DEPARTMENT OF FORESTS

Ministry of Agriculture, Natural Resources and Environment

CRITERIA AND INDICATORS

For the Sustainable Forest Management in Cyprus

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Criteria and Indicators for the Sustainable Management of the Cyprus Forests.

This document is the first attempt to report on the sustainable forest management in Cyprus forests after taking into consideration a national and a science based framework; the Pan European Criteria and Indicators for Sustainable Forest Management (C & I for SFM).

The United Nations Conference on Environment and Development held in Rio de Janeiro in June 1992, initiated a process to formulate C & I for SFM. During the conference, the first in depth multinational discussion on C & I let to a series of international initiatives for the development of tools with which the sustainability can be measured and monitored in practice.

The Second Ministerial Conference on the Protection of Forests in Europe initiated the Helsinki or the MCPFE process. During this conference, four resolutions and one declaration were prepared and signed by thirty eight Ministers responsible for the forests in Europe. The development of Pan European C & I for SFM was based upon resolutions H1 and H2. Within the resolution H1, *General guidelines for the Sustainable Management of the Forests in Europe*, "sustainable management" is defined as "the stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfill, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to their ecosystems.

During the Third Ministerial Conference in Lisbon 1998, the Ministers adopted the six (6) Criteria and endorsed the associated Indicators by signing the resolution L2. The Ministers also decided to implement and continuously review and improve the associated Indicators. The Pan-European C & I for SFM were further developed and revised in the follow up processes after considering the variety of experiences of European countries on this matter and as technical and scientific knowledge improves.

The goal of the Department of Forests is the development of a set of national Criteria and Indicators to serve as an evaluation tool to measure the forest condition and track the department's progress towards the conservation and sustainable management of Cyprus forests. This document is not intended to set standards for desired or objective levels to be reached. It provides a report of the current situation of the forests of Cyprus and provides quantitative and

qualitative standards to evaluate sustainable management of the forest as an entire ecosystem and monitor changes over time. This document will be revised in ten years from now, and the current values and situation will be compared with the new ones, allowing a sound evaluation of the progress towards sustainability.

The present document addresses the six Criteria (as given in the Pan-European set) which are considered as essential components of sustainable forest management. These Criteria are: the maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles; the maintenance of forest ecosystem health and vitality; the maintenance and encouragement of productive functions of forests (wood and non wood); the maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems; the maintenance and appropriate enhancement of protective functions in forest management (notably soil and water); and the maintenance of the other socioeconomic functions and conditions. A selection of 35 Pan-European Indicators are presented and analyzed in this report based on the availability of reliable information and their applicability to Cyprus conditions. The six Criteria define a set of values that the Department of Forests wants to enhance and sustain, while the Indicators identify scientific factors to assess the state of the forests and measure progress over time.

The development of C & I for SFM of the forests of Cyprus required a considerable amount of information and data since Criteria and Indicators concern almost all forestry objectives. In developing the C & I, the Department of Forests made use of the best available information. Certain difficulties were faced though in developing some indicators because of the lack of reliable information and data. Where national data were not available or were not reliable, the Department decided to set up the mechanism for their future collection so that to be included in this document. A preliminary evaluation of the collected information and data regarding the period 1993 – 2002, gives an indication that the Cyprus forests are managed on sustainable basis.

The current document is structured into six chapters, one chapter for each of the six Criteria. First, the quantitative indicators for each criterion are presented along with the rationale behind it. The four qualitative indicators referring to the legal/regulatory framework, institutional framework, financial framework and informational data are presented as a different section of this document.

CRITERION 1: MAINTENANCE AND APROPRIATE ENHANCEMENT OF FOREST RESOURCES AND THEIR CONTRIBUTION TO GLOBAL CARBON CYCLES

Indicator 1.1: Forest Area

Full text: Area of forest and other wooded land, classified by forest type and by availability for wood supply, and share of forest and other wooded land in total land area

Rationale:

Forest and other wooded land contribute in many ways to sustainable development. These areas provide a series of functions vital for mankind. Some of these functions are: the provision of goods like timber and non timber products and the provision of services such as provision of places for recreation and amenity, promotion of ecotourism, provision of habitat for flora and fauna, conservation of biodiversity, watershed conservation and protection against flooding, carbon sequestration and more.

The forest area which can change because of deforestation, afforestation and reforestation provides an indication of the relative importance of a forest in a country and it is an important indicator of sustainable forest management. The increase or decrease of the forest area has also an important effect on the carbon balance locally and globally.

According to FAO data, in the year 2000, the total forest area on the earth surface was equal to 3,9 billion hectares of which 47 per cent were in the tropics. During the period 1990 and 2000, the world lost 4,2 per cent of its natural forest, but it gained 1,8 per cent through natural expansion and establishment of plantations resulting in a net reduction of 2,4 per cent over the ten years period. The estimated net loss during the decade was 9,4 million hectares per year.

Quantitative Indicator:

Cyprus forests, which are greatly reduced in extend and are still recovering from abuse, cover the 18,65 per cent of the island's land area. Cyprus forests, during the classic times, have seen a long history of use and abuse especially by Roman, Byzantine and Turkish Empires. The island was an important shipbuilding center and a timber exporting county. Later on, during the 19^{th} and 20^{th} centuries, the island's forests were suffering from overgrazing since the goat population in Cyprus was greater than on any other island in the Mediterranean. Large areas

of forests were burned by shepherds and converted into degraded shrublands for goat grazing. Big areas of natural forests were also clearfelled and converted into agricultural lands during the last 150 years (Thirgood, 1987).

Table 1.1.1

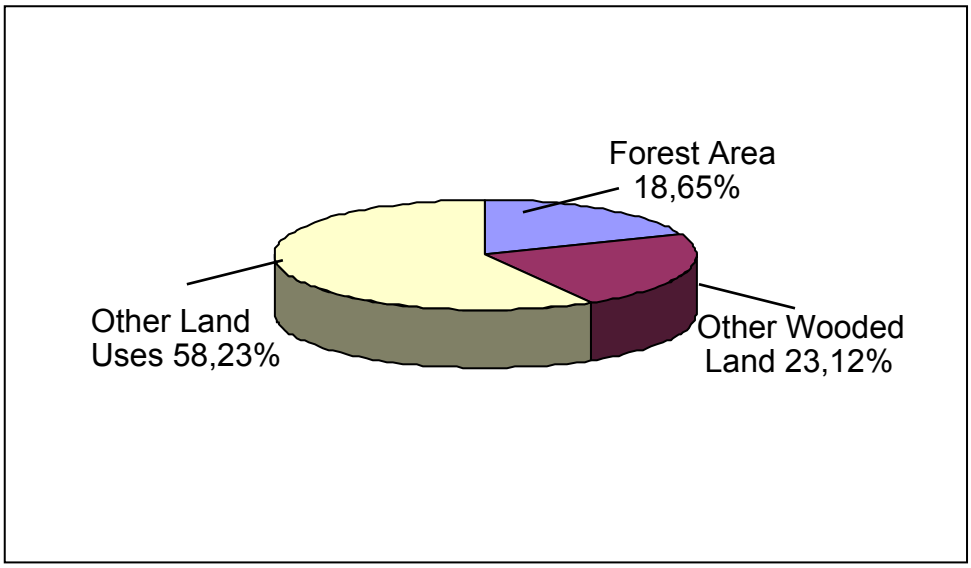
Area of forest and other wooded land (OWL) and its change over time

Vegetation Type	1999		2002	
	Area (ha)	Percentage (%)	Area (ha)	Percentage (%)
Forest	171 615	18,55	172 535	18,65
Other Wooded Land	213 859	23,12	213 859	23,12
Other Land Uses	539 626	58,33	538 706	58,23
Total	925 100	100,00	925 100	100,00

Source: Department of Forests

Chart 1.1.1

Forest, other wooded land and other land uses as a % of total land area of Cyprus



The table 1.1.1 presents the results of a survey carried out by the Department of Forests between the years 1996 and 1999 with the use of remote sensing techniques and field surveys. Adjustments on the above values are carried out annually either because some areas have been afforested or burned or because of land use changes over time. According to the results of this survey, 41,77 percent of the total area of the island is covered by forest or other wooded land. For the purpose of this survey, forest is defined as land with tree crown cover

(stand density) of more than 10 per cent and area of more than 0,5 ha (Definition by FAO). The trees should be able to reach a minimum height of 5 meters at maturity. Other wooded land means: Land which has some forestry characteristics but does not fulfill the criteria stated above. It includes maquis and garrique vegetation. Maquis vegetation includes the evergreen and densely branched shrubs, 2 to 5 meters in height with thick, dark green, leathery and usually small leaves; Garrique vegetation includes the low 0,5 to 0,8 m, generally open sclerophyllous sub-shrubs.

This survey was the first one of its kind carried out in Cyprus for the estimation, apart of the forest area, the area of other vegetation types. The absence of two consecutive land surveys based on the same methodology makes the comparison and the presentation of the development of the same parameters over time impossible. The annual adjustments on the values of the above table show that there is a 0,54 per cent increase in the area of the forest in Cyprus during the last three years. This is translated into 920 ha. This increase is due to the declaration by the Council of Ministers of some "hali" lands[1] (into Main State Forest and their afforestation by the Department of Forests.

A second survey, based on the same methodology was planned to be carried out between the years 2006 and 2009. The results of this survey will be helpful in estimating changes over time for the forest and other wooded land area and will allow the monitoring of the effectiveness of the Department of Forests in managing Cyprus forests on a sustainable basis.

The maintenance and enhancement of forest resources requires that the area of the forests and other wooded land does not decrease from the present state and these areas are preserved for future generations.

[1] Hali land is mostly unfertile land scattered throughout the island, not regularly exploited since the Ottoman occupation from 1571 to 1878. Hali land has never been claimed by anyone due to heavy property and farming taxes imposed by Ottoman administration (Thirgood, 1987). Later on, during the British administration, these areas were declared as common lands and the land ownership remained to the State (Ioannou, 1991).

Table 1.1.2

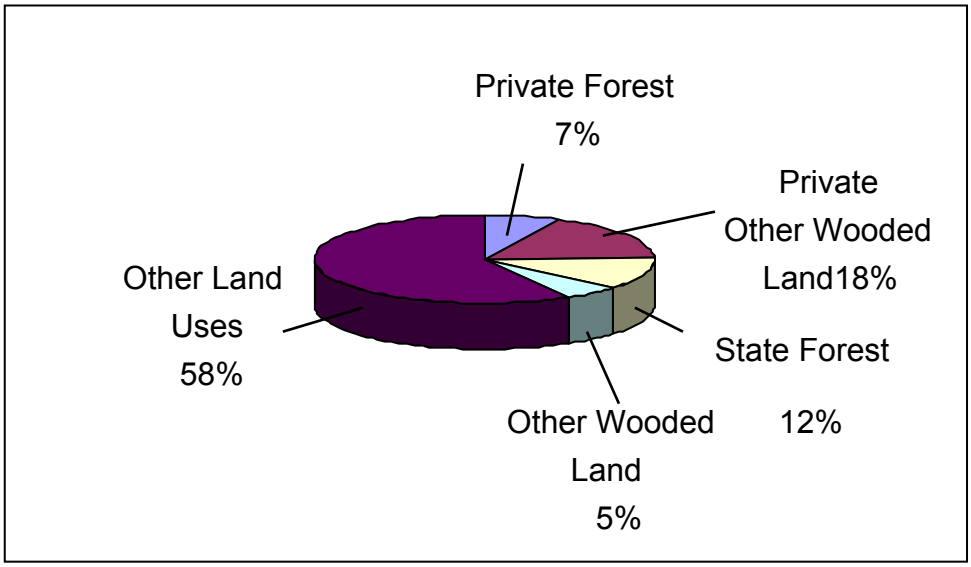
Area of forest and other wooded land by ownership structure

Vegetation Type	State Land (ha)		Private and Hali-Land (ha)		Total (ha)	
	1999	2002	1999	2002	1999	2002
Forest	105 801	106 781	65 814	65 814	171 615	172 595
Other Wooded Land	50 740	50 740	163 119	163 119	213 859	213 859
Total	156 541	157 521	228 933	228 933	385 474	386 454

Source: Department of Forests

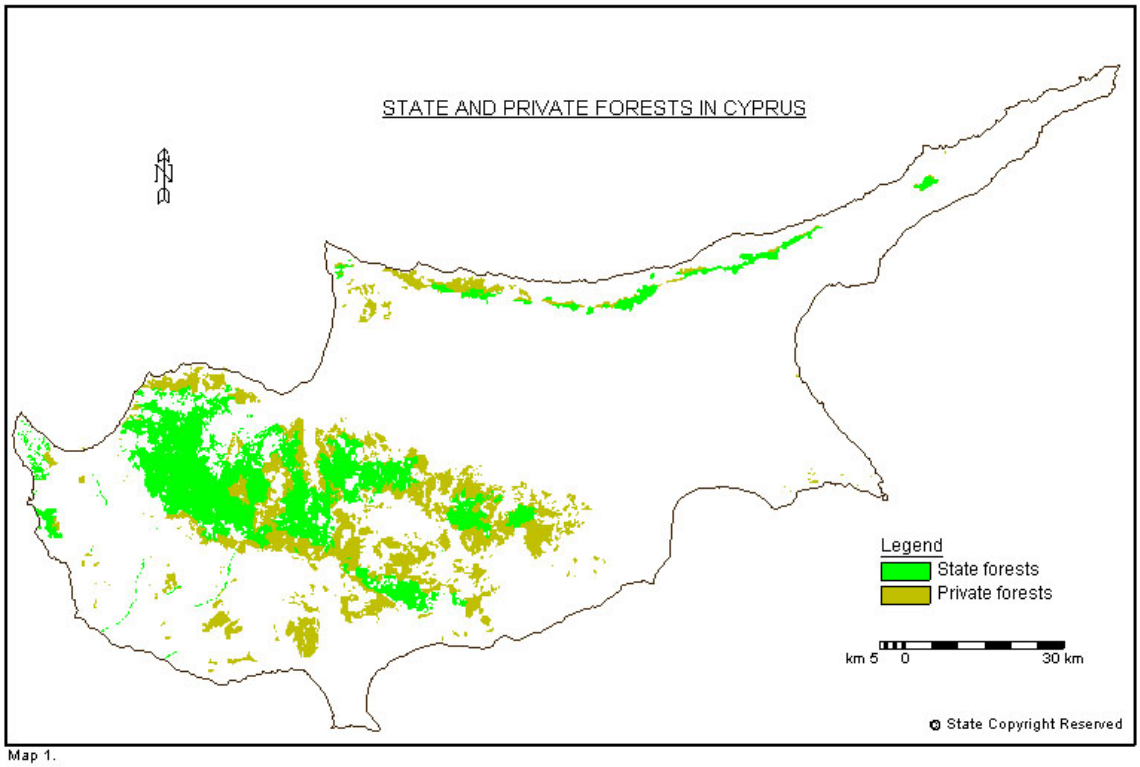
Chart 1.1.2

Ownership of forest and other wooded land



The State forests in Cyprus occupy the two mountainous ranges; the central, Troodos Massif and the Northern, Kyrenia range. The State forest today occupies an area of 106 781 ha which is equal to 11,54 per cent of the total land in Cyprus. The area of the privately owned forests comes to 65 814 ha or 7,11 per cent of the land. However, the practice of private forestry as such, is not existed in Cyprus. The existence of these forests is due to the emigration of people from the mountainous or semi-mountainous to urban areas, the abandonment of agricultural land adjacent to the State forests and the natural expansion of the forest vegetation. The emigration of people resulted in the declination of grazing, in the reduction of the needs for fuelwood, in the reduction of forest fires on the lands outside State forests and in the transformation of parts of them into forest.

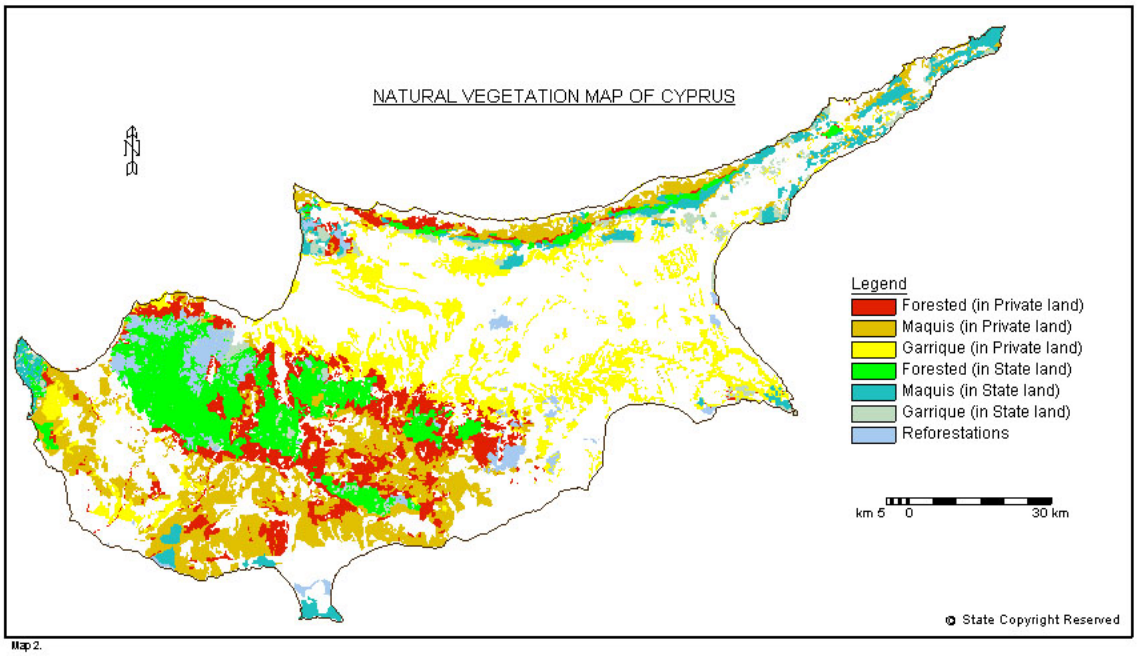
Map 1.1.1



Map 1.

Source: Natural Resources Information and Remote Sensing Center, Ministry of Agriculture, Natural Resources and Environment

Map 1.1.2



Map 2.

Source: Natural Resources Information and Remote Sensing Center, Ministry of Agriculture, Natural Resources and Environement

The changes in the land use in the public forests are prohibited by the Forest Laws of 1967, 1987 and 1991. Changes in the use of the private forests or of the other wooded land is not restricted by any law or regulation. Private forests may be transferred at any time to other uses and private treeless areas may be afforested. The main reason of private forest land use change is the building of country houses or ecotourism development or the conversion into agricultural lands.

For the time being, there is no information regarding the number of private forest owners or the area each-one-owns. This is mainly because private forest areas were small abandoned agricultural lands where natural vegetation invaded from the adjacent State forests. In many cases, these lands are owned by more that a single individual.

According to Forest Law (Law 14 of 1967), the State forest is classified into: Main State Forest and Minor State Forest.
The Main State Forest is further sub-classified into:

- *Permanent Forest Reserves*, which are areas that are used in perpetuity for forestry;
- *Nature Reserves*, which are forests that provide complete and permanent protection of the flora and fauna;
- *National Forest Parks*, which are forests providing amenities and recreation opportunities to the general public.

On the other hand, Minor State Forest is sub-classified into:

- *Communal Forests*, which are forests assigned by the Council of Ministers to the inhabitants of a village in order to be used and enjoyed communally for the purpose of amenity and recreation;
- *Municipal Forests*, which are forests assigned by the Council of Ministers to a municipality for the purpose of obtaining fuel, timber and other forest products for their needs or for the purpose of amenity or recreation;
- *Grazing Areas*, which are areas assigned by the Council of Ministers to the inhabitants of a town or a village for the purpose of grazing their cattle;
- *Nursery Areas*, which are areas reserved by the Council of Ministers for the production of seedlings, including fruit trees, bushes and other ornamental shrubs and flowers for use in any State forest or for sale to other Governmental Departments or to the general public;

- *Multiple Use Forests* are forests which can be leased by the Director of the Department of Forests for different kinds of use, not necessarily related to forestry, such as the cultivation or production of agricultural crops, the breeding and production of livestock or any other use approved by the Council of Ministers.

