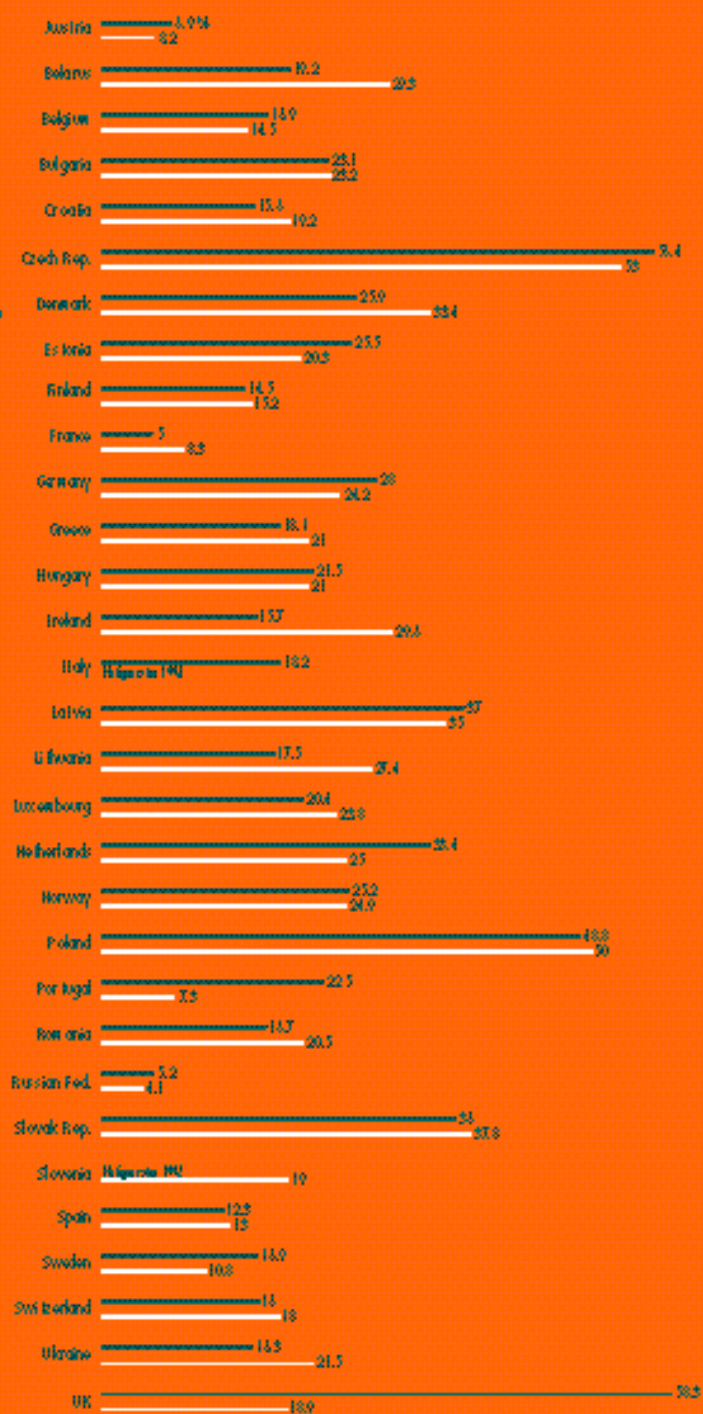
IMPACT OF CLIMATE CHANGE. Predicted climate changes due to global warming³⁸ could have a marked effect on forests,³⁹ many tree species not being able to disperse fast enough to keep pace with changing conditions.⁴⁰ Some researchers suggest that 40 per cent of boreal forests could disappear and be replaced by temperate forests and tundra,⁴¹ and that the biome will be progressively damaged by changes in mean annual temperature, storm frequency and severity, and fire frequency.⁴² Marginal ecosystems may be amongst the most sensitive to change, including tropical montane cloud forests, heath forests and tropical forests found at the edge of their natural ranges (e.g. southern China, Paraguay, northern Argentina and northern Australia). Greater hurricane frequency and intensity could increase threats to forests, and cloud forests are considered to be particularly at risk⁴³.

PEST AND DISEASE ATTACK. Whilst pest and disease infestations are part of the natural forest cycle, some aspects of modern forestry, including particularly the establishment of monoculture plantations, are increasing the likelihood of serious outbreaks. Several North American conifer pests have now been introduced into Europe, where they have no natural enemies. In



Tree damage in different European countries 1992-1993

— 1992 figures
— 1993 figures



Mediterranean Europe, the exotic root pathogen *Phytophthora cinnamoni* is causing rapid decline and death amongst several tree species, particularly cork oak (*Quercus suber*), evergreen oak (*Q. ilex*) and other oak species. In 1991, 1,050 major foci of the disease were found in southwest Spain, and similar declines have been identified in parts of Portugal, Italy, Morocco and Tunisia.⁴⁴ This threat is likely to increase with current developments in intensive plantation management, which further narrows the genetic base of favoured species by using propagation techniques such as tissue culture. There is also growing evidence that air pollution can, on occasion, increase trees' susceptibility to attack by specific pests, and weaken overall resistance to disease.⁴⁵

CHANGES IN FIRE ECOLOGY. Fire is an important component of many forests, increasing variety, opening the canopy for regeneration, controlling pests, releasing nutrients and germinating seeds. However, forest fires in the wrong place and at the wrong time are ecologically, socially and financially damaging. Both rate and extent of forest fires are increasing, mainly as a result of human activity. In 1988, over 4 million hectares were burnt in Europe and North America.⁴⁶ Spain, Portugal, France, Greece and Italy usually account for about 90 per cent of Europe's forest fires.⁴⁷ In China, an estimated one million hectares of commercial forest are destroyed every year by fire.⁴⁸ Naturally occurring fires in West African savannah penetrate further into tropical moist forest once it has been partially logged.⁴⁹ Conversely, in parts of North America,⁵⁰ Australia,⁵¹ and in Scandinavia, artificial reduction in fire is causing ecological problems. Suppression of minor fires also sometimes means that, when fires do occur, they are generally more serious due to the build-up of flammable material.⁵²

A consideration of the issues of forest quantity and quality has led WWF to define the essential elements that need to be taken into account to define a forest in terms of both biophysical and socioeconomic criteria.

commercial
timber
harvesting
is now the
greatest single
threat to the
forests richest
in wild plants
and animals

WWF's criteria of forest quality:

WWF has defined a series of criteria that contribute to forest quality:

- **authenticity:**
 - natural composition of trees etc
 - natural spatial variation of trees with respect to age, size, proportion of dead timber etc
 - continuity
 - accommodation of natural disturbance patterns within forest management
 - integration of forest into the landscape
 - management practices which mimic natural ecological processes.
- **forest health:**
 - impacts of air pollutants
 - robustness to global climate change
- **environmental benefits:**
 - biodiversity conservation
 - soil and watershed protection
 - local climatic effects
 - carbon sequestration
- **other social and economic benefits:**
 - timber products
 - non-timber products
 - support for local industries
 - recreational value
 - forest as homeland for people
 - aesthetic values
 - historical values
 - cultural values
 - educational values
 - spiritual values
 - local distinctiveness⁵³

In many forests, commercial timber production is stressed to the virtual or complete exclusion of other values. Few forest management plans aim to include all aspects of quality. Where they are included, they are frequently only by-products of the primary goal of timber production.

Causes of forest destruction and degradation

FORESTS are seldom destroyed or degraded through accident or malice. There are many practical reasons for destruction and degradation of forests. Most analyses concentrate on immediate causes, such as felling trees to create farmland, rather than the underlying reasons behind such actions. IUCN and WWF believe that it is essential to address both underlying and immediate reasons for forest loss.

UNDERLYING CAUSES OF FOREST LOSS AND DEGRADATION

The real causes of forest destruction can occur far away from the forest itself.

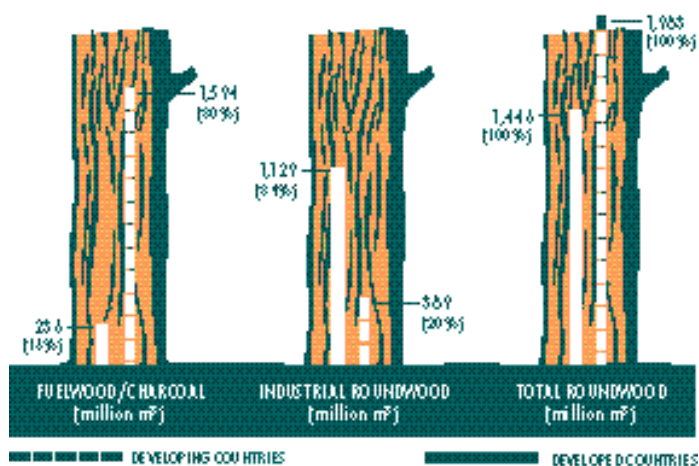
Key issues include:

- current consumption levels
- international debt and structural adjustment
- pressure for trade and development
- poverty
- population
- land tenure
- social relations including gender relations

Many of these causes are inter-linked, to a greater or lesser extent, although for the sake of clarity they are examined separately in the sections below. The underlying causes of forest loss are often ignored in explanations of why forests are being destroyed, and consequently there have been few attempts to assess their overall impact and to trace through the links between cause and effect.

