SUSTAINABLE FOREST MANAGEMENT THROUGH MULTILATERAL ENVIRONMENTAL AGREEMENTS AND MARKET-BASED MECHANISMS

Final report of a study on international efforts to promote the sustainable management of tropical forests in developing countries, commissioned by the Finnish Ministry for Foreign Affairs, Unit for the Co-ordination of Development Policies.

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Executive summary

The report deals with international efforts to promote the sustainable management of tropical forests in developing countries. It is divided into four parts, including the Introduction. In Chapter Two the key Multilateral Environmental Agreements (MEAs) and their implementation mechanisms are described, along with some other relevant multilateral institutions and the new market-based mechanisms. The following chapter concentrates on analysing the relationship between the MEAs and the environmentally justified market-based mechanisms on the one hand, and the international trade regime on the other hand. Chapter Four brings the discussion down to the national level through an analysis of SFM in Mozambique. Finally the last chapter presents the main conclusions and recommendations for Finnish support.

In the 1980s increasing concern was expressed by environmental NGOs for tropical forests, which were quickly disappearing. At the international level the environmental debate culminated in 1992 in the UN Conference on Environment and Development in Rio de Janeiro. The Rio Conference led to the preparation of new multilateral environmental agreements (MEAs), which provide the basis for the present environmental management approach. The new approach emphasises habitat-based conservation, valuation of the whole range of goods and services provided by the forests, and the participation of both the private sector and local communities in natural resource management.

In the negotiations industrialised countries have emphasised the global governance issue, meaning global agreements which bind all participants equally. In terms of funding, market-based mechanisms and NGO channels are favoured instead of bilateral grant aid. Both of these approaches are looked at with suspicion by many developing countries, which fear a loss of sovereignty and deviation of ODA funding to support environmental activities. The World Trade Organisation (WTO) has emerged as a major forum for the developing countries to defend their national sovereignty against environmentally justified restrictions on international trade, which they interpret as protectionism in camouflage. Thus far the stand of the WTO has been generally negative towards environmental justifications, but the increasing weight of 'green labelling' in the key export markets has made many developing countries accept new market-based mechanisms.

Aside from international political issues, the lack of competence on the technical substance is a main impediment to effective participation by developing countries like Mozambique in the international negotiations. It has also limited their capacity to benefit from the new incentive mechanisms and potential synergy between the MEAs and the other SFM instruments. The use of the new market-based incentive mechanisms

for supporting SFM is limited also by the relatively weak institutional capacity of the state to enforce laws and regulations.

In Mozambique, where a large majority of the population lives below the poverty line, the alleviation of poverty is quite predictably the first priority, especially in the rural areas where most of the poor live. But even though the poor seldom consider nature conservation a priority issue, they do value various environmental benefits provided by forests, and are often willing to give up or restrict the use of some resources in order to maintain them.

Poverty alleviation, which is Finland's main objective in development cooperation, is consistent with Mozambique's present development objectives. Recently the MFA has also selected the environment as one of the three priority areas in its co-operation with Mozambique. At present the support is channeled to two environmental projects, which are both relevant for SFM. For future support the following issues are worth considering:

- Finland should take into account the needs of developing countries in arrangements concerning international timber trade, while also keeping in mind that there are divergent views among developing countries, and within them.
- A basic need in countries like Mozambique is for capacity building concerning both the MEAs and SFM. Finland could provide targeted funding through multilateral agencies.
- The general trend in bilateral development co-operation is to move towards a sector-wide approach (SWAP). In this context it is important to develop procedures which ensure that the environment and SFM are included as cross-cutting issues in the sectoral programmes.
- Along with the emerging sectoral programmes, focused small-scale activities outside of the government sphere are also needed. With respect to the environment and SFM, these can be supported efficiently through joint-funding mechanisms like environmental funds.

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Acronyms

APC	African, Pacific and Caribean
ASEAN	Association of Southeast Asian Nations
C	carbon
CBD	Convention on Biological Diversity
CBNRM	community-based natural resource management
CCD	Convention to Combat Desertification
CDM	Clean Development Mechanism
CEF	Forestry Research Department (Mozambique)
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CO_2	carbon dioxide
CPF	Collaborative Partnership on Forests
CTBT	Committee on Technical Barriers to Trade
CTE	Committee on Trade and Environment
DFID	Department for International Development (UK)
DNFFB	National Directorate of Forests and Wildlife (Mozambique)
DSB	dispute settlement body
EC	European Commission
ECOSOC	UN Economic and Social Council
EU	European Union
EWT	Endangered Wildlife Trust
FAO	Food and Agriculture Organisation of the UN
FCCC	Framework Convention on Climate Change
FSC	Forest Stewardship Council
GATT	General Agreement on Tariffs and Trade
GDP	gross domestic product
GEF	Global Environmental Facility
GHG	greenhouse gas
GTZ	German Technological Co-operation Agency
HDI	human development index
IMF	International Monetary Fund
IFF	Intergovernmental Forum of Forests
IPCC	Intergovernmental Panel on Climate Change
IPF	Intergovernmental Panel of Forests
ISO	International Standards Organisation
ITFF	Interagency Task Force on Forests

ITTO	International Tropical Timber Organisation
IUCN	World Conservation Union
MADER	Ministry of Agriculture and Rural Development (Mozambique)
MFA	Ministry of Foreign Affairs (Finland)
MICOA	Ministry for the Coordination of Environmental Affairs (Mozambique)
MITUR	Ministry of Tourism (Mozambique)
NEMP	National Environmental Management Programme (Mozambique)
NGO	non-governmental organisation
NTFP	non-timber forest products
ODA	overseas development assistance
OECD	Organisation for Economic Cooperation and Development
SADC	Southern Africa Development Conference
SFM	sustainable forest management
TFCA	transfrontier conservation area
UN	United Nations
UNCED	UN Conference on Environment and Development
UNDP	UN Development Programme
UNEP	UN Environmental Programme
UNFF	UN Forum on Forests
USD	United States dollar
WTO	World Trade Organisation
WWF	World Wide Fund for Nature

1. Introduction

The present report is the final report of a study on international efforts to promote sustainable management of tropical forests in developing countries. The study was commissioned in 2001 by the Finnish Ministry of Foreign Affairs (MFA), Unit for the coordination of development policies. It is taking place within a series of similar studies commissioned by the unit, covering the following thematic areas: Democracy and international cooperation; Globalisation, developing countries and Finland; and Information technology and development. This study falls within the second thematic area.[1]

The focus of the study is on three main approaches: i) international environmental conventions; ii) international market-based mechanisms; and iii) property-rights approach at the national level. The study analyses the implementation mechanisms of these approaches on international, national and local levels. At the international level the emphasis is on the compatibility of the environmental conventions and the new market-based mechanisms with the international trade rules. For national and local level analysis Mozambique was selected for closer examination due to its prominent role in Finnish development cooperation, and the high development potential of its forest sector. In addition to research literature and public documents, the report is based on interviews with 28 representatives of government authorities, multilateran organisations and NGOs in Mozambique, Kenya and Brazil. The interviews are listed in annex 1.

Sustainable forest management (SFM) issues are included in a number of multilateral environmental agreements (MEA), the most relevant ones being the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and the three main conventions which resulted from the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992. These include the UN Convention to Combat Desertification (CCD), the UN Convention on Biological Diversity (CBD) and the UN Framework Convention on Climate Change (FCCC). At the multilateral level these are supported by various less strongly binding documents, including statements of SFM principles and global forest forums. However, the MEAs are powerless without efficient national institutions and political commitment by the governments to enforce them. These issues can not be treated separately.

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[1] The study has also benefited from the authors' participation in the Clima-X project funded by the Academy of Finland. The desk-work was carried out at the Tampere Peace Research Institute (University of Tampere). We would like to thank Joan Löfgren, who corrected the language of the report, and all the people interviewed, who kindly shared their knowledge and insights with us.

Recently the whole state-based international system has been challenged by a rather heterogenous group of non-governmental actors, including community-based organisations, international and national NGOs, and various entities of the private sector. In the forestry sector the challenge has materialised in a wide scale of market-based incentives to promote sustainable forest management, including independent forest certification. While these ideas have spread quite rapidly in the North, they have met with strong resistance in the South, where many governments consider them a threat to national sovereignty.

The report is divided into four parts. In chapter two the key MEAs and their implementation mechanisms are described, along with some other relevant multilateral institutions and the new market-based mechanisms. The following chapter concentrates on analysing the relationship between the MEAs and the environmentally justified market-based mechanisms on the one hand, and the international trade regime on the other hand. Chapter four brings the discussion down to national level through an analysis of SFM in Mozambique. Finally the last chapter presents the main conclusions and recommendations for Finnish support.

2. Sustainable forest management: agreements and implementation mechanisms

2.1 International initiatives for sustainable forest management

Since the late 1970s the rapid deforestation in many parts of the world has become a central topic in discourses about the looming environmental crisis (Poore 1986). Many of the areas under threat are in tropical developing countries, which are poor and consider economic growth as their main priority. In their view alleviation of poverty must be addressed before the environmental problems can be resolved on sustainable basis (e.g. Chissano 1993). During the 1980s the issue was subject to intensive debate, and by the 1990s it had become increasingly accepted at the political level that the international forest problem is not only an environmental problem, but also a development problem (Poore 1986; Burger 2000).

The holistic view is compatible with current definitions of sustainable forest management (SFM)[2], which emphasise the utilitarian aspect. In principle management activities should create at least enough benefits to counterbalance the costs they incur: SFM must be profitable in order to be pursued. On the other hand forest management which ignores some forest values or leads to long-term decrease in the total value of products and services produced by forests is also unsustainable. Thus ecological and social aspects can not be neglected. These include maintenance of forest health and vitality through conservation of soil and water resources, conservation of biological diversity, and maintenance of long term socio-economic benefits. However, ultimately the operational definition of SFM depends on the current values of each society. The dominant theory of state sovereignty prescribes that such values are operationalised through national-level political processes. According to this view, it remains the task of the government to create enabling conditions for SFM, including an appropriate legal, institutional and economic framework for forest conservation and sustainable development (Moura Costa *et al.* 1999).

The essential role of forests in economic development and the maintenance of all forms of life is recognised in the international Forest Principles approved by the UNCED in 1992. This authoritative (but non-legally binding) statement of principles represent a global concensus on the management, conservation and sustainable development of all types of forests. It emphasises three key principles: i) recognition of national sovereignty; ii) public participation; and iii) valuation of the total range of goods and services provided by the forests (UN General Assembly 1992).

According to the sovereignty principle states have the sovereign and inalienable right to utilise, manage and develop their forests in accordance with their development needs on the basis of national policies consistent with sustainable development. But they also have the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other states or of areas beyond the limits of national jurisdiction. Governments should enable interested parties (including local communities and indigenous people, private sector, NGOs and individuals) to have an economic stake in the forest use, perform economic activities, and achieve and maintain cultural identity and social organisation. This requires the participation of these parties in the development, implementation and planning of national forest policies. The Forest Principles also emphasise the vital role of all types of forests in maintaining the ecological processes, biodiversity and biological resources, as well as the carbon cycle. Thus decisions taken on the management, conservation and sustainable

[2] Definitions, criteria and indicators for SFM have been developed, inter alia, by the International Tropical Timber Organisation (ITTO), and the Helsinki and Montreal processes.

development of forest resources should benefit from a comprehensive assessment of both economic and non-economic values of forest goods and services. In this context incorporation of environmental costs and benefits into market forces and mechanisms is encouraged both domestically and internationally (UN General Assembly 1992).

Along with the Rio Declaration, Chapter 11 of Agenda 21, the UN Forum on Forests, and the relevant MEAs the Forest Principles represent a body of an emerging – albeit soft – international law on forests. They have all been consensually agreed in international negotiations, and thus can be said to form globally valid guidelines for SFM (Ympäristöministeriö 1993; Humphreys 2001).

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

Formal agreements concerning international environmental management are a relatively new phenomenon. Before 1900 the few existing agreements were based on unrestricted national sovereignty and focused on boundary waters and their use for navigation and fishing. In the early 1900s a number of agreements were concluded to protect commercially valuable species, including the 1902 Convention for the protection of birds useful to agriculture, and the 1911 Treaty for the preservation and protection of fur seals. The only general conventions on wildlife before 1940 were the 1900 London convention for the protection of wild animals, birds and fish in Africa, and the 1933 London convention on preservation of fauna and flora in their natural state, both of which focused primarily on Africa. Even though multilateral environmental agreements increased significantly during the 1960s, modern international environmental law can be dated to 1972, when the UN Conference on Human Environment took place in Stockholm, and the UN Environmental Programme (UNEP) was established. The Stockholm conference lead to the establishment of various MEAs, including the Convention on International Trade in Endangered Species CITES and the World Heritage Convention (ENTRI, no date).

While species extinction is a natural process, its rate has increased enormously as human presuure on natural resources has intensified. Traditinally conservation measures have focused on the preservation of individual species, which has been supported through three main approaches: nature reserves, botanical and zoological gardens, and germplasm banks. In the early 1970s uncontrolled international trade on products (such as ivory and rhino-horn) deriving from a few charismatic species was identified as a major problem for the conservation of endangered species in the international media. The World Conservation Union (IUCN) had started to draft an international convention to regulate the export, transit and import of rare or threatened wild species already in 1963. The idea of the convention was subsequently approved by the 1972

UN Conference, and already in the same year IUCN, the United States and Kenya produced a unified working paper, which became the basis for convention negotiations. CITES was approved in 1973 and entered into force in 1975, and there are currently 152 parties to the convention (ENTRI, no date).

CITES is basically a control-oriented agreement between sovereign states. It seeks to control international trade of such wildlife products, which threaten endangered plant or animal species. As such it represents a traditional state-centred and preservationist approach to conservation, whereby the emphasis is on controlling the trade and use of specific species in order to safeguard their survival as viable populations. There is no supranational structure capable of ensuring that states honor their obligations, and unlike the more recent conventions, it does not provide economic incentives to promote protection (Yale Center for Environmental Law and Policy, no date).

The UN Conference on Environment and Development (UNCED)

A second climax of environmental agreements is linked to the UN Conference on Environment and Development in Rio de Janeiro (UNCED) twenty years later. In contrast to the earlier preservationist approach, the main idea behind the UNCED process was that if countries can generate income from more sustainable use of forests, then international transfers are more likely to be successful than regulation. According to this view the key problem with regard to forests is that sustainable forest management is financially unprofitable compared to other management options and land uses. This is because the national and local level actors are not compensated adequately for the global services they provide, including ecological and aesthetic functions. In UNCED three environmental issues were emphasised: biological diversity, climate change, and land degradation (Ympäristöministeriö 1993).

Forests are crucial for the maintenance of biodiversity, for they contain some of the most species-rich habitats and much of world's terrestrial biodiversity occurs in them. They can also serve as reservoirs, sinks or sources of greenhouse gases, depending on the land use decisions made. Currently net CO_2 emissions from deforestation mainly in tropical regions (and other negative changes in land use) is estimated to contribute about 20 per cent of global atmospheric CO_2 emissions (Burger 2000; Brown 2001). At the same time deforestation and unsustainable use of existing forests and woodlands are among the main causes for desertification and drought in Africa (MICOA 1999). But even though the respective international conventions (BSD, CCD and FCCC) were deeply influenced by the Rio pocess, they represent different types of compromise between the predominant concerns of national sovereignty, socio-economic development, environmental conservation, and the principles of market economy. In

general it can be stated that even though the conventions formally recognise the global character of the respective environmental agendas, the states have actually strengthened their operational sovereignty by focusing on national plans and actions.

The Convention on Biological Diversity (CBD)

Out of the three conventions resulting from the UNCED process, the Convention on Biological Diversity is perhaps the one most closely linked to the old preservationist agenda. The objectives of the convention are: i) conservation of biological diversity; ii) sustainable use of its components; and iii) fair and equitable sharing of the benefits arising out of the utilisation of genetic resources (CBD 1992). It emphasises that biodiversity and its links to ecosystem properties have cultural, intellectual, aesthetic and spiritual values that are crucial to human society. Reduction in biodiversity can also directly reduce sources of food, fuel, construction materials, medicinal plants and genetic resources.

In addition to its effects on current functioning of ecosystems, species diversity influences the resilience and resistance of ecosystems to environmental change. Human influence threatens to cause the extinction of 10–20 per cent of the species even in familiar groups of organisms such as birds and mammals, and current rates of extinction are estimated to be 100–1,000 times greater than pre-human rates. By the year 2100 land-use change is projected to have the largest global impact on biodiversity, followed by climate change, nitrogen deposition, species introductions and changing concentrations of atmospheric CO_2. Human activity has already transformed 40–50 per cent of the ice-free land surface, changing it mainly into agricultural and urban systems. Directly or indirectly human beings dominate about one third of the net primary productivity on land and use over 50 per cent of the available fresh water. Among these change factors land-use change is of particular importance in the tropics (Chapin *et al.* 2000).

While CBD acknowledges that economic and social development and eradication of poverty are the overriding priorities of developing countries, it stipulates that each member country must provide financial support and incentives also for the conservation of biological diversity. Each member country commits itself to: i) developing national strategies, plans or programmes for the conservation and sustainable use of biological diversity; and ii) integrating the conservation and sustainable use of biological diversity into relevant sectoral and cross-sectoral plans, programmes and policies. The additional role of developed member countries of CBD is addressed through the concept of incremental costs, for which they are expected to provide new and additional financial resources through a special financing mechanism (CBD 1992). Incremental costs have been interpreted as the costs of achieving global environmental objectives over and

above the costs of national sustainable development. In practice operationalising such a complex concept has turned out to be very difficult, if not arbitrary (Moura Costa *et al.* 1999). At present, the budgets of most biodiversity-related projects in developing countries are funded predominantly through bilateral, regional and other non-CBD channels.

The Convention to Combat Desertification (CCD)

Desertification[3] occurs in arid areas when ecosystems are managed unsustainably, causing soil to degrade and the land to become non-productive. Eventually degraded land turns into a desert. The degradation of ecosystems and their soils is difficult, and sometimes impossible to reverse. It gives rise to an environmental problem that has a severe negative impact on social and economic development, and jeopardises the sustainability of people's lives. Globally, the continents loose annually some 24 billion tons of soil, and about 70 per cent of the 5.2 billion ha of dry lands used for agricultural purposes are already degraded. Thus, desertification affects annually about 30 per cent of the world's total land area. In Africa about 73 per cent of the cultivable dry lands are moderately or heavily affected by desertification, while the generalised poverty leaves the population few alternatives to predatory exploitation of land. The result is almost always appearance of internal or international migrations, which debilitate the environment even further and cause socio-political conflicts and tensions (Timberlake 1986; MICOA 1999).

Land degradation was already the topic of the UN Conference on Desertification in 1977, which approved an action plan to combat desertification. However, in 1992 UNCED concluded that land degradation in arid, semi-arid and dry sub-humid areas had continued to increase, and acivities to combat desertification should be strengthened. This assessment was based on previous reports, which had found that all relevant parties had failed to fulfil their role. While funding from the donor countries was only a fraction of what was needed, the affected developing countries had also failed to address the issue in their national plans, and finally the multilateral agencies had failed in their coordination and fund-raising role. After further negotiations the Convention to Combat Desertification was approved in 1994 in Paris (Timberlake 1986; UNEP 2001).

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[3] According to the definition agreed in the 1977 UN Conference on Desertification, desertification is defined as "the diminution or destruction of the biological potential of the land, which leads ultimately to desert-like conditions and is an aspect of the widespread deterioration of ecosystems under the combined pressure of adverse and fluctuating climate and excessive exploitation" (quoted in Timberlake 1986: 21).

The focus on national operational capacity of the affected developig countries is especially strong in the CCD approach, which defines preparation and implementation of national action programmes as the central element of the strategy. The role of developed countries is reduced to providing financial resources for preparation and implementation of the national programmes, and facilitating access to technology. The purpose of the national action programmes is to identify the factors contributing to desertification, and the practical measures needed to combat it. In addressing desertification each national programme should: i) pay special attention to the socio-economic factors contributing to desertification process; ii) promote awareness and facilitate the participation of local population and NGOs; and iii) provide an enabling environment by strengthening existing legislation and/or enacting new laws, and establishing long-term policies and action programmes (CCD 1994). These premises reflect the criticism wielded against the previous Plan of action (cf. Timberlake 1986).