Table 1.1.3

Stately owned forest area classified according to the Forest Law

	Main State Forest			Minor State Forest					
Year	Permanent Forest Reserves Ha	National Forest Parks ha	Nature Reserves Ha	Multiple Use Forests ha	Communal Forests ha	Municipal Forests ha	Nursery Areas ha	Grazing Areas ha	Total Area ha
1993	134 473,9	10 476,1	1 043,0	12 547,5	1 485,9	97,6	3,1	1 696,5	161 823,6
2002	131 960,0	11 103,6	4 788,5	12 421,9	1 485,9	97,6	3,1	1 696,5	163 557,1

Source: Department of Forests

The above table shows the last-ten-years changes in the areas of Main and Minor State Forests as well as the changes in the areas of their sub-classes as defined by the Forest Law. The total area of the State forest has been increased between the years 1993 and 2002 by 1 733,5 ha. This 1,07 per cent increase is due to the declaration by the Council of Ministers of some "hali" land into Main State Forest. During the same period, the area of National Forest Parks and Nature Reserves has been increased by 627,5 and 3 745,5 ha respectively. This increase is the result of the declaration by the Council of Ministers of certain areas previously classified as Permanent Forest Reserves into Nature Reserves or National Forest Parks. According to the criteria of classification, these areas should have specific values and unique characteristics such as: be outstanding examples of natural beauty, contain endemic or rare species of fauna and flora and their habitats, contain archeological, cultural, historical and scientific features etc. This is also the reason for the 1,87 per cent decrease, one can observe, on the area of the Permanent Forest Reserves between the years 1993 and 2002.

It has to be noted that the Permanent Forest Reserve areas presented in table 1.1.3 are not related to the areas of Forests shown in tables 1.1.1 and 1.1.2. These 131 960 ha of Permanent Forest reserves are areas under the jurisdiction of the Department of Forests and are managed for forestry purposes. Some of these areas do not fulfill the criteria to be defined as forest. Therefore, these areas, along with others classified as Permanent Forest Reserves where dams

were constructed or mining was taking place or were leased for different reasons are not included in tables 1.1.1 and 1.1.2.

From the 106.781 ha of State forests presented in table 1.1.2 only 43 173 ha are classified as Productive and are managed for timber production.

Table 1.1.4

Forest area occupied by the main forest communities in the State forests

Major Forest Communities	*Area in hectares*
Pinus brutia community	88 790
Pinus nigra community	2 640
Mixed brutia – nigra community	2 330
Cedrus brevifolia community	130
Mixed Cedrus brevifolia – Pinus brutia community	120
Mixed Pinus brutia – Quercus alnifolia	5 870
Juniperus phoenicia	5 350
Eucalyptus community	137
Riverine community (Platanus and Alnus)	430

Sources:
- Department of Forests
- Natural Resource Information and Remote Sensing Center, Ministry of Agriculture and Natural Resources

The State forests of Cyprus are made up of the following plant communities; the Pinus brutia, the Pinus nigra, the mixed Pinus brutia-nigra, the Cedrus brevifolia, the mixed Cedrus brevifolia-Pinus brutia, the Quercus alnifolia, the mixed Pinus brutia - Quercus alnifolia, the Eucalyptus and the Riverine community. The area of the State forest that each one of the above communities occupies is stated in table 1.1.4 above.

From the 130 ha of Cedrus brevifolia community shown above, the 86 ha are natural stands and the rest are plantations. The Eucalyptus community is mainly concentrated around Fasouri. 110 ha of Eucalypts are also grown in various experimental stations around Cyprus.

Regarding the private forests, the areas occupied by the main forest communities are as follows:

Table 1.1.5

Forest area occupied by the main forest communities in the private forests

Major Forest Communities	*Area in hectares*
Pinus brutia community	48 954
Cupressus sempervirens	7 270
Ceratonia siliqua and Olea europaea	5 720
Juniperus phoenicia	2 940
Eucalyptus community (Plantations)	260
Riverine community (Platanus and Alnus)	610
Quercus infectoria	60

Sources: Natural Resource Information and Remote Sensing Center, Ministry of Agriculture and Natural Resources

The above figures are the best available at present. More accurate figures are expected after the completion of a series of inventories that will cover both stately and privately owned areas.

CRITERION 1: MAINTENANCE AND APPROPRIATE ENHANCEMENT OF FOREST RESOURCES AND THEIR CONTRIBUTION TO GLOBAL CARBON CYCLES

Indicator 1.2: Growing Stock

Full text: Growing stock on forest and other wooded land, classified by forest type and by availability of wood supply

Rationale:

The growing stock is one of the fundamental information a forest inventory can provide. The growing stock along with the area of the forest can be used to calculate the productive capacity of the forest that is the ability to provide a flow of benefits to the society, both timber and non-timber.

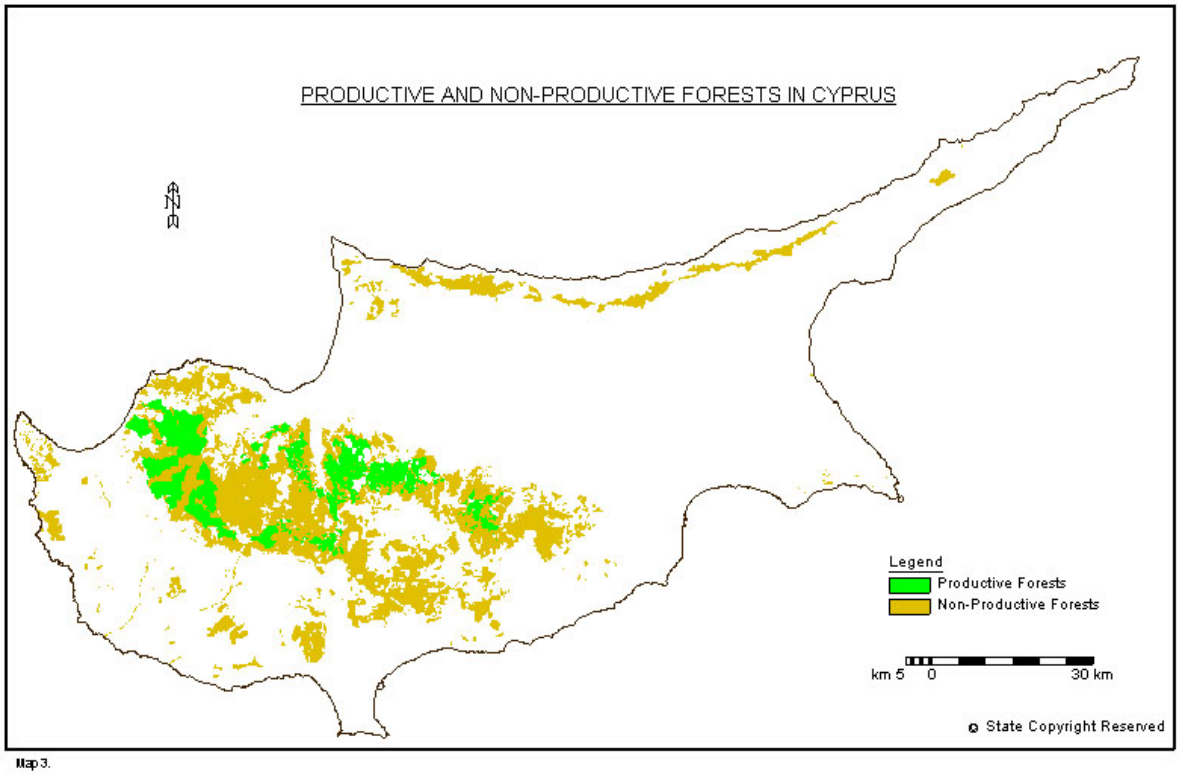
Knowing the standing volume of the growing stock and how it changes over time, the forest manager can easily take decisions regarding the sustainable supply of wood and the sustainability of the ecosystem producing it. The growing stock, which is closely related to the above ground biomass, can also provide data for calculating carbon budgets.

Quantitative Indicator:

Information for the indicator 1.2 is derived from 1 650 permanent sample plots located in the Productive Forests within the State forests of the island. Productive forests are considered to be 43 173 ha of Pinus brutia (is the main species of commercial value in Cyprus) forest capable of producing and supplying a remarkable amount of timber. Today, this area is by 49 ha less than what it was back in 1991 because of forest fires. The area managed mainly for purposes other than production within the State forests is equal to 63 608 ha. This area is composed of:

- Nature Reserves,
- National Forest Parks and,
- Areas where the forest has crown density less than 10%, or is growing on steep slopes and rocky sites that are remote and non-cultivable.

Map 1.2.1



Source: Natural Resources Information and Remote Sensing Center, Ministry of Agriculture and Natural Resources

Table 1.2.1

Total and per hectare volume of the growing stock of Pinus brutia State forest

Year	Growing Stock (m^3/ha) Management Unit		Growing Stock (m^3) Management Unit		Total Growing Stock (m^3)
	I	II	I	II	
1991-1992	58,9	77,8	954 357	2 102 078	3 056 435
2001-2002	59,1	79,0	954 879	2 134 264	3 089 143

Source: Department of Forests

The total volume of the growing stock of the Productive Pinus brutia State forests as estimated by the forest inventory of 2001-2002 is 3 089 143 m^3. The table 1.2.1 shows per hectare and total volume of the growing stock in Management Unit I, composed of the productive forests of Macheras, Adelphi and Troodos, and Management Unit II, composed of the productive areas of Paphos Pinus brutia forest. The per hectare stocking of Cyprus forests, as shown in the above table, is considered low especially when the last is compared to the growing stock of other coniferous forests in other Mediterranean countries. The adverse

climatic condition of the island i.e. long periods of drought and high temperatures, affect the growing stock as well as the increment and the regeneration of Cyprus forests.

Despite of the above negative factor, the growing stock of the productive State forest has increased by 32 708 m^3 during the last decade. This is mainly because the increment of the last 10 years period exceeded the harvesting drain. According to the recommendations made by the Management Sector of the Department of Forest, responsible for the forest inventory, the harvesting volumes shall be reduced substantially so that the stocking increases in a thirty years period to 100 m^3/ha and 150 m^3/ha for Management Units I and II respectively.

It is estimated that the average growing stock and the increment of the entire State and Private forests of Cyprus is roughly equal to 45 m^3/ha and 0.63 m^3/ha/year respectively. In order to improve these estimates, the Department of Forests is planning to carry out inventories for:

- the Non-Productive Forests,
- the Private Forest Areas,
- the Nigra Pine Forest and,
- the recently regenerated areas.

The quantitative increase and the qualitative improvement of the growing stock in the forests and other wooded land are also stimulated by the reforestation of the burned areas or by the afforestation of bare and degraded land. During the period between 1993 and 2002, 3 340 ha have been rehabilitated in State forests after forest fires or afforested after the declaration of "hali" lands into State forest.

CRITERION 1: MAINTENANCE AND APPROPRIATE ENHANCEMENT OF FOREST RESOURCES AND THEIR CONTRIBUTION TO GLOBAL CARBON CYCLES

Indicator 1.3: Age Structure and/or Diameter Distribution

Full Text: Age structure and/or diameter distribution of forests and other wooded land, classified by forest type and by availability of wood supply

Rationale:

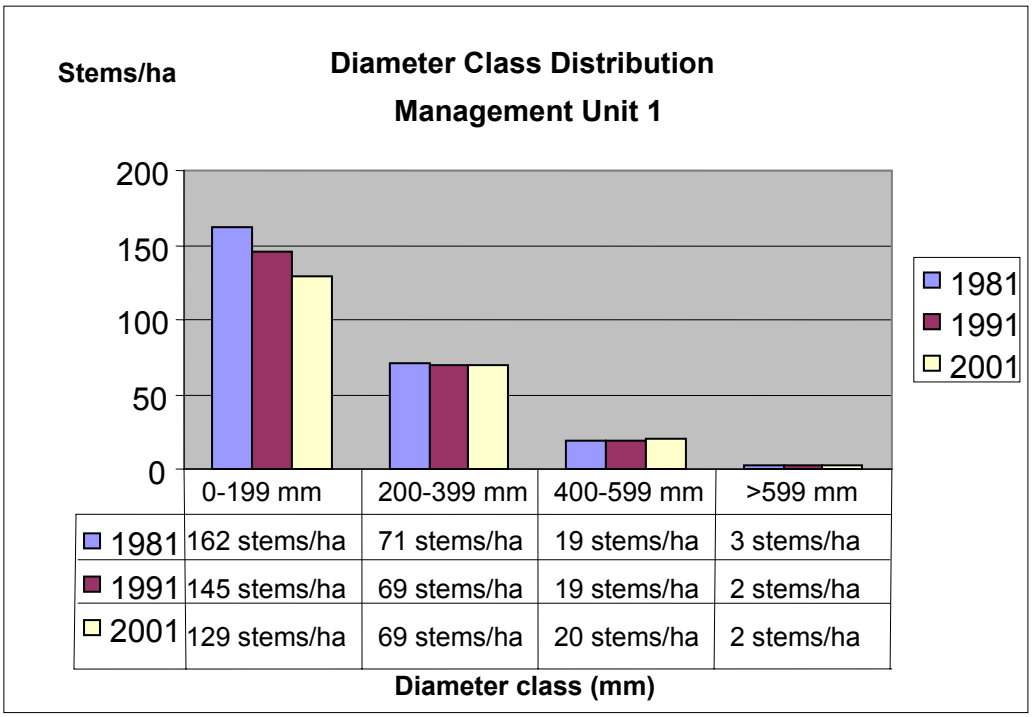
Diameter and age class distributions provide insight in the current and future development of forests and are a prerequisite for Sustainable Forest Management. On a national level for uneven-aged stands the diameter distribution should be given, while for even-aged stands the age class distribution is more appropriate.

The diameter and age class distributions can provide an indication of health, vitality, potential growth and stability of the forests.

Quantitative Indicator:

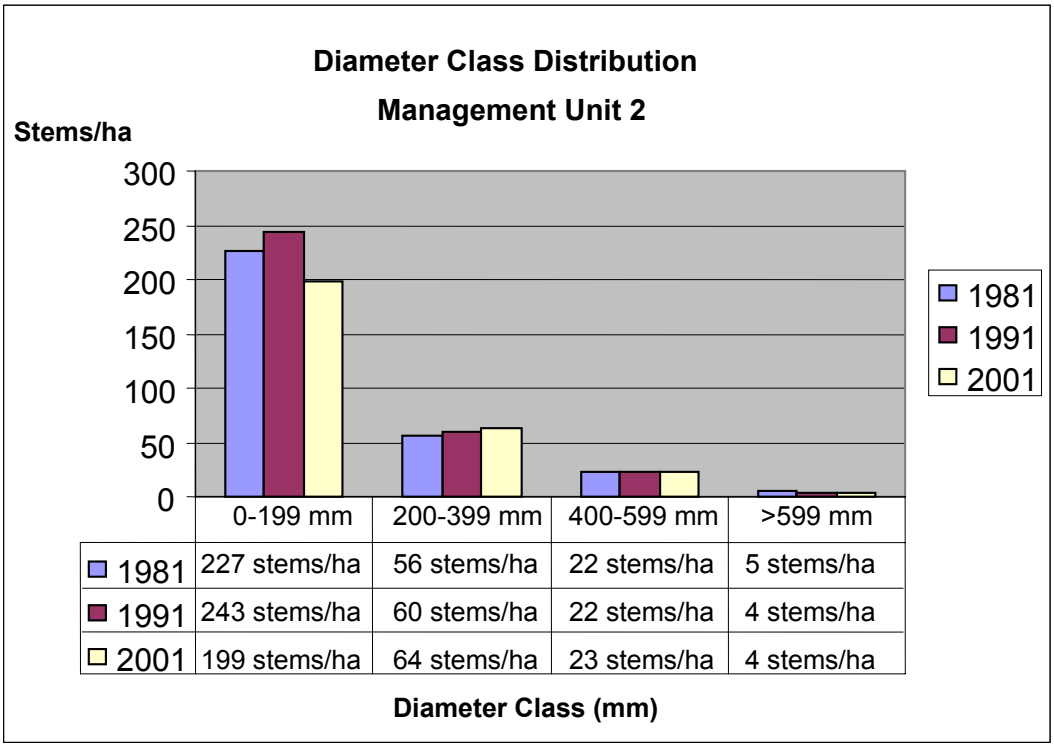
Pinus brutia forests in Cyprus are uneven-aged forests made up of even aged stands and are managed under the selection system. The following graphs plotted using data from the current (2001) and previous forest inventories (1991, 1981) in the productive Pinus brutia forests of the island, show a reverse J shape diameter distribution, a clear characteristic of the uneven-aged forests.

Graph 1.3.1



Source: Department of Forests

Graph 1.3.2



Source: Department of Forests

Both graphs (for Management Unit I and II) show a small through-time reduction in the number of stems in the smaller diameter class (0-199) and a slight increase (only for Management Unit II) in the number of stems in the medium size class (200-399). The reduction in the number of stems at the first diameter class may be due to lower success in natural regeneration, due to higher natural mortality or due to the removals of younger trees for silvicultural purposes.

CRITERION 1: MAINTENANCE AND APPROPRIATE ENHANCEMENT OF FOREST RESOURCES AND THEIR CONTRIBUTION TO GLOBAL CARBON CYCLES

Indicator 1.4: Carbon Stock

Full Text: Carbon stock of woody biomass and of soils on forest and other wooded land

Rationale:

Carbon dioxide is possibly the most important of the greenhouse gasses (it accounts for some 65% of the greenhouse effect) and contributes to climate change with various effects on ecosystems and life.

The rise of atmospheric CO_2 concentrations since the beginning of the industrial revolution has been caused by anthropogenic activity, in particular the combustion of fossil fuel and deforestation. In the 20^{th} century, the amount of atmospheric CO_2 increased by 20%, resulting in global climate warming. The International Panel on Climate Change (IPCC) estimated that the global mean temperature of the earth's surface has increased by 0,3 to 0,6^{o}C over the past 100 years (IPCC, 2000).

Forests are extensive, ever changing pools of carbon. Photosynthesis is the principal natural mechanism of removing greenhouse gasses from the atmosphere. Through photosynthesis, trees absorb carbon dioxide from the atmosphere, convert it to carbohydrates and store it in their biomass (roots, stems, branches and leaves). CO_2 is released back to the atmosphere through respiration or when trees die and decay. Through these processes, forest can become a source of CO_2 to the atmosphere.

Forests are vulnerable to climate changes and are expected to react in a variety of ways. A longer growing season may result in enhanced growth which may be partially or fully offset by increased respiration. Shifting of climatic zones may increase trends towards forest loss or even desertification.

Quantitative Indicator:

Table 1.4.1

Annual carbon emissions in Cyprus

	1990	1998	Change (%)
Annual carbon emissions (in thousand tons of CO_2)	4 600	6 400	+39,13

Source: Dr. Elena Georgopoulou, Dr. Demetra Koundenaki, National Observatory of Athens, Results of the greenhouse gasses emissions inventory in Cyprus, 2001.

The values given above were estimated by the National Observatory of Athens using the IPCC reference approach as well as the methodology used by CORINAIR. The estimates refer to the emissions coming from the free part of the island since there is no access to data taken at the occupied part.

According to the National Observatory of Athens, the total emissions of CO_2 during the period 1990-1998 have increased by almost 40%. 90,5% of the total emissions of carbon to the atmosphere are due to the burning of fossil fuel for energy production, and the rest is due to various industrial activities like production of cement and lime etc.

The carbon emissions in Cyprus can be reduced by switching to other sources of energy and by increasing the carbon sinks. The last can be achieved by protecting the existing forests mainly from fires, by increasing the forest areas mainly through afforestation of bare lands and reforestation of abandoned agricultural lands, by protecting their stocking and productivity, by securing the capacity of the soil to sequester carbon, by replacing non-renewable materials with renewable and by using alternative sources of energy.

Table 1.4.2

Carbon storage in forest stands and forest soils for the productive State forests.

	Carbon stored in thousand of tons	
	1991	2001
Aerial biomass of the forests	1 018	1 029
Forest Soils	973	972
Aerial biomass and forest soils	1 991	2 001

Source: The values above are estimates made using the IPCC 1996. Guidelines for National Greenhouse Gas. Intergovernmental Panel on Climate Change. Revised Edition.

Table 1.4.3

Carbon storage in forest stands and forest soils for the entire State and private forests of Cyprus.

	Carbon Stored in thousands of tons
Aerial biomass of the forests	2 586
Forest Soils	3 884
Aerial biomass and forest soils	6 470

Source: The values above are estimates made using the IPCC 1996. Guidelines for National Greenhouse Gas. Intergovernmental Panel on Climate Change. Revised Edition.

The carbon stored in aerial biomass in forest stands was calculated using the results of the current and previous forest inventories, the estimates regarding the average stocking of private and State forests of Cyprus and the IPCC 1996, Guidelines for National Greenhouse Gas.