CURRENT CONSUMPTION LEVELS. Individual consumption at today's levels is a recent phenomenon, and is concentrated amongst a fifth of the world's population, mostly in North America, West Europe, Japan, Australasia, Hong Kong, Singapore and the oil sheikdoms of the Middle East.⁵⁴ This relatively small group consumes 80 per cent of global resources.⁵⁵ Maintaining such high consumption levels for a few needs inputs of labour and resources from the rest of the world. Consumption is driven by social pressures, advertising and industrial structures. Changing lifestyles in developing countries have also increased consumption levels through construction activity, greater use of consumer goods, political forces with demands for development etc. These changes have important impacts on forests; both directly through use of timber and also through other resource requirements which encourage logging, oil drilling etc. For example, world consumption of paper and paper board was 243 million tonnes in 1991,⁵⁶ and since 1950 world paper consumption has increased by five times.⁵⁷ Consumption also affects forests indirectly through such factors as forcing landless people into forests by taking the best farmland for export cash crops.

the most
significant
links between
population
and the
environment
are those of
consumption
and pollution
by people in
rich countries



Uses of timber vary dramatically in different parts of the world

INTERNATIONAL DEBT AND THE FLOW OF RESOURCES FROM POOR TO RICH. Current economic practices have also led to a sharp rise in international debt, particularly in developing countries. Debts have been caused by many factors including incautious bank lending, profiteering by minority elites in the South and economic policies in the North which have pushed interest rates up and complicated debt servicing. Debt remains a crushing problem for many poor countries, and currently exceeds US\$1 trillion. Of the 17 most indebted countries, 14 have tropical forests, including Brazil, Costa Rica, Mexico, Peru, Zaire, Indonesia and the Philippines. In practice, debt servicing is often achieved by cashing in natural resources such as timber.⁵⁸ A report of the Commission of the European Communities notes that "...international debt obligations...can lead developing country governments to accelerate the pace of forest exploitation in order to earn needed foreign exchange".⁵⁹ The role of commercial banks in this process has also been highlighted.⁶⁰ Research by WWF suggests that structural adjustment programmes can have both positive and negative effects on the environment, and that in some cases reduction in resources available for environmental programmes caused a decline in the capacity of governments to respond to problems.⁶¹

PRESSURE FOR TRADE AND DEVELOPMENT. Consumption and debt are encouraged by global trading patterns, including trade within and between countries. The current dominant ideological role of free trade means that its requirements significantly affect decisions regarding natural ecosystems. International competition and pricing structure can lead to undervaluing of timber resources in an attempt to undercut competition. The position taken by the General Agreement on Tariffs and Trades, and its successor the World Trade Organization, has made it more difficult for countries to improve environmental controls on the production of goods that they

import by restricting governments' controls over imports.⁶² World trade encourages the development of ever-larger transnational corporations, which can themselves have damaging effects on timber resources.⁶³ It often acts against smaller traders in the developing countries. The desire of a local community to take part in the market economy is quite legitimate. However, the way in which trade is promoted in the late twentieth century is an important factor in forest degradation and loss.

The associated role of multilateral development banks (MDBs)⁶⁴ and bilateral aid agencies⁶⁵ in promoting forest destruction has been well documented. For example, the World Bank has funded the Indonesian transmigration programme, resulting in destruction of huge areas of lowland rainforest and conversion to areas of unproductive along along grassland.⁶⁶ MDBs have also funded several major dam projects in the Amazon, which have flooded forested areas and where deforestation and soil erosion have dramatically shortened the lifetime of the associated hydropower systems.⁶⁷ MDBs projects, usually being large scale and thus relying on heavy investment and rather inflexible, pose inherent problems for forest conservation. Despite apparent changes within aid agencies,⁶⁸ and some welcome developments, certain projects still give cause for concern. For example, the World Bank has approved a loan of US\$41.9 for the Belarus government to establish forest development projects, and the European Bank of Reconstruction and Development (EBRD) has announced funding for the development of extractive forestry in the country, raising fears that biologically rich old-growth forest will be destroyed.⁶⁹

POVERTY. Lack of money and alternative means of livelihood are critical factors driving many people to use forests unsustainably. Recent trends have indicated a widening gap between rich and poor in many countries, as highlighted at the World Summit on Social Development in 1995. This increasing distance between "haves" and "have-nots" has further disadvantaged the poorer sections of society. A substantial proportion of the world's population remains in absolute poverty. Unemployment encourages forest loss, through illegal timber felling, smuggling of forest products and developments such as illegal mining.⁷⁰ Economic policies in the North have increased, rather than alleviated, these problems.⁷¹ A report from the Asian Development Bank concludes "Poverty as such cannot be said to cause environmental degradation, however, often the two are associated with each other...As change occurs it leaves behind winners and losers; typically, the losers have few choices available and are forced to adopt short-term survival strategies under which longer term resource management considerations appear to be an unaffordable luxury."⁷² People without any hope or future have little incentive to manage forest resources well, and often have little option but to exploit them unsustainably, for short term survival.

POPULATION. The links between population and forests are complex. It is wrong to argue that there is a simple relationship between "overpopulation"

and forest loss. Indeed, the most significant links between population and environment are those of consumption and pollution by people in the rich countries. Over the next few years the South will experience ten times the population growth of the North, but most consumption will remain in the North.⁷³ Analysis fails to identify a close correlation between deforestation and rates of either total or agricultural population growth. Nevertheless, there are also clearly cases where population growth in the South has had a detrimental impact on forests, for example through the need to increase the area of available farm land and demand for fuelwood. Identifying the precise role of population is difficult because of the relationship between total numbers of people and such issues as land tenure, debt and poverty.⁷⁴

LAND TENURE. Pressures on forests are increased in many countries because most of the good farmland is owned by a few people, thus forcing the poor and landless to try farming in forested areas. For example, in Peru 93 per cent of agricultural land is owned by 10 per cent of landowners and in El Salvador 78 per cent of land is owned by 10 per cent of the population.⁷⁵ In Brazil, 60 per cent of families are landless.⁷⁶ Imbalance in land ownership is not confined to the developing world and for example in the UK, the richest 1 per cent of the population own over 50 per cent of privately-owned land.⁷⁷ Unbalanced land ownership patterns put additional pressures on forests, particularly where large rural farming communities still exist and where land tenure also remains insecure. In many tropical rainforests, sustained farming on poor tropical soils is difficult for those who cannot afford to buy expensive agrochemicals and machinery. The problem is thus seldom about the total number of people so much *as the number of people without access to available agricultural land*⁷⁸ and is often not a simple function of total population. Forests have been taken from the traditional lands of indigenous people, who have often had little chance to exercise any land rights.⁷⁹ A report from the United Nations Research Institute for Social Development concludes that: "Land tenure problems are often root causes – or play an important mediating role – in deforestation..."⁸⁰

SOCIAL RELATIONS, INCLUDING GENDER RELATIONS. Social relationships, and particularly the position of women in society, play a key role in determining attitudes to forests. In most developing countries, women gather fuelwood and fodder, and often clear farmland,⁸¹ thus having the most direct relationship with forests.⁸² Participation of women in decision-making regarding forest management has been negligible in most societies.⁸³ Yet women have been involved in many successful campaigns against forest destruction, such as the tree-hugging groups in northern India⁸⁴ and the Green Belt Movement in Kenya.⁸⁵ Throughout the world, experience shows that access to decision-making processes by local people reduces many problems of forest development.⁸⁶ Yet these options have seldom been followed through in practice, and problems are increased by lack of education, poor organisational structures and often an ignorance of cultural issues by those planning forest management.

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scale

These underlying causes are exacerbated by a range of political and infrastructure problems in many countries. An inadequate national policy framework for forests, and lack of trained staff and equipment, reduces the effectiveness of attempts to address forest problems. Lack of political will, at national and international level, often ensures that these deficiencies are not effectively addressed.

IMMEDIATE CAUSES OF FOREST LOSS AND DEGRADATION

Largely as a result of the underlying causes outlined above, there are also some immediate causes of forest degradation and destruction.

These include:

- pressure from human settlement including agriculture, fuelwood collection, etc
- operations of the timber trade, logging and intensification of forest management
- the impact of other industrial sectors, such as agribusiness, mineral mining, etc
- atmospheric pollution.

PRESSURE FROM HUMAN SETTLEMENT. Human settlement, and particularly agricultural development, is the principal threat to many remaining tropical dry forests and rainforests, and to some temperate forests, accounting for around 50 per cent of losses in these areas. Problems include: an increasing rate of shifting cultivation, due to exclusion from more productive land, human migration and population growth; and a rapid spread of subsistence farming, due to permanent settlement through forced or encouraged transmigration and illegal encroachment into forest areas.

Migration has increased pressure on areas of shifting cultivation in northern Thailand.⁸⁷ The Indonesian government's transmigration programme is the largest resettlement project in the world, moving people from the densely populated and fertile islands of Java and Bali to the outer islands of Kalimantan, Sulawesi and Irian Jaya. So far, around 4 million people have been moved, initially with assistance from the World Bank, Asian Development Bank and UK Overseas Development Administration. The project threatens 3.3 million ha of pristine rainforest, including tribal lands.⁸⁸ Forest clearance for the extension of grazing areas is a major threat to the survival of much of Queensland's remaining tropical and subtropical dry forests. Current estimates are that about 500,000 ha per year of native "bushland" are being cleared. Settlement pressure is a major cause of forest loss in the Everglade region of Florida and in many forests on the Mediterranean coast of Europe.

Fuelwood and charcoal are the primary energy source for around 2 billion people in the South, and estimates are that this figure could rise to 2.4 billion by the year 2000.⁸⁹ Fuelwood collection contributes to forest degradation, and is also a cause of deforestation around cities where fuelwood is sold.⁹⁰ For example, the fuel wood trade in El Salvador, centred on the capital of San

Salvador, threatens national parks such as El Espino and mangrove forests along the Pacific coast.⁹¹ However, the importance of collection has sometimes been exaggerated and is often secondary in importance to clearance for agriculture in overall forest loss.⁹²

Although tourism can sometimes be beneficial in encouraging countries to maintain forests in good condition, particularly through carefully organised ecotourism,⁹³ it can also sometimes encourage deforestation and forest degradation. Visitor pressure is having a direct effect on some forest systems in Europe and North America. Almost 400 million visits were made to North American National Parks in 1991.⁹⁴ Providing fuel for trekkers in parts of Nepal is leading to additional deforestation.⁹⁵ In the forests of northern Thailand, trekking in tribal areas has grown from a handful of people in the 1970s to over 100,000 in 1988.⁹⁶

OPERATIONS OF THE TIMBER TRADE. The timber trade contributes to forest destruction and degradation through: logging natural forests; replacement of natural forests with plantations, intensive management of secondary forests for timber production; and by opening up primary forests to agriculture, and other development activities.⁹⁷ The key role of timber traders in Europe,⁹⁸ Japan⁹⁹ and East Asia¹⁰⁰ in causing losses of tropical forest have been clearly identified. The global market for timber, and especially for pulp, is currently expanding. For example, Cameroon has recently undergone a rapid increase in logging pressure.¹⁰¹ A study for the International Tropical Timber Organization found that "...the extent of tropical forest which is being deliberately managed at an operational level for the sustainable production of timber is, on a world scale, negligible".¹⁰² One survey in Malaysia found that for every 10 per cent of trees extracted from an area, 55 per cent were damaged.¹⁰³ Natural forests in temperate and boreal areas also continue to be logged, even when they have been reduced to fragments.¹⁰⁴ As a result, valuable habitat, including dead standing trees and logs, are lost.¹⁰⁵ For example, only around 1 per cent of old growth forest remains in Ontario, Canada, and over half of this is still unprotected.¹⁰⁶

Some sections of the timber industry are also involved in illegal timber logging on a large scale; for example in the Philippines a Senate Committee estimated that the country lost almost us\$5 million per day from illegal logging.¹⁰⁷ Additional areas where illegal logging is of particular concern include: Myanmar (Burma) and Laos, which are supplying Thailand following the introduction of a logging ban in the latter;¹⁰⁸ Papua New Guinea and the Solomon Islands where large scale corruption by both PNG and Japanese firms has been identified;¹⁰⁹ Ghana;¹¹⁰ Brazil with respect to mahogany;¹¹¹ Cambodia;¹¹² and areas of Russia including Siberia.¹¹³ Much of the legal and illegal trade in timber is fuelled by the heavy consumption demands of the rich countries. The timber trade also causes damage through intensification of management in forests, and the establishment of plantations. Some problems associated with plantations are outlined in Table 2 page 18.