In CCD desertification is placed squarely within the problematic of economic growth, social development and poverty eradication, which are defined as the priorities of developing countries. Desertification and drought must be tackled because of their interrelationship with social problems such as poverty, poor health and nutrition, lack of food security, and unfavourable demographic dynamics. Through economic development the issue is linked also to problems of international trade and the debt burden (CCD 1994). Consequently CCD is at present the MEA receiving the highest priority among most African countries.

The Framework Convention on Climate Change (FCCC)

In the late 1980s an increasing consensus emerged within the scientific community that the global climate system is facing a non-cyclical rise in air temperature due to accumulation of atmospheric greenhouse gases (GHGs) released by human activities. Carbon dioxide (CO_2) is a relatively weak GHG, but it is several orders more abundant than the other GHGs, and thus of major concern when evaluating the anthropogenic change in atmospheric chemistry and climate (Koskela *et al.* 2000). Global emissions of CO_2 increased rapidly during the last century due to expanding use of fossil fuels (such as coal, gas and oil) for economic development. Cement production is another industrial source of CO_2, but carbon dioxide is released also when any organic matter containing carbon is either burned or decomposed. The atmospheric CO_2 increased from 270 parts per million (ppm) by volume in the pre-industrial era to 360 ppm in the late 1990s (Kägi 2000).

On the international level climate change was recognised as a global problem in a declaration of the First World Climate Conference convened by the World Meteorological Organization (WMO) and the United Nations Environmental

Programme (UNEP) in 1979. In 1987 WMO and UNEP established an Intergovernmental Panel on Climate Change (IPCC) to assess the climate change and its potential impacts, and in 1988 the World Conference on the Changing Atmosphere in Toronto called for the reduction of CO_2 emissions by 20 per cent by the year 2005. Increasing scientific evidence of global climate change coupled with mounting public concern led to the establishment of the United Nations Framework Convention of Climate Change (FCCC) at the UNCED in Rio de Janeiro in 1992 (Koskela *et al.* 2000).

FCCC aims at stabilising the GHG concentrations at a level that would prevent dangerous anthropogenic interference with the global climate system. It forms a framework and a process for agreeing to specific actions for meeting this aim among nations committed to the convention. A concrete step in the FCCC process was taken in 1997 when the third Conference of Parties (COP-3) was held in Kyoto, Japan. The Kyoto Protocol sets legally binding commitments for developed countries to reduce their GHG emissions on average by 5.2 per cent below the 1990 emission levels within the first commitment period (2008–2012). It proposes three instruments to reduce emissions: joint implementation, emission trading, and the clean development mechanism (CDM). Participation under the CDM may involve both private and/or public entities. Along with consumption of fossil fuel, terrestrial CO_2 sources and sinks are also included in the emission reduction network. This brings in the role of forests in maintaining the carbon balance (Kägi 2000; Koskela *et al.* 2000).

Even though developing countries are exempted from legally binding commitments in limiting GHG emissions, they are engaged in the mitigation process. While joint implementation and emission trading can only take place between developed countries, the CDM was proposed for the particular purpose of enhancing cooperation between developed and developing countries by allowing industrialised countries to accrue certified emission reductions in return for their financing activities that limit emissions in developing countries. Despite the fact that some developing countries like China and India are considerable fossil carbon emitters on the global scale, the majority of developing countries contribute to climate change mainly through deforestation, rather than through industrial emissions (see annex 2). Since 1930, the annual net flux of carbon to the atmosphere from forests and other ecosystems as a result of land use changes has been substantially higher in the tropics than in the temperate or boreal regions. By 1990 about 20–25 per cent of the global anthropogenic CO_2 emissions were caused by land use change, practically all of which took place in tropical forests (Houghton 1996; Koskela *et al.* 2000).

Forests and forest management can contribute to the mitigation of climate change basically in five ways: i) by reducing the rate of deforestation; ii) by increasing the rate of afforestation; iii) by increasing the stocks of carbon within existing forests; iv) by increasing the use of wood; and v) by substituting fossil fuels with wood-based fuels (Houghton 1996).

UN Forum on Forests (UNFF)

The UNCED resulted also in a number of legally not binding statements of intent, such as the Forest Principles agreed at Rio in 1992. A more recent process for building international consensus on SFM is the UN Forum on Forests, which developed from the Intergovernmental Panel of Forests (IPF) created in 1995. The process continued as the Intergovernmental Forum of Forests (IFF) under the UN Commission on Sustainable Development (CSD) up to 2000, when the UN Forum on Forests was created under the auspices of the UN Economic and Social Council (ECOSOC 2000; Humphreys 2001). The IPF and the IFF were supported by a high level, informal Interagency Task Force on Forests (ITFF). The ITFF consisted of eight international forest and forest-related organisations[4], and was chaired by FAO. The ITFF members assisted in the preparation of the reports of the UN Secretary-General on various forest-related programme elements, and contributed to the implementation of the IPF/IFF proposals for action. They enhanced also coordination on forest-related matters among the members, and supported IPF/IFF Secretariat through secondments of staff. ITFF is considered as an example of an effective mechanism for interagency collaboration, and one of the main institutional legacies of the process. After the creation of UNFF in 2000, ECOSOC recommended that a new forum be formed on the basis of ITFF. The Collaborative Partnership on Forests (CPF) was created in 2001 on this basis. It is also chaired by FAO, and the initial membership is the same as for ITFF. At present GEF and the Secretariats of the CCD and FCCC are being invited to join (CPF 2001).

The principal functions of the UNFF are: i) to facilitate and promote the IPF/IFF proposals for action, and to mobilise and channel resources for this end; ii) to provide a forum for continued policy development and dialogue on SFM; iii) to enhance international cooperation and coordination; iv) to monitor and report on progress in SFM; and v) to strengthen political commitment. National forest programmes have a crucial role in the implementation of the proposals for action in a multisectoral manner, and they provide the main framework for channelling development assistence to forestry sector. Development and implementation of strategies that acknowledge the full range of forest values and functions, integration of local livelihood needs, as well as participation of local communities and other civil society stakeholders are emphasised (CPF 2001; ECOSOC 2000).

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[4] Members of the ITFF were Secretariat of the CBD, Center for International Forestry (CIFOR), Department of Economic and Social Affairs of the UN Secretariat (DESA), FAO, ITTO, UNDP, UNEP and the World Bank.

Along with the Forest Principles of the Rio Declaration, Chapter 11 of Agenda 21, and the above MEAs, the resulting arrangements and proposals represent the body of an emerging international normative framework on forests. However, the results of the previous two phases (IPF and IFF) were not very encouraging. Rather than concentrating on clarifying the initial proposals by the IPF and monitoring their implementation, the IFF spent most of its resources on generating 120 new proposals with little additional value. No systematic reporting and peer review processes were implemented at the national level. Also the main institutional issues, such as the launching of negotiations for a forest convention and creation of a global forest fund were postponed once again (Humphreys 2001).

The International Tropical Timber Organization (ITTO)

Since the 1980s the use of economic incentives for improving natural resource management has resulted in increasing international collaboration outside of the UN framework. One such result is the establishment of the International Tropical Timber Organisation (ITTO) in 1983. ITTO is an intergovernmental organisation based in Yokohama, Japan. The 57 member states[5] are represented in the ITT Council, which meets twice annually. ITTO focuses on the promotion of SFM in tropical forests through interventions in reforestation and forest management, forest industries, economic information and market intelligence. The main objective, set in 1989, was that ITTO's memebers should achieve an international trade of tropical timber from sustainably managed forests by the year 2000. In its policy ITTO recognises that one of the main causes of forest destruction is poverty, thus it is crucial to address basic human needs in tropical forest management. In this context international timber trade and the industry on which it is based can have a positive role in forest conservation by adding value to the forest resource and providing employment (ITTO 2001).

According to a recent review of ITTO's performance, its greatest success lies in promotion of policy and law reform. The principles of SFM have been incorporated into administrative structures, environmental legislation and land-use planning of various member countries. This, combined with increased decentralisation, has enabled greater community involvement in forest management. ITTO has also pioneered the development of criteria and indicators for SFM in tropical forests. Incorporation of ITTO criteria and indicators in national policies is a major achievement, but the review reports that this far the implementation of good management in the forest itself remains

[5] Mozambique is not a member of ITTO.

inadequate. According to the assessment, only six of the producer countries had the on-the-ground capacity to implement SFM in their forests (ITTO 2001).

Forest certification

By the early 1990s major environmental NGOs had become frustrated with the intergovernmental initiatives, which had not made any visble impact on global or regional deforestation rates. At the same time some northern environmental NGOs were asked to support local NGOs and indigenous peoples' organisations in the southern countries struggling to save their forests. The support materialised in international campaigns and boycotts against the use of tropical timber. However, the incongruence of singling out tropical timber as destructive while ignoring the problems with timber coming from temperate forests soon made many NGOs to reconsider the issue.[6] It was realised that trade can be made to work towards environmental conservation by creating a mechanism which allows consumers to make a distinction between products coming from well managed forests and that of unsustainably managed forests – regardless of geographical origin. It was in this context that market-based voluntary certification of forest management quality and 'green labelling' of forest products emerged as a policy instrument to address the problems of deforestation and forest degradation (Burger 2000; Lindahl 2000).

The purpose of market-oriented certification schemes is: i) to improve the quality of forest management; and ii) to provide market advantage or improved access for products from sustainably managed forests. Certification is essentially a process of conformity assessment, which takes place against a standard (Bass and Simula 1999).

There are two kinds of standards used in forest management certification. Performance standards set technical specifications which must be met before a forest can be certified. These may include compliance with national legislation, maintenance of biodiversity and ecological functions, respect for local people's rights, economic viability, and adequate planning and monitoring of operations. Performance standards are formulated as a framework of principles, criteria and indicators. Management system standards specify how an organisation's management structure and processes must be organised for it to achieve the target of performance, set by itself. For example the ISO 14000 series, which was developed by the International Organisation for Standardisation (ISO), contains standards which apply to environmental management systems (EMS). An ISO standard certifies the forest management system rather than

[6] Germany had been active in the tropical timber boycott process, and subsequently GTZ was also in the forefront in calling for its lifting in 1989, to be replaced with support to SFM.

the forest. In practice a combination of both types of standards is often used (Kruedener and Burger 1998; Thornber *et al.* 1999).

Forest certification involves an inspection and evaluation of forest management in a specific area according to specified standards, carried out by an independent certification organisation. To make sure that the certifiers work competently, independently and to a common standard they are accredited by a third-party organisation. To label the product as one coming from the certified forest, an independent body must also verify the chain-of-custody, i.e. the track the timber takes from the forest to the end-user. Currently there is only one genuinely international accreditation body for forest certification, the Forest Stewardship Council (FSC). In the ISO system national standards organisations accredit independent certifiers (Kruedener and Burger 1998). There are also some regional initiatives like the Pan-European Forest Certification Framework (PEFC), which is already operational, and the Pan-African certification scheme being developed together by the African Timber Organisation (ATO) and the Inter-African Forest Industries Association (IFIA). In addition there are a number of national schemes, which are typically based on a combination of criteria from different international standards (Bass and Simula 1999).

The Forest Stewardship Council (FSC)

Independent forest certification was introduced in 1989 by the Smartwood Program of the Forest Alliance in the USA. However, the definition of a standardised international criteria and indicators for SFM was largely a result of the work done by ITTO, even though by 1990 the result was not yet operational and remained incomplete with respect to social criteria. By voluntarily agreeing to the target of trading only in sustainably produced tropical timber by 2000 the ITTO member countries have also committed in principle to the same goal as forest certification. As a result of these experiences the first internationally acknowledged independent forest certification body, the FSC, was founded in 1993 by 130 representatives from mainly environmental, economic and social organisations from all over the world (Burger 2000). FSC is an international body which accredits certification organisations in order to guarantee the authenticity of their claims. Its credibility in European and North American markets is enhanced by the fact that the standards were developed in the public domain, not within a closed market or a bureaucratic system (Markopoulos 1999).

The FSC principles and criteria are ment to apply to all tropical, temperate and boreal forests, and many of these apply also to plantations and partially replanted forests. The main difference between the FSC principles and criteria and most other SFM criteria (such as ITTO's) is the emphasis given to social issues. The FSC principles cover the following main issues: i) compliance with national laws; ii) respect for tenure

and use reponsibilities, community relations and workers' rights, and indigenous peoples' rights; iii) economic viability; iv) environmental sustainability; v) planning, monitoring and assessment. Out of the ten FSC principles four focus on social issues, and most of the others consider them indirectly (FSC 1999).

Even though FSC has advanced considerably the debate on and implementation of SFM, it has also been criticised. On the one hand it has been considered as a threat to national sovereignty, and on the other hand the equity issues have caused concern. Those who prefer the established governmental or inter-governmental institutions tend to challenge the authority of FSC, asking who does it actually represent and who gave it its mandate (Bass, no date). There is concern that the processes and standards reflect predominantly the values of northern private enterprises and environmental NGOs, and the priorities of developing countries are neglected. The FSC scheme was developed specifically to include the social objectives, such as benefits to local people who live in the forest, and opportunities for small enterprises to make a living from the responsible management of natural forests (Irvine 2000; Scrase 2000). However, by 1999 some 60 per cent of FSC certificates and 80 per cent of certified areas were in developed countries, while Africa had only eight per cent of the certificates. Industrial enterprises accounted for 66 per cent of the area certified, while community enterprises account for only three per cent of the area. Developing countries are also under-represented in the FSC membership. But it should be noted that FSC has recognised the problems, and is moving to address them (Bass and Simula 1999; Thornber *et al.* 1999).

2.2 The implementation mechanisms of SFM

As noted above, the main problem in implementing environmental conservation is the distorted way in which benefits vs. burdens are distributed between different stakeholders in the traditional system, which emphasises the state and its control function. The benefits of such protection activities accrue overwhelmingly to international and non-local national beneficiaries, whereas local people suffer the highest costs. In this context failure to intervene to close the gap between private and social returns has been identified as a major factor leading to unsustainable forest management (Richards 2000). As the global values of forests are increasingly recognised, incentives have been created for individual countries and/or forest managers to maintain these values. But the issue is rather complex. For example in some cases conservation actually provides more benefits than logging to the local forest dwellers, as the benefits of industrial logging accrue mainly to non-local actors (logging companies and the state) (Brown 2001). On the other hand conversion to agriculture may be more profitable to individual farmers than conservation, SFM or logging, especially as the mechanisms

for compensating the local inhabitants for maintaining the global benefits remain undeveloped (Kundhlande *et al.* 2000). Clearly some kind of more efficient financial incentives for forest users are needed for SFM to become viable. At the same time external donor funding has a role to play in institutional strengthening and developing an adequate regulatory framework for private sector and community forestry (Richards 2000).

Michael Richards (2000) has presented a framework for assessing the different new incentive mechanisms developed for supporting SFM (table 1). By incentive mechanisms we refer to those instruments and policy measures which attempt to modify the factors contributing to unsustainable forest management. The emphasis on this study will be on transfer payment mechanisms and market-based mechanisms on the international level, and property rights approach on the national level. International transfer payment refers to nonmarket transfer of financial resources from consumer to producer countries in compensation for maintaining the public good values of forests. A prominent example is the Global Environmental Facility (GEF), which is the main financing mechanism for FCCC and CBD. International market-based approaches focusing on public good benefits include forestry-based carbon offset trading and forest certification. These can include both public and/or private actors. In property rights approach the emphasis is on the domestic level, where ownership and use rights over forest resources are created, clarified and modified. A major constraint for the last type of approach is weak state capacity to establish clear property rights, and to administer and enforce them.

Table 1. Classification of the incentive mechanisms for SFM

Approach	Mainly domestic	Mainly international
Transfer payments approach	Fiscal market based instruments like ecological and differential land-use taxes	International transfer payments like GEF, national environmental funds and international taxes
Market-based approaches (public good benefits)	Water commodisation, ecotourism charges	Certification of forest products, carbon offset trading
Property rights approach	Community usufruct rights, overlapping property rights	Tradeable development rights, intellectual property rights

Source: Adapted from Richards 2000.

The control approach

The instruments for global environmental conservation, which were developed mainly in Europe and in the USA by the 1960s focuse on protection. They are based on a notion of equity adopted from international relations, which empasises the sovereign rights of each state to exploit resources within its jurisdiction and control, combined with rights to shared or common resources on first-come, first-served basis. Under this approach natural resource use can legitimately be controlled only in some narrowly focused areas of international trade. This has turned out to be a major weakness with respect to environmental issues, which are usually not geographically restricted within political boundaries.

CITES is a prime example of this kind of a focused conservation instrument. Its goal is: i) to monitor and stop international trade in endangered species; ii) to maintain those species under international commercial exploitation in an ecological balance; and iii) to assist countries towards a sustainable use of species through international trade. CITES parties regulate wildlife trade through controls and regulations on a limitd number of species listed in three appendices of the convention. At present some 34,000 species are listed in these appendices. Listing of species is based on proposals by parties and subsequent voting in the Conference of the Parties. International trade is regulated through a system of permits and certificates that are required before specimens of listed species can legally enter or leave a country. Each party must designate a management authority, which is responsible for issuing the permits and certificates based on the advice of a designated scientific authority. A CITES Secretariat (located in Geneva) interprets the convention provisions and services the parties and scientific advisory committees[7] (CITES, no date). CITES suffers from a chronical lack of funding, as the parties (the only source of funding) have failed to commit sufficient financial resources to implement and enforce the convention both domestically and internationally. Scientific research about endangered species and their habitats is also insufficient to define sustainable levels of use (Yale Center for International Law and Policy, no date).

Many stakeholders consider the species-by-species approach represented by CITES outdated, and call for its replacement by an ecosystemic approach to habitat conservation. There have also been various proposals to modernise its funding structure, scientific basis and enforcement mechanisms. However, except for the proposal to provide additional international funding and capacity building for the developing

[7] There are four scientific advisory committees: the Animals Committee, the Plants Committee, the Nomenclature Committee, and the Identification Manual Committee.

country members, the proposals tend to be incompatible with the strong definition of sovereignty favoured by the developing countries. The new proposals include increasing transparency of CITES implementation at the country level, granting NGOs and foreign nationals standing to press charges under civil statutes against illegal wildlife traders, creation of international or regional tribunals, use of conditional aid and trade sanctions against non-compliers, and market-oriented approaches like development of a CITES seal of approval to promote sustainable trade (Yale Center for International Law and Policy, no date; cf. Najam 2000).

The property rights approach

The traditional Western approach to natural resources management is based on sectoral differentiation, whereby different management objectives are seen as mutually incompatible. Thus nature conservation and timber production are considered as exclusive activities to be carried out in physically separate areas: conservation in specific protected areas and timber production in forest plantations. Local people and their subsistence needs are excluded from both. However, as a consequence of the emerging SFM discourse this approach has lost ground to the idea of multi-purpose use areas, which acknowledge the access rights of local people (Nummelin and Virtanen 2000). The new approach has two distinct premises: i) it is imperative to allow local people to participate in the management and share in the benefits of the local forest resources; and ii) every conservation or production activity implemented in lands managed as common property (even if formally state property) must contribute to the basic needs of the local people (Adams and Hulme 2001).

In Africa woodlands provide a host of goods and services, ranging from everyday items to sustain life, to cultural and spiritual values and ecological services. If the woodlands disappear or are severely degraded, or become inaccessible, local communities will bear much of the cost. Various studies have demonstrated that multi-purpose strategies can yield the greatest net benefit to all the user groups, if the complete range of products and services are included in the account. However, even though for example values of carbon sequestration in the woodlands are substantial, they are of the same order of magnitude as converting these lands to individually held agricultural land. In this kind of situation the lack of readily available mechanisms through which local dwellers and the state can be compensated for foregoing short-term gains in order to maintain the long-term global values creates a considerable impediment for SFM (Campbell *et al.* 2000; Kundhlane *et al.* 2000). Thus, in addition to local and/or national benefits from SFM, international incentive mechanisms are needed to make the proprty rights approach effective in environmental conservation.