The carbon content of the forests of Cyprus was calculated in the following way:

- The over stump non-merchantable volume of the growing stock was estimated after multiplying the total merchantable volume of the growing stock by 0,160 which is an average factor taking into account the volume of tree branches, stump and foliage.
- The under stump non-merchantable volume of the growing stock was estimated after multiplying the total merchantable volume of the growing stock by 0,320 which is an average factor taking into account the volume of tree roots.
- The total volume of the growing stock was estimated after adding the non merchantable over and under stump volumes to the total merchantable volume of the growing stock.
- The total volume of the growing stock expressed in m^3 was converted to dry matter biomass after it was multiplied by 0,450 m.t/ m^3.
- Finally, the carbon contend of the biomass was estimated by multiplying the dry matter biomass by 0,5.

The amount of carbon stored in forest soils was also estimated using the IPCC 1996, Guidelines for National Greenhouse Gas. The value used for this estimate was 22,5 ton of Carbon per ha.

The conversion factors used were general approximations and averages and provide a reasonable starting point for the current carbon reporting requirements. More accurate figures will be available in the near future, especially after the implementation of the Program for Monitoring of the Effects of Atmospheric Pollution in the Cyprus Forests.

The forests in Cyprus are estimated to contain nearly 2 586 thousand tons of carbon. This amount has increased during the last decade, since the annual increment for the same period exceeded the harvesting drain. Thus, more carbon is sequestered in forest than what it is released in harvesting. The forests of Cyprus are capable of blocking approximately 36 thousand tons of carbon as estimated by the gross increment of the forest. This amount makes up the 0,56 % of the total 1998 emissions of carbon in Cyprus.

The greatest carbon pool though in Cyprus is soil. The amount of carbon sequestered in the soil was estimated to be around 3 884 thousand tons.

Carbon budgets are sensitive to forest land conversion because replacement ecosystems usually have higher carbon turnover rates and lower storage capacity than forested lands. Land use change in the State forests is prohibited by the Forest Law but this cannot be prevented in the private forest areas due to the absence of any regulations or laws regarding their use and management.

CRITERION 2: MAINTENANCE OF FOREST ECOSYSTEM HEALTH AND VITALITY

Indicator 2.1: Deposition of air pollutants

Full text: Deposition of air pollutants on forest and other wooded land, classified by N, S, and base cations

Rationale:

Pollution is the addition to the environment of substances at a rate faster than what the environment can accommodate by dispersion, breakdown, recycling, or storage in a harmless form. Much of the air pollution arises from fuel burning in transportation, power plants, and buildings.

The deposition of air pollutants in an ecosystem is a major external stress factor affecting ecosystem stability by changing soil condition, upsetting forest tree health, predisposing trees to the effects of drought and to insects and fungi attacks, negatively affecting ground vegetation composition, and causing severe problems to water environments.

Quantitative Indicator:

The main source of air pollution is the burning of fossil fuels like coal, oil and its derivatives such as diesel and gasoline which are widely used in internal combustion engines, for heating or for industrial purposes. The most common pollutants resulting from fuel burning, negatively affecting forest ecosystems are nitrogen oxides (NO_x) and sulfur dioxide (SO_2).

Sulfur dioxide (SO_2) is produced by burning oil containing sulfur as an impurity for public electricity and heat production, in manufacturing industries, in road transportation and in agriculture. Sulfur dioxide is also released by refining petroleum and during cement production. It comes mainly from point source such as smoke stacks and thus, sulfur dioxide injury to forests tend to be restricted to small areas around its source.

Table 2.1.1

Emissions of sulfur oxides in Cyprus for the period between 2000 and 2002

Sector	SO_x Gg (10^9g) SO_2		
	2000	2001	2002
Public Electricity and Heat Production	32,69	29,83	30,15
Petroleum Refinery	0,66	0,98	1,06
Manufacturing Industries	4,70	4,77	5,63
Road Transportation	7,49	7,29	7,02
Agriculture	0,84	0,82	0,84
Residential	2, 83	2,74	2,63
Cement Production	3,54	3,37	3,34
National Total	**52,75**	**49,80**	**50,67**

Source: Department of Labour Inspections, Ministry of Labour and Social Insurance.

Nitrogen oxides (NO_x) come from fuel-burning power-plants and home heating, motor vehicles, petroleum refining and cement production and manufacturing industries.

Table 2.1.2

Emissions of nitrogen oxides in Cyprus for the period between 2000 and 2002

Sector	NO_x (Gg NO_2)		
	2000	2001	2002
Public Electricity and Heat Production	5,77	5,64	6,49
Petroleum Refinery	0,21	0,20	0,17
Manufacturing Industries	0,48	0,48	0,52
Road Transportation	9,89	10,04	10,07
Agriculture	0,71	0,69	0,67
Residential	0,59	0,57	0,55
Cement Production	3,98	3,78	3,74
National Total	**21,63**	**21,40**	**22,21**

Source: Department of Labour Inspections, Ministry of Labour and Social Insurance.

The absence of similar comparable data for the years before 2000 cannot allow a safe evaluation of the air pollution trends in Cyprus.

Once in the atmosphere, these pollutants can be deposited back to the earth's surface either as dry depositions or wet depositions.

Sulfur dioxide and nitrogen oxides while in the atmosphere can combine with water vapor to form acid rain, which is damaging to forest vegetation, soil, and water resources. Most of the acid rain comes from sulfur dioxide (SO_2) which dissolves into the water to form sulfuric acid (H_2SO_4). Acid rain comes also in the form of Nitric, HNO_3, and Nitrous, HNO_2, acids from various oxides of nitrogen, mainly NO_3 and NO_2, collectively called nitrogen oxides NO_x.

The deleterious effects of pollution on sensitive ecosystems, forests, forest soils, and water have been scientifically documented for the last 30 years.

The monitoring of depositions of pollutants and particularly of sulfur dioxide and nitrogen oxides in the Cyprus forests is exercised since 1/1/2003 under the *Convention on Long-range Transboundary Air Pollution of the United Nations Economic Commission for Europe (CLRTAP) by the International Co-operative Program on the Assessment and Monitoring of Air Pollution Effects on Forests (ICP-Forests)*. According to this program, two monitoring stations have been established. At the first station, *Agia Marina Xyliatou*, the data collection begun on the 1/1/2003. At the second station, *Prodromos*, the data collection has just begun; 1/1/2004.

Table 2.1.3

Mean concentration of pollutants in rain water at Ayia Marina Xyliatou Monitoring Station for the year 2003

	Nitrogen (N) Total mg/l water	Sulfur ($S\text{-}SO_4$) mg/l water
In open space	2,10	2,85

Source: Department of Forests

Table 2.1.4

Deposition of air pollutants on forest land as estimated at Ayia Marina Xyliatou Monitoring Station for the year 2003

	Nitrogen Kg/ha	Sulfur Kg/ha
In open space	12,63	17,14

Source: Department of Forests

Due to the nature of land cover, more air pollutants can be deposited on forest and other wooded land rather than on open land. The deposition of pollutants in forests and other wooded land has various implications on forest vegetation, forest soils and water.

Acid rain injury on conifers is very difficult to be diagnosed because symptoms are very similar to injury caused by other stress factors. The needle tips and in some cases the entire needle become brown leading to premature needle drop off. Younger plants and seedlings can be more seriously affected by acid rain failing to produce new trees.

Acid rain can cause chemical changes to soil. Sulfate and Nitrate do not only reduce the soil pH but also displace base cations that trees need, such as calcium (Ca^{2+}), magnesium (Mg^{2+}) and potassium (K^{+}), leading to nutrient leaching and tree starvation. Weakened by nutrient deficiency trees become more susceptible to natural stresses such as insects, diseases, wind, drought, and ices storms. Acid rain has also negative impacts on soil mycorrhiza. A wide range of other forest dwelling species, like soil microorganisms, is also affected by the on going chemical change of their environments.

Under extreme acid rain conditions, acid rain can break down some compounds freeing metals and washing them into water courses such as rivers.

Water pollution includes the accumulation in water bodies like oceans, lakes, dams, rivers, and ground water, of substances that are either directly harmful or have harmful secondary effects. Phosphorous and nitrogen when added to lake and stream water can cause nuisance growth of aquatic weeds, as well as bloom of alga (eutrophication). Polluted water looses its economical and aesthetic value and can become a threat to life that depends on.

Air pollution is a global problem which can compromise the sustainability of forest management. Every country has to take measures to reduce the emissions of air pollutants. Some measures taken by the Cyprus Government to reduce the emissions of NO_x and SO_2 are the fitting of catalytic converters to all internal combustion engines, the use of fuel with low sulfur content and the use of sun and wind as alternative sources of energy.

CRITERION 2: MAINTENANCE OF FOREST ECOSYSTEM HEALTH AND VITALITY

Indicator 2.2: Soil condition

Full text: Chemical soil properties (pH, CEC, C/N, organic C, base saturation) on forest and other wooded land related to soil acidity and eutrophication, classified by main soil types

Rationale:

Soil condition is the basic source of ecosystem stability. Acidification and changes in chemical soil properties directly or indirectly affect crown condition and species composition. Tree resistance to insect attacks and diseases are often correlated to soil condition. In addition ecosystem stability is closely related to nutrient cycling. The existing tendency to acidification and eutrophication of soils and the associated changes in foliar chemistry of many parts in Europe is a potential area of concern.

The base saturation indicates the reserves left in the soil to buffer against further additions of e.g. acidifying substances. The C/N ration, the Cation Exchange Capacity (CEC) as well as the pH and organic C are important key indicators to describe soil acidity and eutrophication.

Depending on the respective soil property, the recommended soil depths are the organic layer and the top 20 cm.

Quantitative Indicator:

The monitoring of the soil properties in the forests and other wooded land constitutes an important tool for the evaluation of the sustainable management of these resources. For forests to be sustainable, soil quality and productivity must be maintained. The determination and the monitoring of chemical indicators like the pH, the CEC (cation exchange capacity), the C:N ratio, the organic C and the base saturation is a reliable method of evaluating soil quality and productivity.

pH is a measure of acidity or alkalinity of a soil and is determined by the hydrogen ion (H^+) concentration in the soil solution.

Cation exchange capacity (CEC) is the amount of exchangeable cations bound to clay and humus material in the soil e.g. Ca^{2+}, Mg^{2+}, K^{+}, Na^{+}, NH^{4+}, H^{+}. CEC gives indication of the soils ability to bind and store nutrients.

C:N ratio is the ratio measured by weight of the number of parts of carbon to each part of nitrogen. The value of this ratio allows knowing the organic material evolution and its potential for mineralization.

Organic carbon is the major component of soil organic matter, the presence of which is an indicator of soil quality. The loss of soil organic matter and reduction of soil carbon content result in the soil structure breakdown rendering soils vulnerable to soil erosion, reducing soil fertility, and leading to yield reduction and loss of sustainability of the soil resources.

Base saturation which is the ratio of the quantity of exchangeable bases to the CEC, indicates the reserves left in the soil to buffer against further additions of, for instance, acidifying substances.

The first mechanical analysis of the soil properties was carried in 2003 using soil sampling techniques. Fifteen (15) sample plots were examined with primary aim the classification of these areas into soil types based on the FAO, 1990, guidelines for soil description.

Table 2.2.1

Soil type classification of the 15 sample plots selected for the mechanical and chemical analysis of forest soils

Plot No.	Location	Elevation (m)	Soil Classification
1	Akamas	196	Calcaric renzic leptosols
2	Ayios Merkourios	315	Euric leptic regosols – Anthropic leptic regosols
3	Anadiou	531	Euric leptosols
4	Mala	480	Euric leptosols
5	Tripilos	1359	Euric mollic leptosols
6	Kameny	546	Euric chromic leptosols
7	Orites	443	Calcaric renzic leptosols
8	Pareklisia	351	Euric mollic leptosols
9	Gerasa	553	Euric leptosols
10	Platres	1392	Euric leptic leptosols
11	Saranti	1294	Euric leptic leptosols
12	Stavroulia	1185	Euric leptic leptosols
13	Pyrkolofos	368	Euric leptic leptosols
14	Kionia	1184	Euric leptic leptosols
15	Kakoratzia	231	Euric mollic leptosols

Source: Department of Forests

Data related to the chemical soil condition have not yet been compiled. It is expected that during this current decade, the systematical chemical analysis and investigation of the soil properties within these plots will be carried out. The new regulation (2152/2003) of the European Parliament and of the Council concerning monitoring of forests and environmental interactions in the community, known as "*Forest Focus"*, will enact this practice and will make it a must.

CRITERION 2: MAINTENANCE OF FOREST ECOSYSTEM HEALTH AND VITALITY

Indicator 2.3: Defoliation

Full text: Defoliation of one or more main tree species on forest and other wooded land in each of the defoliation classes "moderate", "severe" and "dead"

Rationale:

Crown defoliation is an indicator giving an estimation on tree condition. Defoliation depends on many stress factors and is therefore a valuable measure to describe the overall forest condition, although the causes of observed defoliation might be non-specific and not quantifiable.

Quantitative Indicator:

Defoliation is the relative loss of needles or leaves and is considered as an indicator for monitoring forest health and vitality. The extend of visually assessed defoliation of trees, as developed by the International Co-operative Programme (ICP Forests) of the Executive Committee for the Convention on *Long-Range Transboundary Air Pollution in Europe*, has as follows:

Table 2.3.1

ICP Forests, defoliation classes

Class	Needle/Leaf Loss	Degree of Defoliation
0	No defoliation up to and including 10 %	none
1	More than 10% to 25% defoliation	slight
2	More than 25% to 60 % defoliation	moderate
3	More than 60% to 100% defoliation	severe
4	100% defoliation	dead

Source: ICP Forests

A large number of factors can cause defoliation. These include the deposition of atmospheric pollutants, soil acidification, adverse climatic and weather conditions (drought), biotic factors (insects and fungi), the development stage of trees (aging of trees) or even heavy seed production.

The monitoring of stand defoliation in Cyprus began in 2001 by establishing and measuring 15 sample plots within the Pinus brutia, Pinus nigra and Cedrus brevifolia communities within the State forests of the island.

Table 2.3.2

Results of surveys on health status of Pinus brutia on the basis of defoliation

Year			2001		2002		2003	
Number of trees			300		300		300	
Defoliation Class	Needle Loss %	Degree of Defoliation	%	Number of trees	%	Number of trees	%	Number of trees
0	0-10%	None	19,3	58	26,3	79	17,7	53
1	>10-25%	Slight	70,1	210	70,4	211	60,3	181
2	>25-60%	Moderate	10,6	32	3,3	10	21,7	65
3	>60-100%	Severe	0	0	0	0	0,3	1
4	100%	Dead	0	0	0	0	0	0

Source: Department of Forests

Table 2.3.3

Results of surveys on health status of Pinus nigra on the basis of defoliation

Year			2001		2002		2003	
Number of trees			36		36		36	
Defoliation Class	Needle Loss %	Degree of Defoliation	%	Number of trees	%	Number of trees	%	Number of trees
0	0-10%	None	75,0	27	53,0	19	41,7	15
1	>10-25%	Slight	25,0	9	47,0	17	58,3	21
2	>25-60%	Moderate	0	0	0	0	0	0
3	>60-100%	Severe	0	0	0	0	0	0
4	100%	Dead	0	0	0	0	0	0

Source: Department of Forests

Table 2.3.4

Results of surveys on health status of Cedrus brevifolia on the basis of defoliation

Year			2001		2002		2003	
Number of trees			24		24		24	
Defoliation Class	Needle Loss %	Degree of Defoliation	%	Number of trees	%	Number of trees	%	Number of trees
0	0-10%	None	33,3	8	52,5	13	33,3	8
1	>10-25%	Slight	66,7	16	47,5	11	66,7	16
2	>25-60%	Moderate	0	0	0	0	0	0
3	>60-100%	Severe	0	0	0	0	0	0
4	100%	Dead	0	0	0	0	0	0

Source: Department of Forests

The first assessment (2001 – 2003) showed that no major defoliation problems exist in Cyprus forests.

Regarding Pinus brutia, the 2003 defoliation assessment showed that 17,7% of the monitored trees are classified as healthy with no defoliation, 60,3 % of the trees are assigned to the defoliation class slightly damaged, 21,7% are classified as moderately damaged and 0,3% of them as severely damaged. The survey showed no dead trees. Regarding Pinus nigra and Cedrus brevifolia, only slight defoliation has been observed.

Regarding hardwoods, no data have been collected related to defoliation. The reason lies on the fact that the existing hardwood-stands are quite open and do not fulfill the criteria for the establishment of sample plots.

The accurate judging of the situation of defoliation over time requires accurate and comparable data from a series of annual defoliation surveys. The presence of only three annual surveys (2001 – 2003) does not allow a safe evaluation of the situation.

As already mentioned, defoliation can be the result of many factors, but defoliation is Cyprus is affected mainly by abiotic factors, like drought, and biotic agents, like insects, (e.g. Thaumetopoea wilkinsoni) and not by air pollution.

CRITERION 2: MAINTENANCE OF FOREST ECOSYSTEM HEALTH AND VITALITY

Indicator 2.4: Forest Damage

Full text: Forest and other wooded land with damage, classified by primary damaging agent (biotic, abiotic and human induced) and by forest type

Rationale:

Biotic agents include e.g. insects and diseases, wildlife and grazing in woodland. Abiotic agents include e.g. fire, storm, wind, snow, drought, and mudflow. Direct human induced damage factors include harvesting damages and damages by forest operations which cause severe economical losses and decrease of the ecosystem health and vitality (decrease in timber quality, rot, decay, destruction of natural regeneration, soil degradation). The effects are long lasting. A decrease of harvesting damage indicates gentle harvesting and logging methods and an increase ecological sense of responsibility. Also damages caused by wrong forest management should be also considered.

Heavy attacks of insects and phytopathogens (bacteria, viruses, fungi) may cause major impacts to forest resulting in a risk for forest ecosystem functionality and an economic loss. Insect populations are also likely to react to long-term change processes such as climate change. Furthermore, biotic damages may result in deterioration of tree condition not only in the year of occurrence but also in later years.

Forest fires are a major threat notable to Mediterranean forests with an average area burned of several thousand hectares. While controlling burning might increase species diversity under control conditions, uncontrolled forest fires might have major negative consequences for the ecosystem, such as desertification, erosion, loss of water supply or economic loss.

Storm, drought, and mudflow damage are also serious threats to forest and other wooded land because they might also result in a loss of timber yield, landscape quality and wildlife habitat. However, impacts in the case of non-site adapted forest stands may be evaluated less serious than in the case of natural, semi-natural or site adapted ones since necessary reforestations may lead to side adapted forests in the future.

Pressure to forest and other wooded land is also caused by society in form of intensive tourist and recreational activities with negative site effects such as forest fire, contamination and vandalism.

Human induced damages by unidentified causes comprise e.g. damages of air pollution, traffic or cattle breeding.

Quantitative Indicator:

2.4.1 Biotic agents

Biotic agents include the following two sub-categories:

a) insects and diseases and,

b) wildlife.

2.4.1.1 Insects and diseases

In Cyprus, no detailed inventories have been carried out to determine the extend of loss and damages by insects and diseases. Therefore, reliable and comprehensive data on the annual occurrences of insect attacks and diseases as well as the consequences on forests and forest products are still not available. Seasonal observations and investigations throughout the forests of Cyprus lead to the conclusion that our forests are quite healthy and do not severely suffer from any of these damaging agents.

Damages caused by insects

These seasonal observations show that insect attacks by Thaumetopoea wilkinsonii Tams were the most common of all identified causes of damage. Thaumetopoea is considered as one of the most important forest pests in the Pinus brutia forests of the island. Defoliation by processionary caterpillar is extremely serious especially in young reforested areas and can lead even to death of trees, either directly or indirectly as a consequence of drought or other insect attacks. Mature forest-trees are rarely killed but significant losses of volume growth occur. Insect populations are favored by weather conditions, environmental factors and related population dynamics of insects. The extend of defoliation and the economic impacts, due to the negative effects on increment and stock volume vary a great deal annually. This is because the insect populations fluctuate considerably. Economically significant epidemics occur every few years.

Thaumetopoea wilkinsonii can also cause nuisance to habitats of villages and to forest visitors when a considerable number of caterpillar nests are found on pine trees, due to the irritant properties of their hairs which produce rashes on the skin.

Lymantria dispar L. is another common defoliator attacking deciduous and evergreen oaks causing local epidemics especially on maquis forests of Quercus alnifolia and Arbutus andrachne.