Plantations
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timber...

Table 2 Environmental Problems Associated with Timber Plantation Establishment

Plantations can and must play an important role in producing timber and relieving pressure on natural forests. Unfortunately, many current plantations create a range of environmental problems as outlined below.

Problem	Notes
Loss of habitat	In many places, plantations have been established in the place of existing natural forest, ancient heathland etc.
Reduced tree diversity	Plantations tend to be of monocultures, exotic tree species, or genetically narrow strains of native trees thus reducing genetic variability and adaptability of trees.
Reduced wildlife diversity	Replacing native or managed forests with plantations can lead to a dramatic reduction in biodiversity.
Introduction of exotic trees	Exotics sometimes compete with native species, and have occasionally hybridised with native species leading to loss of local provenances, or themselves become invasive species in certain circumstances.
Soil erosion	Deep ploughing and use of heavy machinery can lead to soil erosion and nutrient loss, as can the impact of clearfelling.
Acidification	Plantations on base-poor soils increase soil and water acidification due mainly to trees scavenging air pollutants, which are washed to the ground.
Water table changes	Planting some fast-growing species, eg Eucalyptus, can result in lowering of the water table.
Water quality changes	Drainage, ploughing and clearfelling can increase water turbidity, which can damage breeding success of salmonoid fish and disturb other aquatic life.
Changes to the fire ecology	Plantation management often results in changes in fire incidence, either increasing fire risk or suppressing fires so effectively that this in itself has serious ecological consequences.
Increased pest and diseases	Monocultures are prone to attack by pests and diseases. Use of exotic trees has sometimes also resulted in introduction of serious pests.
Agrochemical use	Pests and problems of decreasing fertility lead to increased use of pesticides and soluble fertilisers with associated environmental effects.

THE IMPACT OF OTHER INDUSTRIAL SECTORS. Several other industrial sectors operate in forests. Financial institutions, including lending agencies, banks and others, help provide capital for the operations. Oil companies have now leased virtually all remaining tropical forest areas for exploration and/or production,¹¹⁴ and drilling has caused damage in the Amazon,¹¹⁵ West Africa, Papua New Guinea, etc. Oil drilling also threatens several areas of boreal forest, particularly in Siberia. Tropical forests are also harmed through mining for iron ore,¹¹⁶ gold,¹¹⁷ bauxite, copper and uranium.¹¹⁸ Large hydro-electric projects have flooded forests in many countries and have caused controversy in for example Sri Lanka (the Mahaweli project), India (the Narmada project), China (the Three Gorges project) and virtually every Amazonian country.¹¹⁹ Large scale farming is also destructive, and seldom beneficial to local communities as agribusiness companies and business people concentrate on export crops. Around 72 per cent of land clearance in the Amazon until 1980 was caused by the expansion of cattle ranching.¹²⁰ Similar deforestation for ranching has taken place in Costa Rica¹²¹ and Honduras,¹²² also resulting in the marginalisation of peasant producers. Overgrazing by sheep means that 70 per cent of the remaining oak forest in the Snowdonia National Park in Wales, UK, is failing to regenerate, and similar problems are connected with overstocking of red deer for hunting in Scotland.¹²³ Roads are a problem in many forests particularly when they are connected with timber or other industrial development. Logging roads can create soil erosion and act as migration routes for legal and illegal settlers, miners and hunters. In some areas of South East Asia, 40 per cent of the forest may be cleared to create roads and tracks.¹²⁴

ATMOSPHERIC POLLUTION. Industrial plants, power stations and road vehicles are major sources of local pollution, including sulphur dioxide (SO_2), nitrogen oxide and nitrogen dioxide (NO and NO_2)¹²⁵ and hydrocarbons; the last two can react together in the presence of sunlight to form ozone (O_3). Ammonia (NH_3) is also a significant pollutant in some regions, being released from intensive livestock units and fertilizer factories.¹²⁶ All of these can, sometimes after chemical transformation in the air, be transported long distances by prevailing winds. SO_2 and nitrogen oxides (NO_x) fall as dry or wet deposition and in the latter case can be deposited in mist, rain or snow. Ozone lands in gaseous form and is itself an important pollutant which can help create forest damage. Impacts on forest health occur both through direct effects on trees and as a result of the impact of soil acidification. Over the last decade, various theories about causal factors of forest decline have been investigated, including: ozone and acid mist;¹²⁷ soil acidification;¹²⁸ direct damage from sulphur dioxide; nitrogen saturation;¹²⁹ etc. Recent thinking has tended towards the view that many different factors, including air pollution, react together, the so-called multiple-stress hypothesis. The fact that air pollution causes damage to trees is no longer seriously in doubt.

Implications of forest loss and degradation

REDUCTION in both quantity and quality of forests has a variety of implications, both for human society and for the environment, including harmful impacts on:

- people, including indigenous peoples, other forest dwellers and, ultimately, the world population;
- biodiversity, through loss of ecosystems, species and genetic diversity;
- environment, as a result of such problems as soil erosion and hydrological disturbance;
- climate, both locally and through potential impacts with respect to climate change.

IMPLICATIONS OF FOREST LOSS TO PEOPLE

Forests play a key role in the welfare of human populations, including both forest dwellers and others who use the goods and services that forests provide.

FOREST DWELLERS. Many people make their homes in or living from forests. The FAO estimates that the livelihoods and cultures of 300 million people are closely dependent on the integrity of tropical forests alone.¹³⁰ Many people also live in or around temperate and boreal forests. Forest dwellers can be affected by agricultural encroachment, logging and other forestry operations, oil drilling, hydro-electric schemes, strip mining, etc.¹³¹

INDIGENOUS PEOPLES. Some indigenous groups have inhabited particular forests for millennia, and have developed a sophisticated knowledge of their biology and ecology. Tribal peoples are the most profoundly affected by forest loss. Many tropical groups first experience contact with western society when forests are felled, and suffer persecution, introduction of diseases and destruction of homelands. Throughout the world, tribes are in conflict with loggers: including the Dayaks and Penan in Sarawak; the Lumad people in the Philippines;¹³² tribal groups in the Chittagong Hill Tracts of Bangladesh; and the Waorani, Yanomani and other groups in the Amazon. Forest resource issues are an important source of conflict between First Nations and both the federal and provincial governments in Canada.¹³³ In Russia, at least 26 indigenous groups live in forests;¹³⁴ around 40 per cent of the population in the heavily-forested Yakutia province are indigenous groups, currently in dispute with foreign timber companies.¹³⁵ There have been disputes between Scandinavian Lapps and the forest industry. Indigenous cultures represent alternative world views to the dominant industrial culture and ideas of development, and their erosion marks a profound loss in human potential. Local successes in maintaining indigenous culture, such as some community forestry projects in India, show that these losses are not inevitable. In some countries, promising changes in the constitution provide indigenous communities with autonomy and landrights, for example the “resguardos” in the Colombian Amazon.

OTHER FOREST USERS. The rights and interests of non-indigenous people are also important. Forests provide a range of goods and services that are, to a greater or lesser extent, essential to the survival of human communities. Many of these benefits are lost as forests are destroyed. It is estimated that forestry provides annual subsistence and wage employment equivalent to some 60 million work-years around the world, of which four fifths is in developing countries. Global economic contribution of forest products, predominantly timber, reached approximately US\$400,000 million in 1991. In 1990, exports of forest products were worth US\$98,000 million or 3 per cent of total world merchandise trade.¹³⁶

Fuelwood is the major energy source for almost half the world's population, supplying around 15 per cent of global energy needs. In many countries over 90 per cent of domestic energy comes from wood.¹³⁷ Managed properly, fuelwood production has the potential to be a sustainable part of the forest cycle and provide a renewable alternative to fossil fuels. Out of 1.76 billion m³ of woodfuel produced in 1987-89, only about 3 per cent came from Europe and 7 per cent from Canada and the United States.¹³⁸ Nonetheless, it remains significant in some Northern countries as well; for example 10 million m³/year of firewood is used in France¹³⁹ and firewood has recently become important again in Romania, due to energy shortages.¹⁴⁰

Non-timber forest products are also important. In Sweden, 100 million litres of berries are collected from the forest every year, along with 20 million litres of mushrooms.¹⁴¹ In Italy, the total value of non-timber products from forests was estimated at 117,286 million lire (US\$75 million) in 1986, 45 per cent from chestnuts.¹⁴² In Tanzania, farmers supplement their income by a variety of forest-based craft activities, along with honey collection and charcoal production.¹⁴³ Between 70-90 per cent of the animal protein consumed in forested parts of Africa comes from wild animals.¹⁴⁴ Tropical forests provide a particularly wide range of resources.¹⁴⁵ The FAO lists many other non-wood products, including pharmaceuticals, toxins (for hunting, pesticides etc), aromatics (including essential oils for cosmetics, unguents, incense etc), biochemicals (such as non-edible fats and oils, waxes, gums, latex, dyes, tannins, paints, varnish, etc) and fibres (for cloth, matting, cordage, basketry, brooms, stuffing for pillows, cork etc).¹⁴⁶ In addition, human societies also benefit from a range of environmental goods and services, described below.