A common cause for deforestation in Africa is *de facto* open-access regime of many forests and woodlands. In these situations the state is typically the owner but lacks the capacity to manage the resource sustainably, while community based regimes are absent or have already declined. In such cases overlapping property rights between the state, local communities and private sector can be considered. Property rights can be designed to allow private exploitation of forest products, while the state and local communities retain control and protection of public good services. By allocating user permits or lisences for different goods and services from the area under its control the community and/or state can access the income from marketable benefits. However, this approach requires the creation of a clear and transparent system for allocating use rights, investment in land-use planning, and strong regulation capacity by the state and the community organisations involved (Richards 2000). Support for national and local level implementation and capacity building is typically provided through bilateral development projects, but especially for institutional reform also through multilateral channels like UNDP, FAO and the UNEP regional programmes.

The transfer payment approach: the GEF

The principal international financial mechanism created for the implementation of CBD and FCCC is the Global Environmental Facility (GEF). It is a transfer payment mechanism for providing new, and additional, grant and concessional funding to meet the incremental costs of measures to achieve agreed global environmental benefits in the areas of biodiversity, climate change, international waters, and ozone layer depletion. In developing countries capacity building projects, national reporting and preparation of action plans can also be funded in total by GEF (Moura Costa *et al.* 1999). Land degradation (the main topic of CCD) was originally addressed in GEF only as a cross-cutting issue in relation to the four focal areas.[8] However, in 1996 the GEF Council adopted a framework document for GEF activities concerning land degradation, and in 1999 an action plan on land degradation was adopted. In 2001 the Council recommended its designation as a focal area (UNEP 2001).

The idea behind GEF is that by putting relatively small amounts to venture capital funds, GEF funds can generate several times more equity finance (Richards 2000). During the second additional funding period (1998–2001), total funding to GEF was USD 2,750 million (MFA).

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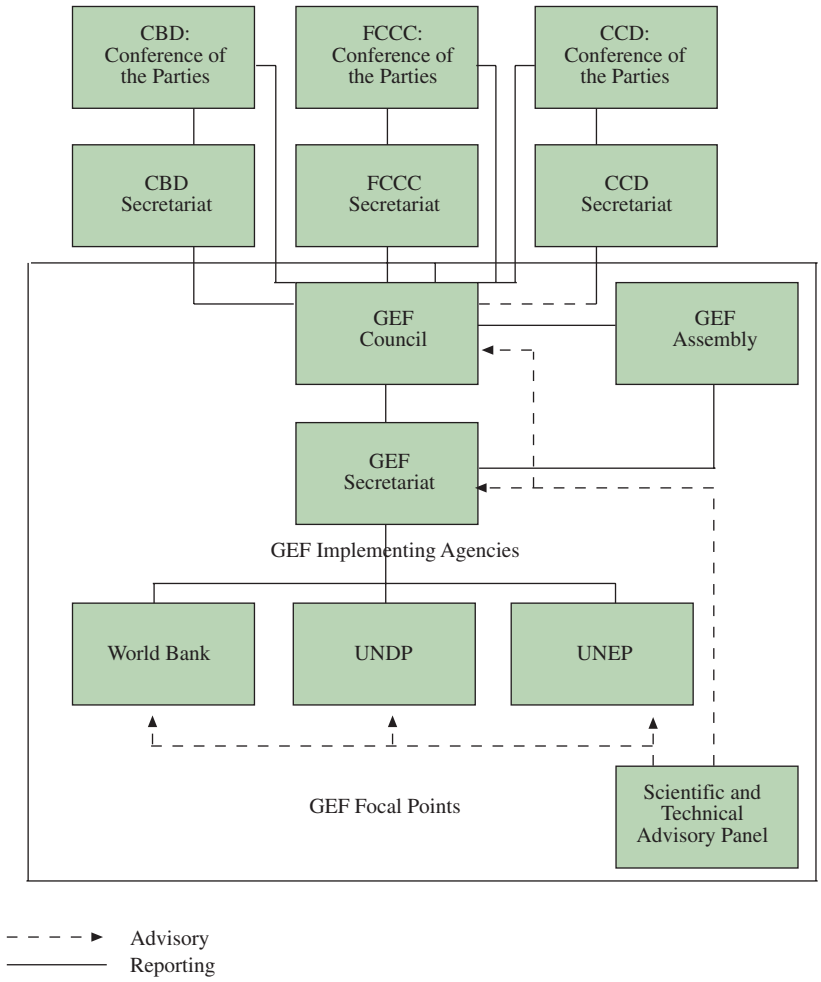
[8] Lack of efficient channels for international funding and/or lack of donor interest have been persistent problems with land degradation/desertification initiatives, including the 1977 Action plan (Timberlake 1986).

The GEF institutional structure is presented in figure 1. It comprises of an assembly, a council and a secretariat. The assembly consists of all participating countries (155 in 1999), and is reponsible for reviewing general policies. The council is the main governing body, and comprises representatives of 32 constituencies: 16 members from developing countries, 14 members from developed countries, and two from transitional economy countries. The secretariat services and reports to the assembly and the council. The GEF implementing agencies (the World Bank, UNDP and UNEP) are responsible for developing projects for GEF funding and implementing them through executing agencies. The World Bank serves also as the trustee for GEF (Moura Costa *et al.* 1999).

Figure 1. Organisational structure of the GEF



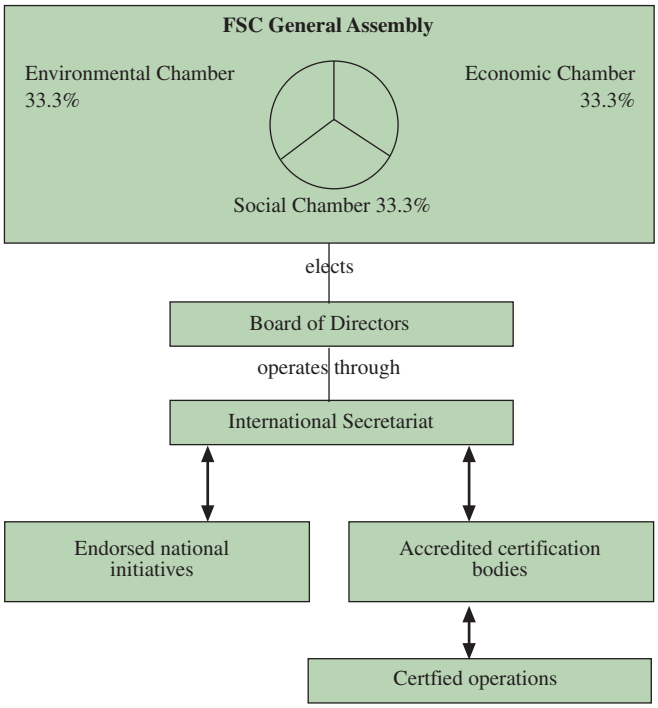
Source: Adapted from Moura Cost et al. 1999. The CCD will probably be included in 2002.

The GEF funds three types of activities: i) projects under ten long-term operational programmes (OP) defined in the operational strategy; ii) enabling activities (like compilation and assessment of existing country information, development of strategies and action plans); and iii) short-term response measures expected to yield immediate benefits at low costs. SFM is considered as one of the means to protect globally significant biodiversity. Forest ecosystems (OP3) is one of the ten operational programmes, and the main source of GEF funding to SFM. Other important sources include forest-related components under operational programmes for mountain ecosystems (OP4) and arid and semi-arid ecosystems (OP1). A new OP is being developed under the climate change focal area to cater for carbon sequestration (OP12). Also the UNDP managed small grants programme has financed a considerable number of SFM projects (Moura Costa *et al.* 1999). While GEF has been criticised for its heavy bureaucracy and nonparticipatory approach, the main criticism is linked to its character as a non market-based instrument. According to some critics this has prevented it from affecting user incentives, and thus from having any impact on the basic problem of market failure (Richards 2000).

Market-based mechanisms: the FSC framework

Along with the more traditional international transfer payment mechanisms, new market-based mechanisms like forest certification have attracted increasing attention during the last decade. In principle forest certfication seeks to harness market forces to provide an incentive for SFM by providing better access to markets and/or better value for the marketed product. The institutional foundations for internationally acknowledged, independent forest certification were laid in 1993, when representatives of environmental, economic and social organisations from all over the world founded the Forest Stewardship Council (FSC). It has three main roles: i) to endorse regional forest stewardship standards based on the international principles and agreed ecological, economic and social criteria; ii) to evaluate, accredit and monitor organisations providing certification services under the FSC framework; and iii) to provide information, education and training. The FSC does not itself certify products, but endorses the competence and monitors certification bodies, which inspect particular forests and woodlands to verify that they are managed according to an agreed set of principles and criteria (Burger 2000). Between 1995 and 2000 the FSC certified area increased from less than 800,000 ha to more than 18 million ha, while the share of southern hemisphere increased from 6 to13 per cent (Lindahl 2000). The organisational structure of the FSC is presented in figure 2.

Figure 2. The organisational structure of the FSC



Source: Lindahl 2000.

FSC is an open membership association with a general assembly as its highest organ. In the assembly membership voting is structured into three chambers to provide a balance between environmental, social and economic interests from the north and the south. The association works through an international secretariat which is located in Mexico (Lindahl 2000). It promotes the formation of national working groups, which draw up the national criteria and indicators that correspond to the specific ecological, social and economic conditions of each country. These groups must also include the three main interest groups/chambers represented by the private sector, social and environmental groups, which vote on an equal footing. The state is usually present as an observer (Burger 2000). The product of the consultative elements in the certification process is an agreed definition (within FSC principles and criteria, and national legislation) of how forests should be managed. It forms a binding contractual basis between the certifier and certified operation, but in many cases it has also more broad implications. For example in various Latin American countries the national cetification

debates and even individual forest certifications have contributed to policy and legal changes in support of SFM (Kruedener 2000).

Especially in countries whose governments have only a limited capacity to regulate forest use, the checks and balances provided by certification can offer more solid performance guarantees than state-centred systems. Under the transparent model of standards development and monitoring promoted by certification, a great deal of the control functions previously held by governments can be transferred to civil society and market constituencies. But widespread adoption of certification is difficult without a a legislative framework that encourages SFM, and in fact the synergetic relationship between certification and conventional regulation argues for a clear role for the government in the development of certification standards. Like regulation, certification needs also an institutional framework with all its associated costs to define standards, ensure compliance and undertake monitoring (Markopoulos 1999; Thornber *et al.* 1999).

National and regional certification initiatives have been supported by both multilateral and bilateral donors, as well as international NGOs. The EU development cooperation protocols and policies recognise regional, national and local capacity building in forest certification as one area of cooperation with APC-states. For example Africa relies on EU markets for more than 80 per cent of its tropical timber exports. Unless African countries can meet certified standards, they are likely to lose out as the markets increasingly reflect environmental and social concerns (EC 2001). Among bilateral donors especially the German GTZ and the British DFID have been active since the early 1990s. They have supported the preparation of certification standards and procedures for tropical forests, the production of inspection and training materials, documentation of certification costs, as well as research projects on the impacts of certification. The emphasis on research projects has been on small-scale, community-based enterprises in tropical countries (GTZ/IAC 2001; Markopoulos 1999). Another important source of external support has been the World Bank/WWF alliance, which has supported various regional and national certification initiatives. Certification has also been used by donors to demonstrate the achievement of SFM objectives in forestry projects supported by them (Thornber *et al.* 1999).

CDM – a new market-based approach?

The existing, still fragmentary information concerning the implementation and monitoring mechanisms for international trade on CO_2 sinks under the Clean Development Mechanism (CDM, clarified to some extent in the 2001 Marrakech Accords, cf. Anderson 2001) point toward some kind of a hybrid structure. It might combine some relevant elements of both the transfer payment and the market-based approaches described above.

In principle the CDM is a multilateral fund to finance GHG abatement measures and adaptation in developing countries through investments by industrialised countries. The emission targets of each developed country participant are fixed in the Kyoto Protocol. Under the CDM the developing countries (non-Annex 1 parties) can benefit from project activities resulting in certified emission reductions, while industrialised countries (Annex 1 parties) may use the certified emission reductions accruing from such project activities as partial fulfilment of their emission reduction commitments. In principle emission reductions resulting from each project shall be certified by operational entities defined by the Conference of Parties, and supervised by the the Executive Board of the CDM. Certified emissions must be based on: i) voluntary participation approved by the country concerned; ii) real, measurable and long-term mitigation benefits; and iii) emission reductions that are additional, i.e. would not have taken place without the project. According to most interpretations (e.g. Subak 2000) additionality means that CDM funding must be supplemetal to other sources of ODA. A share of the proceeds from CDM projects is used to cover administrative expenses, as well as to assist particularly vulnerable developing country parties (FCCC 1997).

The CDM has had a pilot phase, the Activities Implemented Jointly (AIJ) initiative. Like the CDM, AIJ provides a means for countries with higher marginal costs of emission reductions (developed countries) to reduce emissions in countries with lower marginal reduction costs. It has been promoted as a market-based mechanism to transfer technology and resources from the developed to the developing countries without increasing foreign debt. It also called for measurable emission abetements. Therefore the AIJ can be used to evaluate the prospects of the CDM. The pilot stage has indicated several bottlenecks in its wider usage, including a distorted geographical distribution of the projects and low participation of the private sector. However, the problems originating from the unfinished process of the Kyoto Protocol and undefined emission targets have reduced the initiative to realise the AIJ, and therefore the experience gained remains thin (Blanchard *et al.* 1997; IEA, no date).

One crucial issue concerning CDM is the role of the state vs. private sector and NGOs. One possible solution has been developed in Costa Rica, where the state has created a national carbon fund through which investors can buy 'certifiable and tradeable offsets' (CTO), which represent a certain amount of GHGs compensated for or reduced from atmosphere. The fund thus functions as a link between the investor and the individual projects to reduce emissions or compensate for them through sinks. In forestry sector the funds are mainly channelled through an additional government structure, the national forest fund which works through projects in reforestation, sustainable forest management, and forest conservation. Private landowners sign a contract with the government to maintain specific land use for plantations, forest magament or forest protection systems for a certain period in return for a set payment.

This has meant a fundamental change in Costa Rican forest policy: instead of paying subsidies the government now has a central role in economic valorisation of the environmental services provided by the forests. At the same time the new modality reinforces national sovereignty. Unlike the traditional host-sponsor relationship, the GHG reductions are certified domestically and traded internationally as a commodity. This far the main international client has been Norway, while a substantial part of national funding comes from a fuel tax (Subak 2000; Vicente 2000).

Another pilot initiative is the World Bank administered Prototype Carbon Fund (PCF), which was established in 1998 to finance such renewable energy and forestry projects in developing and transition economy countries, which fulfil the conditions of the Kyoto Protocol flexibility mechanisms. In the PCF system investors (both governments and private enterpises are eligible) get bonds which can be used to fulfil the requirements for reducing GHG emissions. The required investment is USD 10 million for governments, and USD 5 million for private sector. Finland has participated since 1999; other participants include Sweden, Norway, the Netherlands, Canada, Japan and 17 private companies including Fortum from Finland (MFA; Moura Costa *et al.* 1999).

The efficiency of such a mixture of market initiatives, environmental values and government activities is a riddle so far. At the moment the private sector remains hesitant while the governments, at least in the EU, try to persuade the companies to go ahead with the emission trade.

3. International trade regimes, multinational environmental agreements and market-based mechanisms at the global level

3.1 The World Trade Organisation and environment

Broadly speaking, the issue of international trade and global nature conservation is dealing with the interaction between international trade and international environmental regimes. They form a system of environmental governance where the interplay of different forces such as governmental state interests, non-governmental movements and organisations, and business interests have a central role. The environmental and trade regimes are areas where both functional needs and maintenance

of state sovereignty are dominating trends. They create the basic latent and open conflicts in international environmental and trade negotiations.

When dealing with environmental conservation, this relationship poses several questions: Is it possible to regulate environmental and global change by taking advance of the trade regime? How should the possible contradictions between different kinds of regimes be resolved? Do the market-based mechanisms offer any kind of solutions for forest management in developing countries such as Mozambique?

The relation between trade and environmental regimes is highly disproportionate. The international trade regime is mainly focused on the World Trade Organisation (WTO), whereas the environmental regime is scattered into different multilateral environmental conventions and agreements as well as different non-governmental mechanisms. There are regional organisations focused on trade, and there are specific producer organisations which evidently regulate supply and demand in particular regions and on specific products. However, when global trade is concerned, the general regulation mechanism is based on the agreements made under the GATT rounds and the WTO.

There are other important distinctions between these two regimes. While the trade regime is based on the philosophy of economic liberalism and free trade, it has also rather exact rules and structured dispute solving mechanisms. On the other hand, the MEAs (except for CITES) are operating on much more general levels and rules. The Clean Development Mechanism (CDM) included in the Kyoto Protocol is the only other case in which more sophisticated procedures are developed. However, these have not been put into practise yet. As no comprehensive arrangements exist in global environmental regime, certain non-governmental mechanisms – basically environmental certification schemes – have developed more exact rules for nature and environmental conservation, that reach the same kind of exactness as the WTO rules.

Nevertheless, there are similar characteristics in the trade and environmental regimes. The WTO consist of multilateral trade agreements, most of which are made during different GATT rounds. The MEAs are signed largely by the same governments. Therefore there should not be great contradictions between these two types of agreements. Neither the WTO nor the MEAs form supranational organisations, but they are a group of agreements reached through consensus-based intergovernmental bargaining.

The WTO ideology and main organs

Even though the WTO is not a global trade regime as such, the crucial role it plays in the world trade regulation evidently justifies its examination as a main component in this regime. Several elements emphasise its role and the importance of the whole global

trade regime: i) its scope; ii) the underlying ideology and WTO policy; and iii) its dispute settlement mechanisms.

The WTO includes 144 countries (January 2002) which have signed the agreements negotiated during the GATT rounds and after the establishment of the WTO itself. After the accession of China in 2001, it includes all the the world's main trading countries except Russia.

From the point of view of WTO's authority, equally important to its scope is the underlying ideology which is broadly accepted by its members. It would be erroneous to claim, however, that the ideology of economic liberalism as such is the driving force why the countries have joined first to the GATT agreements and to the WTO. It is rather that the countries want to take advantage of global trade and to support their own exports. Therefore they have compromised to agree on some treaties which probably harm their intentions to protect their own domestic markets. The agreements are the results of negotiations where the countries weight their benefits/losses to remove the barriers of trade. Therefore it is the policy of the WTO – to remove all kind of trade barriers – which is broadly accepted by its member governments, and not the ideology as such – economic liberalism – that solidifies the organisation and gives its authority in the global trade regime.

The third element, the dispute settlement body (DSB), makes the WTO unique among the international organisations. Although the WTO has no instruments to implement its resolutions, the decisions of the dispute settlement body justify its members to reciprocal actions against a member who has broken the WTO rules. According to an environmentalist point of view, this mechanism has been the main challenge to nature conservation in the organisation.

Interestingly enough, in the environment-related trade disputes the complainant or the complainants have usually been developing countries, which have brought the legitimacy of an environmentally justified trade barrier imposed by a developed country to the WTO. Therefore, this intergovernmental institution has served their interests and sovereignty against the legislation enacted in a developed country. In fact, there have been rather few environment-related trade disputes which have been dealt by the DSB. Nevertheless, in all the cases where the trade barriers have been set in order to conserve nature, the DSB's stance has been negative. Therefore it has been in the focus of criticism of both environmental and anti-global movements.

Environment has not been the most important issue in the WTO, although environmental concerns were presented when it was established in 1995. However, there were some issues which forced the trade organisation to tackle with environmental concerns. First, the possible contradiction between the MEAs made in the early 1990s and their compatibility with WTO rules created the discussion on environmental conservation and trade rules. This called for anticipation on the scope of the trade

rules. Secondly, the tendency of the developed countries to connect the environmental issues to trade negotiations owing to the pressure of environmental movements has forced the WTO to tackle with this reality. And finally, private environmental certification schemes are penetrating into the international trade, whether or not the WTO wants to deal with the environmental certification issues.

Aside from the DSB, there are two other organs in the WTO which have an important role when dealing with trade and environment. The Committee on Trade and Environment (CTE) was established in 1995 following the Uruguay Round Decision on Trade and Environment in 1994. Its mandate was defined as "to identify the relationship between trade measures and environmental measures in order to promote sustainable development;" and "to make appropriate recommendations on whether any modifications of the provisions of the multilateral trading system are required, compatible with the open, equitable and non-discriminatory nature of the system" (WTO, no date).