Some other harmful insects affecting forest species (but without significant economic loses) are presented in table 4.2.1.1.1

Table 2.4.1.1.1

Other indigenous harmful forest insects affecting Cyprus forests

Insect Species	Insect Type	Host Trees
Rhyacionia buoliana Schiff	Shoot borer	Pinus brutia, Pinus nigra
Tomicus (Blastophagus) piniperta L.	Shoot beetle	Pinus brutia, Pinus nigra
Tomicus (Blastophagus) minor	Shoot beetle	Pinus nigra
Phloeosinus armatus	Bark beetle	Cupressus sempervirens
Orthotomicus (Ips) erosus Wollaston	Bark beetle	Pinus brutia, Pinus nigra, Cedrus brevifolia
Leucaspis spp.	Defoliator	Pinus brutia, Pinus nigra
Megastigmus schimitscheki	Seed borer	Cedrus brevifolia

Source: Department of Forests

Damages caused by diseases

The most common agents causing infectious diseases to forest trees are fungi. The most popular fungi species in Cyprus causing some problems to forest trees and seedling are:

a) Heterobasidion anosum which causes root rot especially in conifers and,
b) Fusarium spp. a fungus responsible for damping off in forest nurseries.

2.4.1.2 Wildlife

Potential direct and indirect damages to forests and other wooded land can be caused by the following vertebrates: the Cyprus moufflon (Ovis gmelini ophion), the hare (Lepus europaeus cyprius), rats and rodent, and the recently introduced wild pig.

The Cyprus mouflon: In spite of the unavailability of comprehensive annual data regarding the damages caused by the Cyprus mouflon, available sources report the absence of severe damages on forest and other wooded land by this animal. The Cyprus mouflon, an endemic species, has Paphos forest as its natural habitat. Its population has revived from near extinction, at the beginning of 1900s, to about 2,000 animals which is the current population. Its food resources include plants of the herb layer like grasses, forbs and non-graminaceous monocotyledonous plants especially during the winter period. During summer, when the above food supply is less abundant, less digestible and less proteinaceous, broadleaved trees and shrubs are added to their diet. Pines, cedars and oaks (Quercus alnifolia) are avoided throughout the year.

Severe damages are caused especially during summer and when there is a shortage of food supplies within the forest. The most damages were observed in agricultural areas of specific villages found either within or around Paphos forest like Agios Demitrianos, Agios Ioannis, Agios Nikolaos, Anadiou, Arminou, Asprogia, Vretsia, Galataria, Gerakies, Zacharia, Kaminaria, Kampos, Kilani, Kritou Marotou, Milikouri, Lasa, Lemithou, Lysos, Omodos, Panagia, Saramas, Tris Elies, Fini and Fiti.

The damages caused can be distinguished into different categories like:

- Damages on the leaves and young shoots of vines and fruit bearing trees like cherry, apple, pear trees etc,
- Breakages on the leading shoots and side branches of young trees,
- Damages on vegetable gardens and,
- Damages on cereals.

The number of farmers receiving compensatory payment increases year after year. The annual level of damage is presented in the following table:

Table 2.4.1.2.1

Damages caused by mouflon during the last decade

Year	Persons Receiving Compensation	Level of Compensation (CYP)
1993	222	11 344
1994	338	18 588
1995	376	16 647
1996	448	32 439
1997	447	31 324
1998	540	45 952
1999	483	38 875
2000	506	34 749
2001	546	53 901
2002	532	43 465

Source: Department of Agriculture

The hare: Data related to the damages caused by hares on forests and other wooded lands are not available. It is widely acceptable through, that these animals can cause slight and insignificant damages on young plantations.

Rats and rodent: In spite of the absence of an inventory related to the damages caused on forests and other wooded land by rats and rodents, there are a lot of reports of forest officers stating that *Rattus rattus frugivorous* causes severe damages on carob trees and on cones and seeds of pines and on acorns.

The wild pig: This is an exotic animal for the Cyprus forests. It was imported in Cyprus few years ago and was illegally released into the country side. The animal ended up in the forests where it could find shelter and food. Side observations report some minor damages on forest vegetation and soils.

2.4.2 Abiotic Agents

Frost, snow and hail, wind, drought, lighting, and wild fire represent the most important abiotic agents causing damages to Cyprus forests. Abiotic injury can reduce the economic value of individual trees, the productive potential of stands, and the aesthetic value of the forest. Abiotic damage can also provide an entry for biotic pathogens and insects.

Frost: it can damage or kill foliage, buds and twigs. Frost injury may occur in late spring, when emerging foliage and shoots are still succulent and tender, or in the fall before the buds and shoot tips harden and can withstand low temperatures and frost. Frost besides killing needles, leaves, buds and twigs, can also cause *frost cracks* and *top kill* rendering individual trees vulnerable to insect attacks. Due to the climate of Cyprus (Mediterranean climate) frost injuries are not considerable. Minor damages by frost can be seen in forest nurseries and at young reforestations.

Snow and hail: Heavy snowfalls and hail can significantly injure and deform both conifers and hardwoods. Consequences of heavy snowfalls are overwhelmed young trees, broken tops and side branches, injuries through which insects and fungi can gain entrance. Such problems are more obvious after a heavy snowfall and at places that do not receive snow frequently. Hail can cause severe injuries rendering trees vulnerable to insect and fungi attacks.

Wind: It can cause structural damages. Trees are broken or even windthrown. Wind damages are sporadic in Cyprus and occur only when strong winds affect the island. Obvious problems are seen in thinned stands and stands partially cut. Some species like Cupressus sempervirens are quite vulnerable to windthrows.

Drought: Symptoms of drought and soil moisture deficiency include chlorotic foliage, decreased growth rate, premature shedding of leaves and needles, dead branches and tops, even dead trees. Symptoms are usually visible from the top of the trees down and from the outside of the crown to the inside. Cyprus forests suffer considerably by drought and water stress that are very intense in certain years. Due to the existence of long, dry and hot summers as well as the low levels of winter precipitation between 1993 and 2000, a significant number of trees dried out in the forests of the island. This period of drought caused the following problems:

- Death of trees with shallow root system,
- High mortality of plants and seedling in artificial reforestations,
- High failure of natural regeneration,
- Weakening of trees and predisposition to insect and fungi attacks,
- Reduction of volume growth etc.

Drought is a major factor responsible for the number and volume of dead trees in the Cyprus forests as presented in table 4.5.1.

Lighting: Usually the taller and greener trees are more attractive to lighting. Lighting can skin off a strip of bark from the top of the tree to the ground either in a straight line or a spiral pattern. Wounding caused by lighting commonly predisposes trees to biotic attacks.

Lighting can cause a wildfire with many consequences on forest vitality and productivity. According to the data presented in the following tables, the damages caused by lighting in Cyprus are minor since such fires break out either during or after a rain.

Table 2.4.2.1

Wild fires within the State forests of the island caused by lighting

Year	Number of fires	Forest Area Burned (ha)	Other Wooded Land Burned (ha)	Total Area Burned (ha)
2000	6	0,094	0,470	0,564
2001	2	0,002	0,000	0,002
2002	4	0,004	0,000	0,004
Total	12	0,100	0,470	0,570

Source: Department of Forests

Table 2.4.2.2

Wild fires outside the State forests of the island caused by lighting

Year	Number of fires	Forest Area Burned (ha)	Other Wooded Land Burned (ha)	Total Area Burned (ha)
2000	1	0,000	0,002	0,002
2001	2	7,000	0,003	7,003
2002	1	0,100	0,000	0,100
Total	4	7,100	0,005	7,105

Source: Department of Forests

Even though the degree or risk of biotic damages is low in Cyprus forests, the Department of Forests takes several measures for preventing or minimizing these damages through proper planning and good silviculture.

2.4.3 Direct Human Induced Damaging Factors

Direct human-induced damaging factors include forest fires, grazing, air pollution, tourism and, harvesting and other damages.

Human induced damages and specifically forest fire and grazing damages are the most significant compared to damages caused by other damaging agents.

Forest Fires:

Fire in Cyprus is by far the most destructive single agent threatening forests and other wooded lands. The fire hazard in Cyprus is pretty high especially during the summer period. This is because of:

- the nature of Cyprus forests (thousands of hectares of resinous pine trees),
- the prevailing climatic conditions (the long, hot and dry summers, as well as the strong winds) and,
- the topographic conditions (the steep slopes).

The fire hazard increases through time since rural people migrate to urban areas and abandon their agricultural land with all the consequences.

For the reduction of the fire risk and the prevention of a fire outbreak, the Department of Forests employs a series of separate but integrated programs. These are:

a) A prevention program,
b) A fuel management program
c) And a complex of activities that culminate in and support suppression.

With the increase of forest fire prevention, most fires are controlled at an early stage.

Whether on purpose or careless, forest fires have important consequences on forest ecosystems like loss of vitality and productivity, timber value reduction, loss of biological diversity, desertification, soil erosion and degradation, loss of water quality and quantity, severe economic effects, damage to wildlife habitats, even loss of human life.

The most common causes of wild-land fires in Cyprus are:

- Farmers who burn grass and stubble in their own land,
- Forest visitors, campers and picnickers who are careless with cooking-fires,
- Smokers who are careless with matches and cigarette ends,
- Military exercises with ammunition or explosives,
- Hunters, hunting during summer period.

The Department of Forests keeps data regarding the number of forest fires as well as the area per incidence since 1886. As from 2000, a new database has been developed and the data are grouped into the following categories:

a) fires that break out either within the State forests or outside the State forests but extend into the State forest,
b) fires that break-out outside the State forests.

For the fires that break outside the State forests, the Civil Fire Service keeps data also.

Table 2.4.3.1

Fires that break out either within the State forests or outside the State forests but extend into the State forest

Year	Number of incidences	Total Burned Area (ha)	Burned Area According to Ownership (ha)			Burned Area According to Vegetation Cover (ha)		Mean Time of Intervention (minutes)	Causes of fires		
			State Land	Private Land	Hali- Land	Forest	Other Wooded Land		Careless	On purpose	Other
1993	16	1344,4	69,2	1268,9	6,3	Not available	Not available	16	12	2	2
1994	35	1021,0	178,1	816,8	26,1	Not available	Not available	18	7	2	26
1995	24	308,7	69,6	169,1	70,0	Not available	Not available	20	6	0	18
1996	20	284,5	116,1	168,4	0	Not available	Not available	15	4	1	15
1997	19	396,7	166,7	145,0	85,0	Not available	Not available	23	3	1	15
1998	19	4056,3	566,4	3489,9	0	Not available	Not available	13	9	0	10
1999	20	4,4	3,4	1,0	0	Not available	Not available	10	3	1	16
2000	23	563,9	333,8	210,1	20,0	518,8	45,1	16	7	2	14
2001	23	793,9	380,4	276,6	136,9	665,8	128,1	12	12	4	7
2002	28	22,3	20,2	2,1	0	19,1	3,2	12	10	9	9
Total	227	8796,1	1903,9	6547,9	344,3	---------	--------	15.5	73	22	132

Source: Department of Forests

Table 2.4.3.2

Fires that break out outside the State forests

Year	Number of incidences	Total Burned Area (ha)	Burned Area According to Ownership (ha)			Burned Area According to Vegetation Cover (ha)		Mean Time of Intervention (minutes)	Causes of fires		
			State Land	Private Land	Hali- Land	Forest	Other Wooded Land		Careless	On purpose	Other
2000	89	6295,6	0	3103,8	3191,8	1813,1	4482,5	15	55	2	32
2001	82	3194,8	0	3068,9	125,9	112,4	3082,4	15	56	3	23
2002	127	1851,8	0	1774,1	77,7	84,4	1767,4	15	99	10	18
Total	298	11342,2	0	7946,8	3395,4	2009,9	9332,3	15	210	15	75

Source: Department of Forests

Grazing

Forest grazing was a major cause of land degradation and forest destruction in Cyprus until the early 1900's when several measures have been taken to control free-range animal grazing in the State and community owned lands.

Domestic goats and sheep have been on the island from the fourth millennium B.C. and they were playing an important role in the life and nutrition of Cyprus people for centuries. Goats could be found grazing in a wide range of habitats; from seashores to marshy lowlands and to steep and dry slopes in the highest mountain ranges. They were grazing on private lowlands during winter and spring and they were turning to the forest during summer and autumn. Shepherds were accustomed to burn the forest to improve the browse causing even more severe problems than grazing itself. These shepherds were the concern of the first forest grazing policies.

Legislation related to forest grazing was enacted as early as 1888 with a view to control goat grazing, prevent undue increase in goat numbers or even exclude them completely from the forest. Several laws and policies followed under which:

a) the importation of goats into Cyprus was forbidden to prevent undue increase in the goat population,
b) shepherds were encouraged either to increase sheep numbers in the expense of goats, or improve their method of animal husbandry outside State forests, or to give up their occupation for some other after providing alternatives.

These measures had positive effects on the reduction of goat population within the forests with many positive consequences on forest ecosystems. In 1953, 86,3% of the Main State Forest was free from any grazing. There were 2 834 permitted goats and 5 352 sheep left in the 13,7% of the Main State Forest open for grazing. Although grazing pressure was still high in these areas, by comparison with the 282 000 goats of 1886, this had a very low level of grazing impacts.

In due course, grazing was almost completely eliminated from the State forests of the island by the operation of the Goat Law and the Forest Law. The consequences were numerous; the floristic composition of the forest has been increased, the growth of wood and timber

production have been increased, natural regeneration have been increased, the productivity of the flocks has been improved, tourism and recreational use of the forest flourished etc.

Grazing continues to be a problem nowadays in Akamas, Randi, Peyia and Orides forests. In 2002, even though the Department of Forests issued 29 grazing licenses for a total of 2 126 animals, both goats and sheep, in these forests one can find more than 17 700 animals. These animals are blamed for serious damages on the particular forest ecosystems leading to complete loss of vegetation, erosion and desertification.

Illegal grazing has also been observed at Macheras forest but there, the pressure on the forest ecosystem is not as high as it is at Akamas forest. According to Department of Forests' data, 7 shepherds were accused for the illegal grazing of 1 530 animals in Macheras forest during 2002.

Grazing continues to be a severe problem in areas outside the jurisdiction of the Department of Forests.

Air Pollution

Although air pollution has not yet become a significant forest health problem in Cyprus, sophisticated monitoring methods of depositions of pollutants and particularly of sulfur dioxide and nitrogen oxides is exercised since 1/1/2003 under the *Convention on Long-range Transboundary Air Pollution of the United Nations Economic Commission for Europe (CLRTAP) by the International Co-operative Program on the Assessment and Monitoring of Air Pollution Effects on Forests (ICP-Forests)*. The deposition of air pollutants on forest land as estimated at Ayia Marina Xyliatou Monitoring Station are given in table 2.1.4.

Tourism

Tourism is the largest industry in Cyprus on which the Cyprus economy is heavily dependent. During 2001 and 2002, the arrival of foreign tourists to the island was 2 696 732 and 2418 236 respectively. The revenue from tourism during the same period was 1 271 630 043 and 1 132 321 228 Cyprus pounds.

Since tourism occurs in environmentally fragile areas rich in biodiversity, its impacts on the environment are quite significant. The most notable impacts are:

- Land degradation and landscape destruction due to the development of tourism facilities and infrastructure like hotels, apartments, restaurants, roads, ski pistas, golf courses, airports, etc.
- Soil erosion and compaction,
- Pressure on the fauna, flora and endangered species,
- Excessive ground water pumping and lowering of water tables to meet the increasing demands for freshwater since the demand outstrips supply,
- Loss of terrestrial and marine biodiversity,
- Increased levels of pollution from dumping of solid and liquid wastes generated by tourism activity.

Intensive tourism development and tourism activities while not properly planned can quickly cause environmental damages.

Harvesting and other damages

The most obvious type of mechanical damage in Cyprus forests is breakages during felling, logging and skidding operations.

Felling of trees in Cyprus is carried out using light equipment like chainsaws. This is due to the topography and ground configuration (steep slopes). The directional felling of trees is many time responsible for injuries caused to the remaining individuals. Manual or mechanical skidding can also leave marks and injuries on standing trees.

Bulldozer blades can also cause stem and other structural damages during opening and maintenance of roads and firebreaks. These damages can affect tree survival and growth. It is also well accepted that minor tree wounds that may not even restrict growth, can provide entrance points for biotic diseases and destructive insects which are worse than the physical damage by itself.

Harvesting and other mechanical damages are considered insignificant in Cyprus.

CRITERION 3: MAINTENANCE AND ENCOURAGEMENT OF PRODUCTIVE FUNCTIONS OF FORESTS (WOOD AND NON-WOOD)

Indicator 3.1: Increment and fellings

Full text: Balance between net annual increment and annual fellings of wood on forest available for wood supply

Rationale:

The balance between net annual increment and annual fellings of wood is an indicator of long run sustainability of timber production. In order to have sustainability, the volume harvested should not exceed the net annual increment defined as the average volume growth of survivor trees. This ensures that the volume of the growing stock is maintained through time. The difference between net annual increment and annual fellings should be enough to cover wood losses because of natural losses like forest fires which are very common in Cyprus.

The indicator, which aims at assessing whether forests are being used within the limits of their actual productivity, evaluates the ratio of harvesting to net increment. If this ratio is less than a unit, this means that the country is harvesting less than what the forest produces. If the ratio is more than a unit, then the country is over harvesting its wood forcing the forest resources to depletion.

Quantitative Indicator:

Information for this indicator is derived from tree measurement taken every ten years on permanent sample plots located in the productive Pinus brutia State forest of the island. This type of information reveals changes over time in forest productivity, health and vitality.

The first forest inventory in Cyprus was carried out by A.E. Wild in 1897 using sample plots with primary aim the estimation of the growing stock, increment, and other parameters.

Since then, some other attempts were followed based on various statistical methods. One of the most important attempts was made by Dr. Unwin in 1922 who planned a forest inventory based on simple random sampling and using sample plots covering 5% of the entire forest area. The gradual recognition of the need of systematical forest inventories had as a result the development of the Forest Management Section in 1930. Soon after and during 1936,

Chapman introduced the systematic sampling in Cyprus forests. A new approach was adopted by Polycarbou in 1953. Permanent sample compartments, 27 daa each, comprising 20% of the forest estate were used to provide a series of predetermined information. These sample compartments were re-measured every ten years.

The attempts for the continuous improvement of the methodology continued taking into consideration the scientific improvements and the weakness of the various methodologies arising through time. In 1981, the Continuous Forest Inventory (C.F.I) using permanent sample plots was adopted to provide accurate information regarding forest stocking and growth and increment, parameters on which the forest management to be based in achieving the forest policy objectives which are the sustainable provision of the maximum social benefits through multiple use of the forests as well as the maintenance and improvement of their structure and composition.

Three comparable forest inventories based on C.F.I have been carried out in the productive Pinus brutia State forests of Cyprus so far. The first was carried out in 1981-82, the second in 1991- 92 and the third in 2001-2002.

For the needs of these forest inventories, forest stratification was carried out dividing the Pinus brutia State forests into various strata based on forest type, stand density, site quality and possibility of mechanical site preparation, with main aim the reduction of variability and the improvement of the accuracy. All inventories carried out after 1981 were confined in the Pinus brutia State forests with stand density over than 10% grown on cultivable by mechanical means soils. This stratum has been further classified into:

- Management Unit I which comprises Macheras, Troodos and Adelphi forests and covers an area of 16 334 ha and,
- Management Unit II which comprises Paphos forest and covers an area of 27 217 ha.

The following tables present results regarding the net annual increment as estimated from these forest inventories and compares them with the volume harvested during the same decade.

Table 3.1.1

Balance between increment and volume harvested over the past ten years 1992 - 2001

Management Unit	Net Annual Increment (m^3)	Mean Annual Volume Harvested (m^3)	Harvesting to Increment ratio
I	10 017	5 220	0,521
II	32 149	21 768	0,677
Total	42 166	26 988	0,640

Source: Department of Forests

The annual volume of timber harvested is around 64 % of the net annual increment of the Pinus brutia growing stock. This ratio of harvesting to increment is similar to other European countries' ratios.