IMPLICATIONS FOR BIODIVERSITY

The world is experiencing a loss of biodiversity – in terms of species, genetic diversity¹⁴⁷ and ecosystems – on an unprecedented scale. Estimates of losses are very approximate. Figures as high as 17,500 species a year becoming extinct have been suggested.¹⁴⁸ Although other researchers believe that these predictions are too pessimistic, the occurrence of high losses is now generally accepted and the IUCN/WWF/UNEP publication *Caring for the Earth* concludes that: "While we are still uncertain about how many species now exist, some experts calculate that if

Fragmentation of forest

Outright destruction is not the only problem facing the ancient forests. Ecologists are increasingly worried that fragmentation of remaining forest areas could be as dangerous to species as large-scale clearfelling. Fragmentation causes species to become trapped in old-growth fragments, where the small population size can threaten survival, and exposes remaining forests to winds and harsher climatic conditions. Studies of two major blowdowns in the Mount Hood National Forest in the United States found 48 per cent and 81 per cent respectively of downed trees occurred beside clearcuts and roads.¹⁴⁹ Fragmentation is also related to increased predation.

many
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level, in
villages, on
farms and by
communities
living far from
the media
spotlight

present trends continue, up to 25 per cent of the world's species could become extinct, or reduced to tiny fragments, by the middle of the next century.¹⁴⁹ Most of the world's species are found in tropical moist forests, along with high "islands" of biodiversity in some temperate rainforests, and forests worldwide represent ecosystems with high genetic and species diversity when compared with other local ecosystems. Deforestation and forest degradation therefore play key roles in biodiversity loss.¹⁵⁰

TROPICAL FORESTS. Tropical forests only cover 6 per cent of the Earth's land areas, but contain 10-50 million species, well over half the planet's total, most of which remain unrecognised. They are not evenly distributed and "islands" of high biodiversity occur. It has been estimated, for example, that within ten high biodiversity areas, including Madagascar, Ecuador, the Atlantic rainforest of Brazil, and Peninsular Malaysia, at least 350,000 animal species could become extinct within the next decade.¹⁵¹ Others remain more cautious about the current scale of losses in tropical areas, but agree that at the present time thousands of species are becoming committed to extinction as a result of forest loss, and they will over time become extinct unless drastic action is taken now.¹⁵² Our knowledge of species at risk is generally confined to the large and spectacular mammals and birds, and these have been used to "map" areas of high biodiversity. Several mammal and bird species are now highly at risk through forest loss.¹⁵³ In Madagascar, for example, many mammals are threatened by deforestation, including several lemurs (*Lemur spp.*) and mouse lemurs (*Microcebus spp.*). In Malaysia, amongst mammals suffering from forest loss are the Malayan sun bear (*Ursus malayanus*) and the silvered langur (*Presbytis cristata*).¹⁵⁴ Knowledge of the threats to smaller animals and to lower plants remains rudimentary.

TEMPERATE AND BOREAL FORESTS. Temperate forests can also have high biodiversity, and that of soil micro-organisms can approach the levels found in tropical systems. Some forests are highly threatened, including fragments of original European woodland and for example some Mediterranean habitats face extinction. In Finland, loss of old deciduous forest threatens the white-backed woodpecker (*Dendrocopos leucotus*),¹⁵⁵ while in Latvia the black stork (*Ciconia nigra*) is at risk due to plans to drain large areas of wet forest.¹⁵⁶ In North America, several species are threatened by logging, such as the spotted owl (*Strix occidentalis*), marbled murrelet (*Brachyramphus marmoratus*) and northern goshawk (*Accipiter gentilis*), which all require old growth habitats for nesting sites.¹⁵⁷ Over a thousand species are dependent on old-growth and many fish need old growth forest habitat for spawning. The red-cockaded woodpecker (*Picoides borealis*) has declined due to loss of mature pine forest. The "most noble" polypore *Oxyporus nobilissimus*, probably the world's largest fungus, weighing up to 136 kg and measuring 1.4 metres, is rare and confined to areas of the Pacific Northwest slated for logging.¹⁵⁸

IMPLICATIONS FOR THE ENVIRONMENT

Loss of forest cover has a number of serious side effects. Many of these have direct impacts on human communities, and can be measured in economic terms.

SOIL EROSION. Loss of soil increases dramatically when forest cover is removed. Erosion is greatest on steep slopes and in hill districts, particularly in countries with monsoon climates and/or high rainfall, but can occur anywhere. In West Africa, soil loss from cultivated fields was found to be 6,300 times greater than from tropical forests.¹⁶⁰ In Indonesia, construction of logging roads increased erosion from virtually zero to 12.7 tonnes/hectare/month.¹⁶¹ In Panama, which has suffered serious deforestation, about 90 per cent of the country is affected by soil erosion.¹⁶² Severe soil erosion and landslides, following heavy rainfall in 1988, resulted in a logging ban in Thailand.¹⁶³ In Oregon, USA, a storm in the Siuslaw National Forest caused 245 landslides, of which 9 per cent were judged to be natural events, 14 per cent were related to road construction and 77 per cent occurred in clearcut areas.¹⁶⁴

IMPACTS ON HYDROLOGICAL CYCLES AND WATER SYSTEMS. Deforestation and soil erosion have direct effects on rivers and watersheds. Hydrological cycles are disrupted in several ways, including increased siltation of stream beds, lakes and reservoirs and the possibility of increased downstream flooding. Changes in silt, and in the amount of coarse woody debris in rivers and streams, damage aquatic communities and the spawning of fish such as salmon. In the USA, the executive director of the Association of Professional Fish Biologists stated that increased logging in the US Pacific Northwest would contribute to: “the decline and extinction of native fishes over vast portions of their range”.¹⁶⁵ For example, within the Columbia River basin some 76 native salmon populations are at high or moderate risk of extinction due to logging and deforestation¹⁶⁶ and many other fish populations are at risk throughout the region.¹⁶⁷ Deforestation generally causes an increase in total water yield in catchments because of reduced transpiration as the deep-rooted trees are replaced with shallower rooted grasses or annual crops. This can cause a rise in the ground water tables and if salts occur in the soils they can be brought to the surface, killing the vegetation. In the south west of Western Australia, more than 400,000 ha of arable land has been lost to production by rising saline water tables as a direct result of clearing eucalypt forests and woodlands during the past 100 years.¹⁶⁸ Poorly planned activities associated with logging can result in point sources of erosion by increasing and concentrating surface run off.

DESERTIFICATION. Forest loss in countries with a dry climate and poor soils is often followed by desert formation. Once deserts form, it is extremely difficult to restore a natural habitat, due to associated changes in micro-climate, loss of fertility and resultant problems in establishing seedlings, and the social problems that come with desert formation. Deserts occur in over 100 countries, and cover 30 million km² around the world.

Two thirds of the deserts are found in Africa and Asia, where they are frequently still expanding. Desertification also affects Mediterranean Europe, North and South America and Australia.¹⁶⁹

IMPLICATIONS FOR CLIMATE

Forests are often important regulators of both local and global climatic patterns. It follows that their degradation or loss can cause serious climatic disruptions. Deforestation, especially in the tropics, results in changes to hydrological systems and local climate. At least half the rain that falls on the Amazon is recycled through transpiration, and the same water often falls several times on the forest as clouds pass over the continent. Forests also have more far-reaching effects on global climate, as described below.

Carbon offsets:

WWF and IUCN have reservations about the establishment of plantations specifically to offset carbon, because this does not deal with the underlying problems of either deforestation or global warming.¹⁷¹ The organisations have particular concerns regarding the proposals for joint implementation agreements, whereby carbon dioxide emissions might be offset by establishing plantations in different parts of the world.¹⁷² Problems identified include the limitations of plantations from the perspective of both biodiversity and multiple use of forest products, and the fact the carbon sequestration is only temporary if forests are harvested. To remove 3.2 billion tonnes of CO₂ a year from the atmosphere (the average annual rate of increase in atmospheric CO₂ through the 1980s) for the next 100 years would require, according to some calculations, an additional area of temperate forest larger than Sudan or Western Australia, an additional area of tropical forest the size of India or an additional area of boreal forest half the size of Russia.¹⁷³ Instead, WWF and IUCN believe that greater priority should be given to maintaining the carbon store in existing natural and old-growth forests.

TROPICAL FOREST AND CLIMATE CHANGE. Most carbon dioxide (CO₂) comes from industrial processes in the countries of the North, including the Russian Federation. In addition, historical deforestation in temperate countries has already resulted in major transfers of carbon to the atmosphere. Today, tropical forest loss is also having a direct effect on the accumulation of greenhouse gases in the atmosphere. This occurs through the release of CO₂ as a result of burning, as has been taking place for example in the Amazon and Indonesia during changes in land use from forests to grassland and agricultural crops. It has been estimated that around 22.5 per cent of global anthropogenic carbon emissions, some 1.6 (+/-1) gigatonnes of carbon, come from tropical forest destruction.¹⁷⁰

TEMPERATE AND BOREAL FORESTS AND CLIMATE CHANGE. Less is known about climatic implications of temperate and boreal forest loss. The forest industry claims that industrial forestry increases the biomass of growing trees and therefore also carbon sequestration. However, the net carbon balance depends on the uses of the timber; for example most uses of pulp result in fairly rapid breakdown of the product and re-release of carbon dioxide (CO₂), the most important of the greenhouse gases associated with global warming. In Finland it is estimated that 80 per cent of carbon stored in trees is released as CO₂ within five years of felling.¹⁷⁴ In addition, clearing old growth forest and replacing it with plantations or intensively-managed secondary forests usually results in a net carbon loss, in that most of the carbon is stored in the soil and humus layer, much of which is released following clearfelling and site preparation.¹⁷⁵ Thus replacing natural forest with plantations not only reduces biodiversity but also probably reduces net carbon storage. Permanent reforestation of deforested or degraded areas could help offset the potential effects of global warming.