However, perhaps even more crucial for trade and environment issues is the Committee on Technical Barriers to Trade (CTBT) which is serving WTO's main task of facilitating global trade. The issues that are tackled in the CTBT deal with the compatibility of the rule systems of different MEAs and the WTO, as well as unilateral restrictions on trade justified by environmental protection.

The WTO principles and environmentally related trade barriers

In order to implement its policy, the WTO has two principles to promote international trade and the removal of trade barriers: i) non-discrimination means that the regulations, tariffs and other barriers of trade do not give a favourable position to the importer country's producers; and ii) transparency means that the regulations laid by every importer country are available and distributed through the WTO channels to all producers. However, among these general principles there are more specific principles which are relevant from the point of view of nature conservation. These are the WTO's negative stance to certification based on the production process, and the requirement for the proof of harm to environment, health or hygiene of a given product. The last one was a result of the Agreement on the Application of Sanitary and Phytosanitary Measures (the SPS Agreement), which aims to ensure that strict health and safety regulations are not being used as an excuse for protecting domestic producers. The treaty was originally directed to regulate the trade of agricultural products (WTO 1998).

The possible rifts between the interpretations of the MEAs and the WTO regulations were in the background for the establishment of the Committee of Trade and Environment, although the CTBT has occupied a critical role in this, too. Two considerations are of particular interest. The first case is when two WTO member

states fall into trade dispute in which the other member justifies trade barriers according to a certain MEA. Secondly, how to deal with the issue where a WTO member, which is not part of a MEA, brings an action against a WTO and MEA member who has used trade barriers justified by this MEA.

Even though these issues have remained largely theoretical, as there has been no real dispute in which the interpretations of the WTO rules and MEAs have collided, a lot of deliberation on these possibilities has been done in the CTE. For the first case, the Committee has taken a stance according to which the more accurate rules and more exact agreement should be obeyed. Accordingly in possible dispute cases the WTO rules should be kept, due to more general character of the environmental agreements. Similarly in the case when two WTO members – but only one of them has signed the MEA – have a dispute over the application of the MEA, the WTO rules should be obeyed, owing to the fact that both parties are under the WTO legislation. Apparently, therefore, the WTO rules have more weight on the issues of trade and environment than the MEAs.

The situation differs to some extent when environmental certification is considered. First, the discussion on environmental certification schemes is held mostly at the CTBT. Secondly, the situation differs drastically depending on whether the question is of compulsory labelling issued by a WTO member government, or of private and voluntary labelling established by non-governmental bodies.

The fact that compulsory environmental labelling is acting at the same time as a barrier to trade is the reason why certification is tackled mostly at the CTBT. There is no rule in the WTO that prohibits compulsory labelling, although the CTBT stance on it is very reserved and the decisions made by the DSB, negative. Hence, the principle of non-discrimination is crucial. Environmental labelling can be based on the consequences caused by the process and production mechanism (PPM), or on the environmental harm caused by the final product (or the materials and components of the product). The WTO refers to two principles. So far, labelling based on PPM has been considered at the CTB as a barrier to trade and against the WTO rules. The WTO argument is that any member government can set domestic environmental standards to production. However, there cannot be a compulsory environmental standard which is covering imported goods and materials, because this can be considered a trade barrier for imports as the conditions of production can vary remarkably in different countries. Therefore the principle of non-discrimination occupies a central position in the DSB reasoning against compulsory environmental certification.

The other principle is the requirement to prove in a scientific way that uncertified products cause environmental harm. This efficiently hinders the use of compulsory certification. Similarly the SPS Agreement suggests that the advantages of substituting material have to be proved in order to show that the environmental certification is not

an artificial barrier for trade. Both of these principles do not encourage to develop a compulsory environmental labelling system.

The situation is rather different when we are speaking of voluntary and private environmental certification schemes. These schemes are based on consumers' environmental awareness and their consumption decisions. Therefore these schemes compete at the market and try to convince the consumers. As the WTO agreements are made by the governments, the private environmental labelling is outside of the WTO regulations. In the WTO there is a fear that different kinds of schemes can deviate the competition and a lot of discussion on environmental labelling is held particularly at the CTBT. The WTO suggests that its members should adopt common standards, particularly those of the ISO in order not to confuse the premises of free competition.

3.2 Global environmental regulation, trade rules and the question of sovereignty

There are certain MEAs that concern directly forest management and the trade of forest products in the developing countries. Accordingly, these MEAs have been in special concern of tropical timber producers. Particularly one of the largest and the most extensive conservation agreements in existence, the CITES can put limits to the trade in timber and other forest products, as well as to forest management. The convention is intergovernmental and it covers "varying degrees of protection to more than 30,000 species of animals and plants, whether they are traded as live specimens, fur coats or dried herbs"(CITES, no date). Therefore there is an obvious, or at least a latent conflict between the exploitation of tropical forests and the purposes of this treaty. In the trade issues, the fact that the prohibited species are exactly defined and scientifically justified makes it more binding than the WTO regulations.

However, if trade barriers are set to other products in order to protect species (or their habitats) defined in the CITES, the WTO rules are stronger. In the beginning of the 1990s Austria tried to impose an unilateral trade restriction concerning the importation of tropical timber and timber products, referring to unsustainable harvesting and its damages to biodiversity and to the specifies listed at the CITES. It passed a law setting a specific tariff on tropical timber products unless the timber was proven to be produced according to the acknowledged SFM practises. Hence, together with the tariff Austria developed the first (and so far only) compulsory labelling scheme on timber products.

Austrian policy proved to be short-lived. The tropical timber exporting countries – mainly those of Southeast Asia – complained to ITTO and to the GATT on

discriminatory tariff barriers. The Austrian tariffs obviously gave a better position to domestic timber in the Austrian market. It violated thus the GATT principle of non-discrimination, and the labelling was also in conflic with GATT's negative stance toward production process based standardisation. Austria gave up on this policy after the apparent negative stance and sanctions of the GATT.

In practical situations, it seems obvious that the GATT and WTO regulations step over the spirit of the MEAs. There are, however, recent WTO decisions on trade and environment where the environmental concerns and trade restrictions based on environmental conservation have received more understanding from the DSB. These recent decisions of the WTO indicate that even if not rejecting the non-discriminatory principle, it is now accepting environmentally justified product process based trade restrictions. The United States' sea turtle law, which reflects to environmentalist the WTO's attitude to exploitation of nature, has met with more sympathy in the third decision of the DSB (DeSombre and Barkin 2002).

World trade legislation is the outcome of sovereign nation-state bargaining, and therefore the trade principles have gained strength over other considerations. The principle of non-discrimination reflects the emphasis on sovereignty, that the developing countries want to preserve in the realisation of their economic development.

Trade rules and certification

The principle of national sovereignty is carefully included in the MEAs. However, new market based mechanisms sometimes overcome this cautiously preserved principle of sovereignty. For example, green labelling schemes shake national authority in environmental issues and in some cases in broader political spheres. There are, of course, differences between certification schemes. As the WTO has recognised the ISO standardisation, the ISO 14000 series for the certification of environmental management systems is therefore accepted by the WTO member governments. This is possible because of the technical nature of the ISO approaches, which are not considered as a threat to national authorities. The situation is different with FSC certification, which is now the most rapidly spreading international environmental certification system.

The attempt of Malaysian authorities to prevent the spread of the FSC forest certification scheme in the USA is illustrative. The FSC certification criteria deal also with social issues, which include the rights of indigenous people. Therefore, when the government's interests in exploiting tropical forests and the interests of local people are in contradiction, the interference of a labelling scheme coming from developed countries is particularly irksome to developing countries. Thus Malaysia, acting together with other ASEAN countries, resolutely resisted environmental certification in the

GATT and in the WTO during the early 1990s by referring to national sovereignty. This policy gained results in Austria's forest certification case. However, there is no such arena to oppose non-governmental environmental labelling as with compulsory certification. When California's state authorities decided to purchase only products with FSC certification, Malaysia started a diplomatic move to postpone this decision and to prevent similar ones in the future (Palmujoki 2001).

In fact, when referring to earlier WTO decisions, Malaysia's claim would have been legitimate, if the authorities were the US central government. However, in this case the authorities who decided on the purchases were at the state level. This made the issue more complicated to the Malaysians. At least the reading of the verdict would have been much longer than in a normal WTO case. Therefore the Malaysian timber producers together with the government presented Malaysia's own timber certification scheme, and in the end, started to seek the FSC's approval for it (Palmujoki 2001).

The FSC case shows the power of a private environmental certification scheme against a developing country in a situation where certain eco-labels have gained enough popularity in the developed countries. There are critical issues in the FSC scheme, which question national sovereignty in the traditional sense, and which stand out in relief in the Malaysian case. First, the whole scheme is strongly value laden. On the background of the FSC approach are not only environmental movements in a strict sense, but the new political movements in Europe and North America. They promote not only environmental values, but also democracy, human rights and the rights of indigenous people. Secondly, where the ISO approach to certification is used, the focus is on the enterprise and its environmental management system. In the FSC approach the main concern is paid to the impact of the enterprise on outside groups, and to broader environmental impacts. This focus as such means that the FSC wants to move to the spheres which traditionally belong to a government's authority. Finally, when the FSC practise of external certifiers in every phase of the chain of custody is added, there is not much left of government authority in forest issues (Bass, no date).

In Asia, Africa and Latin America the social criteria and their monitoring signify clear interference in the traditional sphere of government authorities. In the North where these criteria are mainly developed, the social conditions and forest management standards required by certification do not differ to a great extent from the prevailing conditions. The existing monitoring and control systems in the North are based on the sovereignty of national bodies, because the audit criteria are established in national management plans based on national legislation. Even the auditing bodies are usually the competent public bodies. In the FSC scheme, and in the model largely adopted by ITTO, forest management is based on international criteria and indicators moulded by national working groups. Together with the basic criteria and indicators which are set from outside, the auditing bodies can be (as in the FSC model) foreign and definitely

non-governmental (Appanah and Kleine 2000). In this context the sovereignty issue concerns practically only the developing countries.[9]

The coverage of private certification schemes is far from comprehensive when all the forest exploitation is considered. So far, the spread of these schemes is at an initial stage in the developing countries, while the main portion of FSC certified forests are in developed countries. There is still considerable demand for non-certified wood in domestic consumption, as well as in Asia's import markets. Nevertheless, developing countries have had to rethink their claim on absolute sovereignty. Environmental certification is increasingly gaining strength in tropical timber trade, and most probably this development will continue. Therefore developing countries are encouraged to take proactive stand to environmental certification in order to influence certification schemes (Najam 2000).

In fact, a number of national and regional certification schemes have emerged in the developing countries. Together with Malaysia, Indonesia, Bolivia, Brazil and Ghana have introduced their certification schemes. They follow the criteria of international certification schemes, such as the FSC, ISO and the criteria developed by ITTO. The last one is an important framework for the third world forest certification schemes. It covers the major part of tropical timber trade streams (95 % of all global trade) and a major part of tropical forests (75 %). The participation of developing countries in the organisation is remarkable. The fact that it provides a forum for consultation to promote non-discriminatory timber trade practices emphasises its importance for the producer countries. Therefore its endeavour to develop the criteria of sustainable forest management are supported by the developing countries. Interestingly enough, the ITTO criteria and indicators follow those of the FSC. This includes the participation of local communities, the preservation of forest ecosystem condition, and the conservation of biological diversity. The ITTO model, which it strongly suggests to its members, indicates that the tropical timber producers have accepted the idea of environmentally justified product certification (ITTC 2001). This questions the WTO principle of opposing process based certification.

Nevertheless, the ITTO criteria and indicators is not a certification scheme, for it only makes a reference to issues which should be certified if a certification scheme is adopted. It provides also the format how its member countries should report on their forest management to ITTO. This is in striking difference to the FSC: ITTO reporting is based on two levels, the forest management unit level and the national level, of

[9] See the responses of Ruth Nessbaum and Hannah Scrase to Jean-Pierre Kiekens. *TWPI –Bulletin*, Sept. 26, 1999.

which the national level is responsible to ITTO.[10] As the national level is crucial, the ITTO activities are based on national sovereignty. The issue is how credible the national certification schemes of the developing countries based on the ITTO criteria and indictaors are for the consumers in the North. So far, the FSC seems to be the only broadly accepted international scheme.

3.3 Trading in the global commons: the Clean Development Mechanism

In the Kyoto Protocol there is an interesting possibility to integrate market-based SFM efforts and national authority. As noted above (chapter 2) the point of departure is that the tropical forests are needed to absorb the world's GHG emissions, and therefore SFM issues are important in controlling climate change. The common point with different forest certification schemes discussed above is, that the mechanisms proposed by the FCCC call for certification organs and criteria for the SFM projects. In this context the composition of the international monitoring body (especially the expert review teams which will assess each country's compliance with reporting commitments, and whether the country has met its targets) has become the subject of political dispute. The northern countries have advocated selection of team members primarily on technical knowledge criteria, while the southern countries have demanded equitable geographical representation. The Marrakech Accords represent a compromise between these two positions (Anderson 2001).

From an ethical point of view the developing countries have consistently argued that it is unjust for the industrialised countries to push the burden of emission reduction to others under the pretext of cost-effectiveness. A significant number of developing countries view the promotion of forest-sinks as an attempt to create yet another technical loophole in the implementation of the emission reduction obligations by the Annex-1 countries. It is in this context that they have also resisted joint implementation between the developed and the developing countries, if the condition is that this creates emission credits in favour of the developed country partner (Blanchard *et al.* 1997; Mwandosya 2000). These considerations are also shared by a number of Northern environmental NGOs, with an added concern for the rights of the rural poor and

[10] See *ITTO Criteria and Indicators for Sustainable Management of Natural Tropical Forests – Reporting Questionnaire for Indicators at the Forest Management Unit Level*, and *ITTO Criteria and Indicators for Sustainable Management of Natural Tropical Forests – Reporting Questionnaire for Indicators at the National Level*.

indigenous communities (Lohmann 1999). The validity of comparative advantage calculations has also been disputed on economic grounds (Blanchard *et al.* 1997).

The developing countries' point of view can be supported by comparative data, for there is convincing proof that affluence is a critical determinant of environmental degradation. High rates of economic activity are associated with high demand of energy and raw materials, and the release of wastes. Per capita GDP and emissions of carbon dioxide are strongly connected: in 1990 the CO_2 emission calculated per GDP were about the same in developed and developing countries. However, there are also important differences among the groups, and for example in North America the carbon dioxide emissions per capita are double the emissions in Europe and Japan (Cleveland *et al.* 2000; Savolainen 2000). Table 2 shows the total emissions of CO_2, emissions per capita and emissions per GDP in developed and developing countries in 1990.

Table 2. Total emissions of CO_2, emissions per capita and per GDP in developed and developing countries in 1990

	CO_2 emission (million tons)	CO_2 per capita per year (tons)	CO_2 per 1000 USD (tons)
Developed countries	14,900	11.9	0.86
Developing countries	6,880	1.7	0.85
World	21,780	4.2	0.85

Source: Savolainen 2000.

In the 1997 preparatory meeting the Africa Group of Nations proposed the definition of emission rights on per capita basis (Karamanzira 1997). However, up to 1997 the most strict line on the 'historical responsibility' of Annex-1 countries was presented by Brazil, which demanded that these countries must reduce emissions of all GHGs by 30 per cent by the year 2020. In a proposal submitted in 1997 Brazil outlines a methodology for defining the anthropogenic emissions by sources and linking them with the sinks, in order to establish objective criteria for allocating the burden of emission reduction according to each country's historical contribution to climate change. Such parties which fail to meet the required target would be obliged to contribute to a clean development fund, to be created for financing mitigation and adaptation projects in non-Annex-1 countries. The fund would be managed by the financial mechanism of the FCCC, and the resources would be distributed in proportion to each country's relative contribution to the mitigation process. This proposal gained the support of the 'G77 and China' group – which represented the majority of developing countries – despite its incompatibility with the group's policy to reject any

mechanisms for tying non-Annex-1 countries to emission reductions. This was because the proposal represented a new approach which had a potential for breaking the political deadlock threatening the whole process (Blanchard *et al.* 1997; Mwandosya 2000).

The Brazilian proposal formed the basis for the development of the present Clean Development Mechanism (CDM), which represents the main channel whereby the developing countries are linked to the Kyoto Protocol implemetation. The role of private sector vs. government institutions in the implementation of CDM is yet to be clarified, but the developing countries have insisted on a strong role for the latter. Thus capacity building at the national level is a crucial issue to them. For the implementation of CDM projects a sound legal and regulatory framework must be in place to deal with registration and monitoring of projects, and certification of emission reduction. Creating and maintaining such a system in a developing country will involve a relatively high cost, even if it is based partly on existing institutions (Mwandosya 2000).

However, it should be noted that the interests of developing countries are divided with regard to FCCC. There are various sub-groups, such as the oil-producing countries, coal-producing countries, the newly-industrialised countries, and those countries which are especially vulnerable to the effects of climate change (e.g. small island states). These geographical and economic conditions have divided the developing countries over various issues, and have made the maintenance of a common stand problematic (Blanchard *et al.* 1997).

The interests of different stakeholders within developing countries are also divergent. In Brazil a group of NGOs representing different stakeholders especially from the Amazon region published in 1998 a letter, which emphasised a holistic view about the climate change issue. Advocating a point of view which differs somewhat from the official government policy, they underlined the need to consider the other SFM issues, such as conservation of biodiversity and recognition of the rights of traditional and indigenous peoples, along with the protection of forests as carbon sinks. In this contexts they emphasised such objectives as combat of deforestation and forest fires, and support to new institutional approaches to forest conservation like the extractive reserves (Carta de Brasília 2000; Langer 2000). With its qualified support to CDM as an additional mechanism for financing SFM, the group has also drawn attention to the marginal role of CDM in the FCCC framework. This is interpreted as a reflection of the dismal value placed on the whole issue of deforestation.

With regard to the WTO policy the FCCC presents two problems. On the one hand it rejects explicitly the necessity of undisputed scientific grounds as a precondition for measures to mitigate the effects of climate change (FCCC 1997), and on the other hand it is likely to provide a sufficiently sophisticated technical and methodological framework to overcome the specificity of WTO regulations (Anderson 2001). As the mechanism is not yet operational, it is too early to say how these issues will be handled.

4. International conventions and SFM in Mozambique

4.1 Poverty alleviation and SFM

In recent years the objective of alleviating poverty and sustaining growth through sound and equitable management of the environment has become widely accepted by the main international organisations, such as UNDP, OECD, EC and the World Bank. In this context poverty is viewed as encompassing both income and non-income dimensions of deprivation – including lack of income and other material means; lack of access to basic social services such as education, health and safe water; lack of personal security; and lack of empowerment to participate in the political process and in decisions that influence one's life. Environment refers to the biophysical environment as provider of goods and ecosystem services utilised for food production, energy and as raw material; and an important source of recreation, spiritual values and other amenities (OECD 2001; Steele *et al.* 2002). In Southern Africa forests provide a major share of these goods and services (Clarke *et al.* 1996).

Poor people in rural areas are especially affected by natural resource degradation because of their limited assets and their relatively great dependence on such resources, usually managed as common property. For example one study in rural Zimbabwe found that about 35 per cent of average total income came from freely provided environmental goods, while the respective share was over 40 per cent amongst the poorest quintile of the population (Cavendish 2000). Resource mismanagement and environmental degradation can exacerbate the frequency and impact of droughts, floods, forest fires and other natural hazards, and can intensify competition and the potential for conflict over access to shared resources. The frequency, intensity and duration of extreme weather events is likely to increase further as a result of climate change. The poor are most vulnerable to environmental hazards and environment-related conflict, and they suffer the greatest losses in relative terms (Steele *et al.* 2002).

Property rights to resources such as land, forest and trees play a fundamental role in the poverty-environment nexus. Property rights encompass a diverse set of tenure rules and other aspects of resource access and use, and govern the patterns of natural resource management. For poor people access rights to forest resources represent key household and community assets that may provide income opportunities, the ability to meet essential household subsistence needs, and/or provide a means of insurance against livelihood risks. The poor also tend to rely heavily on customary or informal rights. Uncertain ownership conditions can affect long-term agricultural productivity and incentives for resource conservation and investment, and can especially cause rapid

deterioration of lands and natural resources when the owner tries to squeeze out the maximum revenue during a short period (Matose and Wily 1996; Steele et al. 2002).