Table 3.1.2

Ratio between net annual increment and annual volume harvested for the period between 1992 and 2001 for Management Unit I

Year	Net Annual Increment (m^3)	Actual Volume Harvested (m^3)	Harvesting to Increment ratio
1992	10 017	6 575	0,656
1993		4 866	0,486
1994		5 155	0,515
1995		5 177	0,517
1996		4 206	0,420
1997		5 361	0,535
1998		5 211	0,520
1999		5 080	0,481
2000		5 153	0,507
2001		5 746	0,574
Total	100 170	52 196	-------
Average	10 017	5 220	0,521

Source: Department of Forests

Table 3.1.3

Ratio between net annual increment and annual volume harvested for the period between 1992 and 2001 for Management Unit II

Year	Net Annual Increment (m^3)	Actual Volume Harvested (m^3)	Harvesting to Increment ratio
1992	32 149	26 175	0,715
1993		31 874	0,952
1994		26 330	0,804
1995		28 489	0,827
1996		27 018	0,803
1997		22 807	0,708
1998		18 726	0,561
1999		20 370	0,583
2000		10 999	0,338
2001		4 892	0,161
Total	321 490	217 679	------
Average	32 149	21 768	0,677

Source: Department of Forests

Table 3.1.3

Ratio between net annual increment and annual volume harvested for the period between 1992 and 2001 for the entire State forest; Management Unit I and II

Year	Net Annual Increment (m^3)	Actual Volume Harvested (m^3)	Harvesting to Increment ratio
1992	42 166	32 750	0,777
1993		36 740	0,871
1994		31 485	0,747
1995		33 666	0,798
1996		31 224	0,740
1997		28 168	0,668
1998		23 937	0,568
1999		25 188	0,597
2000		16 152	0,383
2001		10 638	0,252
Total	421 660	269 948	------
Average	42 166	26 995	0,640

Source: Department of Forests

The Department of Forests, after the execution and the analysis of the results of the last year's inventory and in order to be in line with the objectives of the National Forest Program (nfp) decided to reduction substantially the volumes of timber to be harvested during the decade 2002 and 2011 to around 8 000 m^3 annually. This decision will unquestionably help in maintaining the value of forests as a source of timber and other forest products and will drop the harvesting-to-increment-ratio to 0,2.

The Department of Forests is proceeding now with a new forest stratification since the modern forest management follows a more ecological approach and some factors like the possibility for mechanical soil cultivation are not any more that important in forest stratification. After the completion of the new stratification, the Department is planning to proceed with the enumeration of reforested areas and other non-productive forests.

No values are available at the moment regarding increment and fellings in the private forests of Cyprus. The main reason lies on the fact the no active forest management is applied in these areas since the private forests are the result of agricultural land abandonment and the natural expansion of the adjacent State forests. Private forestry cannot be a viable business in Cyprus for reasons like:

- there are many private forest owners owing small pieces of land usually less than 1 ha and,
- the productivity of the forests is very low (usually less than 1 m^3/ha/year) and this is because of the prevailing climatic conditions and the low forest soil productivity.

CRITERION 3: MAINTENANCE AND ENCOURAGEMENT OF PRODUCTIVE FUNCTIONS OF FORESTS (WOOD AND NON-WOOD)

Indicator 3.2: Round-wood

Full text: Value and quantity of marketed round-wood

Rationale:

Marketed round-wood includes all wood removed from the forest with or without bark, including wood removed in its round form, or split, roughly squared or in other form and sold by the forest owner. Value added processing steps are not included.

Marketed round-wood is a direct contribution to the income of the forest owner.

Quantitative Indicator:

Cyprus is a wood importing country. The annual yield of the Cyprus forests which is around 8 000 m^3 (for the period 2002-2011) can satisfy only a tiny portion of the local demand for wood. All the yield from the forests goes to the private sawmills who convert it to sawn-timber for constructional purposes and, box-shooks and pallets for the export trade.

The yield which is mainly obtained from the productive State forests is sold to sawmill owners or wood-cutter associations through open tenders. Trees for felling are firstly selected and marked by forest officers who follow the *¨Rules for Marking in the Pinus brutia and the Pinus nigra State Forests of Cyprus¨*.

The primary purpose of these rules is to provide marking forest officers with the necessary guidelines while applying silvicultural treatments in the State forests in an attempt to maximize the total benefit to the community from the forests, through sustainable and multiple use (production, recreation and protection) maintaining at the same time the naturalness and improving the structure and productivity potential of the forests.

Trees are also harvested from forest areas other than the productive State forests for many reasons like: construction of forest roads, construction of fires brakes, removal of dead or injured trees due to snowfall or windfalls etc. These trees are sold mainly based on a price-list which is revised from time to time by the Department of Forests.

Table 3.2.1

Volume of round-wood extracted from the State forests and revenue obtained

Year	Round- Wood Extracted m^3	Fuelwood Extracted m^3/ha	Revenue (£)		Total Revenue (£)
			Round-wood	Fuelwood	
1992	32 750	13 550	416.271	69.599	485.870
1993	36 740	13 158	579.207	80.423	659.630
1994	31 485	9 238	565.195	67.488	632.683
1995	33 666	9 959	534.006	72.783	606.789
1996	31 224	8 464	407.876	63.965	471.841
1997	28 168	8 682	515.015	61.380	576.395
1998	23 937	6 744	414.763	51.440	466.203
1999	25 188	6 905	501.235	53.873	555.108
2000	16 152	5 564	376.994	53.449	430.443
2001	10 638	6 499	158.819	62.098	220.917
Total	269 948	88 763	4.469.381	636.498	5.105.879
Mean of the decade	26 995	8 876	446.938	63.650	510.588

Source: Department of Forests

The felling, uprooting, conversion of round-wood to timber and the conveyance of forest trees like pines, cypresses, cedars, planes, alders, eucalypts, oaks, poplars, splinters and terebinths, carob trees etc. from any private land can be done after the attainment of a license issued by the Director of the Department of Forests. From the records of the Department regarding the licenses issued for the felling and extraction of forest trees, 27 070 m^3 of round-wood have been extracted from private forests and other wooded land during the period 1992 and 2001.

Table 3.2.2

Volume of round-wood extracted from private forests

Year	Total Wood Extracted m^3	Wood Extracted m^3/ha
1992	1 329	0,020
1993	1 319	0,020
1994	3 193	0,048
1995	2 489	0,038
1996	4 031	0,061
1997	1 947	0,030
1998	3 129	0,048
1999	3 284	0,050
2000	2 099	0,032
2001	4 250	0,064
Total	27 070	-------
Mean of the decade	2 707	0,041

Source: Department of Forests

No values regarding the revenues from the sale of round timber from the private forests can be given due to the lack of available data.

The average annual yield extracted from the State and private forests of Cyprus for the period between 1992 and 2001 was about 40 000 m^3. The average annual wood consumption in Cyprus for the same period was estimated around 174 000 m^3. For this particular period, the local timber production could satisfy only about the one fifth of the demand for wood (round-wood and sawn-timber), resulting to great quantities of imports.

CRITERION 3: MAINTENANCE AND ENCOURAGEMENT OF PRODUCTIVE FUNCTIONS OF FORESTS (WOOD AND NON-WOOD)

Indicator 3.3: Non-wood goods

Full text: Value and quantity of marketed non-wood goods from forest and other wooded land

Rationale:

Forests provide a variety of products other than wood. Non-wood goods (NWGs) are for instance game meat, pelts, fruits and berries, mushrooms and truffles, cork, medical plants, Christmas trees, honey or nuts.

Non-wood goods have an important economic value. However, it has to be considered that depending on national laws the income from these products does not necessarily go to the forest owner.

Quantitative Indicator:

Today, in Cyprus, there is a better appreciation of the importance of forests for purposes other than timber production like production of non-wood forest products (NWFPs) and provision of non-wood forest services. The role of NWFPs has become important during the last decades and it is expected to play an increasing role in future forest use.

The most important non-wood forest products in Cyprus are:

- Christmas trees; Christmas-trees-production includes mainly pine and cypress trees coming either from private Christmas-tree plantations or as the result of thinning of stands in State forests,
- Mushrooms; edible mushrooms are collected free of charge for private consumption, but commercial picking can provide valuable extra income to rural communities in good production years. The most often picked up species are the so called red (Lactarius delicious) and white (Russula delica) mushrooms. Less common are the fennel mushrooms (Pleurotus fuskus) and the voletos (Tricholoma caligatum).
- Medicinal and aromatic plants; are gathered by the inhabitants of villages bordering the forest for their own needs and occasionally for sale. In Cyprus, there are over 280 wild aromatic and medicinal plant species. The most important species are:

- Origanum spp. is gathered for its valuable aromatic oil. Oregano is usually dried, packed and used as an aromatic substance for food,
- Salvia fruticosa (sage) is used as a medical plant for tea preparation against sore throats and colds,
- Thymus capitatus (thyme) is collected and used as an aromatic in cooking,
- Caparis spinosa; its tender shoots, buds and fruits are preserved in vinegar and consumed as appetizers,
- Asparagus sp; their tender shoots are collected and used for culinary purposes,
- Laurus nobilis (laurel); their leaves are used for their aromatic properties and the oil from its fruits is used in cosmetics,
- Rhus coriaria; is an industrial plant rich in tannin.

The demand for medicinal and aromatic plants in the international market is growing at a fast rate and could result to significant cash returns to rural communities. Considering this, the Department of Agriculture has initiated a project to promote the production and marketing of medicinal and aromatic plants on a commercial basis.

- Honey; is a popular forest product in Cyprus. Nectar honey originates from wild forest flowery plants growing in or at the fringes of forests and other wooded lands. The Department of Forests can lease any part of the State forest to professional beekeepers for placing their beehives.
- Forest species seeds; seeds of forest tree and shrub species are collected from State and private forest areas. The Department of Foreststsells these seeds by kg according to the current FD price list,
- Pine cones; they are usually collected free of charge by the inhabitants of villages and are used as tinder,
- Plant soil from F and H horizons; is usually purchased and used in gardens and for transplanting,
- Building rocks; are traditionally collected from specific areas and are used for building purposes,
- Acorn;
- Forage etc.

During most of the times, it is difficult to place numerical values on non-timber forest products because access to these is not allocated through markets. Non wood forest products

are many times available either free of charge or for a fee that does not reflect the costs of production or the costs of providing them.

Comprehensive data regarding the economic significance of non-wood forest products are limited in most of the times. The Department of Forests keeps data on most economically important products and for those that are sold in the market and extracted form the State forest. No data are available for private forest areas.

Table 3.3.1

Income from the sales of non-wood forest products from the State forests

Year	Christmas trees (£)	Forest species seed (£)	Plant soil and building rocks (£)	Other NWFPs* (£)	Total Revenue (£)
1992	30.470	1.086	2.660	635	34.851
1993	33.227	336	576	319	34.458
1994	34.714	488	2.276	317	37.795
1995	29.468	433	273	303	30.477
1996	27.303	532	83	356	28.274
1997	23.947	946	397	478	25.768
1998	18.267	743	1.544	543	21.097
1999	15.766	531	677	731	17.705
2000	11.487	805	204	885	13.381
2001	9.381	490	1.439	273	11.583
Total	234.030	6.390	10.129	4.840	255.389

Source: Department of Forests

* Other NWFPs are products like cones, aromatic and medicinal plants etc.

The income from NWFPs is fairly small in comparison with the income from timber sales. However, some non-wood forest products are quite significant as inseparable elements of the cultural heritage of Cyprus.

CRITERION 3: MAINTENANCE AND ENCOURAGEMENT OF PRODUCTIVE FUNCTIONS OF FORESTS (WOOD AND NON-WOOD)

Indicator 3.4: Services

Full text: Value of marketed services on forest and other wooded land

Rationale:

Marketed services include, for instance, hunting licences, fishing licences, managed outdoor recreation areas or trails for biking, horse riding, skiing and other recreational activities. Also environmental services like private contracts for conservation should be included here. Depending on national laws, these marked services of the forests contribute in general directly to increase the income of the forest owner.

Quantitative Indicator:

Over the last decade, Cyprus has experienced an increase in the demand for a diversified range of non-wood services both marketable as well as non-marketable. Recreation and tourism opportunities, hunting and fishing represent the major forest services offered by the forests and other wooded land in Cyprus.

The State forests of the island are a popular recreation destination for both residents and non-residents. The State forests provide to people the opportunities to engage in outdoor activities such as picnicking, camping, hiking, walking, cycling, skiing, birdwatching, sightseeing, hunting, fishing etc. During the last two decades, the number of forest visitors has almost doubled and this trend is expected to continue.

<u>Picnicking, Camping, Hiking, Walking, Cycling</u>

Foreign and local forest visitors are able to use 41 picnic sites, 6 camping sites, 174 km of nature trails, and 449 km of cycling tracts within the State forests of the island free of charge or by paying minor fees (camping sites only). The expenditure of people on the above nature related activities show the importance placed on the non-wood uses of Cyprus forests.

Skiing

Four Ski-pistas under the management of the Cyprus Ski Federation are available for Cypriot and foreigner skiers. These pistas which are found within Troodos National Forest Park are: Aphrodite, Ermis, Dias and Era.

Bird-watching, Sightseeing

Both activities can be exercised free of charge at any place within the State forests of Cyprus where people have free access.

Tourism, Ecotourism

The importance of ecotourism is growing as more and more individuals travel to come closer to nature to gain unique outdoor experiences. During 1990's a number of ecotourism enterprises were founded in Cyprus especially at communities around the forest. The importance of these enterprises is quite significant to rural people as a source of employment and income.

Hunting, Fishing

Hunting and game are the non-wood forest service and product with the highest value. Game comprises all hunted birds and mammals such as chukar partridges, black francolin, pheasants, quail, wood pigeons, woodcocks, turtledoves, thrush etc. Cyprus supports 45 to 48 thousands of hunters (the amount fluctuates depending on the years) which is the 7% of the population or 25% of the male population of the island.

Hunting, traditionally, has been an important element of the Cyprus culture. Today, hunting is a popular sport and an important socio-economic activity. The total revenue of the Game Fund Service (of the Ministry of Interior) from the annual hunting licenses issued come to £1.750.000. All this revenue from hunting licenses is used to support programs related to wildlife management, protection of habitats and endangered species, re-establishment of wildlife populations etc. Hunting is the major source of income for a number of businesses that deal with cartridge production, shotgun imports and maintenance, hunting clothing etc.

Hunting is an activity exercised within the State and private forests, the other wooded land and land under other uses (farm and agricultural land). The protection and conservation of the

hunted species and their habitats is achieved by the declaration of some of the above areas as Game Reserves.

It is not possible to segregate the funds from hunting licenses to different categories like Forests, Other Wooded Land and Other Land Uses.

The average amount of game harvested every year is shown in the following table:

Table 3.4.1

Game harvest in Cyprus

Game	Average annual game harvest (for the last 8 years)
Hare	35 000 – 90 000
Partridges,	350 000 – 600 000
Francolin,	4 000 – 7 500
Quail	12 500 – 40 000
Wood pigeons	20 000 – 45 000
Turtledoves	19 000 – 30 000
Thrush	950 000 – 3 000 000

Source: Game Fund

The commercial sale of game in Cyprus is prohibited by the law.

Fishing is another popular activity of the Cyprus sportsman. Fishing is allowed to be carried out in 24 dams around Cyprus. Five of them are found within the State forests, sixteen of them are found within private forests and the rest are found outside forests. A list of the main dams of the island is given in table 5.1.1.

The Fisheries and Marine Research Department of the Ministry of Agriculture, Natural Resources and Environment is responsible for issuing fishing licenses and regulations regarding amateurish fishing in fresh waters.

The following table shows the number of fishing licenses issued and the funds collected for the period between 1993 and 2002.

Table 3.4.2

Fishing licenses and funds collected

Year	Number of Fishing Licenses	Total Revenue £
1993	2 856	15.358
1994	2 643	15.553
1995	2 800	16.223
1996	2 697	15.738
1997	2 347	13.909
1998	2 475	15.645
1999	2 762	17.085
2000	2 822	16.666
2001	3 487	20.954
2002	3 324	21.031
Total	28 213	168.162

Source: Fisheries Department

State Forest Land Leases

According to the Forest Law and Forest Regulations of 1967, the Director of the Department of Forests can lease any part of a Permanent Forest Reserve for other than forestry uses provided that:

- The vegetation of the area to be leased has not been destroyed by fire, unauthorized felling or cultivation;
- Such lease will not interfere with the forest or any other policy or will not result to the detriment of the existing forest;
- The period of the lease does not exceed one year.

State forest land can be leased for reasons like agriculture, tourism, grazing, placement of beehives, the development of ski facilities etc. Κοινωνήσεις

The revenue of the Department of Forests from these leases is shown in table 3.4.3.

Table 3.4.3

Revenue from State forest land leases

Year	Revenue from leases related to agriculture £	Revenue from leases related to tourism industry £	Revenue from other leases* £	Revenue from leases related to grazing £	Revenue from leases related to honey production £	Revenue from leases related to ski slopes £	Total revenue from leases £
1992	789	26.786	14.327	533	141	410	42.986
1993	789	223.949	183.445	533	239	410	409.365
1994	789	263.855	50.306	636	214	2.960	318.760
1995	789	281.091	167.613	636	239	2.960	453.328
1996	789	259.875	136.240	618	240	510	398.274
1997	937	311.746	7.692	618	353	510	310.856
1998	1267	342.891	33.636	605	332	510	379.241
1999	1302	379.606	8.927	587	223	510	391.155
2000	1302	386.443	482.071	551	264	865	871.496
2001	1302	397.570	128.627	683	389	2.105	530.676
Total	10.055	2.862.812	1.212.848	6.000	2.634	11.750	4.106.135

Source: Department of Forests

* Other leases are related to telecommunications, power supply lines etc.

The non-wood uses of the forest must be considered jointly with all other uses to ensure that forests continue to be managed under sustainable principles and meet the demands placed on them.

CRITERION 3: MAINTENANCE AND ENCOURAGEMENT OF PRODUCTIVE FUNCTIONS OF FORESTS (WOOD AND NON-WOOD)

Indicator 3.5: Forests under management plans

Full text: Proportion of forest and other wooded land under a management plan or equivalent

Rationale:

The existence of forest management plans or management guidelines indicates an approach towards pre-set goals and an intension to achieve them. Forest management plans, in general, contribute to sustainable forest management but cannot guarantee it. Sustainable forest management can also be carried out without a written management plan or management guidelines.

Quantitative Indicator:

The first management plans in Cyprus are dated back to 1930's when A.H. Unwin (Principal Forest Officer 1921-1936) gave instructions for the preparation of the first working plan placing emphasis on the forest protection and the elimination of grazing rather than on silviculture, since it was considered premature to devote much time and money to silviculture and yield regulation before the forests were fully protected. When the first working plans were drawn up, they focused on remedies required to solve forestry problems.

By the year 1937, 70 417ha out of 127 114ha of Main State Forests have been brought under working plan control and sustainable yield working. These working plans were relied upon the Group Selection System with a 150 years of rotation and a 10 years felling cycle, control of yield by basal area, conservative marking of trees to be felled and on unassisted regeneration.

In 1950, in the Department of Forests' annual report, it was recorded that 77,72% of the total area of Main State Forest was under working plan management and only 22,28% was without plans. The many years of patient protection and reclamation brought the forest to full productivity by the late 1950's.

Today, in Cyprus, there are no management plans defining the explicit forest management objectives. The main management objectives which are clearly stated in the forest policy have

to do with the protection and expansion of the forest resources for the benefit of the entire community while capturing the advantages of development based on ecotourism. Main management objectives for the various categories of forests (Main and Minor State Forests and their subdivisions) are also outlined in the forest legislation.

Planning of fellings is done using data and information from continuous forest inventories that are carried out every ten years and determine the yield and location of mature timber for harvesting.

Intermediate and short term planning is achieved within the framework of the National Forest Program which covers a ten years' period, the five years development plans and the annual programs of work. The National Forest Program as well as the five years' development plans indicate the main action areas and activities with which the Department of Forests deals. Both the nfp and the five years development plans are approved by the government. The annual programs of work provide an analytical description of all theses works to be carried out by the forest divisions within the framework of the National Forest Program and the five years development plans.

CRITERION 4: MAINTENANCE CONSERVATION AND APPROPRIATE ENHANCEMENT OF BIOLOGICAL DIVERSITY IN FOREST ECOSYSTEMS

Indicator 4.1: Tree Species Composition

Full text: Area of forest and other wooded land, classified by number of tree species occurring and by forest type

Rationale:

Species diversity describes the number and relative abundance of species found in an area. The forest biological diversity is important in ecosystem productivity, health and stability. Conserving species diversity ensures that forests maintain their integrity and continue to be productive and to adapt to changing conditions.

Species diversity and dynamics of forest ecosystems and other wooded land ecosystems depend considerably also on the composition of tree species. Multi-species forest and other wooded land are usually richer in biodiversity than monospecific forest and other wooded land.

Quantitative Indicator:

The island of Cyprus is endowed with a rich and unique biological and natural heritage, due to its geographical position, its unusual geological and meteorological features, its long history and the fact that the island has never been subjected to a glacier era (Della, 1988).

In Cyprus today, there are more than 1 960 taxa of plants (species, sub-species, varieties and hybrids). The plant endemism rate of the island is about 7% (140 species are endemic).