Responses: attempts to address forest problems

FEARS about the future of the world's forests have resulted in the creation of a powerful non-governmental movement interested in safeguarding natural and old-growth forests around the world. Largely as a result of NGO action and public pressure, there have been a range of official attempts to address some of the problems outlined in this paper. Some major initiatives are described briefly in the following paragraphs. They include:

- The Food and Agriculture Organization and the Tropical Forestry Action Programme
- The International Tropical Timber Organization
- UNCED (The Earth Summit) and the Commission on Sustainable Development

UN FOOD AND AGRICULTURE ORGANIZATION (FAO): The FAO was one of the first international agencies to outline the threats to tropical rainforests,¹⁷⁶ and has a good community forestry programme, but remains committed to, and supportive of, intensive, industrial forestry. Its funding, global reach, and close relationships with governments have allowed FAO to exercise enormous influence on the development of forest policy, and it has frequently been criticised for both promoting timber extraction over other forest uses and its top down approach to development.¹⁷⁷ It has a lead role in the Commission for Sustainable Development (CSD, see below).

FAO established the **TROPICAL FORESTRY ACTION PLAN** (TFAP, now known as the *Tropical Forestry Action Programme*) in 1985, with the UN Development Programme (UNDP), the World Bank and the World Resources Institute (WRI). Its aims were the introduction of improved management and use of forests, including that of raising US\$8 billion for tropical forest conservation, setting up national forestry action plans, and providing an effective international umbrella organisation for donor agencies.¹⁷⁸ Unfortunately, the aims have not been achieved and the TFAP has sometimes increased timber production from primary forests.¹⁷⁹ For example, in Cameroon, the TFAP in effect encouraged exploitation of the last 14 million hectares of pristine rainforest in the south and east.¹⁸⁰ In 1990, WWF concluded that: "TFAP has failed to provide consistent guidance and leadership to national governments in developing plans for the rational management and conservation of their tropical forests. It has been unable to set priorities amongst countries and consequently has become overburdened. It has yet to demonstrate the capacity to oversee the implementation of national plans. It has been unable to effectively align all donor agencies in the forest sector under one common umbrella. It has failed to ensure widespread participation by representative groups within countries... And it has failed to convince local groups and non-governmental organisations that it offers realistic solutions over the long-term".¹⁸¹ The FAO has been left alone as other founding members have withdrawn support, and WRI published a critical assessment in 1990.¹⁸²

THE INTERNATIONAL TROPICAL TIMBER ORGANIZATION (ITTO): The International Tropical Timber Agreement (ITTA) was signed in 1985, and led to the establishment of ITTO in 1986, to help research, promote and coordinate trade in tropical timber. There is confusion about whether ITTO's main aim is to promote or regulate the tropical timber trade. Following pressure from NGOs, ITTO has set a target that all internationally traded tropical timber should come from sustainably managed sources by the year 2000 and has agreed guidelines and criteria for sustainable tropical forest management.¹⁸³ However, it has failed to achieve its own policies. In Malaysia, the main focus of the ITTO's practical initiatives, the Sarawak state government has largely ignored the ITTO Mission's findings and recommendations which called for a drastic reduction in the rate of felling. ITTO has also tended to put great emphasis on projects,¹⁸⁴ and in 1991 WWF concluded that: "Regrettably, many ongoing ITTO projects must be regarded as subsidized logging, and the organisation should ask itself whether it provides an incentive or disincentive for radically new approaches to forest management."¹⁸⁵ When the ITTA was renegotiated in the 1990s, NGOs and some tropical country governments suggested expanding the scope of the agreement to include temperate and boreal timber as well. However, this was strongly resisted by Northern countries, which almost brought the whole renegotiation process to a halt. The renegotiated ITTA, finally agreed in January 1994, has, like the original, no environmental controls.

UNCED AND THE CSD: The UN Conference on Environment and Development (UNCED or the Earth Summit) took place in Rio de Janeiro in 1992 with the aim of taking decisive steps to address environmental problems. In the event, results have been partial and several apparent gains have since been eroded. The proposal for a Global Forest Convention was rejected, and replaced by a chapter on deforestation in *Agenda 21* (of plans for reducing problems of environment and development), and a *Non-Legally Binding Authoritative Statement of Principles for a Global Agreement on the Management, Conservation and Sustainable Development of All Types of Forest* – usually called the Forest Principles. Agreement of the Convention on Biological Diversity and the Climate Change Convention gave some cause for optimism, but three years on these both remain unproven and, in the case of many countries, unratified. The Biodiversity Convention in particular, has been watered down, is underfunded and attempts to introduce a forest protocol are being resisted by governments. In April 1995, the Climate Change Convention seemed to be in danger of disintegration in the face of widespread failure to meet targets for carbon dioxide reduction.

The Commission on Sustainable Development (CSD) was established to follow up the UNCED work, and held a major meeting which covered forests in April 1995. This failed to agree firm actions and instead established a two-year **INTERGOVERNMENTAL PANEL ON FORESTS** (IPF) to look at

some forest management problems in more detail. Conservation groups are concerned that biodiversity is not given a specific remit under the IPF. Some of these issues are addressed in more detail in the sections below.

NON-GOVERNMENTAL ORGANISATIONS: In addition to “official” responses, a wide range of non-governmental organisations (NGOs) have addressed problems of forest degradation and loss. NGO actions have taken three main forms. Environmental groups have been prominent in raising public and official awareness about the problems facing forests, and in lobbying for changes in law, forest management and related issues such as indigenous peoples’ rights. On an international stage, **IUCN**,* **WWF**, **FRIENDS OF THE EARTH AND GREENPEACE** are amongst the best known, although in practice much of the work has been carried out by far smaller and less well known organisations. NGOs have also been responsible in many of the most innovative practical projects in forest management, ranging from those run by local community groups to others organised by large international bodies. More recently, NGOs have become involved in practical attempts to address forest problems at a research and policy level, and this has helped feed into the work of the **WORLD COMMISSION ON FORESTS AND SUSTAINABLE DEVELOPMENT**, launched in 1995.

Responses by identifiable groups and organisations only represent part of the effort aimed at improving management of the global forest estate. Many other initiatives are being taken at local level, in villages, on farms and by communities living far from the spotlight of media or political attention. Indeed, many of the best hopes of future development can be said to lie with these local actions.

*IUCN IS ALSO AN INTER-GOVERNMENTAL ORGANISATION AND IS THUS NOT ONLY AN NGO

In the remainder of this policy brief, some responses are suggested from WWF and IUCN.

A GLOBAL GOAL FOR FORESTS

WWF and IUCN have defined a challenge for the world community which summarizes their priorities for the remainder of the century:

To halt and reverse the loss and degradation of forests and all kinds of woodlands (particularly old-growth forests) by the year 2000.

A FOREST VISION

The increasing rate of deforestation in the tropics, and the accelerating loss of quality in temperate and boreal forests, make it imperative to take urgent measures to maintain – and in some cases to restore – the world's forests. We need those forests. Without them, people and the global environment will lose out.

FOREST MANAGEMENT

It is vital that forest management systems are based on the principle of sustainability. This means that management must be appropriate to the environment, benefit society and be economically viable. Management systems must seek to conserve biodiversity at genetic, species and ecosystem levels.

Such systems can only come into being if foresters alter the way they approach forests. Current management practices focus principally on producing timber. Other forest products and services are almost always regarded as secondary and are only utilised when this does not interfere with timber production.

Future forest management plans and systems should concentrate first on conserving the rich natural diversity of forests and on the environmental functions they perform. All human use of forests depends on these two crucial elements.

FOREST QUALITY AND EXTENT

In the future the world's forests should be both more extensive and of a higher quality than now. There should be a greater proportion of natural and semi-natural forest. This should largely be made up of existing natural and old-growth forests, but may be supplemented by restored secondary forest, which has been permanently set aside to develop a natural dynamic.

It will be necessary to carry out ecologically and socially appropriate reforestation activities (preferably using mixes of native species), to encourage regeneration, and to promote widespread use of sustainable forest management.

TIMBER PRODUCTION

A proportion of the world's forests is likely to remain under fairly intensive timber production. This should be based around more rigorous social and environmental safeguards than is usually the case at present.

Only in exceptional circumstances or where native species are unsuitable should non-native (exotic) species be used. Management areas should be defined by natural boundaries, such as watersheds, and management should follow the principles of landscape ecology.

MANAGEMENT POLICIES

A range of management policies will be needed. These must involve the full participation of local communities. Greater priority should be given to non-timber values. The impacts of pollution should be reduced. At the policy level, there should be enhanced regional and cross sectoral collaboration.

Not all the elements identified above can be catered for in every forest stand. They should, however, be reflected in national and regional forest policies around the world.

Responses: a forest strategy

Making progress from the current position will need commitment, cooperation and resources. IUCN and WWF have identified five priority objectives to halt and reverse the decline in the global forest estate. These are presented below, along with positions on a variety of specific issues. They are not listed in order of priority.

It is important to stress that, although IUCN and WWF are principally known as conservation organisations, both are well aware that the needs of the environment cannot be addressed in isolation from human needs. Any forest policy that does not take full account of the needs and desires of local people, including indigenous people, is both unacceptable and ultimately unworkable. The principle of participation of local and indigenous people in forest conservation and management therefore underpins the following strategy.

Objective 1:

Establishment of a network of ecologically-representative protected areas.

Objective 2:

Environmentally appropriate, socially beneficial and economically viable forest management outside protected areas.

Objective 3:

Development and implementation of ecologically and socially appropriate forest restoration programmes.

Objective 4:

Reduction of forest damage from global change, including a decrease of pollution below damage thresholds, as measured by critical loads.

Objective 5:

Use of forest goods and services at levels that do not damage the environment, including elimination of wasteful consumption, to attain a level of use of forest goods and services within the regenerative capacity of the forest estate.



Objective 1:

Establishment of a network of ecologically-representative protected areas.

THIS objective addresses the issue of protected forest areas for the conservation of biodiversity and the maintenance of ecological processes. The focus is consequently on preserving sufficient forest to allow natural ecological dynamics to continue indefinitely. This means that the area of protected forest must be determined on a case-by-case basis, rather than for example by aiming to set aside a standard area of forest per country. Management of protected forests will need to be securely funded as a step towards guaranteeing their long term security. Many protected forests will have people living in or around them, including indigenous people. Local involvement, in both planning and collaborative management, is therefore essential to success.