To strengthen the access rights of the local communities, it is necessary to address and reform a wide range of policies and institutions responsible for natural resource management. These include central government agencies, local government and the justice system. However, the emphasis is increasingly on devolution of management powers to local community institutions, including traditional authorities where appropriate. In some areas indigenous cultural institutions like traditionally protected forests have been found to be a cost-effective way to enforce conservation (Nummelin and Virtanen 2000).

Different social groups prioritise different environmental issues. Marginalised users, such as poor women, often lose out as a result of policies and processes whereby land is appropriated by the state or privatised. Even new Joint Forest Management regimes have, by unifying and simplifying the previous complex bundle of rights based on customary norms, created strongly male-centered tenure systems. Women are also disproportionately affected by natural resource degradation. The impact is seen in increased time, physical burden and personal risk that women face in having to travel greater distances and enter into forbidden areas in order to collect fuel, fodder and water. This reduces the time spent on income-generating activities, crop-production, and household and child-rearing responsibilities (Agarwal 1997; Steele *et al.* 2002).

Poverty alleviation is the first among the three main goals of Finland's development co-operation. The other two are to combat environmental threats and to promote social equality, democracy and human rights (MFA 1996). Essentially the same main goals are also included among the eight 'millenium development goals' identified by the UN, IMF, OECD and the World Bank secretariats (Faure 2002). In the 1990s there has been a significant shift in the policies and practices of Finnish development aid towards socially just and environmentally sustainable development, with increased emphasis on participation and ownership. The composition of the country programmes (including that of Mozambique) has also been changing in the past few years away from capital development sectors towards the environment, women, democracy, good governance, education, and health. The multilateral division of MFA has also been a systematic promoter of pro-poor reforms in the UN and the development banks (Soil and Water 2002; Voipio 1998).

At the 1995 World Summit for Social Development, governments committed themselves to developing more explicitly pro-poor policy frameworks through the preparation and strengthening of national strategies to reduce poverty. In 1999 the IMF made Poverty Reduction Strategy Papers (PRSP) the basis for debt forgiveness and new concessional lending. The PRSP process provides a critical entry point for integrating relevant poverty-environment issues and ways to tackle them into a country's

mainstream national planning framework (Steele *et al.* 2002). In Mozambique the first poverty reduction strategy was formulated already in 1995, and in 1996–1997 the Ministry of Planning and Finance organised the first national poverty assessment. An interim PRSP was prepared for the period 2000–2004, and submitted to the relevant Bretton Woods institutions in 2000 (Soil and Water 2002). This interim document was subsequently developed into a full PRSP (2001–2005). The public action strategy of the PRSP emphasises economic growth, but acknowledges that this requires public investment in human capital, productive infrastructure and institutional reform. On the other hand environment has been given a relatively low priority in the present PRSP (Government of Mozambique 2001).

4.2 The use and management of natural resources in Mozambique

Mozambique occupies a land area of 784 755 km^2 on the southeastern seaboard of Africa from the latitude 10°30'S in the north to 26°49'S in the south. It is bounded by Tanzania in the north, Malawi, Zambia, Zimbabwe, South Africa and Swaziland in the west and south, and by the Indian Ocean in the east (Hatton 1997). With an estimated population of 17 million in 1999 it is the fourth most populous of the 14 member states of the SADC. With regard to human development, the index used by UNDP places Mozambique (with a HDI value of 0.341) in the bottom position among the SADC countries. The situation is further aggravated by unequal distribution of wealth within the country. While the HDI in Maputo city (0,669) is comparable to that of relatively wealthy African countries like Botswana and Egypt, it is 2–3 times greater than that of the rest of the south or other regions. In the north and centre life expectancy is around 40 years, while in the south it is close to 50 years, and in Maputo about 58 years (UNDP 2000).

The average per capita income in 1999 was about USD 134 per year, which was among the ten lowest in the world (Mansur and Cuco 2002). According to recent estimates nearly 70 per cent of the population live below the poverty line, and more than 80 per cent of the poor are located in rural areas. In Mozambique poverty is predominantly a rural phenomenon (Ribeiro 2001). In 1997 the rate of adult litearcy was 40 per cent, but only 28 per cent of the Mozambicans living in the countryside were literate, as agaist 65 per cent in the urban areas. Only about 22 per cent of all Mozambicans had finished some education level, and in the rural areas the rate of attendance at secondary education is just over one per cent (UNDP 2000).

More than 70 per cent of the population live in the rural areas, and over 90 per cent of the rural dwellers depend directly on natural resources for food, shelter and income. Some 94 per cent of rural, and even 61 per cent of urban families live in huts made of

local materials. In the late 1990s up to 80 per cent of the population used wildlife meat and fish as their principal source of animal protein, and wood still supplies more than 80 per cent of Mozambique's energy demands. The majority of the rural people derive their livelihood exclusively from the land, but less than ten per cent use some kind of equipment beyond the most basic tools (like hoe) to cultivate the land (Ribeiro 2001). As the overall population density remains relatively low (21 hab./km^2), only about five per cent (3.6 million ha) of the land area was cultivated in 1994 (FAO 1995). Estimates of cultivable land vary from 18 to 36 million ha (Addison and McDonald 1995, FAO 1995). About 78 per cent (62 million ha) of the country's total land area is covered by forests and woodlands, which are composed of wooded savannah (over 40 million ha), open forest (miombo, about 15 million ha), dense forest (5 million ha, mainly in the central and northern parts of the country), and mangrove (400 000 ha along the coastal strip) (DNFFB 2000).

Out of the total forest/woodland area nearly 80 per cent (48 million ha) is considered to have good potential for forest and wildlife management, including some 20 million ha of medium to high density forests with potential for commercial production (Mansur and Cuco 2002). These forests contain about 500 million m^3 of timber (over 25 cm in diameter), including over 68 million m^3 of timber with recognised commercial value (Saket 1994). There is also a relatively modest area (28,000 ha) of forest plantations, mainly *Pinus*, *Eucalyptus* and *Casuarina* species.

Between 1972 and 1990, the annual rate of deforestation in Mozambique was estimated at 0.23 per cent. The process was very uneven, approaching total destruction in some localised areas where the internally displaced population concentrated, while at the other extreme some areas reverted to bush conditions due to population exodus caused by the civil war (1977–1992). For example in Maputo Province the deforestation rate for the whole period was nearly 20 per cent, while the national average was 4.3 per cent and the lowest rate was 1.4 per cent in Niassa Province (Saket 1994; Alves and Sousa 1987). According to FAO the average annual change in forest cover in Mozambique decreased to 0.21 per cent in the period 1990–2000. This is below the world average (0.24%), and considerably lower than the average for Africa (0.78%) (FAO 2000). However, it should be noted that these figures hide the effects of selective logging, which is quite common in Mozambique.

Deforestation is caused by various factors, including soil erosion, fire, and over-pasturing (which diminish the regeneration capacity); shifting cultivation and opening of more permanent fields; and finally unsustainable logging and production of poles, firewood and charcoal. Generally extraction of non-wood forest products like wild fruits, mushrooms, honey, edible insects, fibres, resins, and medicinal plants is not a main cause for deforestation. However, some practices like debarking (for beehives and fibre) and felling of entire trees to obtain honey or edible insects, can have a major

impact locally. Uncontrolled hunting poses a serious threat to wildlife, and in densely populated areas close to urban centres larger species of mammals have practically disappeared. According to some estimates the total stock of large mammals fell by 80 per cent during the civil war, which paralysed existing control mechanisms (DNFFB 2000).

Development of the legal framework for natural resource management

Government policies during the first decade of independence, such as land tenure, legal reform, villagisation, and price and incentive policies sought to assert exclusive state control over the allocation of natural resources. The rationale of this approach was the state-socialist idea that the government is best placed to pursue the multiple economic, social and environmental objectives through its centralised planning system (Isaacman and Isaacman 1982). However, due to lack of administrative, technical and financial capacity the government stewardship was not adequate, and led to wasteful and unsustainable use of available natural resources. Since 1987 the government has embarked on a World Bank supported Structural Adjustment Program (SAP) to alleviate macroeconomic problems and establish a market-based economy (Cuco 1994; Matakala and Mushove 2001).

Up to 1997 the basic framework regarding rights to natural resources was contained in the Constitutions of 1975 and 1990, the Land Law of 1979 and the Land Regulations of 1987. These were all based on the socialist premise that land and natural resources are the property of the state. At the same time a number of colonial statutes remained in force, including those regulating forest and wildlife ownership and management.[11]

During this period the pricing policy for forest resources was inappropriate and encouraged environmental damage. Stumpage fees for timber and other forest products were very low, representing less than one per cent of the value of standing timber. Fees charged for safari hunters were equally low. Actual recovery of the fees was also inefficient, and illegal logging and hunting were widespread. As a result, private interests captured close to the totality of the value with no revenue accruing to the government or the local population. In 1989 the forest sector's contribution to the GDP was estimated at less than nine per cent, of which the forest industry's share was marginal (Cuco 1994).

In the mid 1990s there were still over 40 pieces of legislation related to environmental/natural resource management, many of them developed prior to independence. They

[11] These include the Forestry Act (1965), the Decree No. 40 040 (1955), Legislative Diploma No. 183 (1960) and the Farming and Hunting of Wildlife Act (1970).

were heavily centralised and addressed specific sectoral interests. The then dominant compartmentalised sectoral management model was reflected also in the way the respective legal texts were prepared by each sector in isolation, without prior consultatio or harmonisation with other sectors or existing laws. This was also recognised as a problem in the new National Environmental Management Program (NEMP) prepared in 1995, which noted that the country's institutional mechanisms tend to reflect mainly politico-economic and administrative concerns, and neglect the mangement needs and optimal use of the resources (Salamão 1999).

After the transition to multi-party democracy had taken place in 1994–1995, the new government recognised the importance of institutional coordination and public participation in natural resource management, and various new initiatives were taken. With respect to environmental coordination, creation of the Ministry for the Coordination of Environmental Affairs (MICOA) in 1994 and the National Council for Sustainable Development (CONDES) in 2000 were crucial steps (Salamão 1999). New sectoral policies were also developed to improve the situation. In addition to NEMP, these include the Land policy (1995), the Agricultural policy (1995) and its strategies (including the Fisheries policy and implementation strategy of 1996, and Forestry and wildlife policy and strategy of 1997), the National plan and strategy to conserve biodiversity (1997), and the Water policy (1995). In addition the national legal framework has since been developed to support the sustainable use of natural resources. The key statutes are the Framework Environmental Law (1997), the Land Law and Regulations (1997, 1999), the Forest and Wildlife Law (1999), and the Law on Municipalities (1998). The development of new environmental legislation has been supported by UNEP, UNDP and FAO, as well as various bilateral donors.

All the above statutes recognise the principles of sustainable development, including the need to protect environmentally sensitive areas and species. They also recognise the rights of local communities to participate in the management and use of land and natural resources (Matakala and Mushove 2001).

However, the new statutes provide a rather ambiguous basis for the exercise of power by local management institutions, and especially the role of customary authorities remains vague. Neither the Land Law nor the Forest and Wildlife Law specify who represents the community, nor do they prevent possible demarcation disputes between communities[12] (Salamão 1999; Ribeiro 2001). The function of the local institutions is only consultative, unless competent state authorities decide to give them more comprehensive powers. At present the land demarcation process remains so expensive and complicated, that external support – typically from advocacy NGOs or projects –

[12] The long awaited Decree 15/2000 on local authorities did not clarify the situation.

is needed. One problem is that the Provincial Cadastral Services (SPGC) do not have adequate and uniform procedures to deal with community land demarcation, and in some cases they have demanded exorbitant sums for the process. Despite the positive approach of the new statutes, in practice CBNRM is still operating in a legal vacuum, whereby the local communities neither enjoy full use rights nor posses authority over the natural resources (Matakala and Mushove 2001).

A potential improvement is introduced in the Land Law's provision for a Community tenure certificate, which enables the recognition of customary tenure. The process involves a delimitation exrecise, in which representatives of the community and its neighbours identify and recognise the borders of the respective lands. The certificate is not as strong as a formal title document, but it is (at least in principle) much easier and cheaper to obtain, and it enables communities to manage their land and negotiate partnerships with investors. The Technical Annex to Land Law, passed by the government in 1999 provides the guidelines for the certification exercise (Comissão Inter-Ministerial para a Revisão da Legislação de Terras 2000).

The present institutional framework

In Mozambique it is the mandate of the Ministry for the Coordination of Environmental Affairs (MICOA) to direct the implementation of environmental policies; and to coordinate, control and initiate environmentally sustainable planning and use of natural resources in the country. The main objectives and functions of MICOA are to: i) promote sustainable development in the use of both renewable and non-renewable natural resources; ii) promote and monitor the implementation of the MEAs to which Mozambique is a signatory party; iii) promote and prepare policies and corresponding legislation for sustainable development, and coordinate their implementation by different sectors; iv) maintain the quality of the environment and carry out environmental monitoring; v) build up the capacity of the local communities in the sustainable use of natural resources, having in mind the gradual elimination of poverty; vi) secure that local communities have access and use rights to fertile lands, water and other basic natural resources for their sustenance and development; and vii) establish, maintain and develop relations of cooperation with similar institutions at the regional and international level (MICOA 1999).

At the provincial level, the Ministry is represented by Provincial Directorates for the Co-ordination of Environmental Affairs (DPCAs) which are sub-ordinated to MICOA on the national level, and to the Governor at the provincial level. The Ministry is not represented at the district level. Recently the role of MICOA in land-use planning at the provincial level was formally strengthened, as the National Institute of Physical Planning (INPF) was integrated into the Ministry (Soil and Water 2002). Institutionally

MICOA has been supported mainly by UNDP and a few key bilateral donors, notably Norway, Denmark, the Netherlands and recently also Finland.

In Mozambique the forest sub-sector is governed by the Ministry of Agriculture and Rural Development (MADER), where it is the reponsibility of the National Directorate of Forestry and Wildlife (DNFFB). The National Forest Policy defines three specific objectives: i) the social objective seeks to strengthen the role of forest and wildlife resources in the alleviation of poverty and increasing the participation of local communities in natural resource management; ii) the ecological objective aspires to conserve forest and wildlife resources and promote their role in the protection of soils, water and other environmental resources; and iii) the economic objective aims to reinforce the role of forest and wildlife in the promotion of economic development and as a source of national income (DNFFB 1997).

At the national level DNFFB has four specialised technical departments: the Forest Department, the Wildlife Departmen, the Department of Economics and Planning, and the Forestry Research Centre. In 2001 the management of protected areas (national parks, hunting areas and reserves) was transferred to the Ministry of Tourism. The Provincial Forest and Wildlife Services (SPFFB), overseen by the Provincial Directorates of Agriculture and Rural Development (DPADER), are responsible for forest-related activities at the provincial level. At the district level the District Directorates of Agriculture and Rural Development are charged with carrying out the activities on the ground (DNFFB 1997). Generally the activities are limited to inspection, issuing of licences and collection of fees. Other activities tend to remain rather sporadic. Recently units for community management were created within the SPFFBs with support from a FAO project.

As a part of agricultural sector forestry is within the comprehensive PROAGRI sectoral program, which seeks to organise support under a sector-wide approach. It is funded by a number of bilateral donors ranging from Sweden to the USA, as well as the main multilateral donors, including UNDP, FAO, EU and the World Bank group (Soil and Water 2002). Specific support for strengthening the legal and institutional framework for forest management has been provided by FAO and the DFID (UK).

4.3 Implementation of the MEAs at the national level

Mozambique has signed and ratified the four multilateral environmental agreements (MEAs), which are the main focus of this study (table 3). In his statement at the summit segment of the Rio Confererence in 1992 President Chissano emphasised the incompatibility between poverty and sustainable environmental management. According to his statement sustainable development starts with the establishment of

national policies, which promote social justice and eliminate poverty and misery. He urged also the Conference to take decisive steps in order to elaborate an international convention which addresses the specific problems of Africa, such as drought and desertification (Chissano 1993). The emphasis was thus on the two priority issues of national sovereignty and economic development for poverty reduction.

Table 3. The main multilateral environmental agreements ratified by Mozambique

Name of the MEA	Established	Ratified by Mozambique	Coordinating Agency
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	1973	1981	DNFFB
Convention on Biological Diversity (CBD)	1992	1996	MICOA
Convention to Combat Desertification (CCD)	1994	1996	MICOA
Framework Convention on Climate Change (FCCC)	1992	1994	MICOA

Source: Office of the UN Resident Coordinator 2000.

In addition to the above conventions, Mozambique has signed the following multilateral environmental agreements: the Convention on the Protection of the World Cultural and Natural Heritage (ratified in 1982), the Vienna Convention for the Protection of Ozone Layer (1993), The African Convention on the Conservation of Nature and Natural Resources (1981), the Nairobi Convention for the Protection, Management and Development of the Marine and Coastal Environment in the Eastern Africa Region (1996), the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (1997), the Bamako Convention on the Ban of Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa (1997), the Protocol on Shared Watercourse Systems in the SADC Region (signed in 1995), The Zambezi River Basin Multilateral Agreement (1987) (Office of the UN Resident Coordinator 2000). Ratification of the Cartagena Protocol on Biosafety is presently in process.

While the signing of the MEAs can be interpreted as an expression of concord, it does not – by itself – guarantee their effective implementation. In the following we look briefly at the main opportunities and barriers to the implementation of the MEAs and SFM in Mozambique.

Conservation of biological diversity

Along with the African Convention on the Conservation of Nature and Natural Resources, CITES is the first MEA ratified by Mozambique with the objective of conserving biological diversity. The management authority, which is also responsible for issuing the permits and certificates, is DNFFB. The scientific authority is the National Institute for Agronomical Investigation (INIA), also within MADER.

The foremost problem in the implementation of the Convention in Mozambique is lack of sufficient inventory data about biological diversity in general, and especially about the species listed by CITES. DNFFB has extremely limited resources for carrying out inventories or supporting others to collect the necessary scientific data. Combined with inadequate enforcement capacity, the current resource problems make DNFFBs management capacity insufficient. Presently there is adequate inventory data only about *Loxodonta africana* (elephant), which benefits from various international projects. For the others it is impossible to define quotas on a rational basis. In practice control is limited to adding up the licences given per species listed for the annual report. Although a coordination committee including both government authorities and environmental NGOs was established recently, coordination between different authorities remains weak.

By volume the export of species listed under CITES from Mozambique concentrates on seashells and row corals, for which export licences have been given recently despite a contrary decision reached in the coordination committee in 1999. Among live fauna most of the licences concern different species of tortoise, lizards, and parrots. The demand is less on plants, but the export of some decorative plants like orchids and aloes is restricted. In addition eight commercially valuable tree species are protected through logging quotas and minimum size requirements (Decreto no. 12/81). However, enforcement of these measures is largely inadequate, and the existing data on the prevalence of these species is not sufficient for defining sustainable levels of offtake.

The species by species approach is nowadays considered insufficient for efficient conservation purposes. Consequently one of the primary tasks of MICOA in 1997 was the formulation of a national strategy for the conservation of biological diversity in accordance with Article 6 of the CBD. Financial support for this was provided by UNEP and Denmark. A team of local consultants prepared adraft strategy document, which was distributed to government agencies, donors and NGOs for comments and discussion. The draft document was then presented, reviewed and revised in a national workshop (Hatton 1997), but it has not yet been passed by the government. Due to the delay the existing document must be updated and revised, and translated into English. A working group on biodiversity has also been established. It is coordinated by MICOA and includes representatives from other sectoral ministries (MADER; MITUR) and NGOs (EWT, IUCN, WWF).