The forests of Cyprus are dominated by coniferous species but deciduous species can also be found scattered in small stands in different areas. Six coniferous and an equal number of broadleaved indigenous tree species (with basal area > 5% of the total) are growing in the forests of Cyprus. These tree species have been recorded following the criteria set by MCPFE.

Table 4.1.1

Native tree species in Cyprus

	Conifers	Broadleaves
1	Pinus brutia	Platanus orientalis
2	Pinus nigra sub spp. pallasiana	Alnus orientalis
3	Cedrus brevifolia	Slix alba
4	Juniperus foetidissima	Ceratonia siliqua
5	Juniperus excelsa	Olea europaea
6	Cupressus sempervirens	Quercus infectoria sub-spp. veneris

Pinus brutia is the dominant and most commercially valuable forest tree species in Cyprus. It covers 137 744 ha of State and private forests and grows naturally almost everywhere (except Mesaoria plain) from sea level to the elevation of 1 400 m above sea level. The most extensive Pinus brutia forests are found along the Troodos and Pentadaktylos ranges. The Pinus brutia forest occurs with rich understorey made up of maquis and garrique vegetation. Pinus brutia can also be found mixed with other tree species like Pinus nigra subsp. palasiana (2 330 ha), Cedrus brevifolia (130 ha), Cupressus sempervirens and Olea europaea.

The Pinus nigra forest (2 640 ha) colonizes the highest peaks of Troodos range (mainly Olympos) with elevation usually over 1 200 m above sea level. Pinus nigra subsp. pallasiana can be found mixed with Pinus brutia (2 330 ha) especially in the elevation range between 1 200 to 1 400 m. Black pine is usually the overstorey of a wide range of shrubs and herbs including many endemic and rare species.

The endemic forest of Cedrus brevifolia is confined to Tripylos area in Papho forest at an altitude between 900 and 1 400 m above sea level. It forms pure (130 ha) as well as mixed stands with Pinus brutia and Quercus alnifolia (120 ha).

Juniperus foetidissima grows on the highest peaks of Troodos range at an elevation between 1 400 and 1 952 m above sea level as pure stands or as mixed with Pinus nigra sub spp. pallasiana. Juniperus excelsa on the other hand occurs in pure and mixed stands (with Quercus alnifolia) at Madari and Papoutsa peaks on Troodos mountain at an elevation range between 1 300 and 1 610 m. Both species occupy an area of 180 ha.

Cupressus sempervirens is another indigenous coniferous tree species found in Cyprus in two varieties; var. horizontalis and var. sempervirens. It grows well from the sea level to the elevation of 1 400m in pure or mixed stands with Pinus brutia. The most stands are found on Pentadaktylos range. Pure and mixed stands of Cupressus sempervirens cover an area of 7 270 ha.

In Cyprus there are no real deciduous forests with the exception to the riparian forests made up of Platanus orientalis, Alnus orientalis and Salix alba individuals. These mixed stands (1 040 ha) occupy rivers and streams from sea level up to the elevation of 1 400 m.

Ceratonia siliqua as well as Olea europaea are both sclerophyllous short trees (heights up to 10 meters) growing naturally or as cultivated from sea level to the elevation of 800 m.

Small pure stands (60 ha) of Quercus infectoria subsp. veneris can be found in Agros, Panayia and in other villages in Pafos district. Over a small area (34 ha) Quercus infectoria can also be found mixed with Pistacia atlantica.

CRITERION 4: MAINTENANCE CONSERVATION AND APPROPRIATE ENHANCEMENT OF BIOLOGICAL DIVERSITY IN FOREST ECOSYSTEMS

Indicator 4.2: Regeneration

Full text: Area of regeneration with even-aged stands and uneven-aged stands, classified by regeneration type

Rationale:

Both natural and artificial regeneration are considered as tools for the preservation and safeguarding of the area of forests resources and their productivity. Natural regeneration, on the one hand, contributes to the conservation of the diversity of the genotype and to the maintenance of the natural species composition, structure and ecological dynamics. Artificial regeneration, on the other hand, can supplement natural regeneration where the last is not or cannot be successful in securing the existence of forest stands and forest productivity in perpetuity.

Regeneration types include the following categories:

- Natural regeneration,
- Natural regeneration enhanced by seeding and/or planting,
- Regeneration by planting and/or seeding and,
- Coppice sprouting.

Regeneration of forest lands following human induced disturbances, such as harvesting and fire, is a good indication of the sustainable management of forest ecosystems.

Quantitative Indicator:

The silvicultural system in use in the unevenaged forests of Cyprus is the selection system during which the mature timber, usually the oldest and largest trees, either as single, scattered individuals or in small groups are removed repeatedly at relatively short intervals (felling cycles of 10 to 15 years). This way, the continuous establishment of reproduction is encouraged and an uneven aged stand is maintained.

The rules for marking in the Pinus brutia and Pinus nigra State forests of Cyprus which have been revised in 1991, aim at reserving the naturalness of the forests through natural regeneration and at pursuing the unevenaged stand structure.

According to these rules, three different felling operations are applied encouraging the natural regeneration of an uneven aged stand. First, some mature and over-mature stems are removed with priority to the bulkiest, the oldest and generally the least desirable for seed production, so as to reduce the canopy density to about 70 % (preparatory felling). Ten to fifteen years later, the seeding felling is applied during which mature stems are removed reducing the canopy density to 50 % and creating open environments for seed germination and seedling growth. The final felling which is carried out 10 to 15 years after the seeding felling, aims to the removal of all remaining stems and the release of the newly developed advanced natural regeneration. In the cases during which no natural regeneration is appearing in the stand within an acceptable time frame, or when the regeneration is not satisfactory creating poor and understocked stands, planting and direct seeding are carried out to hasten natural regeneration.

In the case of a forest fire and when there were enough seed trees with even distribution over the burned area, the site is left for a reasonable time period (usually 5 to 7 years) to regenerate naturally from the available seed. Pinus brutia adapted itself to fire conditions and regenerates itself mostly after a fire in virgin forest conditions (Boydak, 1993). If natural regeneration fails, planting or broadcast seeding is applied.

On deep, fertile soils and when the slope gradient is suitable, mechanical cultivation is applied. Planting of stock of native trees coming from proper provenances and grown within polyurethane containers is usually used. On steeper slopes, terracing, mini gratoni and pit planting are also applied. In shallow soils, application of seeding methods is mostly inevitable.

Planting and seeding programs has also been used to treat understocked sites across the island.

Good natural and artificial regeneration years, in the hot and dry region of Cyprus, usually coincide with favorable precipitation periods during the growing season and the subsequent years. Maintenance of the regenerated stands, especially irrigation, is also necessary for the first three years.

Tables 4.2.1

Annual (State) forest area regenerated by planting and seeding

	Planting	Seeding	Total
Year	Area in ha	Area in ha	Area in ha
1993	0,0	394,1	394,1
1994	74,2	239,1	313,3
1995	14,6	220,3	234,9
1996	71,5	274,1	345,6
1997	45,1	232,8	277,9
1998	26,1	221,6	247,7
1999	46,7	174,5	221,2
2000	43,8	157,7	201,5
2001	128,0	440,7	568,7
2002	79,0	179,5	258,5
total	529,0	2 534,4	3 063,4

Source: Department of Forests

The areas presented as shown in the above table, have been artificially regenerated by planting or seeding. These are either areas where natural regeneration failed to replace the forest stand after a forest fire or a harvesting operation or they are “hali” lands declared by the Council of Ministers as State forests and afforested. 281,3 ha of “hali” lands were also afforested during the same period by planting (112 ha) and seeding (169,3) but, they have not been declared yet as State forests.

Planting accounted for roughly 17% of the total area regenerated. The remaining 83% of the land was regenerated by other methods, such as manual seeding. All these areas were firstly site prepared mainly by mechanical means to improve seed germination, seedling survival and reduce early plant competition.

Table 4.2.2

Area of mechanical and manual site preparation in the State forests

	Mechanical Preparation	Manual Preparation
Year	Area in ha	Area in ha
1993	354,3	37,6
1994	268,3	44,8
1995	187,8	47,1
1996	258,9	86,7
1997	275,4	2,5
1998	237,2	10,5
1999	198,1	27,1
2000	188,2	13,3
2001	408,2	160,5
2002	258,5	0
total	2 334,9	430,1

Source: Department of Forests

The artificially regenerated forests, mainly after forest fires since 1974, accounting for approximately 20 438,7 ha or 2,21% of the total land area, constitute significant portion of the total forested area.

In Cyprus, all areas harvested after 1991 (using the current marking rules) were left to regenerate naturally.

CRITERION 4: MAINTENANCE CONSERVATION AND APPROPRIATE ENHANCEMENT OF BIOLOGICAL DIVERSITY IN FOREST ECOSYSTEMS

Indicator 4.3: Naturalness

Full text: Area of forest and other wooded land, classified by "undisturbed by man", by "semi-natural" or by "plantations", each by forest type

Rationale:

The degree of naturalness of forest ecosystems shows the intensity of human interventions. Different levels of utilization intensity are characterized not only by changing structures but also by different species communities. The composition and structure determine the functional diversity and these factors constitute the biological diversity of an area. The existence of forest and other wooded land undisturbed by man, i.e. forests where natural processes and species to a considerable extent remain or have been restored, has a high conservation value for understanding the ecological principles, and for reference when setting up management priorities, plans and models for silvicultural planning.

Semi-natural forests can keep certain characteristics, allowing natural dynamics and biodiversity closer to the original ecosystem. Plantations usually represent ecosystems on their own, with artificial dynamics establishing species communities completely distinct from the original ecosystem. In European conditions most forests are "semi-natural".

Quantitative Indicator:

According to the TBFRA 2000 definitions:

- Forest undisturbed by man is one that shows natural forest dynamics, such as natural tree composition, occurrence of dead wood, natural age structure and natural regeneration processes, the area of which is large enough to maintain its natural characteristics and where there has been no known significant human intervention or where the last significant human intervention was long enough ago to have allowed the natural species composition and processes to have become re-established.

- Plantations are forest stands established by planting or/and seeding in the process of afforestation or reforestation. They are either: of introduced species or intensively managed stands of indigenous species which meet the following criteria: they are

made up of one or two species at plantation, even age class and regular spacing. Stands which were established as plantations but which have been without intensive management for a significant period of time are considered as semi-natural.

- Semi-natural forests are forests which are neither undisturbed by man nor plantations as defined above.

According to these definitions, most of our forests are semi-natural. 21 507 ha were considered natural (year 1999) and only 1 396 ha were considered as plantation, during the same year.

Table 4.3.1

Distribution of forest and other wooded land by origin of forest

	Year 1999
	Area (ha)
A. Forest and OWL Undisturbed by man	21 507
B. Semi-natural Forests and OWL	362 571
C. Plantations	1 396

Source: Department of Forests

CRITERION 4: MAINTENANCE CONSERVATION AND APPROPRIATE ENHANCEMENT OF BIOLOGICAL DIVERSITY IN FOREST ECOSYSTEMS

Indicator 4.4: Introduced Tree Species

Full text: Area of stands of forest and other wooded land dominated by introduced tree species

Rationale:

Non indigenous tree species have been introduced in many countries for various reasons like forestry or gardening. Introduced tree species make a significant contribution to wood supply in many countries, however, through their ecological characteristics, e.g. competitiveness, may change the dynamics of forest ecosystems.

In recent years, invasive species have gained considerable notoriety as major threats to species and ecosystems. They influence sites, species composition, structure and functional diversity, they alter the ecosystem processes and threaten the survivor of native species and they cause significant economic impacts.

Quantitative Indicator:

Exotic tree species have been intentionally introduced in Cyprus for various reasons such as: for their ornamental value, for experimental reasons, for health reasons (improve sanitation and reduce the incidences of malaria) and for wood production purposes. They have been used for more than a century for the re-vegetation of degraded sites, for the reforestation of rural and urban landscapes and for the creation of road site plantations.

The wide use of coniferous and broadleaf species, both indigenous and introduced, in reforestation operations was promoted by the Colonial Forest Policy as stated in a document written by Chapman, Director of the Department of Forests in 1950's, and published in a forest magazine back in 1948. According to this Forest Policy, the most popular coniferous trees species in reforestation works were: Pinus brutia, Pinus halepensis, Pinus pinea, Pinus canariensis and Cupressus sempervirens. The most popular broadleaf tree species were: Eucalyptus spp., Acacia cyanophylla, Casuarina equisetifolia, Populus alba, Robinia pseudoacacia, Tetraclinis articulata etc.

Even after the independence of Cyprus (1960), introduced tree species have been used in various reforestation works throughout the island. The most commonly used species and the areas where these have been used are presented in tables 4.4.1 and 4.4.2 respectively.

Table 4.4.1

Main introduced coniferous and broadleaf tree species in Cyprus

Conifers	Broadleaves
Pinus halepensis Pinus pinea Pinus canariensis	Eucalyptus camaldulensis Eucalyptus gomphocephala Eucalyptus torquata Acacia cyanophylla Robinia pseudoacacia Tetraclinis articulata

Table 4.4.2

Reforested areas using introduced species

Site	Species used	Area in ha
Koshi and adjacent areas	Pinus halepensis, Acacia, Cupresus spp. Eucalyptus species	832 27
Athalassa Park	Pinus pinea and Pinus halepensis Eucalyptus species Acacia cyanophylla Casuarina equisetifolia Pines, Acacia, Eucalypts mixed	74 77 4 1 158
Pedagogical Academy	Pinus pinea Eucalyptus species Eucalyptus-Acacia mixed Pinus pinea mixed with other species	32 7 1 2
Fasouri	Eucalyptus species	137
	TOTAL	1 359

Source: Department of Forests

Individuals of Abies cephalonica, Sequoia sempervirens, Sequoiadendron giganteum, Robinia pseudoacacia, etc. can also be seen planted along road sites.

Introduces species have also been used in various experiments (presented in table 4.4.3) in Cyprus.

Table 4.4.3
Experiments established by the Department of Forests since 1960 using introduced species

S/N	Location	Year of Establishment	Type of Experiment	Species Used	Area ha
1.	Xeropigi	1966	Pine spp.	*P. pinaster, P. brutia, P. maricata, P. taeda, P. willichiana, P. halepensis, P. eldarica*	1
2.	Diorios	1967	*Eucalyptus camaldulensis*, (Provenance trial)	*E. camaldulensis*	2
3.	Lakovounara	1971	Eucalyptus spp.	*E. astringens, E. brockwayi, E. occidentalis, E. sargentii*	1,5
4.	Montesi (Troodos)	1974	Pine spp.	*P. brutia, P. halepensis, P. radiata*	4
5.	Listovounos (Limassol)	1976	Eucalyptus spp.	*E. camaldulensis, E. gomphocephala E. grandis E. astringens, E. brockwayi, E. occidentalis, E. sargentii*	3,5
6	Xeros (Pafos)	1977	Eucalyptus spp.	*E. camaldulensis, E. gomphocephala, E. grandis, E. astringens, E. brockwayi, E. occidentalis, E. sargentii*	3,5
7.	Sotira	1977	Species trial	*E. camaldulensis, E. gomphocephala, E. grandis, E. astringens, E. occidentalis, E. sargenti, P. halepensis, P. brutia, Cupressus sempervirens, Casuarina glauca, P .pinea, Acacia melanoxylon, Acacia cyanophylla, Picea omorika, Quercus coccifera, Quercus calliprinos, Quercus inthaburensis, Cedrus brevifolia*	4,5
8.	Profali	1977	Species trial	*E. camaldulensis, E. gomphocephala, E. grandis, E. astringens, E. occidentalis, E. sargentii, P. maritima, P. halepensis, P. brutia, Cupressus sempervirens, Robinia pseudoacacia, Casuarina glauca, Melia azedarach.*	4,5
9.	Frenaros	1977	Eucalyptus spp. Pine spp.	*E. camaldulensis, E. gomphocephala, E. grandis, E. astringens, E. occidentalis, E. sargenti, P. maritima, P. halepensis, P. brutia, C. sempervirens, P. pinea.*	4
10.	Xeros	1977	Pine spp. Cupressus spp.	*P. radiata, P. brutia, Cedrus brevifolia, C. sempervirens, Sequoia sempervirens, X"Cupressosyparis leylandii*	1
11.	Profali	1978	Pine spp.	*P. eldarica, P. canariensis, P. halepensis, P. brutia*	0,5
12.	Sotira	1978	Pine spp.	*P. eldarica, P. canariensis, P. halepensis, P. brutia*	1
13.	Stavrovouni	1978	Pine spp. Cupressus spp.	*P. brutia, P. halepensis, P. pinea, Cupressus sempervirens.*	1
14.	Atratsa	1978	Eucalyptus spp.	*E. camaldulensis, E. viminalis, E. dulympleana*	0,5
15.	Magali Mouti	1979	Eucalyptus spp.	*E. brockwayii, E. camaldulensis, E. occidentalis, E. gomphocephala, E. grandis, E. astringens, E. camaldulensis, E. cornuta, E. stricklandii, E.sargenti, E. lesouefii, E. tereticornis*	7
16.	Agios Georgios Alamanou	1998	Biomass Production	*E. gomphocephala, Robinia pseudoacasia, Casuarina equisetifolia, Tetraclinis articulate, Morrus spp.*	1
				Total	37

Source: Department of Forests

In 1967, the Department of Forests set up a series of experiments to study the capability of cross breeding of Pinus brutia X Pinus halepensis. The experiments showed that the F1 hybrids had better phenotypical characteristics and higher fitness than their parents. The individuals of advanced generations had inferior characteristics than their parents. During the same period (1960 – 1991), the use of plants and seed of Pinus brutia X Pinus halepensis hybrid was very common in reforestation operations. All these individuals have been removed recently to avoid the genetic pollution of the indigenous pines.

CRITERION 4: MAINTENANCE CONSERVATION AND APPROPRIATE ENHANCEMENT OF BIOLOGICAL DIVERSITY IN FOREST ECOSYSTEMS

Indicator 4.5: Deadwood

Full text: Volume of standing and lying deadwood on forest and other wooded land, classified by forest type

Rationale:

Deadwood in the form of dead standing trees and dead lying trees is a habitat for a wide range of organisms. After decomposition and humidification, deadwood constitutes an important component of forest soils.

Many organisms are dependent, during some part of their life cycle, upon dead or dying wood or upon wood-inhabiting fungi or other organisms. Because of lack of deadwood, many of the dependent species are in danger.

Quantitative Indicator:

Table 4.5.1

Number and volume of dead Pinus brutia trees in the productive forests

Period	Number of dead stems n/ha	Volume of dead wood m^3/ha
1981 – 1991	1,28	0,72
1991 – 2001	2,50	0,95

Source: Department of Forests

The number and volume of dead trees presented in the above table are based on the estimates of the last inventory and refer to the standing trees within the forests available for wood supply (productive forests of Cyprus). Unfortunately, there are no available data for dead trees lying on the ground. A good number of trees that are dying in the forest from different causes (diseases, insect attacks, adverse weather conditions etc.) remain standing in the forests. This contributes to the conservation of biological diversity.

Adequate data regarding dead or dying trees from the protective forests of Cyprus (National Forest Parks and Nature Reserves) were not yet collected. According to our experience and some site observations, the number and volume of dead and dying trees in the protective forests of the island is much greater than the corresponding values of the productive forests. Deadwood in these forests constitutes a habitat for saprophytic fungi, bark beetles, wood borers and other insects, birds and even small animals and it contributes to the forest biodiversity.

The number of dead and dying trees in the forest increases especially during periods of drought.

CRITERION 4: MAINTENANCE CONSERVATION AND APPROPRIATE ENHANCEMENT OF BIOLOGICAL DIVERSITY IN FOREST ECOSYSTEMS

Indicator 4.6: Genetic Resources

Full text: Area managed for conservation and utilization of forest tree genetic resources (in situ and ex situ gene conservation) and area managed for seed production

Rationale:

Genetic diversity is the ultimate source of biodiversity at all levels. Genetic resources of species should be conserved for the future, both to secure the width of genetic pools and to allow use of best provenances. A loss of variation may have negative consequences for fitness and production and may prevent adaptive changes in populations in response to climate changes.

Quantitative Indicator:

The genetic resources and the genetic diversity are safeguarded throughout the Cyprus Forests and particularly:

- In the Nature Reserves and National Forest Parks which are under a special regime of protection and,
- In the Permanent Forest Reserves either through the promotion of natural regeneration or, through artificial regeneration using seed from provenances with the same or similar ecological conditions as the area to be reforested or, using seedlings produced using this superior seed.