WWF and IUCN recommend the establishment of an ecologically representative network of protected areas covering at least 10 per cent of the world's forest area by the year 2000, demonstrating a range of socially and environmentally appropriate models.¹⁸⁶

MECHANISMS FOR ACHIEVING OBJECTIVES AND TARGETS: include identifying relevant forests and finding ways to protect them. Steps required in this process are:

Identification of forest areas requiring protection, including:

- Identification of forest types, along with a review of their original, current and likely future extent, including the development of reliable forest inventory methods;¹⁸⁷
- A review of current protection status for each forest type, noting issues relating to threats and ownership;¹⁸⁸
- Description of the main threats to remaining primary and old growth forests around the world;

Gap analysis:

Setting up a successful network of conservation areas, to ensure protection of biodiversity, requires a precise knowledge of what habitats and species are most threatened. Gap analysis¹⁹⁸ can be used to identify those habitats that have not, as yet, been adequately represented in protected areas. Methods vary with data available, which can include current species distribution, historical records, use of pollen analysis, and assessment of “enduring features” within the landscape to identify gaps in existing protected areas coverage. In other words, gap analysis is a way to locate ecological habitats and features which are missing from a protected areas network. Instead of an open-ended, *ad hoc* and reactive approach to site selection, it defines a pro-active, science-based and achievable agenda.¹⁹⁹

International conventions:

Several international conventions have an actual or potential impact on forests. The Convention on Biological Diversity and the Climate Change Convention both have the option of developing forest protocols. WWF supports a forest protocol in the Convention on Biological Diversity. This convention already has a role in protecting critical forest habitats in some regions. There are, once again, moves towards developing a Global Forest Convention although no agreement about form or content has been reached as yet. Other potentially useful conventions include the Ramsar Convention, World Heritage Convention, ILO Indigenous Peoples' Convention, Desertification Convention, Climate Change Convention, and a range of regional treaties.²⁰⁰

All these could potentially deliver useful benefits for forests, but might also achieve little, or perhaps cause damage, if set up or applied in the wrong way.

Some environmental organisations have called for a Global Forest Convention to unify actions with respect to forest conservation.²⁰¹ WWF and IUCN believe that international cooperation on forest issues is vital. However, a number of international agreements already exist which, if implemented, could greatly assist efforts to improve forest conservation and sustainable management. A new legally binding instrument on forests is therefore not a priority.²⁰²

- Estimation of area of each forest type requiring protection to preserve biodiversity and forest dynamics through gap analysis (see sidebar on page 33);
- Identification of particular tree species and other forest wildlife at risk, especially endemic species;¹⁸⁹
- Research into the function of forest corridors, buffer zones etc in maintaining regional and trans-regional biodiversity;¹⁹⁰

Indigenous peoples and protected areas:

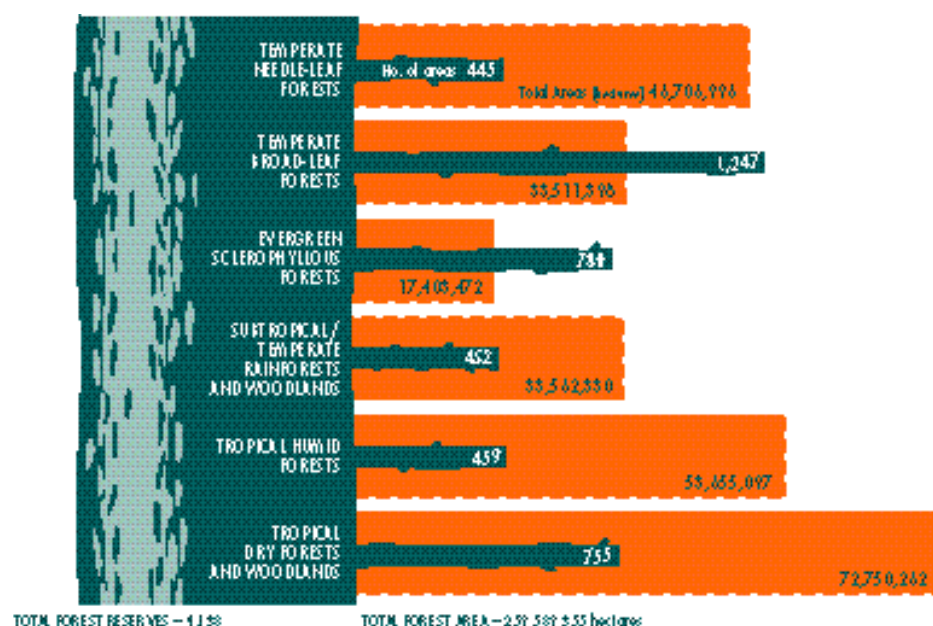
WWF has drawn up a set of draft principles for conservation with indigenous peoples. These principles recognise that indigenous peoples live in most of the remaining tracts of high biodiversity on earth, and that, given the frequency with which indigenous peoples' rights and livelihood have been discriminated against, conservation organisations have a responsibility to make special efforts to respect, protect and comply with their basic human rights. It notes that "Regrettably, sometimes the goals of protecting biodiversity and protecting and securing indigenous culture and livelihoods are perceived as contradictory rather than mutually reinforcing", thus underlying the need for greater cooperation and clear guidelines. The policy document sets out some principles for partnership between conservation groups and indigenous peoples. WWF will take steps to identify and assess in more depth the situation of indigenous peoples in the areas in which it operates, and to formulate strategies to specifically take into account their rights when developing conservation actions. In the case of unresolved land claims, the principles establish a number of steps to recognise individual peoples' rights. Steps are also to be taken to resolve conflicting claims giving primacy to indigenous peoples. WWF will be prepared to oppose conservation or development initiatives which threaten these rights. According to the Article 30 of the draft UN Declaration on the Rights of Indigenous Peoples, they have the right:

"to determine and develop priorities and strategies for the development or use of their lands, territories and other resources, including the right to require that States obtain their free and informed consent prior to the approval of any project affecting their lands, territories and other resources"

In application of this provision, in any conservation project to be developed within indigenous peoples' territories – such as the designation of a protected area – and in which WWF is involved, it will demand from governments and other authorities the full implementation of this article.

WWF seeks out partnerships with local communities, grassroots groups, non-governmental organizations, governments, corporations, international funding institutions, and other groups, including indigenous communities and indigenous peoples' organizations, whose activities are consistent with the conservation of biodiversity, sustainable use of resources and pollution prevention. IUCN also supports these initiatives, and has adopted the approach of forming "strategic alliances" with local groups and organisations to bridge the gap with policy-making levels.

Different forest types in protected areas



- Identification of problems for forests raised by the potential impact of climate change, and assessment of methods to address these;¹⁹¹
- Identification of strategies for maintaining the integrity of protected areas, including collaborative management involving a range of stakeholders, and the use of extractive reserves.¹⁹²

Identification and implementation of mechanisms for protecting forests:

- Interaction with local resource users in planning, selecting and maintaining protected forest areas;¹⁹³
- A review of the mechanisms needed to achieve the protected area target, including policies, national and international legislation, treaties such as the Convention on Biological Diversity including a review of the National Biodiversity Strategies, a possible Forest Convention, the Commission on Sustainable Development, and economic incentives such as grants and tax concessions;¹⁹⁴
- Promotion of national and international funding mechanisms for achieving the objectives;¹⁹⁵
- Identification and initiation of specific forest protection activities, including pilot projects;¹⁹⁶
- Development of campaigns and advocacy work to attain the protected area target.¹⁹⁷

WWF's target
is to achieve
sustainable
management,
including no net
deforestation,
by the
year 2000



Objective 2:

Environmentally appropriate, socially beneficial and economically viable forest management outside protected areas.

EVEN if 10 per cent of the world's forests were set aside in reserves, protected areas would not on their own be enough to provide full protection for biodiversity, or to ensure continuation of other important environmental services. Many of these functions will, in practice, have to carry on alongside other forms of management. The objective aims to improve forest quality in forests outside areas fully protected for biodiversity and ecological processes. Forests should be managed for a variety of values, including both those of people and the environment.

Any management that does take place should meet or exceed the type of criteria laid down by the *Forest Stewardship Council Principles and Criteria* (see sidebar) or an equivalent form of timber certification²⁰³ (whether or not the forests themselves are certified). Management for commercial purposes should now be aimed, wherever possible, at secondary forests and only undertaken in old-growth forests after careful assessment of local needs and national conservation considerations. Management must be participatory and also ensure that forest dwellers do not suffer physically or culturally as a result of mismanagement of, or bad planning decisions relating to, forests.²⁰⁴

WWF's target for the implementation of timber certification (supported by IUCN) for sustainable forest management is to ensure the independent certification of at least 10 million hectares of sustainably managed forest by 1998.

MECHANISMS FOR ACHIEVING OBJECTIVES AND TARGETS: embrace research and lobbying initiatives, and field projects, as elaborated below.

Research and review processes, including:

- Development of the concept of forest quality, particularly at stand and landscape levels, and investigation of options for quantification;²⁰⁶

- A review of management systems that aim to maintain forest quality;²⁰⁷
- Development of the concept of buffer zones between protected areas and managed forests;²⁰⁸
- A review of the relationship between agriculture, forestry and other land uses in the context of developing national land-use plans;²⁰⁹
- A review of the options for compensation mechanisms, where it is necessary to conserve large forest areas in a particular country.²¹⁰

Implementation of mechanisms for achieving improved forest management:

- Continued progress through international initiatives, including ITTO, FSC, the post UNCED processes, the Climate Change Convention, the Convention on Biological Diversity, a possible global forest convention, multilateral bank policies etc;²¹¹
- Policy initiatives undertaken by the forest industry, forest authorities, governments, NGOs, and combinations of two or more of the above as appropriate, to encourage higher quality forest management;²¹²
- Increased protection for endangered tree species under CITES (see box on page 39) and through, for example, European Union Directives;
- Introduction of greater transparency in terms of trade through work with the World Trade Organisation etc;²¹³
- Promotion of the Forest Stewardship Council including initiation of pilot projects and assessment of implications for the timber and pulp industry;²¹⁴
- Cooperation between local forest owners and communities in forest areas, through participatory planning processes and other channels;²¹⁵
- Introduction of mechanisms for greater protection of primary and old-growth forests;
- Tackling wider questions of how to integrate economic growth, social development and sound resource management so that these dimensions of development are able to interact more effectively.