With respect to SFM especially the strategy's objectives concerning conservation status of species, sustainable use of forest resources, and protection of habitats are pertinent. The strategy encourages research to determine the conservation status of plant, animal and fungal species, in line with activities supporting CITES. Assessments of biodiversity should be carried out especially in forests suspected of having high biodiversity. It is considered important to ensure that biodiversity issues are an integral part of the forestry sector legislation and policies, and their implementation. Sufficient land should be destined for permanent foret cover, especially in areas of high diversity. Criteria and indicators for sustainable forest management, including the conservation of biodiversity, should be developed. Protection of habitats by promoting the rehabilitation and redefinition of existing conservation areas, and identification of sensitive ecosystems with a view to establishing additional protected areas if necessary, are highlighted in the draft strategy as important aspects of conservation. It emphasises also the involvement of local communities and other stakeholders in the management of protected areas (Hatton 1997; cf. CBD 1992).

Mozambique is characterised by a wide diversity of ecosystems, but relatively little is known about the status of biological diversity. It has been estimated that 250 plant species may be endemic. There are also several endemic species or subspecies of fauna, ranging from large mammals like the *Cannochaetes taurus johnstonii* (Blue Niassa wildebeest) to insects like *Ceriagrion mourae* (a species of dragonfly). The country has officially an impressive system of protected areas, which were established mainly during the colonial era. However, as a result of the recent civil war some of the conservation areas exist only in paper, and enforcement of the conservation legislation is generally weak (Hatton 1997). The National Parks and Game Reserves are presented in table 4. There are also 13 Controlled Hunting Areas (*Coutadas*) and 16 Forest Reserves in Mozambique.

Table 4. National Parks and Game Reserves in Mozambique

Designation	Province	Area	Established
Niassa Game Reserve**	Cabo Delgado & Niassa	22,000 km^2	1964
National Park of Quirimbas*	Cabo Delgado	n.a.	2002 (?)
Gilé Game Reserve	Zambezia	2,100 km^2	1960
Gorongosa National Park	Sofala	5,370 km^2	1960
Marromeu Game Reserve	Sofala	1,500 km^2	1961
Chimanimani Biosphere Reserve	Manica	1,740 km^2	2002 (?)
Zinave National Park	Inhambane	3,700 km^2	1972
Bazaruto National Park	Inhambane	700 km^2	1971
Banhine National Park	Gaza	7,000 km^2	1972
Maputo Elephant Reserve	Maputo	700 km^2	1969

Sources: Hatton 1997; *GECORENA 2001; ** SRN 2001.

Even though the biodiversity of Mozambique is relatively poorly known, there are three areas which have been identified as highly important from a biological perspective. They are the Gorongosa Mountain – the Rift Valley – Zambezi Delta at Marromeu complex; the Mozambique-Zimbabwe frontier escarpment region; and the Maputaland centre of endemism. All these 'biological hotspots' support rare endemic or near-endemic species (Hatton 1997). Presently the conservation area network is being extended to cover representative parts of these areas.

In 1996 the government approved the implementation of an international Transfrontier Conservation Areas (TFCA) project, which places greater emphasis on multiple resource use and management by local communities living adjacent or within the protected areas, than the traditional national parks. Three areas were selected based on biological, social and economic criteria. In Mozambique the Gaza TFCA lies within the provinces of Gaza and Inhambane. It includes three existing conservation areas: Zinave and Banhine National Parks, and Controlled Hunting Area no. 16 (10,000 km^2). The TFCA borders on the Gonorezhou and Kruger National Parks in Zimbabwe and South Africa respectively, which are included in the TFCA complex. The Maputo TFCA includes the Maputo Elephant Reserve and the proposed Futi Corridor, which is an area of undisturbed habitat that links the Elephant Reserve to Tembe Elephant Park and Ndumo Game Reserve in South Africa. It is within the Maputaland centre of endemism. The third area is the Chimanimani TFCA in Manica Province, which is contiguous with the Chimanimani National Park in Zimbabwe, and includes the eastern escarpment and foothills of the Chimanimani massif, including the Moribane Forest Reserve. This area lies in the important Afromontane habitat (Hatton 1997). According to present plans the area on the Mozambican side should be declared a Biosphere Reserve in 2002.

The Niassa Game Reserve's impact has been extended by creating a 20,000 km^2 buffer zone consisting of six blocks (SRN 2001). There is also a proposal by the WWF to complement the existing Gorongosa National Park and the Marromeu Game Reserve with a buffer zone consisting of the ten controlled hunting areas (altogether 38,760 km^2) around, and a corridor between the conservation areas. The area is one of the three national 'biological hotspots' (WWF 2001). Finally, the National Park of the Quirimbas, a new conservation complex consisting of important inland miombo forests, mangroves, coastal mosaic forests, island and marine ecosystems is expected to be declared in 2002 (GECORENA 2001).

In Mozambique TFCA remains the most important project in terms of biodiversity, and GEF the main funding mechanism with afocus on environment. However, protection of habitats through revitalisation of the protected area network has managed to attract considerable additional funding from multilateral and bilateral donors, NGOs and even the private sector. The interest is based mainly on the revenue potential

provided by increasing international tourism, which is also reflected in the decision to move the administration of protected areas from MADER/DNFFB to the recently established Ministry of Tourism (MITUR).

Carbon sequestration

In Mozambique the Kyoto Protocol has already been presented to the Council of Ministers, and will be submitted to the Parliament in 2002. A draft national document on vulnerable areas is technically ready, but it does not cover the whole country or all relevant aspects. It has not yet been submitted for political approval, and would require some improvements. However, those involved in making the original study are no more available, and MICOA (which is the coordinating agency) does not itself have the necessary human or material resources. This impasse highlights the more general problem of rapid staff turnover in the responsible ministries, which makes capacity building problematic. Especially with respect to the Clean Development Mechanism (CDM, which is a technically complex issue) lack of specialised technical knowledge creates a veritable barrier to efficient participation. This far capacity building has been provided mainly by UNEP (with Norwegian funding) on regional basis; with UNDP it has also supported preparatory work and participation in the international conferences. The information and education material available is almost exclusively in English, and it would need to be translated into Portuguese to have a wider impact. Some discussions on collaboration with Brazil have taken place, but no concrete activities have resulted yet. At the country level activities have been limited to preparation of the initial draft document and organisation of a few seminars.

The role of DNFFB has been rather limited. Possible CDM activities include improved forest management, establishment of plantation forests to act as carbon sinks, and more efficient production of wood-based fuels as an alternative to fossil fuels[13]. Another means to reduce CO_2 emissions is the creation of efficient mechanisms to control forest and bush fires. Carbon sinks remain a problematic approach in the Southern African context, where the land available beyond agricultural and livestock use tends to be poor and dry, except in some mountain areas. The situation is complicated further by the CDM requirement of additionality, which would require strong institutional capacity for monitoring and enforcement (Mwandosya 2000).

[13] Biomass fuel plantation represents a carbon-neutral use of land: the carbon sequestered during growth is released into the atmosphere when the biomass is burned for fuel. But unlike other forestry activities that benefit the carbon cycle only while the forest lasts, they can reduce emissions permanently by replacing fossil fuels.

The capacity for carbon sequestration in Mozambique is hampered by the fact that its forests are predominantly dry (see annex 2). At 44 t C/ha the potential average carbon stocks in dry forests are much lower than in tropical rain forest (198 t C/ha) or moist forests (95–101 t C/ha). Even though the actual difference tends to be less than the potential (29 t C/ha for dry forests against 50–68 t C/ha for moist and 144 t C/ha for rain forests), it is still in the range of 2–4 times higher. No accurate data about the annual increase of carbon stock in dry forests is available, but data from Sahelian countries indicate a range of 0.07–0.34 t C/ha per year, while the corresponding value for a rain forest is around one ton (Koskela *et al.* 2000). Figures from different types of *Acacia* savannas in Swaziland indicate an annual sequestration capacity of around 0.07–0.23 t C/ha (Saket 1994).

Based on Saket (1994) the annual carbon fixation capacity in woody biomass can be estimated to vary between 0.16–0.94 tons C/ha/yr in Mozambique, according to forest type and climate[14]. Establishment of new forest plantations on fertile lands by the government or private industries is likely to create conflicts with local communities, which can defend their rights on the basis of the new land law. A possible alternative is reforestation of the existing 20,000 ha of forest plantations in the mountain areas of Manica, which have been largely destroyed by cyclones, forest fires and unsustainable management by the state parastatal IFLOMA and its successor. However, this might create problems with the additionality clause in case CDM funding is sought.[15]

Globally the anthropogenic carbon emissions in the period 1980–1998 were about 1.4 tons per capita annually (Koskela *et al.* 2000). The fossil fuel (and cement production) based emissions were considerably lower in developing countries like Mozambique (0.07 t C per capita in 1997) than in industrialised countries (UN Statistical Yearbook 2001). However, pyrogenic CO_2 emissions were higher in the former. According to a recent estimate pyrogenic carbon dioxide releases (excluding woodfuel) in Mozambique were about 25 million tons (about 1.5 t C per capita) in 1989 (Scholes and Andreae 2000). The process is cyclical, and during regrowth carbon dioxide is reincorporated into biomass (Miranda and Miranda 2000). One option for increasing carbon uptake in savanna woodlands is to reduce the frequency of fires. Both biomass and soil carbon would increase if fires were excluded, but permanent fire exclusion is practically impossible in a strongly seasonal climate. However, an

[14] Assuming a a wood basic density of 650kg/m^3 (Brouwer and Falcão, no date), and 48 per cent carbon content in wood (Koskela *et al.* 2000).

[15] UNEP is presently planning a reforestation project in Mozambique, which aims to restore the native woodland in a national park and to aid sustainable timber harvesting. It is expected to qualify as a CDM project (Ukabiala 2002).

increase in fire interval from the current 1–3 years to ten years is probably achievable at reasonable cost. This would simultaneously increase CO_2 uptake, and decrease the emission of GHGs. The carbon uptake would last until the woodlands reach a new equilibrum carbon density (Frost 1996; Scholes and Andreae 2000). The forestry project supported by Finland is presently introducing a fire prevention program, but it is important that the system is developed in close collaboration with rural communities, and that it is compatible with local needs and practices.

There are very few estimates of the volume of wood used for fuel in Mozambique. In 1989 the annual fuelwood need was estimated at about 12.5 million m^3, and charcoal production at 2.3 million m^3 (Alves *et al.* 1989). This would mean an average consumption of one m^3 per person. A recent study in Maputo gives an estimate of 0.9–1.0 m^3 of wood per capita per year (Brouwer and Falcão, no date), while other studies from rural areas in Southern Africa indicate also a consumption of about one m^3 per capita (Mussanhane *et al.* 2000). If we estimate the annual wood consumption for fuel per capita to be around one m^3, the annual carbon emissions from this source in Mozambique would be around 5.2 million tons, or 0.3 t C per capita. In comparison the volume of wood used for other purposes like construction is minor. Different estimates range from about five per cent of the total (Alves *et al.* 1989) to nearly 30 per cent in some rural areas (Mussanhane *et al.* 2000).

Large-scale industrial production of modern biofuels, such as alcohol and gaseous fuels is probably not economically feasible in the Mozambican socio-economic context. Advanced biomass production is very land-intensive, and may lead to sacrifice of other critical land-use options. Previous experiences from large-scale fuelwood plantations near the main urban areas (Maputo, Beira and Nampula) were generally negative.[16] Nevertheless, biomass is likely to remain a major source of energy, although used rather in the traditional form as fuelwood or charcoal. Even in Maputo city charcoal remains the main source of domestic energy. According to a recent study 76 per cent of the households use charcoal or firewood as a source of energy, even though the use of firewood has declined considerably while the use fossil fuels and electricity has increased (Brouwer and Falcão, no date). In this context sustainable mangement of existing forested lands by improving the rights and techniques of local communities to manage forest resources and market forest products seems to be a more promising option than large-scale plantations.

[16] In 1978 a total of 7,500 ha of *Eucalyptus* plantations were established around Maputo, Beira and Nampula to supply fuelwood, charcoal and poles for the urban and peri-urban populations (Alves *et al.* 1989).

Activities that can improve energy efficiency (and thus reduce CO_2 emissions) include more efficient charcoal production and improved stove programs. The main benefits of the latter are that improved stoves reduce both the time or money spent for obtaining fuel and the indoor pollution from smoke[17] (Barnes and Floor 1999).

Combat of land degradation

The Ministry for the Coordintion of Environmental Affairs was designated the focal point for the implementation of the CCD in Mozambique after its ratification in 1996. Subsequently a national coordination body was established, comprising of representatives of the main relevant institutions in the country. In addition to MICOA and DNFFB it includes the National Directorate of Agriculture (DINA), the National Directorate of Water (DNA, in the Ministry of Public Works and Housing) and the National Institute of Meteorology (INAM, in the Ministry of Transport and Communications). The main activities include coordinating the preparation of the National Action Plan (NAP) and National Desertification Fund (NDF) processes. But ultimately it is the role of MICOA to coordinate inter-institutional arrangements between donors and other stakeholders for the implementation of CCD activities in Mozambique (MICOA 1999). Recently Portugal was nominated as the lead donor, with the task of coordinating the implementation of CCD activities among the donors. The NAP is expected to be ready in 2002.

In Mozambique dry areas (annual rainfall less than 600 mm) are found especially in Gaza, but also in large parts of Manica, Tete and Inhambane provinces. The interior of Gaza Province is semi-arid (annual rainfall less than 400 mm). In terms of vegetation type, open grasslands cover large areas (7–15 % of land area) in Gaza, Sofala, Manica and Tete, while they are less common (0.5–4 %) in the other six provinces (Saket 1994). Generally there is a close relationship between vegetation type and precipitation, even though other factors like altitude, soil characteristics and human influence, especially deforestation are also important. The main anthropogenic factors causing deforestation are uncontrolled and unsustainable logging, shifting cultivation and opening new permanent fields, production of charcoal and firewood, and uncontrolled fires. In some areas population pressure and unsuitable cultivation methods have caused extensive soil-erosion. At present over-grazing is not a major problem, as most of the livestock was lost during the civil war.

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[17] Indoor air pollution caused by burning of unprocessed biomass fuels in traditional stoves for cooking and heating affects globally one billion people, killing an estmated two million women and children annually (Steele *et al.* 2002).

The importance of reforestation is acknowledged by both DNFFB and MICOA, but despite various proposals concrete activities have been limited to sand-dune stabilisation at the coastal areas of Bilene (by DNFFB) and Xai-Xai (by MICOA). There is also a new afforestation project to control erosion, which is implemented with Venezuela in the context of south-south cooperation. Another key activity is land-use planning, which could identify vulnerable areas and direct use accordingly.

The main cause for the lack of implementation of CCD activities despite relatively high political priority is shortage of both material and human resources. Capacity building would be urgently needed, but up to now there has not been an efficient international funding mechnanism. It is hoped that with the inclusion of land degradation as a focal area of GEF this problem will be alleviated to some extent, even though GEF is regarded as a slow and cumbersome mechanism. Presently a five-year regional project 'Integrated management of dryland biodiversity through land rehabilitation in Mozambique, Zambia and Zimbabwe' is being initiated with GEF funding. Implementing agencies are UNEP and UNDP, and the executing agency in Mozambique is MICOA. The project addresses land degradation problems in two transboundary ecosystems in the three countries. The first covers and area of about 37,500 km^2 in the lower Save River catchment area between Zimbabwe and Mozambique (in Gaza), and the second approximately 23,000 km^2 in mid Zambezi Valley between Zimbabwe, Zambia and Mozambique (in Tete). The total population of the two project areas is about 700,000 (UNEP 2001).

In combating land degradation cooperation between different sectors remains a problem. At present there are various 'paper projects' in different ministries, with few or no concrete activities. Many of them have been in charge of some individual officer, with no institutional memory and follow-up. Recently both UNEP and the Southern Africa Development Community – Environment and Land Management Sector (SADC-elms) have proposed activities to improve coordination and increase synergy between the different MEAs and projects under different sectors. SADC-elms is starting a capacity survey for CBD, FCCC and CCD implementation with funding from the World Bank. With experience from the pilot activities in Lesotho, SADC-elms is also expanding its land rehabilitation program to other members, including Mozambique.

Forest certification in Mozambique

At present Mozambique's internationl trade in timber remains well below its sustainable production capacity. Its trade balance of forest products in 1998 was USD 14.3 million. Exports of forest products were in total USD 14.6 million, out of which the share of sawnwood was about 30 per cent and industrial tropical roundwood about 70 per cent (FAO 2000). The main export markets are in South Africa and Asia. In this

context certification represents an interesting alternative for promoting SFM. There are no certified forests in Mozambique yet, but a national working group is being formed with support from the WWF/World Bank Alliance. The national standards will be developed in close collaboration with the national forest authorities (the National Directorate for Forests and Wildlife, DNFFB) on the basis of the FSC principles and criteria (GTZ/IAC 2001). Some international donors (notably GTZ, DFID and the EU) are also supporting the preparation of regional forest certification standards for eastern and southern Africa. Mozambiue is included in the latter initiative. Development of criteria and indicators has also been identified as a useful tool for promoting biodiversity (Hatton 1997).

It is also hoped that forest certification would increase the demand for lesser known species (cf. Irvine 2000). It has been estimated that Mozambique's productive forests contain almost 120 commercial species, but current forest harvesting makes use of only 15 per cent of this potential. The use is concentrated on three species: *Dalbergia melanoxylon* (ebony), *Pterocarpus angolensis* (umbila) and *Androstachys johnsonii* (mecrusse). At the same time other valuable species like *Colophospermum mopane* are widely used for such secondary purposes as production of firewood, charcoal and posts (DNFFB 2000).

Certification of non-timber forest products (NTFP) is another market-based initiative, which is already being studied with respect to edible mushrooms and honey by the FAO CBNRM project in Nampula Province (Masuka 2000). Other potential certified NTFPs include woodcarving products, for which the process is presently explored in Kenya. In addition to FSC, which has also developed certification criteria for some NTFP products, possible certification bodies include those for organic agriculture (e.g. The International Federation of Organic Agriculture Movaments, IFOAM) and alternative trade (e.g. Fairtrade Labelling Organizations International, FLO). All these certification programs share the key requirements concerning ecological, socio-economic and institutional sustainability, even though the emphasis differs (Mallet 2000).

South Africa is the leading country in forest certification in the region with a number of certified industrial plantations. However, by 2000 there were only two examples of certified community forestry operations in the region, one in Zimbabwe (about 25,000 ha) and one in Zambia (about 800,000 ha). In the Zimbabwean case the certificate holder is a private company that received a concession to communal land in a protected forest area to carry out management activities under community guidelines (Irvine 2000). In Zambia the certificate is held by a community owned trading organisation representing mainly local carpenters and pit-saw operators. However, in 2000 the certificate was suspended due to lack of government support and withdrawal of the harvesting permit. The project has been heavily supported by external donors

(Robertson 2000; Thornber and Markopoulos 2000). Neither of these schemes is based on existing national standards.

Even these few regional experiences in community forest certification are important as they have revealed key poblems of the system with regard to other countries in Southern Africa. These include: i) the relatively high costs of certification in comparison to benefits; ii) lack of adaptation of certifiction requirements to local conditions; and iii) failure of state institutions to regulate forest use. Forest management and/or chain of custody certification add direct and indirect costs to forest management. The direct cost of certification in developing countries can be high, as it involves specialist accredited certifiers, who are not available in a country like Mozambique. At the same time the financial benefits tend to remain at the end of the chain of custody and do not flow back to the producers, and thus certification remains an extra cost for them. For the costs and associated risks of certification to be acceptable, the enterprise must be selling its products to a market which demands certified products, and thus gaining market advantage or premium prices. Such markets are in reality limited mainly to north-west Europe, that is outside Mozambique's present export markets. However, certification has recently gained credibility in South Africa, which has direct implications for the markets across the whole region. Also in Asia buyers' groups for certified products are being formed in the key markets of Hong Kong and Japan (Scrase 2000; Thornber *et al.* 1999).

Unfortunately the level of forest management in natural forests in Mozambique remains low. Logging is still done mainly under simple licence, which means extraction of the best logs without any management concept or care for future harvests. Until recently this trend was reinforced by inadequate forest legislation, while the forest authorities still lack the necessary resources and incentives to act as forest stewards. This means that there remains a wide gap between the actual practice of logging and any minimum standard of SFM required by certification. The indirect cost of certification to upgrade management to meet minimum standards is thus much higher in the natural forests in a developing country like Mozambique than in the industrially managed forests of developed countries like Sweden. The main change introduced by Mozambique's new forest policy is a move towards concessions instead of simple licences. Most of the existing concessions (12 in Sofala and 24 in Cabo Delgado by November 2001) were given just recently, and the management plans required by the Forest Law were still lacking. The proposal of the national working group on forest standards is that the requirements placed on the concession management plans would be in line with FSC principles and criteria, and would thus be conducive to independent certification and monitoring. However, at the same time provincial level authorities continue to grant simple licences, and even the existing licences and concessions are constantly abused without any major consequences (e.g. Notícias 22.11.2001).