The in-situ gene conservation will be also ensured after the identification of Seed-Collection-Stands throughout the different growth and altitudinal zones of Cyprus forests. The *Production and Marketing of Plant Reproductive Material Laws* of 1991 and 2003 as well as the *Production, Marketing and Control of Forest Reproductive Material Regulations* of 2003, define a series of criteria regarding the selection of these stands. These criteria refer to: the origin, isolation, effective size of population, age and development, uniformity, adaptiveness, health and resistance, volume production, wood quality and, form or growth habit. The Department of Forests is currently evaluating a series of stands within the Pinus brutia forests to declare them as Seed-Collection-Stands with main aim the provision of seed of superior in quality traits and growth properties for reforestation purposes.

The ex-situ conservation and utilization of genetic resources is achieved through the establishment of seed orchards and clone banks.

The Department of Forests has established a series of seed orchards of Pinus brutia in order to satisfy the need for genetically superior seed in reforestation operations throughout Cyprus. Further information regarding these seed orchards are given in the following table:

Table 4.6.1

Seed orchards in Cyprus

S/N	Location	Year of Establishment	Species	No. of clone	No. of trees	Area ha
1	Morfou	1962	Pinus brutia	20	400	1.0
2	Vatili	1967	Pinus brutia	40	800	2.0
3	Athalassa	1975	Pinus brutia	100	2 800	16.0
					Total Area	19.0 ha

Source: Department of Forests

Beside the above Seed Orchards, the Department of Forests established a 2 hectares Clone Bank for Pinus brutia in Athalassa. This is made up of 850 trees of 174 different clones.

The maintenance of a high genetic variability of tree species ensures the full adaptiveness of Cyprus forests to changing environmental conditions on a sustainable basis.

CRITERION 4: MAINTENANCE CONSERVATION AND APPROPRIATE ENHANCEMENT OF BIOLOGICAL DIVERSITY IN FOREST ECOSYSTEMS

Indicator 4.7: Landscape Pattern

Full text: Landscape-level spatial pattern of forest cover

Rationale:

The loss in biodiversity has been attributed to habitat loss and to the fragmentation of the forest land into isolated patches of insufficient size. Fragmentation has important influence on biota and disturbs the ecological processes within the remnant areas. These effects are expected to vary with the distance of the patches from the main landscape structure and their connectivity with other patches. The landscape-level spatial pattern of forest cover gives information on the size, shape and spatial distribution of forests in a landscape as it reflects the potential of a landscape to provide forest habitats.

Quantitative Indicator:

Humans modified their environment to suit their own needs. In the process of development, they deforested large areas converting them into agricultural, industrial and other settlement land. This fragmentation created patches of remnant areas of native forest vegetation surrounded by developed land.

This was the case in Cyprus especially during the previous century. The fast changes in the economy of the island during the second half of the century converting the agricultural country into one based on tourism and services had serious effects on country side. Various pure Quercus and Pine stands have been fragmented through time in the process of development.

Today, land use change is the leading cause of landscape change and fragmentation. Land cover is altered principally by direct human use through agriculture, pasture, forestry and development. No land cover change has been documented so far in the state land. The forest law prohibits the land use change in the State forest. The protection of landscapes and specific natural elements is a main management objective on State forest land. Fragmentation, if it exists, can be observed only in private land due to the absence of any legislation prohibiting land use change.

CRITERION 4: MAINTENANCE CONSERVATION AND APPROPRIATE ENHANCEMENT OF BIOLOGICAL DIVERSITY IN FOREST ECOSYSTEMS

Indicator 4.8 Threatened Forest Species

Full text: Number of threatened forest species, classified according to IUCN Red List categories in relation to total number of forest species

Rationale:

The most recognizable form of depletion of biodiversity lies in the loss of species of flora and fauna. Slowing down the rate of species extinction due to anthropogenic factors is the key objective of the conservation of biodiversity. Changes in forest species population levels may also provide an early warning of changes in vital forest ecosystem functions.

The majority of threatened species are limited in their geographical distribution to single countries. Therefore, this indicator is of high importance for the implementation of SFM at national level.

Quantitative Indicator:

The number of threatened species gives information on the rarity status of plants, animals and other organisms in Cyprus. Threatened forest species are classified into the following IUCN Red List categories:

- Vulnerable (species believed likely to move into the Critically Endangered or Endangered categories in the near future if the causal factors continue operating),
- Endangered (species not Critically Endangered but facing a very high risk of extinction in the wild in the immediate future),
- Critically Endangered (species facing an extremely high risk of extinction in the wild in the immediate future) and,
- Extinct in the wild (species not definitely located in the wild during the past 50 years).

In Cyprus, detailed inventories for all forest species are currently under way and the Cyprus Red Data Book is still at its preparatory stage. Therefore, it is not yet possible to talk about the status of all species, especially of invertebrates, because assessments have not been completed yet.

From the available figures, today in Cyprus, there are 59 threatened species that depend on the forest during some portion of their life cycle. These are 5 species of mammals, 16 species of birds, 5 species of reptiles, 3 species of amphibians, 1 species of fish, 4 species of invertebrates and 25 species of vascular plants. These threatened species are analyzed into the four already stated IUCN categories as follows:

Table 4.8.1

Plant Population Statistics: Vascular Plants

Total Number of Known Species:	1975
Number of Vulnerable Species:	14
Number of Endanger Species:	11
Number of Critically Endanger Species:	0
Number of Extinct Species in the Wild:	0

Table 4.8.2

Plant Population Statistics: Non-Vascular Plants

A. Macrofungi	Total Number of Known Species:	100
	Number of Vulnerable Species:	0
	Number of Endanger Species:	0
	Number of Critically Endanger Species:	0
Number of Extinct Species in the Wild:		0
B. Algae	Total Number of Known Species:	50
	Number of Vulnerable Species:	0
	Number of Endanger Species:	0
	Number of Critically Endanger Species:	0
	Number of Extinct Species in the Wild:	0

Table 4.8.3

Animal Population Statistics: Mammals

Total Number of Known Species:	32
Number of Vulnerable Species:	1
Number of Endanger Species:	3
Number of Critically Endanger Species:	1
Number of Extinct Species in the Wild:	0

Table 4.8.4

Animal Population Statistics: Birds

Total Number of Known Species:	363
Number of Vulnerable Species:	7
Number of Endanger Species:	4
Number of Critically Endanger Species:	4
Number of Extinct Species in the Wild:	1

Table 4.8.5

Animal Population Statistics: Reptiles

Total Number of Known Species:	24
Number of Vulnerable Species:	1
Number of Endanger Species:	1
Number of Critically Endanger Species:	3
Number of Extinct Species in the Wild:	0

Table 4.8.6

Animal Population Statistics: Amphibians

Total Number of Known Species:	3
Number of Vulnerable Species:	0
Number of Endanger Species:	3
Number of Critically Endanger Species:	0
Number of Extinct Species in the Wild:	0

Table 4.8.7

Animal Population Statistics: Fish (freshwater)

Total Number of Known Species:	15
Number of Vulnerable Species:	0
Number of Endanger Species:	0
Number of Critically Endanger Species:	0
Number of Extinct Species in the Wild:	0

Table 4.8.8

Animal Population Statistics: Fish (Marine species)

Total Number of Known Species:	152
Number of Vulnerable Species:	0
Number of Endanger Species:	1
Number of Critically Endanger Species:	0
Number of Extinct Species in the Wild:	0

Table 4.8.9

Animal Population Statistics: Invertebrates

A. Insects:	Total Number of Known species:	3000
	Number of Vulnerable Species:	0
	Number of Endanger Species:	0
	Number of Critically Endanger Species:	0
	Number of Extinct Species in the Wild:	0
B. Crustacea:	Total Number of Known Species:	95
	Number of Vulnerable Species:	0
	Number of Endanger Species:	1
	Number of Critically Endanger Species:	0
	Number of Extinct Species in the Wild:	0
C. Mollusca:	Total Number of Known Species:	175
	Number of Vulnerable Species:	0
	Number of Endanger Species:	3
	Number of Critically Endanger Species:	0
	Number of Extinct Species in the Wild:	0

In Cyprus, the major causes of rarity of species are:

- forestry activities like timber harvesting, mechanical soil preparation, road construction etc,
- land conversion for agricultural and urban development,
- construction projects,
- air, water and soil pollution and,
- natural disasters like forest fires.

According to the above tables, approximately 1% of all species assessed is classified as threatened. The fact that only 59 species out of 4 161 species found in the forest are threatened may be because Cyprus forests are not intensively managed and timber production is not any more the primary objective. This is a major reason contributing to the species protection and conservation.

The Department of Forests invests a lot in the conservation of biodiversity in order to slow down the rate of species extinction due to anthropogenic factors and it takes measures to protect and help threatened species to recover;

- First of all, any actions that can jeopardize the continued existence of any threatened species are either eliminated or mitigated by the use of laws and regulations.
- The Department of Forest also takes measures to prevent the destruction of forest habitats of many endanger species and thus it adds to the species' possibility for continued survival.

Comparisons with earlier lists are not safe. Any increase in the number of threatened species may be because of the further investigation of the status of the species.

CRITERION 4: MAINTENANCE CONSERVATION AND APPROPRIATE ENHANCEMENT OF BIOLOGICAL DIVERSITY IN FOREST ECOSYSTEMS

Indicator 4.9: Protected Forests

Full text: Areas of forest and other wooded land protected to conserve biodiversity, landscapes and specific natural element, according to MCPFE Assessment Guidelines.

Rationale:

Protected areas per se focus on the conservation of biological diversity and the maintenance of natural ecological processes.

Protected areas represent one of the oldest instruments for protecting nature and natural resources. They are included as a main pillar in nature conservation laws in all European countries.

Quantitative Indicator:

In Cyprus, there is a new legislation concerning the protection of ecosystems and their functions *per se.* In addition, several other laws contain relevant provisions.

The Governmental Departments and Services dealing with the declaration of certain areas as protected are:

- The Department of Forests ,
- The Environmental Service,
- The Fisheries and Marine Research Department,
- The Town Planning and Housing Department and,
- The Game Fund.

In Cyprus, there are the following 9 legal national designated protected areas:
National Forest Parks (Department of Forests),
Nature Reserves (Department of Forests),
Marine Protected Areas (Fisheries and Marine Research Department),
Marine Reserves (Fisheries and Marine Research Department),
Areas of Special Aesthetic Value (Town Planning and Housing Department),
Protected Landscapes (Town Planning and Housing Department),

Coasts and Areas of Nature Protection (Town Planning and Housing Department),
Permanent Game Reserves (Game Fund),
Temporary Game Reserves (Game Fund),

The first attempts for the protection of Cyprus Forest and the creation of Forest Reserves were dated back to 1879 soon after the arrival of the British to Cyprus and the foundation of the Department of Forests. To bring order to the existing chaotic situation and stop the devastation of the forest, a series of Forest Laws was enacted. One of these laws was "The Preservation of the Forest Trees and Plantations" law of 1881.

The first Nature Reserve was declared in 1949, when R.R Waterer, a Conservator of Forests proposed the preservation of Paphos Cedar Valley as the natural habitat of Cyprus mouflon which was threatened by extinction.

Today, about 4788 ha of State Forests are classified as Nature Reserved areas. This area has been declared by the Council of Ministers as a forest appropriated to provide complete and permanent protection of flora and fauna.

This category of protected areas coincides with the MCPFE class 1.1 of protected areas. Areas falling in this class have main management objective "biodiversity" and no active, direct human intervention is taking place. Activities other than limited public access and non-destructive research are prevented in these areas.

Table 4.9.1

MCPFE Class 1.1 of Protected Forests - Nature Reserve Areas in Cyprus.

S/N	Name	Area (ha)	Year of Declaration
1	Tripilos	823,00	1984
2	Troodos	220,00 Picromiloudhi 108,3 Livadi tou Pashia 14,5 S.W. of Chionistra 69,0 Kryos Potamos 28,4	1992
3	Madari	1 187,80	2000
4	Mavroi Kremmi	2 557,60	2000
	Total Area	4 788,40	

Source: Department of Forests

The MCPFE class 1.2 of protected areas refers to areas where the main management objective is biodiversity and the human intervention is limited to a minimum. The only activities allowed are: game control, control of diseases and insect outbreaks, public access, fire intervention, non-destructive research, subsistence resource use to cover the needs of local people. This class of protected areas coincides with class of National Forest Parks.

National Forest Parks are Main State Forests declared by the Council of Ministers as forests to provide amenities and recreation to the public. Nature conservation is a major objective.

Table 4.9.2

MCPFE Class 1.2 of Protected Forests - National Forest Parks

S/N	Name	Area (ha)	Year of Declaration
1	Pedagogical Academy Forest	45,00	1983
2	Potamos Liopetriou	89,00	1984
3	Athalassa Forest	840,20	1985 (357,2 ha), 1990 (483,0 ha)
4	Troodos Forest	9 147,00	1992 (9 117,0 ha), 1999 (30,0 ha)
5	Gavo Greco Cape	384,.90	1993
6	Polemidia	125,40	1996
7	Rizoelia	97,00	1998
8	Agios Nikandros	25,92	2000
9	Petra tou Romiou	349,20	2001
	TOTAL AREA	11 103,62	

Source: Department of Forests

The rest of the State forest (131 960 ha of Main State Forest and 15 705 ha of Minor State Forest) where the main management objective is the Protection of Landscape and Specific Natural Elements falls into the MCPFE Class 2 of protected areas. In these areas, all interventions are directed to achieve the pre-stated management objectives, preserve landscape diversity, conserve the cultural, aesthetic, historical values, provide opportunities for recreation, etc. The use of forest resources is regulated. Any activities negatively affecting the characteristics of the landscape and the specific natural elements are prevented.

CRITERION 5: MAINTENANCE AND APPROPRIATE ENHANCEMENT OF PROTECTIVE FUNCTIONS IN FOREST MANAGEMENT (NOTABLY SOIL AND WATER)

Indicator 5.1: Protective forests – soil, water and other ecosystem functions

Full text: Area of forest and other wooded land designated to prevent soil erosion, to preserve water resources, or to maintain other forest ecosystem functions, part of MCPFE Class "Protective Functions"

Rationale:

Forests have several very important protective functions for soil or for the surface under the forest cover, e.g. protection against erosion.

Forest cover has also many very important functions for the maintenance of water resources and of water cycles like the protection of water reservoirs (ground water and aquifers) or filtering of water, modification of water cycle and run-off.

In addition, forests fulfill other important ecosystem functions, e.g. maintenance of clean air, stabilization of local climate, combating desertification etc.

Whereas all forests fulfill these functions to some degree, for some forests, this is the primary management objective. The intention of this indicator is to identify those forests where protection of soil, water and other ecosystem functions is the primary management objective.

Quantitative Indicator:

Water is a very valuable commodity in Cyprus. The water supply is both inadequate and irregular. This is mainly due to the low annual rainfall (500mm) that is unevenly distributed throughout the year, the consumption by agriculture and by the tourism industry, which is pressing for more and more water.

The protection of fresh water is considered as a key requirement for sustainable forest management. Forests are essential for the maintenance of water resources since they protect water reservoirs, they filter water, they modify water cycles and they affect water runoff.

Forest management activities like site preparation, intensive timber harvesting and forwarding, road and fire-break construction, development of recreational sites as well as overgrazing and repeated forests fires can affect, directly or indirectly, water quality and quantity. Activities like these can cause soil compaction, increase surface run off, cause soil erosion and flooding, increase the solids and the load of nutrients in aquatic systems leading to reduced quality of water and of aquatic habitats.

In Cyprus, the protection of water quality and quantity is achieved through a combination of guidelines, legislation and conservation practices.

The National Forest Program, which was put in force as from 2001 covering the current decade (2000-2009), specifies the actions that need to be taken to implement a new strategy for the development of the forest sector and for the improvement of sustainable forest management in Cyprus. The National Forest Program consists of seven sub-programs, two of which satisfy watershed protection and soil conservation.

Subprograms A seeks to improve the vegetative cover, prevent soil erosion, and increase permeability in the main water catchment areas whereas sub program C deals with the ways of increasing the quantity of water coming from the forests by investigating the possibilities to increase aquifer storage and to increase absorption capacity in selected areas. Broad principles on the role of forests in water and soil conservation are also outlined in the forest policy.

Water conservation in the main water catchment areas in Cyprus is achieved by:

- The restoration of forest vegetation cover to its natural density (e.g rehabilitation of Amiantos mine, reforestations at Kosshi etc) with the subsequent improvement of the water catchment efficiency and the stabilization of the maximum amount of rainfall at the place it falls,
- The continuous monitoring of the forest condition and forest regeneration so that any factors deteriorating the forest condition are detected sufficiently in advance,
- The exercise of proper forest management practices i.e. no fertilizes and no pesticides or herbicides are used within the major water catchment areas,
- The immediate regeneration/reforestation of forests following harvesting and forest fires,
- The systematic chemical monitoring of surface water in the main dams and main watersheds of the island by the Water Development Department,

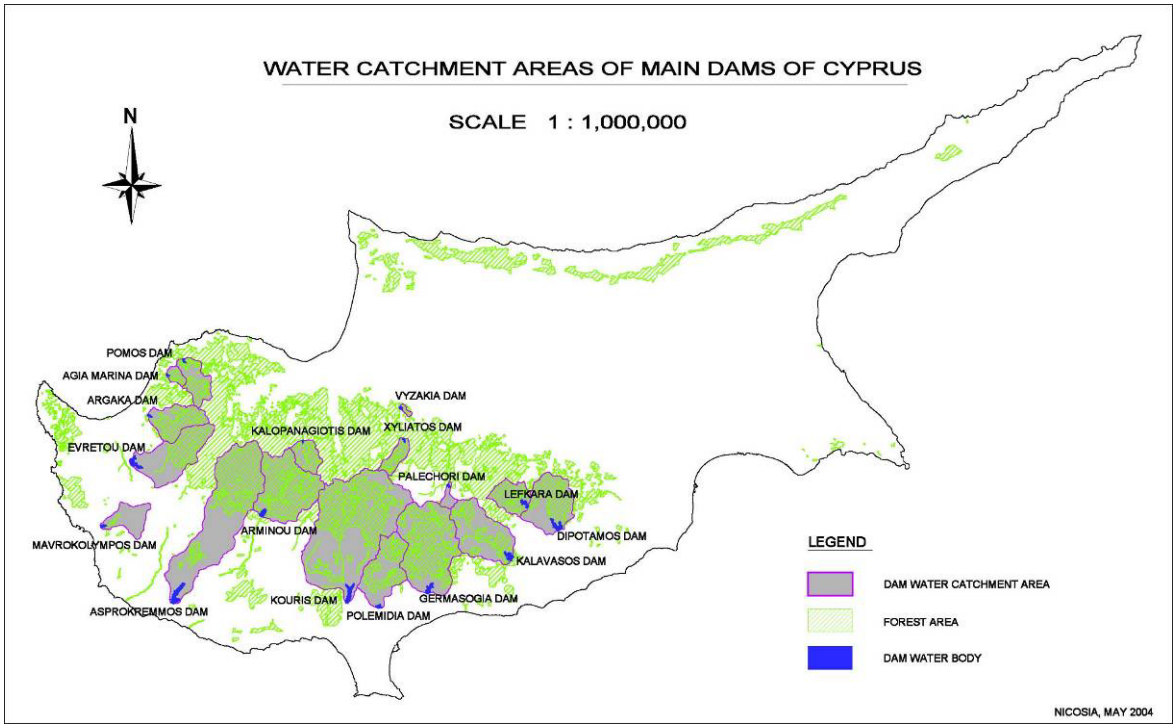
- The adoption of additional emergency measures to protect vulnerable and sensitive forest areas such as streams, riparian zones, and steep slopes,
- The protection of forest against fires etc.

Table 5.1.1

Main Dams of Cyprus

Dam Name	Catchment Area (ha)	Forested (ha)	*Maquis (ha)*	Reservoir Capacity *(1 000 000 m^3)*
ACHNA	2 353	0	44	5,8
AGIA MARINA	903	570	315	0,3
ARGAGA	5 010	3 623	1 225	1,2
ARMINOU	11 915	10 050	951	4,6
ASPROKREMMOS	22 575	10 132	3 257	51,0
DIPOTAMOS	7 938	4 799	2 068	15,0
EVREDOU	9 048	4 241	862	25,0
GERMASOGEIA	15 889	8 922	5 052	13,6
KALAVASOS	9 677	2 332	6 246	17,0
KALOPANAYIOTIS	2 554	1 543	668	0,4
KOURIS	30 577	11 583	9 278	115,0
LEFKARA	3 649	3 083	291	13,8
MAVROKOLYMPOS	3 489	97	1 668	2,2
PALECHORIOU	768	39	613	0,6
POLEMIDIA	7 849	3 734	3 069	3,4
POMOS	3 590	2 111	1 370	0,9
VIZAKIA	252	187	0	1,8
XYLIATOS	1 870	1 376	192	1,2

Map 5.1.1



To avoid water shortages for drinking, household and irrigation uses in Cyprus, more than 30 dams have been constructed since 1960's. More than 90% of their water catchment area is derived from forested areas or areas covered by other wooded land.