Field projects:

- Development and implementation of pilot or demonstration projects assessing a variety of new and traditional forest management regimes.

Forest Stewardship Council:

The FSC is an independent, non-profit and non-governmental organisation. It was founded in 1994 by a diverse group of representatives from environmental institutions, foresters, timber traders, indigenous peoples' organisations, community forestry groups and forest product certification organisations from 25 countries. The FSC seeks to promote good forest management throughout the world, based on a set of Principles designed to ensure that forests of all types are managed in ways that are:

- environmentally appropriate
- socially beneficial
- economically viable

To foster good management practice, the FSC will evaluate, accredit and monitor certification organisations, which inspect forest operations and grant labels certifying that timber has been sustainably produced. The FSC does not itself certify products: its mandate is rather to accredit the certifiers. If a certifier can prove that the products carrying its labels have been produced from forests managed according to FSC Principles, and that it is operating in a reliable manner, the FSC will accredit it. The FSC will continue to monitor an accredited organisation's activities to ensure that standards are maintained.²⁰⁵

International initiatives regarding forest management: in addition to the treaties discussed elsewhere, a number of international plans, institutions and agreements have an impact on forest management practice:

The **International Tropical Timber Agreement (ITTA)** is a commodity agreement which established the International Tropical Timber Organization (ITTO). The latter has set a target for all internationally traded tropical timber to come from sustainably managed sources by the year 2000, and has developed guidelines for tropical forest management. WWF and UCN believe that the ITTA should be widened to include all timbers, despite failure to decide this at the last renegotiation in 1994. ITTO should also be relieved of any environmental mandate, since it is unlikely that such a mandate would be implemented or enforced, or if such a directive does remain, this should be implemented and enforced.

The **Tropical Forestry Action Programme (TFAP)** (formerly the Tropical Forestry Action Plan) was launched with much fanfare in 1985 but gradually abandoned by many of the sponsoring organisations when it failed to be effective in halting bad forest management in the tropics. WWF and IUCN believe that the TFAP should now be discontinued. It could be argued that the TFAP has now to some extent been superseded by FAO's role in the CSD process, and that existing resources should be transferred to this activity. However, it should be stressed that the organisations retain strong reservations about FAO's role in the CSD.

Intergovernmental Panel on Forests (IPF):

the IPF was established at a meeting of the Commission on Sustainable Development in April 1995, with a 2-year mandate to develop ways of implementing UNCED forest decisions within the international community. IUCN and WWF support the IPF and will be watching the process closely to ensure that it really does reflect the spirit of the UNCED *Forest Principles*.

Since the Earth Summit, there have been a series of additional international initiatives regarding forest management, including:

- **CSD INTERGOVERNMENTAL PANEL ON FORESTS:** an Inter-governmental Panel on Forests (IPF), with some representation from NGOs, was established at the April 1995 CSD meeting to review progress on implementing UNCED (Earth Summit) decisions on forests. The first meeting took place in September 1995, and the IPF will run for two years.²¹⁶
- **HELSINKI PROCESS:** launched in Finland, in June 1993, at a Ministerial Conference on the Protection of Forests in Europe, it aims to develop criteria and indicators of good forest management. Currently 6 criteria and 27 indicators have been agreed, although these have not yet been field tested. The Helsinki Process is legally binding.²¹⁷
- **MONTREAL PROCESS:** this was designed to develop temperate forest criteria and indicators for non-European countries and currently has 10 member states. Seven criteria have been identified although the last, on institutional frameworks, is considered different from the others and treated separately; there are respectively 47 indicators for criteria 1-6 and 20 indicators for criterion 7. The Montreal Process is not legally binding.²¹⁸
- **FAO (UN FOOD AND AGRICULTURE ORGANIZATION):** the FAO is currently trying to harmonise criteria and indicators for sustainable forest management, in consultation with ITTO. An expert meeting took place in Rome in February/March 1995.²¹⁹
- **ITTO (INTERNATIONAL TROPICAL TIMBER ORGANIZATION):** ITTO has drawn up criteria and indicators for sustainable tropical forest management, including 5 criteria and 27 indicators at national level and 6 criteria and 23 indicators at forest management unit level. Twenty-five of the largest tropical forest countries have agreed to the ITTO initiative. The guidelines are not legally binding.

- **TCA: AMAZON PROCESS GUIDELINES:** Amazon countries met in Peru in February 1995 to discuss outlines for criteria and indicators for forestry in the region.
- **ISO (INTERNATIONAL STANDARDS ORGANIZATION):** ISO considered options for timber certification at a meeting in Oslo in June 1995. Proposals to introduce a standard backed by the Canadian Standards Association and Australian Standards Association were withdrawn following lobbying by environmental organisations.
- **INTERGOVERNMENTAL WORKING GROUP ON GLOBAL FORESTS:** set up by Malaysia and Canada to identify common ground regarding forests to facilitate CSD 1995, a final report was issued in December 1994.²²⁰
- **INDO-UK INITIATIVE:** which drew up criteria for reporting on forestry related issues to the CSD meeting in April 1995.²²¹
- **WORLD COMMISSION ON FORESTS AND SUSTAINABLE DEVELOPMENT:** was established in 1995 to provide a forum for tackling underlying forest problems.

There are now moves to converge the various initiatives into a single body, under management of FAO, in a process that is predicted to last about two years. Partly as a result of these initiatives, many individual governments are taking steps to halt forest loss and degradation, and to develop a high quality forest estate.

CITES: The Convention on International Trade in Endangered Species of Wild Flora and Fauna

CITES, is an important tool for regulating trade in wild species. Its remit is gradually being extended to include timber tree species. To carry out its role effectively, the CITES Secretariat and member governments need additional resources. Development of more reliable timber tracing systems is one of the keys to effectiveness in this area. The criteria for listing species on CITES have recently been changed, and as a result more timber species, including temperate species, should be listed on CITES. CITES should also be implemented rigorously for all timber species covered by the Convention.²²²

Multilateral development banks

There is potential for multilateral development banks (MDBs) and bilateral aid agencies to play a positive role in forest development. However, past experience has shown that changes in practice are needed if negative impacts are to be avoided. WWF and IUCN believe that MDBs and aid bodies should develop clearer policies to avoid funding unsustainable or damaging forest projects.²²³ Environmental Impact Assessments, carried out well before funding is approved, should include full local consultation, transparency, accountability and projects must consider the relevance of local management and control. Environmental costs should be internalised. Aid disbursements should not be tied to trade or other advantages for industry in the donor country. The emphasis of funding should shift from individual projects to longer-term areas such as capacity and institution building, training and public education.²²⁴ The principles of sustainable resource use should be applied to structural adjustment programmes to ensure that exploitation of forest resources does not exceed regeneration rates and that social and environmental problems do not result.²²⁵



Objective 3:

Development and implementation of ecologically and socially appropriate forest restoration programmes.

THE objective aims to recreate near-original forests and restore representative forest areas in those places that have been degraded or deforested, and generally to increase the area of semi-natural forest. Forests should be restored under criteria and standards of high forest quality, stressing multiple use and restoration of natural dynamics and biodiversity.

Ideally,
restoration
should recreate
something as
near to the
original forest
as possible

Ideally, restoration should recreate something as near to the original forest as possible. Use of local and native tree species should be encouraged, and a ban on planting exotics may be appropriate in some areas. Human needs, particularly those of indigenous and local people, should be included in all forest restoration plans, through a process of joint decision-making and collaborative management. Plantations should not be created through replacement of natural forests or other natural and semi-natural ecosystems.

MECHANISMS FOR ACHIEVING OBJECTIVES AND TARGETS: Most of the mechanisms involve identification of options, research into optimal management strategies and implementation.

Research and development remains important in this area, including:

- Identification of areas where natural forest has disappeared and where ecologically-representative forest restoration is needed;
- Identification of those areas where restoration is feasible and where the main causes of deforestation have been eliminated;
- Identification of technical options (including analysis of social and economic implications) for forest restoration;²²⁶
- Identification of human needs dependent on forests, and their implications for forest restoration programmes;²²⁷

Implementation activities, including:

- Introduction of appropriate forest restoration projects;
- Rejection of inappropriate forest restoration methods, which often includes avoidance of plantations of exotic species unless these are carefully integrated into a regional forest management programme. In many regions and countries exotic species will never be appropriate.

Human needs, particularly those of indigenous and local people, should be included in all forest restoration plans.



Reducing
damage will
generally
involve
reducing
pollution at
source



Objective 4:

Reduction of forest damage from global change, including a decrease of pollution below damage thresholds, as measured by critical loads.

THE objective aims to reduce and where possible eliminate the impact of a range of global change effects, including pollution, ozone depletion, global warming, human-induced forest fires etc. A major factor is elimination of pollution damage from local and long-range atmospheric pollution, water pollution, soil contamination and toxic waste. One way to measure success in this area is by using critical loads (see box). Reducing damage will generally involve reducing pollution at source.

Critical Loads:

A Critical Load (CL) is defined as the highest load that will not cause chemical changes leading to long-term harmful effects on the most sensitive ecological system. Both total load and mixture of pollutants are important in defining CLs, which are based upon a dose-response relationship. Within Europe, CLs have been defined for freshwater and soils. The Critical Load definition for soil, which is the one most relevant to forests is:

"The soil should be protected from long-term changes, due to anthropogenic impact, which cannot be compensated by natural processes. These chemical changes include decrease of pH as well as the mobilisation of potentially toxic cations such as aluminium (Al³⁺) and heavy metals. Such mobilisation requires the presence of mobile strong acid anions such as sulphate, nitrate and chloride."

National data are being compiled to generate continent-wide maps of CLs as part of the UNECE sulphur and nitrogen protocols. These are based on the 150 km squares set up for the UNECE European Monitoring and Evaluation Programme for recording pollution data. Once they have been defined, CLs are used to set Target Loads (TLs), which are the basis for pollution control strategies and are often different from the CLs. TLs have been defined as the permitted pollutants level "determined by political agreement". A TL can in theory be either higher than the CL, to give an extra margin of safety, or lower if it is believed to be impossible to reach agreement on large enough restrictions to meet the Critical Load.²²⁸

MECHANISMS FOR ACHIEVING OBJECTIVES

AND TARGETS: include lobbying and technical development aimed at reducing pollution, promoting less polluting alternatives and managing forests in order to reduce the impacts of global change.