In contrast to developed countries, where the forest is usually considered as a separate unit of production, in Mozambique forest resources form only one component of the rural livelihood complex (Mansur and Cuco 2002). There are also some profound differences in systems of ownership. In such a situation flexible interpretaion of the principles and criteria is needed, but this makes formal planning and documentation difficult. Multiple use forests managed by communities seem to be especially difficult to fit into the current certification systems. For example FSC standards demand that the land tenure situation of the areas applying for certification is secure and codified before a certificate will be issued (Thornber *et al.* 1999). However, in Mozambique communally managed lands belong formally to the state, while local people enjoy various more or less recognised use rights. In this kind of complex property regime a sound foundation of national policies and laws, and the capacity to enforce them are fundamental to good forestry.

4.4 Implementation of the MEAs and SFM at the local level

In order to assess the implementation of the MEAs and SFM at the local level in Mozambique three pilot projects dealing with CBNRM were selected for brief case studies. The projects are the 'Sustainable forest resource management project' in Derre, Zambézia Province; the 'Community natural resource management project' in M'Punga, Manica Province; and the 'Forestry and wildlife community based management project' in Goba, Maputo Province. The focus is on three issues: strengthening of property rights, contribution to poverty alleviation, and impact on environmental conservation.

M'Punga is a traditional chieftaincy located in Sussundenga District, Manica Province, about 80 km south of Chimoio. It covers an area of about 120 km^2, including the Moribane forest reserve with an area of 53 km^2. The population is estimated at 1,900 inhabitants, and about 60 per cent of them live inside the reserve. The main economic activity is subsistence agriculture, which is combined with limited agricultural production for sale. Social infrastructure includes a primary school, a grinding mill and a few shops, but the nearest clinic is 30 km away in Dombe. Large areas of the reserve have been opened up for fields or destroyed by uncontrolled fires. The Forestry Research Centre started an action reserach project in M'Punga in 1996, and since 2000 it has been included in the Chimanimani TFCA project. The project is funded by the Ford Foundation and through the TFCA also by GEF (Serra 2001).

Derre is a forest reserve situated in the district of Morrumbala, in Zambezia Province. It has an area of about 1,700 km^2, with an estimated human population of 15–20,000. The population inside the reserve is divided into four communities (Golombe, Galavi,

Chilo and Guerissa), each under its own traditional chief. In addition some six neighbouring communities use the resources of the reserve. At present most of the land has been taken into agricultural use, mainly under shifting cultivation. Less than half of the land remains under forest cover, with only about five per cent under dense forest. The livelihoods are based on subsistence agriculture, with limited production for sale on local markets (Marciano *et al.*, no date). Social facilities are limited to primary education and health services, and there are a few shops. Overall the surrounding area has declined economically from the 1970s, when it was an important area for the production of cotton. Since 2001 the 'Sustained forest resource management project in Zambézia and Inhambane', implemented by DNFFB and financed by Finland, has been implementing a CBNRM project in Derre (DNFFB 2000).

Goba is a village located in Namaacha District, some 75 km south-west from Maputo, the capital. It lies at the edge of Lebombo mountains, which separate the south of Mozambique from Swaziland and South Africa. The pilot area for the CBNRM project corresponds to the micro watershed of Maxavachane, an affluent of the Umbeluzi river, and covers an area of about 95 km^2. The land falls within the traditional chieftaincy of Mazia, which extends through family bonds even to neighbouring Swaziland (Mansur and Nhantumbo 1999). The area is predominantly agricultural, with only basic social facilities (a school, a health post, railroad offices and some shops). In 1998 about 80 per cent of the 1,500 people living in the area were producing charcoal for sale to Maputo, supplemented with subsistence agriculture (Filimão 1998). The FAO project 'Support for community forestry and wildlife management', which is implemented by the DNFFB and funded by the Netherlands, initiated the pilot project in 1998 (Mansur and Nhantumbo 1999).

Evolution of the CBNRM approach in Mozambique

The protected areas in Mozambique include 16 forest reserves with a total area of 6,600 km^2. They were established by the colonial government between 1943–1974 to conserve the forest, regulate and protect the watersheds, conserve soil, and protect scientifically and economically valuable tree-species (Hatton 1997; Serra 2001). Even though the areas were formally under government control, some communities were allowed to stay within the forest reserves, unlike the then current practice with national parks. The population was controlled by government forest guards, who supervised people's activities inside and around the reserve, and enforced the protection regulations. The guards had the power to restrict expansion of farms and cutting of trees within the reserve area, forbid more people from settling in the reserve, control hunting, and punish those setting uncontrolled fires (Serra 2001; Marciano *et al.*, no date).

After independence the new government practically abandoned the forest reserves, although their legal status was not changed. During the civil war (1977–1992) a number of the reserves became war zones, and a large part of the populations moved to safer areas near the urban centres or as refugees to neighbouring countries, while others sought protection from the dense forests and mountains deeper inside the reserves. The communal villages established by the government around both Derre and Moribane reserves were destructed relatively early on. In Derre most of the people moved to nearby towns or Malawi, while in Moribane most of the residents took refuge in the dense forest inside the reserve. When the war ended in 1992 people started to cut the forest inside the reserves to clear land for farming, and especially in Derre it increased also the influx of logging companies into the area (Serra 2001; Marciano *et al.*, no date).

Aside from the lack of formal reserve status, the situation was quite similar in Goba after the war. The border area had become a war zone and most of the population had moved to Maputo or Swaziland. Immediately after the peace in 1992 the uncontrolled access to forest resources close to the lucrative biomass fuel markets of Maputo led to an influx of charcoal and fuelwood marketeers from outside. Neither the returning inhabitants nor the forest authorities were able to control the wanton destruction of trees for charcoal, which lead to rapid deforestation of most areas accessable by road. The destruction of natural resources was completed by poaching of wildlife to satisfy the demand for animal protein. This predatory exploitation was carried out mainly by outsiders, many of whom set temporary huts in the area, while others settled more permanently (Filimão 1998; Mansur and Nhantumbo, 1999).

After the first democratic multi-party elections in 1994 the new government started to prepare new natural resource policies and legislation to bring the widespread destruction under control. The main MEAs were also ratified in 1994–1996. In line with the emerging natural resource management trends, the role of local communities was emphasised in the new strategies and statutes. From 1992 onwards the former state-centred para-military approach to natural resource management was gradually transformed into a more participatory direction. By 1997 community management was seen as an essential ingredient of successful projects – at least at the rhetorical level. CBNRM initiatives started to proliferate with support from various donor agencies, but also from the government (Ribeiro 2001).

Most of the initiatives date from the period 1995–1999. During the early phase international environmental NGOs, notably the IUCN were quite active in promoting and financing CBNRM activities, including the Tchuma Tchato in Tete (1995), and the Zambezi Delta Sub-project (1995). IUCN was also active in the initial phase of the Chimanimani TFCA project. In this period the projects were mainly wildlife oriented. Since 1997 forestry projects started to increase, and a recent study records

42 CBNRM projects out of which 30 deal with forests. Most of the projects have been initiated by the government and/or donors: in only five the respective community has been the initiator. By 2001 the established local management committees decided *de facto* on the use of natural resources in more than 80 per cent of the projects. However, in only one out of the 42 projects studied the full management and use rights of the community institution were formally recognised. This means that the communities are given a lot of responsibility without granting the necessary authority and formal power to enforce their decisions (Matakala and Mushove 2000).

Strengthening the property rights

As noted above (chapter 2), securing the property rights of rural communities to local natural resources is a key factor when striving for SFM. The record of the three projects in this respect is rather variable. Goba is the one CBNRM project in Mozambique where the local management committee 'Goba Ntava Yedzu' has been juridically recognised by the government, and has obtained the formal tenure document. The project has also supported the preparation of a land-use plan, which has been formally approved and is now being implemented by the community (Matakala and Mushove 2001).

The situation is somewhat different in M'Punga and Derre, where a large part of the area lies inside a forest reserve. In M'Punga the project carried out a forest inventory and a socio-economic study early on in the preparatory phase. Subsequently a mangement committee was created at the instigation of the project staff, but it has remained rather inefficient. In practice decisions are taken by the traditional authorities and/or the project staff, while the commitee members act as messangers and project assistants. Implementation of the existing (mainly customary) management rules remains weak. The slow progress of the project is explained to some extent by the unfavourable political situation: the majority of the population supports the Renamo opposition, and the project is regarded as a new manipulation strategy by the Frelimo government (Serra 2001). After the inclusion of the project in the TFCA framework land-use planning through zoning has become more active.

In Derre the basic information gathered so far (a preliminary forest survey and a socio-economic study) have prompted the project to propose a change of the reserve's legal status to allow for multiple use under full community management. However, this far the the idea of degazettement has not been approved. The project has supported the preparation of a development strategy for the reserve, and is presently promoting the creation of a management commite and a mangement plan. In this situation the lack of formal access rights by the community is a major impediment for further development, and activities have concentrated on institutional strengthening and

support to production groups to provide alternative sources of income (Marciano *et al.*, no date).

The experience from the three projects confirms the view that even though the new legislation about resource tenure makes CBNRM possible, it does not guarantee its implementation in wide scale. In fact the paucity of succesful examples indicates that especially the process of securing formal property rights remains too expensive and technically cumbersome to be applied without external support. In many cases the provincial and district level authorities are not facilitating implementation of the new modalities, such as community land tenure certification. As long as devolution of the authority and power over natural resouces to local communities rests within the government authorities' discretion the process is likely to remain sporadic. Unclear tenure situation complicates the use of market-based mechanisms (like forest certification) to promote SFM, for these mechanisms normally require formal title. The confusion over rights and responsibilities makes it also difficult to access CDM funding, which has scrupulous monitoring mechanisms and strict clauses about additionality.

Contribution to poverty alleviation

A key component in all three projects has been the introduction of alternative sources of income in order to reduce pressure on the forest resource and to encourage SFM. This strategy is based on the premise of poverty alleviation, which is recognised as the main problem of the target populations. The approach adopted by all three projects for introducing new income generating activities has been the creation of interest groups among the local communities. Bee-keeping groups have been established in all three projects in collaboration with relevant NGOs, and this activity has typically been linked with mushroom collecting and processing. The FAO project has studied the possibility of getting NTFP certification for the products, but the natural conditions are less favourable in Goba than in some other pilot areas. Certification of honey is also considered by the project in Derre. Handicraft production and carpentry are pursued in Derre and Goba, even though the raw material for carpentry is bought by the projecs from outside in both cases. Other activities include guinea fowl breeding and a tree nursery in Goba, and fish farming and horticulture in M'Punga. In the latter a grinding mill was also installed by the project. This far the contribution of these groups has remained marginal, and most of the produce is used for local consumption. Without the support provided by the respective projects they would be economically unviable. However, the interest groups serve an important function in capacity building and mobilisation for environmental conservation, and can not be judged solely on the grounds of financial sustainability.

Despite the high rate of deforestation suffered by the area timber production is included in the management plan of Goba, although there has been no commercial logging under the present management regime. The valuable species (existing in highly reduced numbers) include *Androstachys johnsonii* (mecrusse), *Spirostachys africana* (sandalwood), and *Afzelia quanzensis* (chanfuta). In Derre the previous uncontrolled logging has reduced the prevalence of commercial species such as *A. quanzensis*, *Pterocarpus angolensis* (umbila) and *Swartzia madagascariensis* (ironwood) inside the reserve. Presently the local association has plans to get a licence (or concession) to an area outside of the reserve, and also to get a permission to use the logs discarded inside the reserve by illegal loggers. However, the response of the provincial authorities has been reserved at its best.

The M'Punga area is relatively rich in commercially valuable species such as *Millettia stuhlmannii* (jambire) and *Khaya nyasica* (umbaua). There is some interest for commercial logging, but the activities have been strictly limited during the project period. This far there have been no plans for applying forest certification in any of the projects, but it could be one way to reconcile the nature conservation requirements placed on a forest reserve with the development needs of local communities.

Ecotourism has been identified as a potential source of income in Goba and M'Punga. Goba is situated within the Maputaland centre of endemism, one of the three biological hotspots identified in Mozambique. This ecological area has rich and interesting fauna and flora, including nearly 500 species of birds out of which 47 subspecies are endemic or near-endemic. Other endemic species/subspecies include 14 mammals, 26 reptiles and frogs, and 7 freshwater fishes. At least 168 species/infraspecific taxa of vascular plants are also endemic or near-endemic to the area (Hatton 1997). The project area is close to the Maputo TFCA, and borders on a conservation area on the Swaziland side. The management committee has already decided to include ecotourism as one activity area, and it has identified potential locations for the development of service infrastructure. Due to its closeness to Maputo and the international tourism markets of South Africa and Swaziland ecotourism has a reasonable potential for generating income to the communities. However, this far the actvities remain at the level of vague plans.

As the Moribane area forms a buffer zone within the Chimanimani TFCA complex, ecotourism is one of the income generating activities envisaged for M'Punga. Even though the Chimanimani massif is a relatively small area, it is characterised by an exceptionally high diversity of habitats and species. It is also regarded as a biological hotspot. At least 45 vascular plants growing in the area are endemic or near-endemic, as well as a number of bird species/subspecies (Hatton 1997). M'Punga is of special interest due to its large variety of woodland types (including one of the few existing patches of rainforest in Mozambique), and occurrence of some charismatic species

like *Loxodonta africana* (elephant) and *Hippopotamus amphibius*. But despite the ecological potential the role of the M'Punga area in the tourism development plans for the TFCA has been rather marginal, for the main emphasis is on the highland area (above the 1,000 m contour) bordering the Chimanimani National Park in Zimbabwe. Meanwhile the local population continues to suffer from the physical threat to human beings and damage inflicted on agricultural production by the wildlife (Serra 2001).

Impact on environmental conservation

All three projects claim a positive impact on environment due to reduction of uncontrolled and illegal exploitation of the local resource base. The most drastic change has taken place in Goba, where the totally uncontrolled exploitation of forest resources by outsiders (the charcoal extraction from the area used to be several truckloads per day) has been put under effective control. Even though charcoal production continues to be the main source of income, its production is now limited to permanent residents and controlled by licences allocated by the management committee. The production limit is set at 3000 sacs (25 kg) per year, divided among the five organised producer groups. There are also regulations concerning the species and dimensions of trees to be used, as well as areas where they can be cut.[18] The management plan includes zoning to different use areas (including areas for wildlife, forestry and ecotourism), identification of sacred and other culturally protected areas, a rotation system for logging areas, and specific closed seasons to protect regeneration of flora and fauna (Pereira 2000). The community has a system of forest guards (presently 9) who have the task of enforcing the regulations. The main problems seem to be connected to conflicting interests within the community, where the management committee, 'the group of 30' has developed into a local elite faction.

In M'Punga the forests provide a number of crucial basic goods for local livelihoods, including firewood, building materials, wild foods, medicinal plants, and raw materials for handicrafts. Wild animals continue to provide an important source of protein. Apart from the handicrafts and medicinal plants, the meat from wild animals constitutes one of the few products from the forest which has a ready market. During the last few years hunting for commercial purposes has declined, at least as an open activity. This may be the result of environmental education provided by the project. On the other hand subsistence use of the forests by the local population remains practically

[18] In the future it might be interesting to study the possibility of introducing more efficient kilns to improve the production process, and thus to reduce the pressure on the forest resource. See e.g. Holm 1991.

uncontrolled, and recently improved markets for agricultural products have caused the cutting of environmentally important forest galleries among the rivers for planting banana, the main cash crop. Besides biological diversity, this threatens also the water sources of the area. Forest fires remain a serious problem despite attempts at fire control by the project, while the soil protection activities have met with only partial success (Serra 2001). Overall it can be stated that while the M'Punga project may have been a valuable learning process for CEF and other project staff, the practical results in terms of environmental conservation or poverty alleviation are minor.

Forests are an important component of family subsistence strategies also in Derre. They provide grass for thatching the roofs, bamboo, cords and reeds for handicrafts, firewood, and poles for construction. In addition they are an important source of medicine and wild foods like mushrooms, fruits, and honey. The local population acknowledges also some environemntal services provided by the forests, such as the maintenance of a favourable micro-climate. In their view the main threats to the forests are provided by uncontrolled logging by outsiders and uncontrolled forest fires, which are also attributed to outsiders. In their view the system of shifting cultivation practised in Derre does not threaten the forest, as the actively cultivated area is not very large. The project is seeking to strengthen the existing systems of conservation like sacred forests, while it has initiated new ones like a system of communal forest guards. It is also studying a new approach for local fire control (Marciano *et al.*, no date). The wildlife population has decreased from the pre-war situation, and large mammals have practically disappeared. Wildlife is not a major concern of the project. As the project has just started, it is not possible to evaluate its environmental impact.

Lessons learnt from the projects

In general the experience from the three projects confirms the observation made by Matakala and Mushove (2001), that local communities participate actively in CBNRM schemes only when they are convinced that the cost/benefit ratio is more favourable with the project than without it. This is also a key principle of the modern SFM concept. However, the observation needs to be qualified. In Mozambique almost 70 per cent of the population lives below the poverty line, and over 80 per cent of the poor are located in rural areas. For most of the rural people alleviation of poverty is the first priority, especially in such marginalised areas as M'Punga and Derre. While they seldom or never consider nature conservation (as defined in the MEAs) a priority issue, they do value various environmental services provided by forests, and are willing to give up or restrict the use of some resources to maintain them. But in the predominantly agrarian culture giving up the right to increase agricultural production by expanding land-area under cultivation goes against the predominat values, and is

acceptable only if reliable and more profitable sources of livelihood can be provided. This far the projects have largely failed to do this. Perhaps a more realistic alternative is to strengthen the local planning and control mechanisms, and to secure that the local communities receive a fair share of the benefits. There are some interesting examples of such an approach from the neighbouring countries like Tanzania (Matose and Wily 1996).

The contribution of environmentally focused transfer payments, mainly through partial funding to the TFCA project, has this far been quite marginal in Mozambique. International non-market transfer funding operates mainly through traditional development projects – or in the future perhaps sectoral programs – where the objective is essentially poverty reduction. This is also preferred by the recipient governments, which fear that any increase in funding for environmental projects would be taken from the ODA funds. In this context it is important that the development interventions are planned and implemented in such a way that they integrate the main environmental concerns within the developmant objectives. Support to activities like capacity building for relevant government institutions and NGOs, strengthening the property rights of local communities, developing more participatory approaches to land-use planning, and promoting environmenal education serve also the purposes of MEAs. The same applies to more focused activities such as fire control, soil conservation, and development of SFM criteria for management plans.

In the case of market-based mechanisms the situation differs considerably from project to project. In general it seems that it is necassary to develop and operationalise the planning and monitoring mechanisms of relevant government authorities at the national and provincial levels before market-based mechanisms can be effectively used in Mozambique. However, they do provide an interesting potential source of funding in the mid-term perspective, and in the short-term pilot projects would benefit the development of country-specific approaches. The experience from the development of forest certification criteria and indicators in Brazil indicates that the development of a functional country-level system requires up to five years.

5. Conclusions and recommendations

5.1 Conclusions: SFM between national sovereignty and global environmental values

The beginning of modern environmental management can be dated to 1972 when the UN Conference on Human Environment took place in Stockholm. It lead to the establishment of important multilateral environmental organisations and agreements, notably the United Nations Environmental Programme (UNEP) and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The latter is the main international instrument for species-based conservation. The initiative for the conference came mainly from the North, and environmental NGOs were already actively involved in the process.