Priorities for reducing pollution include:

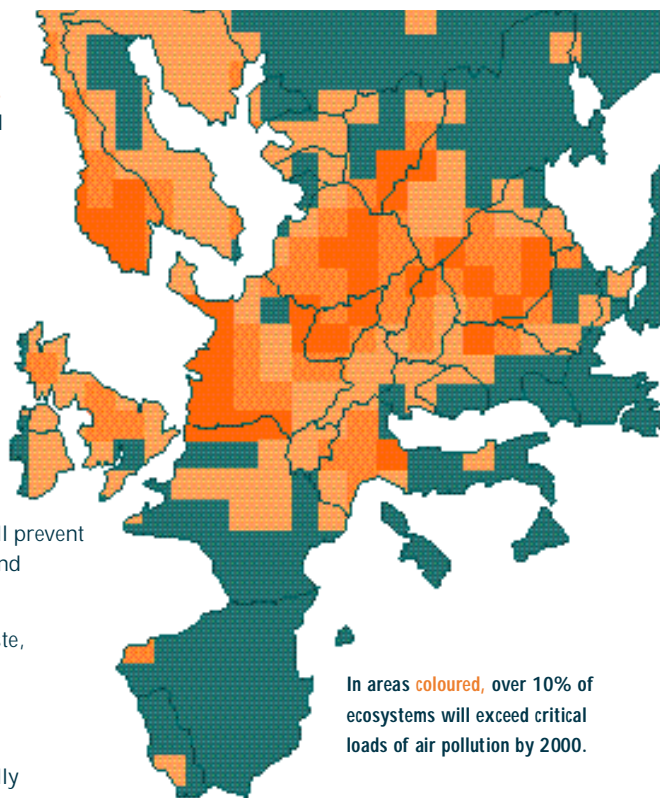
- Reducing air pollution and photochemical smog to levels such that critical loads for forests are not exceeded;²²⁹
- Reducing agricultural pollution and agrochemical input into forests;²³⁰
- Reducing greenhouse gases to a level that will prevent climate change from damaging ecosystems and human communities;²³¹
- Reducing other pollution including toxic waste, industrial emissions etc.

Priorities for developing alternatives include:

- Development and adoption of environmentally sustainable transport systems, energy production and use, etc;
- Supporting research and policy development for less polluting forms of agriculture and forestry;
- Developing conservation strategies for forest ecosystems which take into account the likely impacts of climate change.

Priorities for management include:

- Developing ways of reducing the effects of global warming and climate change on forests.²³²



Consumption
of forest
products
should be at
levels that
minimise
environmental
and social
impact



Objective 5:

Use of forest goods and services at levels that do not damage the environment, including elimination of wasteful consumption, to attain a level of use of forest goods and services within the regenerative capacity of the forest estate.

THIS objective aims to establish levels of consumption of forest products that minimise environmental effects, bearing in mind: the effects of over-consumption of forest products; the potential for forest products to substitute for other products; and conversely the potential for and impacts of substituting other products in place of forest products; the need for greater equity in availability of forest products. It should include consideration of the limits of adaptability of biodiversity to predicted climate change.

MECHANISMS FOR ACHIEVING OBJECTIVES AND TARGETS: include some research, although much information already exists to allow implementation to be initiated immediately.

Further research work needs to be carried out on:

- An analysis of sustainable use of timber and non-timber forest goods and services, and the implications to the global timber and pulp industry;²³³
- A study of the global pulp and paper industry, its environmental effects, and responses to these problems.²³⁴

Implementation work at an international and national level includes:

- Continued work with existing initiatives, such as ITTO, the Helsinki Process, Montreal Process, IPF etc;
- Elimination of wasteful use of timber and pulp products, and proposals for more efficient systems, appropriate recycling and re-use strategies and methods for reducing waste;
- Lobbying governments and international bodies to enact or implement legislation aimed at limiting trade in forest products to those certified as coming from sustainably managed forests.

Overall conclusions: a hopeful future?

WE have drawn a necessarily depressing picture of the state of the world's forests. The problems are large and, worse still, they appear to be getting more serious. The Earth Summit, in June 1992, represented a high point in terms of hopes and ideals about the future of the world's forests, with agreement of the Forest Principles and international commitment to address problems of forest loss and degradation. Yet since then, it could be argued that the spirit of the Earth Summit has failed in five ways:

- continued and/or accelerated rates of deforestation;
- the spread of rapid forest loss to previously stable or untouched areas;
- widespread attempts by industry to reverse or undermine conservation legislation;
- failure to achieve equity between North and South in forest policy;
- failure to use existing legal instruments to halt forest loss.

However, the news is not all bad. Positive progress has been made, and continues to be made, in the wake of UNCED, including:

- development of a series of more-or-less positive international forest initiatives around the world;
- rapid progress towards independent certification of forest products;
- changes in forest practice by some major forest products companies;
- increasing support for sustainable forest management amongst consumers, politicians and business people;
- agreement of integrated forest protection networks in an increasing number of countries.

Much, but not all, of the progress has come from non-governmental organisations and industry rather than from governments. A substantial, and growing, section of the timber trade is prepared to take environmental issues seriously, and is making real efforts to change its practices. Developments such as the establishment of the *Forest Stewardship Council*, and efforts to promote certification in countries such as Belgium, Sweden and the UK, provide a framework for changes in forest management that will have important benefits to wildlife. Recent actions regarding protected areas by governments such as Canada, which has agreed to set aside 12 per cent of its land in protected areas, and Australia which proposes setting aside 15 per cent of pre-European settlement forest in protected areas, are to be welcomed.

At the community level there are numerous examples of empowered communities managing forests sustainably for both economic and environmental benefits. These isolated examples need to be brought into the mainstream of development through the encouragement of strategic alliances to link community-based organisations with higher levels of governance. This is increasingly important in a world where central governments are devolving resource management to decentralised bodies including community groups.

WWF and IUCN have prepared the preceding analysis and recommendations in a positive spirit and believe that, with international commitment, the grave problems facing global forests can be successfully addressed. The five main elements of the WWF/IUCN forest strategy are as follows:

- Objective 1:** Establishment of a network of ecologically-representative protected areas.
- Objective 2:** Environmentally appropriate, socially beneficial and economically viable forest management outside protected areas.
- Objective 3:** Development and implementation of ecologically and socially appropriate forest restoration programmes.
- Objective 4:** Reduction of forest damage from global change, including a decrease of pollution below damage thresholds, as measured by critical loads.
- Objective 5:** Use of forest goods and services at levels that do not damage the environment, including elimination of wasteful consumption, to attain a level of use of forest goods and services within the regenerative capacity of the forest estate.

Getting forest management right – for people and the environment – is in the interests of everyone. We call on the governments, industry and the public to respond positively to the challenge of forest sustainability, and to work with the environmental movement in realising the vision of a world full of high quality forests.

Related publications from WWF International include:

Conservation and Sustainable Management of Tropical Forests: The Role of ITTO and GATT (discussion paper), **Charles Arden-Clarke**, (1990, revised 1991 and 1992);

ITTO in the 1990s: Urgency or Complacency?, **Christopher Elliott**, (1991), (discussion paper), January 1991

Sustainable Tropical Management by 1995, **Christopher Elliott**, (1991), (discussion paper also in Spanish)

European Community Policy and Tropical Forests (discussion paper), **David Baldock**, **Jonathan Hewett** and **Marianne Wenning** (1991) October 1991

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Glossary

Afforestation	establishment of forest on unforested land or areas that have been deforested for at least 30 years.
Boreal forest	mainly coniferous forest found in northern area with cold winter climates, although some other mountain forests are also called boreal; also known as taiga forests.
Broadleaf	forest consisting of non-conifer (ie angiosperm) trees which have broad leaves as opposed to coniferous needles, can be deciduous or evergreen.
Cloud forest	forest growing in places with regular cloud and/or mist, often in the tropics.
Collaborative management	a generic term which embraces community forestry, joint forest management and co-management of forests.
Coniferous forest	forest consisting predominantly of gymnosperm trees, eg pine, spruce, larch. Often, but not always, also an evergreen forest.
Deciduous forest	forest where trees shed their leaves annually in the autumn (fall). Most deciduous trees are angiosperms although some conifers also shed their needles annually.
Deforestation	loss of forest cover which is not replaced by either natural regeneration or replanting of trees.
Evergreen forest	forest of trees that bear their leaves throughout the year, losing them gradually rather than in one season. Examples include pine, yew, most rainforest species.
Exotic species	species that are not native to the area.
Mediterranean forest	temperate forest characterised with a high proportion of evergreen trees and a climate with hot dry summers and warm wet winters, named after forests found in the Mediterranean basin but occurring more widely.
Mixed forest	forest composed of two or more species of trees with at least 20 per cent of the canopy not consisting of the dominant species.
Monsoon forest	forest occurring in regions with a well marked rainy season. A few broadly temperate forests found in sub-tropical regions have monsoons.
Natural forest	forest that still maintains its original elements and ecosystem functions; can be primary or secondary forests.
Old-growth forest	natural forests in which a proportion of the trees have reached (or nearly reached) their maximum age, and which maintain natural structural characteristics, species composition etc.
Primary forest	forest totally unmodified by humans.
Plantation	cultivation, mainly of trees, for commercial timber exploitation, usually managed on agricultural principles, often intensively.
Rainforest	tropical or temperate forest growing in regions of high rainfall where the dry season is short or absent; epiphytes and climbers are abundant.

Reforestation	restoration of recently cleared forest.
Secondary forest	forest that has regrown after human disturbance.
Semi-natural forest	forest that has been modified by human activity but still maintains a significant proportion of natural components and functioning.
Taiga	another name for boreal forest but also including non-forested tundra.
Temperate forest	forest found in the non-tropical zone, usually having fairly evenly distributed rainfall and moderate temperatures.
Tropical dry forest	forest found in tropical regions with low rainfall and no wet season.
Tropical moist forest	forest found in the tropical monsoon zone.

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