In the 1980s increasing concern was expressed by environmental NGOs for the tropical forests, which were quickly disappearing. This was linked to a more holistic view of nature conservation, which emphasised the crucial role tropical forests have in preserving biodiversity and stabilising the global climate. At the international level the environmental debate culminated in 1992 in the UN Conference on Environment and Development (UNCED) in Rio de Janeiro. The Rio Conference led to the preparation of three multilateral environmental agreements (MEAs), which provide the basis for the present environmental management approach. These are the Convention on Biological Diversity (CBD), the Convention to Combat Desertification (CCD), and the Framework Convention on Climate Change (FCCC). The new political consensus on environment emphasises habitat-based (instead of species-based) conservation, valuation of the whole range of goods and services provided by the forests, and partcipation of both the private sector and local communities in natural resource management.

However, discussions to determine how these objectives should be pursued soon brought out quite different views. Industrialised countries tend to emphasise the global governance issue, meaning global agreements which bind all participants (governments) equally. Environmental NGOs and more conservation-minded states have also suggested creation of supranational institutions to enforce compliance by individual governments. In terms of funding market-based mechanisms and NGO channels are favoured instead of bilateral grant aid. Both of these approaches are looked at with suspicion by many developing countries, which fear loss of sovereignty and deviation of ODA funding to support evironmental activities. The developing country governments typically emphasise the need for additional external funding to environmental conservation (preferably in connection with economic development), facilitation of technology transfer, and

capacity building. The support should be directed to national programs through the traditional channels of bilateral aid or existing multilateral organisations based on formal equality in decision making and sovereignty of participants. The logic of unequal development has been applied to justify the exemption of developing countries from the restrictions agreed for purposes of nature conservation.

The different interpretations have materialised in political and financial support – or lack of it – to different MEAs. For industrialised countries the CBD and FCCC have prioritiy, but for developing countries (especially in Africa) the CCD is prioritised, and lack of externall funding for its implementation is a constant complaint. In addition to concrete relevance to economic development, the difference in emphasis is linked to the implementation mechanisms. Despite the common origin, the CBD and FCCC include elements of supranational control, while they place the responsibility for implementation (at least in theory) equally on all participant governments. The focus of CCD is on national action plans, but their implementation by the developing country governments is made conditional on the availability of international funding for the purpose.

The World Trade Organisation (WTO) has emerged as a major forum for the developing countries to defend their national sovereignty against environmentally justified restrictions of international trade, which they interpret as protectionism in a camouflage. This far the stand of the WTO has been generally negative towards the environmental justifications, but the increasing weight of 'green labelling' in the key export markets of Europe and North America has made many developing countries to accept the new market-based mechanisms. This has also been the case with independent forest certification, which is a voluntary mechanism based on market preferences and lies thus beyond the scope of multilateral organisations like the WTO.

Aside from the international political issues, lack of competence on the technical substance is a main impediment for effective participation by developing countries like Mozambique in the international negotiations. It has also limited their capacity to benefit from the new incentive mechanisms and potential synergy between the MEAs and the other SFM instruments. In Mozambique the coordination problem is partly a result of the previous centralised and compartmentalized governance system, which dispersed environmental issues to different sectoral authorities without proper coordination. In addition to insufficient human resources and coordination, SFM suffers from shortage of material resources, corruption, and partly incomplete legal and administrative frameworks. Lack of commitment at the provincial level to devolving authority over natural resources management to communities, coupled with limited experience in implementing the new policies have slowed down the reform process.

With regard to biological diversity, the scientific database in Mozambique is insufficient for determining the needs and most effective means for conservation on a

rational basis. But even though the national capacity remains grossly insufficient, the situation has improved during the last few years. External funding and technical support is now increasingly available also for habitat conservation through GEF, bi- and multilateral donors, environmental NGOs, and the private sector. This is at least partly due to the high visibility of African wildlife in the international media, and its perceived income earning capacity through ecotourism.

The situation is worse in combating desertification, where consensus on efficient mechanisms for international funding was reached only recently. Up to 2001 it was not included among the focal areas of GEF, which is the principal channel for international funding to the MEAs. The recent revision of GEF priorities to include land degradation will improve the situation in this respect. In principle SFM can have an important role in this area. But in the case of Mozambique bilateral donors have largely shunned the issue despite public exhortation by the country's top political leadership. However, it should be noted that national allocations for addressing land degradation have also remained marginal.

In developing countries forestry activities in mitigation of the climate change process can benefit only from the Clean Development Mechanism (CDM). In Mozambique dry forests – which have a relatively low carbon dioxide absorption capacity – are dominant, which limits the potential for additional funding to SFM through this mechanism. On the other hand large-scale plantation forests are likely to have negative socio-economic impacts at the local level. Biomass fuels will probably remain the predominant source of energy also in the future, and the ecological sustainability of their production should be improved. This could mean strengthening the access and management rights of local people to promote SFM, and development of more efficient kilns to reduce waste in charcoal production. Fire control programs in rural areas to reduce pyrogenic emisions and improve carbon sequestration capacity are another option. Unfortunately it is not possible to know yet whether such activities will be eligible for CDM funding.

In general the use of the new market-based incentive mechanisms for supporting SFM in Mozambique is limited by the relatively weak institutional capacity of the state to enforce the laws and regulations. Because of a limited industrial capacity for wood processing forest exploitation remains at the level of predatory logging, which benefits mainly the foreign timber traders and a few urban-based businessmen and/or government officials. Underdeveloped forestry sector is also an impediment to independent forest certification, which becomes prohibitively expensive when the existing management standards are low. Nevertheless, the country has a good resource base, and the market demand for certified forest products may develop favourably in the future. At this stage the development of national standards and implementaion of some pilot activities is a realistic target.

Shortcomings originating at the national level often materialise at the local level. In general the experience from the three projects studied confirms that people participate actively in a CBNRM scheme only when they are convinced that it will bring them concrete economic benefits. This is also a key principle of the modern SFM concept. In Mozambique, where a large majority of the population lives below the poverty line, alleviation of poverty is quite predictably the first priority, especially in the rural areas where most of the poor live. But even though the poor seldom consider nature conservation (as defined in the MEAs) a priority issue, they do value various environmental services provided by forests, and are often willing to give up or restrict the use of some resources to maintain them. However, in a predominantly agrarian culture which operates with very basic tecnology, the right of each rural household to increase agricultural production by expanding land-area under cultivation is crucial for survival. Giving up this right is acceptable only if at least equally reliable and more profitable sources of livelihood can be provided. This far the CBNRM projects have generally failed to do this.

5.2 Recommendations for future Finnish support

Poverty alleviation, which is Finland's main objective in devlopment cooperation, is consistent with Mozambique's present development objectives. Recently the MFA has also selected environment as one of the three priority areas in its cooperation with Mozambique. At present the support is channeled to two environmental projects, which are both relevant for SFM. A project to support the establishment of a regional centre for sustainable development in Chimoio under MICOA is presently in its initiation stage. The 'Sustained forest resource management project in Zambézia and Inhambane' is already in the implementation phase. The institution building and local level support activities through pilot projects, which are included in both projects, can address many of the SFM issues. For future support the following issues are worth considering:

- Finland should take into account the needs of developing countries in arrangements concerning international timber trade, even though it must be recalled that there are divergent views among developing countries, and inside them;
- A basic need in countries like Mozambique is capacity building concerning both the MEAs and SFM. UN agencies like UNEP, but also UNDP and FAO have the human capacity to organise such training at national and regional levels, but lack funding. At the regional level SADC-elms has similar activities. Targeted funding for specific capacity building activities has been provided for example by the Netherlands and Norway, and Finland could do the same;

- At present there are one or two regional projects which enjoy partial GEF funding but lack the necessary additional funding. A case in point is the starting UNEP-UNDP regional project to combat land degradation, where Finland could support the implementation of one of the pilot projects;
- The general trend in bilateral development cooperation is to move towards a sector-wide approach (SWAP). This trend is relatively advanced in Mozambique. In this context it is important to develop procedures which ensure that environment and SFM are included as cross-cutting issues in the sectoral programs. Finland should promote the inclusion of these issues in its priority sectors, when relevant;
- Along with the emerging sectoral programs focused small-scale activities outside of the government sphere are also needed. With respect to environment and SFM these can be supported efficiently through joint funding mechanisms like the IUCN administered environmental fund in Mozambique. The fund is presently relying on support from the Netherlands, but Finland could join to provide additional funding.

In addition to the general issues outlined above there are more focused actvities, which can be funded through either bilateral or NGO channels. These include the following:

- Fire control measures can have a positive impact on the main objectives of all three MEAs, and their implementation on a participatory basis should be supported actively;
- More efficient and sustainable production of biofuels provides a concrete means to reduce carbon dioxide emissions and to promote SFM. This can be pursued through support to community-based forest management and development of charcoal production technology;
- Conservation of biological diversity suffers from lack of scientific data. Forest and wildlife inventories with special emphasis on endangered species should be included in the present projects and supported through focused micro-funds;
- Strengthening of existing institutions at the local level is often a cost-effective way to conserve local forest resources, and especially traditionally protected forests can have an important role as fire refuges for rare and endangered species. They should be actively incorporated into ongoing conservation activities;
- Environmental education is an important activity to promote sustainable forest management. In addition to specific environmental projects, it should be integrated also to projects in other sectors like education;
- Forest and NTFP certification has considerable development potential, even though the present forest management and market conditions are not favourable. The creation of national standards and pilot projects to test them could be supported, while keeping in mind that independent certification must be economically sustainable.

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Annex 1.

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Annex 2. The role of forests in the mitigation of climate change[1]

According to FAO statistics the total land area covered by forests and woodlands in the world was 5,341 million ha, out of which 1,129 million ha (21%) were in Africa (table 1). Forests are important for the atmosphere because trees act as carbon sinks when they absorb CO_2 from the atmosphere, storing most of it in the form of wood. Tropical hardwoods contain about 48 per cent of carbon in the form of lignin and cellulose: to sequester one ton of carbon it is thus necessary to produce 2.2 tons of wood. The carbon sequestration potential of forests depends on the growth rate, which diminishes when trees approach maturity. But when wood is burnt, the process is reversed, using oxygen from atmosphere and carbon from wood and ultimately releasing CO_2. Thus, forests can function as both sinks and sources of carbon (Dabas and Bhatia 1996).

Table 1. Forest cover in 2000 and annual change 1990–2000, distribution of forest and woodland (1995) in Africa and the World

	Land area (million ha)	Forest cover (million ha)	Forest cover change/year	Forest (% of total area)	Woodland (% of total area)
Africa	3 090	650	–5.3	21.0	15.5
World	13 140	3 870	–9.3	29.4	11.2

Source: FAO 2000.

At current deforestation rates of 10 million ha per year, an estimated 2 Gigatons (Gt) of carbon (C) is released annually[2], while emissions from burning of fossil fuel are about 5.5 Gt C per year. Fluxes to oceans and vegetation (about 90 and 120 Gt C per year respectively) in the global carbon cycle are of different order of magnitude than the anthropogenic emissions, while carbon stores in the terrestrial ecosystem (about 470 Gt C in vegetation and 2,010 Gt C in soil) and ocean surface waters (about 1,020 Gt C) are considerably larger than those in the atmosphere (estimated at 750 Gt C). As measurement of carbon stock is problematic, it is also difficult to estimate changes in carbon sinks, especially for ecosystems, which are dominated by large-scale disturbances such as fires and storms. It seems that less than one half of the global carbon emissions end up in the atmosphere, while oceans and known forest sinks absorb about one third. But nearly a quarter of the emissions disappear in a missing sink, which is now believed to consist mainly of forests (Koskela *et al.* 2000). But deforestation (i.e. forests actually being replaced by other forms of vegetation) is not the only form of forest damage: forest degradation due to selective logging and other interventions can also reduce biomass (and thus the carbon stock) significantly. Especially in Africa and Asia the actual carbon stock of tropical forests has decreased considerably during the past decades (Kägi 2000).

In 1990 the tropical forest area was estimated as 1,747 million ha, being largest in tropical America (916 million ha) and smallest in tropical Asia (307 million ha, including the Pacific). Table 2 shows total forest cover with potential (without human impact) and actual carbon stocks in the main ecological zones of Africa.

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[1] References are included in the main text's list of references.

[2] The estimates vary from 1.2 Gt C per year upwards, but more recent estimates suggest figures of 2.4 Gt or even more. (Koskela et al. 2000.)

Table 2. Forest cover and carbon stock in main ecological zones in tropical Africa

	Forest cover (million ha, 1990)	Potential carbon stock (t C per ha)	Actual carbon stock (t C per ha, 1980)
Tropical rain forest	87	198	144
Moist deciduous forest	251	101	68
Dry forest	151	16–44	10–29
Montane forest	35	37–95	18–50

Source: Adapted from Koskela *et al.* 2000: 34.

Due to their high carbon stock value per land area tropical rain forests and moist deciduous forests have received most attention this far. Currently average rain forest carbon sequestration rate is estimated as 1.3 t C per ha and year, or globally 2.0 Gt C per year (Koskela *et al.* 2000). In the African continent rain forests are largely concentrated in Central Africa, where Cameroon, the Central African Republic, Congo, Equatorial Guinea, Gabon, and the Democratic Republic of Congo comprise ten per cent of world's remaining tropical rain and moist forests. According to a recent estimate (Zhang and Justice 2001) the above ground carbon stock in the region's terrestrial ecosystem in 1990 was 24.8 Gt C, out of which forests comprised over 93 per cent. Average annual change during the period 1980–1990 was estimated as 0.4 Gt C.

Dry deciduous forests cover 42 per cent of world's tropical forest and woodlands, including 14 per cent of the tropical closed forest area. In many African countries they are the dominant type of forest/woodland (Koskela *et al.* 2000). While their role in carbon sequestration has received relatively little attention, many dry forests do have a reasonably high potential for carbon storage. In Brazil savanna-type vegetation known as *cerrado* (annual rainfall between 600–2200 mm) has been estimated to contain between 12–38 tons of biomass per ha in the above ground vegetation, and some 16–53 t/ha underground. The latter values are considerably higher than those given for other types of savanna (11–19 t/ha). It has been estimated that the subterranean part can represent even 75–80 per cent of the total biomass in *cerrado*. Annual carbon sequestration was estimated at 2.0 t C/ha (Miranda and Miranda 2000). In Africa extensive root systems are common for many typical species of miombo-forests, where the underground biomass is estimated at about 32–37 per cent of total biomass (Frost 1996).

However, the range of variation is quite large. In Niger the carbon sequestration rate (above ground) was estimated at only 0.32 t C per ha with an average annual rainfall of 200 mm. Annual increment rates of 0.07–0.29 t C per ha have been reported for natural savannas in West Africa. A special characteristic of dry forests and woodlands is their susceptibility to disturbance factors, notably fire. While fire is a natural factor which is present in almost all dry-forest ecosystems, its frequencies have increased due to human influence. Exclusively anthropogenic disturbance factors include grazing, fuelwood cutting and clearing of land for agriculture (Koskela *et al.* 2000).

Recent estimates suggest that savanna fires are the single largest source of pyrogenic emissions of CO_2 in the world, comprising about 42 per cent of the biomass burned globally. Savanna fires in Africa account for about 22 per cent of the total biomass burned. The primary reason for the high incidence of fires is the seasonality of rainfall in these areas. This allows the fuel accumulated in the growing season to become dry and prone to burning (Scholes and Andreae 2000). In Miombo forests the percentage of organic biomass burned is estimated to be only one per cent in a fire at the end of wet season, but close to one half in a mid dry season fire (Koskela *et al.* 2000). Type of vegetation is another important factor.

In Brazil it has been estimated that a fire in a wooded grassland (*campo suja*) burns about 85 per cent of above ground biomass, while only 23 per cent is burned in dense woodland (*cerrado denso*) (Miranda and Miranda 2000). About 60 per cent of the African savannas lie south of the equator, in Angola, Zambia, Tanzania, Rwanda, Burundi, Tanzania, Malawi, Mozambique, Zimbabwe, Botswana, Lesotho, Swaziland and South Africa. The total pyrogenic emissions of CO_2 from this area are estimated at 0.23 Gt (Scholes and Andreae 2000).

Another major source of CO_2 emissions is energy supply, where enhanced use of renewable energy (hydropower, solar, wind, geothermal as well as biofuels) is needed to reduce emissions from fossil fuels. At present the world derives 14 per cent of its energy supply from biomass and six per cent from hydropower. In the developing countries biomass provides about 30 per cent of the total energy supply, while in the OECD countries its share is only 3 per cent. Between 1950 and 1994 annual fuelwood and charcoal production increased from 700 million m^3 to 1,900 million m^3. About 85 per cent of this amount was consumed in developing countries (Schulte-Bisping *et al.* 1999). Wood-based energy consumption in 1995 is shown in table 3.

Table 3. Energy use, population and wood increment (1995)

Countries	Total energy use (million toe[3])	Population (million)	Energy use per capita (toe)	Wood energy per capita (toe)	Wood increment per capita (toe)
Developed	5 720	1 300	4.36	0.12	0.63
Developing	2 230	4 390	0.51	0.09	0.42
World	7 960	5 690	1.40	0.10	0.47

Source: Schulte-Bisping *et al.* 1999.

Substitution of wood for fossil fuels has been promoted as the best way to keep carbon out of the atmosphere. According to some estimates production of biomass for energy could offset fossil fuel emissions by 1–4 Gt C per year by 2050. Besides increased areas of forests and agriculture devoted to energy crops, this would require more efficient technologies for using biomass for example in electricity generation or to produce hydrogen for transport services (Barnes and Floor 1999; Houghton 1996). However, production of wood fuel is often not economically attractive compared to other forms of land use. This is partly due to the high discount rates prevalent in developing countries, which reflect people's preference for near-term benefits over delayed benefits (Kägi 2000; Poulos and Whittington 2000). The environmental externalities and social costs involved are also generally neglected, as those transacting in wood bear only the private costs (Pearson and Stevens 1989).

According to some views preservation of mature forests is a relatively inefficient means of sequestering carbon as mature trees trap less CO_2 than those in prime growth. On the other hand, forest management based on harvesting at optimal rotations, efficient conservation of wood into durable products and swift regeneration of harvested areas would maximise the sequestration process. Compared to the temperate zone, carbon sequestration tends to be faster in the tropics due to favourable climatic conditions. On this basis industrial tree plantations in the tropics have been recommended as a self-evident option for mitigating climate change. Potential land available for reforestation has been estimated at 265–952 million ha, depending on the criteria used (Dabas and Bhatia 1996).

But while forest plantations increased by nearly 150 per cent between 1980 and 1990, with a total area of about 44 million ha they still represent only two per cent of tropical forests. Almost two thirds of

the existing plantations were established for non-industrial purposes, mainly as part of social forestry activities. In Africa the role of plantation forestry is even more marginal with a total area of less than three million ha in 1990. Out of this more than half were non-industrial. Forest plantations are also less efficient carbon sinks than undisturbed natural forests in similar natural conditions. There is great variation in the carbon sequestration potential among plantation tree species, growing sites and management methods applied. In general it can be stated that variations in environmental conditions (especially annual rainfall) and management interventions (like fertilisation) have a considerable impact on growth rates and thus carbon sequestration. Forest plantations are an effective means of carbon sequestration only if they are established in relatively fertile soils with good rainfall, and/or are managed efficiently (Koskela *et al.* 2000).

Increasing the use of wood, and the efficiency of its use is considered to have high potential for sequestering carbon. One option is to store more CO_2 in long-lived wood products. In the 1980s an estimated 0.4 Gt of carbon was accumulated in wood products annually, and by 1995 it was estimated that about 25 Gt C was held in wood products. The generation and use of wood products involves considerable waste, both as slash (logging debris) and processing debris. In 1980 the annual release of carbon to the atmosphere just from slash was estimated as nearly 2 Gt. The amount of waste could be reduced considerably through more efficient harvesting and wood processing (Houghton 1996).

This report deals with international efforts to promote the sustainable management of tropical forests in developing countries. Along with multilateral environmental agreements, such as the UN Conventions on Biodiversity, Climate Change and Desertification, some new market-based mechanisms, such as forest certification, are discussed. The relationship between these agreements and mechanisms, and the international trade regime is analysed on the global level. Finally an analysis of sustainable forest management in Mozambique brings the analysis down to the national and local levels.

ELEMENTS for DISCUSSION

MINISTRY FOR FOREIGN AFFAIRS
Department for International Development Cooperation

Sustainable Forest Management | Through Multilateral Environmental Agreements and Market based Mechanisms

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