Table 5.1.1 and map 5.1.1 present the main dams of the island as well as their water catchment areas in relation to the forest area.

Soil is an essential component of forests and is highly related to forest productivity and proper ecosystem functioning. Of all nonrenewable aspects of the forest, soil is maybe the hardest to replace once lost.

Forest harvesting, as well as other forest management activities, can have adverse effects on forest soils like:

- Soil disturbance: Forest harvesting generally produces disturbance to the soil surface. This can vary from light disturbance of the forest floor to the complete loss of the upper soil horizons depending on the method of harvesting and forwarding of timber,
- Loss of soil stability: Forest soils loose their stability as stumps and roots decay and these effects continue to exist for several years until the re-establishment of new vegetation,
- Loss of organic matter and nutrients content: this is mainly because of increased water surface-run-off,
- Alteration of soil physical properties: Forest harvesting can alter soil structure, cause compaction and loss of soil porosity, reduce soil aeration, reduce water retention, reduce the infiltration capacity and increase the water surface run-off causing soil erosion.

All the above can reduce the productive potential of the soil, which is vested in a relatively thin surface of soil, with subsequent reduction to the plant growth.

Soil protection is seriously taken into consideration in Cyprus. Soil erosion and desertification are serious problems especially at the country side. This is because most of the forests are situated on steep slopes and rocky sites, and they grow on shallow soils that remain in place

only while the vegetation remains intact. Therefore, poor management can lead to increased soil erosion, greater water turbidity, nutrient enrichment and sedimentation.

Soil conservation is satisfied by sub-programs A (Afforestation and silviculture) and C (Protection against fires and other hazards) of the nfp as well as by the Forest Policy. Soil conservation is achieved by:

- the restoration of the forest cover to its natural density especially at places like mines as well as on eroded kafkalla[3],
- the reforestation works that are carried out soon after a harvesting operation and after a forest fire incident and when the natural regeneration fails to re-vegetate the site,
- the construction of contour works like catastrips and gratoni in emergency cases,
- the sand dune fixation and,
- the adoption of a series of measures to prevent desertification like the control of grazing etc.

All forests of Cyprus fulfill the protection functions of the forest to some degree, but for the Nature Reserves and the National Forest Parks this is a primary management objective.

Table 5.1.1

Area of Forest (State) Managed Primarily for Water and Soil Protection

Year	National Forest Parks (ha)	Nature Reserves (ha)	Total Area (ha)	Percentage of Total Forested Area (%)
1993	10 476,1	1 043,0	11 519,1	7,12
2002	11 103,6	4 788,5	15 892.1	9,72

Source: Department of Forests

In addition to their functions with regard to preservation of water quality and quantity and protection of soils especially against soil erosion, these forests have also the function of filtering air and protecting against the impacts of air pollution, stabilization of local climate, as well as combating desertification.

[3] Kafkalla: Rocky flat exposure of limestone carrying shallow soil or pocket of soil of terra rosa character. They usually have a hart crust on the top but the limestone below is softer.

CRITERION 5: MAINTENANCE AND APPROPRIATE ENHANCEMENT OF PROTECTIVE FUNCTIONS IN FOREST MANAGEMENT (NOTABLY SOIL AND WATER)

Indicator 5.2: Protective forests – infrastructure and managed natural resources

Full text: Area of forest and other wooded land designated to protect infrastructure and managed natural resources against natural hazards, part of MCPFE Class "Protective Functions"

Rationale:

Forests fulfill important protective functions for infrastructure (e.g. roads, settlements against avalanches) but also for the protection of managed natural resources (e.g. vineyards, orchards, meadows) or directly for the protection of humans (e.g. from noise or visibility protection).

Whereas all forests fulfill these functions to some degree, for some forests this is the primary management objective. The intension of this indicator is to identify those forests where protection of infrastructure and managed natural resources is the primary management objective.

Quantitative Indicator:

According to the declared forest policy, all forest areas that are managed by the Department of Forests are managed for multiple purposes. Among the priorities of forest management are:

- the protection of the forest and other infrastructure within or adjacent to the forest like roads, trails, fire breaks, buildings and other structures,
- the protection of agricultural land like orchards and vineyards and the agricultural production by the use of linear forestry. Windbreaks and shelterbelts, found at several areas, protect agricultural plantations from strong winds and affect the local microclimate,
- the direct protection of human life from noise, visibility and even pollution.

However, an official designation "protective forest area" does not exist in Cyprus. Therefore, the particular information is not available.

CRITERION 6: MAINTENANCE OF OTHER SOCIO-ECONOMIC FUNCTIONS AND CONDITIONS

Indicator 6.1: Forest holdings

Full text: Number of forest holdings, classified by ownership categories and size classes

Rationale:

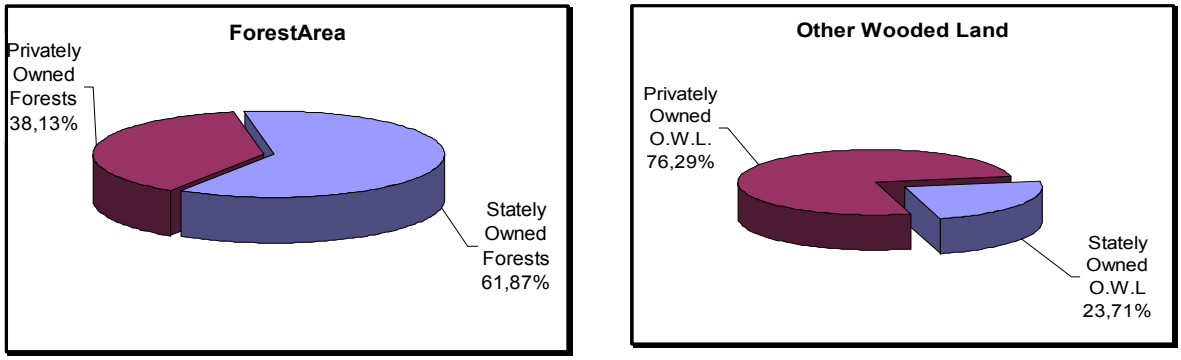
The number of forest holding is an important social indicator, especially for the sustainable development in rural areas due to significant change within the last decades.

Quantitative Indicator:

Unlike most European countries, Cyprus forests are mainly stately owned. 61,87% of the forest is public and only 38,13% is in private ownership. When it comes to the other wooded land, the scenery changes; 23,71% of the other wooded land (maquis and quarique vegetation) is publicly owned and the rest 76,29% is privately owned.

Chart 6.1.1

Share of publicly and privately owned forest and other wooded land in Cyprus



The State forest of Cyprus, as estimated by the Forest Management Sector in 1999 using remote sensing techniques and ground control checks, occupies an area of 106 781 ha which is equal to 11,54% of the total land of the island. The area of the privately owned forests comes to 65 814 ha or 7,11% of the total land.

However, private forestry as a practice is not existed in Cyprus. The existence of these forests is mainly due to the emigration of people from the mountainous or semi-mountainous to urban areas, the abandonment of agricultural land adjacent to the forests and the natural expansion of the forest vegetation.

The private forests consist of small, scatter holdings that have been acquired by inheritance from parents to children. A lot of these holdings were under small vineyards or other minor agricultural plantations on steep slopes or on poor in quality sites, scattered and far way from roads. Constituting uneconomic investments, these areas have been abandoned by their owners and have been forested naturally by nearby expanding forest vegetation. Because of this, the total number of private owners is not known and is very difficult to find.

Private forest owners are numerous but they are not organized into an association yet. In their properties (private forests), there is a lack of infrastructure such as roads, fire traces, vehicle tracks, water tanks, fire look out stations etc. and therefore, the protection of these areas from the greatest enemy of the Cyprus forests, the fire, is not adequate.

For the better protection and adequate management of the State forests, the Department of Forests purchases private forest lands that form either an enclave or a wedge into the State forests.

The protection of State and private forests against fires and other natural disasters, the reforestation of burned areas, the expansion of the forest by the afforestation of non agricultural land, the improvement and tending of existing forests are among the aims of the Rural Development Plan which covers the three year period 2004 – 2006.

CRITERION 6: MAINTENANCE OF OTHER SOCIO-ECONOMIC FUNCTIONS AND CONDITIONS

Indicator 6.2: Contribution of forest sector to GDP

Full text: Contribution of forestry and manufacturing of wood and paper products to gross domestic product.

Rationale:

From the national view point, the contribution of forestry and manufacturing of wood and paper products to gross domestic product indicates the macro-economic importance but can also be used for the assessment on how forest management contributes to the overall sustainable development as well as, more specifically, to rural development and whether this contribution is sustainable.

Quantitative Indicator:

The Gross Domestic Product (GDP) represents the value of goods and services produced annually within a country. The GDP of Cyprus in 2001 was 5.880 million pounds of which forestry, forest based industries and wood furniture manufacturing accounted for only 1,126%.

The forest sector's share of the GDP is generally low. Over the last decade, this contribution followed a declining trend. Among the primary reasons for this decline were:

- the low productivity of Cyprus forests,
- the replacement of the old forest policy, according to which the timber production was a primary objective, with a new one that places a lot of emphasis on the ecological and social role of the forest, benefits that are not marketed,
- the escalated growth of some other sectors of economy like tourism,
- the absence of private forestry etc.

Despite the above, forestry today continues to be significant for the economy of mountainous and semi-mountainous areas of the island. It provides employment to a relatively significant number of people in these areas and helps in the maintenance of a sizable proportion of the population in the rural areas.

Table 6.2.1

Gross Domestic Product

Gross Domestic Product (GDP)	Current Market Values	
	1996 million £	2001 million £
GDP of Cyprus (total)	4.159,6	5.880,0
GDP of Forestry	2,0	1,5
GDP of Wood Based Industries	27,8	32,9
GDP of Wood Furniture Manufacturing	32,5	31,8
GDP of Agriculture	178,5	214,7
GDP of Forestry as a ration to total GDP	0,048%	0,026%
GDP of Wood Based Industries	0,668%	0,559%
GDP of Wood Furniture Manufacturing	0,581%	0,541%
GDP of Agriculture	1,120%	0,699%

Source: Ministry of Finance, Statistics Service

As shown in the above table, the annual contribution of forestry in the economy is negligible. In 2001, this was 0,026% of the total GDP. However, the contribution of timber based industries (sawmilling, wood based panels and wooden pallets) as well as wooden furniture manufacturing was more significant. That contribution was accounted for 1,1% of the total GDP.

It has to be noted that the national annual wood production as set by the Department of Forests after the last national forest inventory to 8 000 m^3/year is not enough to support the primary wood processing industries of the island. The national timber production accounts for only 8% of the local consumption compared to the imported timber and timber products which make up the remaining 92% of the market. Thus, the market shifts to imported final products and the local timber-based-industry is gradually shrinking.

CRITERION 6: MAINTENANCE OF OTHER SOCIO-ECONOMIC FUNCTIONS AND CONDITIONS

Indicator 6.3: Net revenue

Full text: Net revenue of forest enterprises

Rationale:

The level of net revenue of forest enterprises is an important indicator of the degree of economic sustainability of forest management. The net revenue of forest enterprises includes all sources of income of the forest owner directly related to forestry, including subsidies, excluding taxes.

From the national view point, an increasing net revenue from forestry contributes to economic growth and to an increasing economic sustainability of the forest owners.

Quantitative Indicator:

In Cyprus, returns to the Department of Forests are made up of sales of Wood Forest Products (WFP) that are mainly timber and firewood, a wide range of Non Wood Forest Products (NWFP) such as medicinal and aromatic plants, forest seeds, forest plants, Christmas trees, soil and rocks and other minor forest products, the sales of services and, the net income from subsidies.

Table 6.3.1

Returns to the Department of Forests

	1991 £[5]	1996 £	2001 £	2002 £
Sale of Goods and Services				
Wood	485.171	407.875	158.819	171.390
Fuel-wood	63.814	63.965	62.098	52.820
Christmas trees	32.284	27.303	9.381	9.326
Plants sold by forest nurseries	83.770	121.914	155.078	145.517
Forest seeds	1.371	532	490	892
Soil and rocks	3.589	83	1.439	288
Secondary forest products[6]	415	405	960	7.111
Permits				

[5] One Cyprus Pound (£) = 2,2 US Dollars.
[6] Secondary forest products: cones, wood samples, aromatic plants, etc.

Grazing permits	404	618	683	662
Sawmill permits	632	532	462	378
Charcoal production permits	815	918	678	12
Other Revenue				
Beehives fees	172	240	389	356
Land use and water use permits	1.535	5.345	14.349	17.896
Forest telephone use	683	17	0	0
Long term leases	87.249	396.904	527.499	533.255
Cyprus Forestry College[7]	62.058	51.076	23.637	35.144
Settlement of offences	9.810	11.541	7.670	16.553
Other revenue[8]	282.367	233.538	63.295	55.038
Donations				
UNOPS donation[9]	0	0	15.000	82.650
Total	**1.116.139**	**1.322.807**	**1.041.927**	**1.129.288**

Source: Department of Forests

Expenditure is going to employment, purchases, forest protection, and to the provision of social and environmental benefits that are demanded by the public free of charge.

Table 6.3.2

Comparable financial statement for the period 1993 – 2002

Year	Forest Revenue £	Forest Current Expenditure £	Forest Development Expenditure £	Grand Total Expenditure £	Net Revenue / Loss £
1993	1.676.637	3.639.402	2.154.666	5.794.068	-4.117.431
1994	1.455.054	4.124.889	2.323.964	6.448.853	-4.993.799
1995	1.587.757	4.250.584	2.796.082	7.046.676	-5.458.919
1996	1.322.807	4.447.620	3.010.410	7.458.030	-6.135.223
1997	1.424.119	4.783.155	3.902.953	8.686.108	-7.261.989
1998	1.049.671	5.110.591	5.638.107	10.748.698	-9.699.027
1999	1.160.549	5.322.817	4.651.702	9.974.519	-8.813.970
2000	1.643.698	6.831.652	3.554.971	10.386.623	-8.742.925
2001	1.041.927	6.719.989	3.507.250	10.227.239	-9.185.312
2002	1.129.288	7.393.961	4.960.760	12.354.721	-11.225.433

Source: Department of Forests

[7] Revenue form fees paid by foreign scholars.
[8] Other fees, charges and reimbursement.
[9] Donations for fire fighting and reforestation.

Most social and environmental benefits of forests are not marketed and many times it is difficult to assign a monetary value to them. The recreation and tourist benefits of the forest are acknowledged to a certain extent and they have a significant contribution to the GDP. Other indirect use values such as the protection of soil and water resources, the conservation of biological diversity, the support to agricultural productivity, carbon sequestration and mitigation of global warming, the combating of desertification, the protection of coastal resources and fisheries have becoming increasingly important (Constantinides, 1999).

During the preparation of National Forest Program, a partial cost-benefit analysis and a SWOT analysis were carried out to examine the **s**trengths, **w**eaknesses, **o**pportunities and **t**hreats of the forest sector. According to these analysis, the social benefits of the State forests were shown to be very large, approximately 36,7 million Cyprus pounds total per year. The average annual value of these environmental benefits was 303 Cyprus pounds per ha, compared to 4,10 pounds per ha from timber production. The annual costs of providing these benefits were approximately 58 pounds, giving a net benefit flow of 245 pounds per ha/year.

Adding the value of the social benefits to timber and other forest related products and services demonstrates the total economic value of forestry in Cyprus.

CRITERION 6: MAINTENANCE OF OTHER SOCIO-ECONOMIC FUNCTIONS AND CONDITIONS

Indicator 6.4: Expenditure for services

Full text: Total expenditure for long–term sustainable services from forests

Rationale:

Forest owners, public and private, incur additional expenditures for producing a range of services that are demanded by the public free of costs. These are, for instance, expenditure to maintain forest against natural hazards, for preventing soil erosion or for protecting water quality as well as social services. These services are an important contribution to the quality of the life and safety of humankind. It is essential to ensure that these services are maintained and that adequate public funding is provided to cover the necessary related expenditures. The total national expenditure for services from the forest should provide quantitative information on the efforts of countries to provide such forest services.

Quantitative Indicator:

In addition to the commercial wood products, the forests of Cyprus provide to the society a wide array of goods and services, including provision of opportunities for recreation and tourism, protection and conservation of soil and watersheds, conservation of biological diversity, climate amelioration and much more.

Today, these non timber values have become more important than the timber values and are expected to play an increasing role in the future use and management of Cyprus forests. This is the reason for which the Department of Forests invests thousands of pounds annually to provide these goods and services to the public.

The allocation of a money value to these non-timber benefits is quite difficult since access to the natural resources is generally not allocated through markets and these services are available to all free of charge or for a fee that does not reflect the costs of providing them.

During the preparation of National Forest Program, the average annual value of the environmental benefits of the forests was estimated to be 303 Cyprus pounds per ha, compared to 4,10 pounds per ha from timber production.

The Department of Forests invests a lot on the protection of forest resources so that they can continue to provide goods and services of all kinds to future generation.

Table 6.4.1

Expenditure for services provided by the Department of Forests

Description of Services Provided by the Department of Forests	Year					
	1995 £	1996 £	1997 £	1998 £	1999 £	2000 £
Forest Protection (wages of fire-guards, stand-by, fire runners, etc.)	283.936	284.810	312.894	387.248	382.504	351.370
Fire Fighting	12.338	3.176	30.049	40.106	3.679	14.991
Fire Fighting Task Force (wages of fire fighting task force)	896.953	963.426	1.006.289	1.110.635	1.142.892	1.132.519
Construction of Fire Traces, Vehicle Tracts, Paths, Water Tanks etc.	89.347	93.347	109.315	115.874	130.548	127.179
Pests and Diseases (dusting against caterpillars)	12.296	14.087	13.837	48.311	119.606	126.537
Conservation of Nature Monuments	948	693	1.988	1.090	1.650	1.226
Forest Publicity (Posters, fire notices)	5.032	3.459	6.996	9.586	11.863	18.084
Free Issue of Seedlings (mainly for reforestation of communal land)	9.966	9.985	10.397	7,802	12.265	16.585
Maintenance and Cleaning of Picnic and Camping Sites	89.626	99.677	102.975	114.248	114.516	117.508
National Forest Parks: Establishment, Development and Maintenance	200.951	225.633	224.476	307.814	328.265	311.027
Establishment and Extension of Picnic and Camping Places	72.338	75.186	79.486	89.790	94.584	127.115
Maintenance of Nature Trails	9.527	12.789	17.697	26.931	29.214	30.873
TOTAL	1.683.258	1.786.268	1.916.399	2.251.641	2.371.586	2.375.014

Source: Department of Forests

Expenditure is incurred in a number of areas including protection of forest resources from forest fires and pests, provision of opportunities for recreation, conservation of natural monuments, public information etc.

CRITERION 6: MAINTENANCE OF OTHER SOCIO-ECONOMIC FUNCTIONS AND CONDITIONS

Indicator 6.5: Forest sector workforce

Full text: Number of persons employed and labour input in the forest sector, classified by gender and age group, education and job characteristics

Rationale:

Employment provided by forestry is an important indicator for the social benefits generated by forests, especially for a sustainable rural development. At the same time, an adequate workforce in term of numbers and qualifications is a critical input to SFM.

Employment in the forestry sector has been falling in almost all European countries due to rapid increases in labour productivity. This trend continues notwithstanding policy efforts to maintain rural employment. There are often trade-offs between economic viability and the maintenance or creation of employment. Indicators help to make such trade off visible and amenable to decision making. Qualification requirements for the remaining workforce are higher due to the use of advance equipment and machines as well as to growing attention to environmental parameters in forestry and mill operations. Particularly for work in the forestry many countries face an ageing workforce and encounter difficulties to recruit new personnel.

Quantitative Indicator:

Even though the employment provided by the forest sector is relatively small (it is only a very tiny proportion of the total workforce of the country), this contributes significantly to the socio-economic development of some rural communities. Some communities like Kambos are heavily dependent on the forest sector for their well being and even for their survival.

Forestry in Cyprus provides full-time and part-time employment especially to the inhabitants of the mountainous areas. The number of part-time employees who are employed directly by the Department of Forests fluctuates throughout the year. More people work between spring and fall and less during winter. This is due to the fact that many of these workers are employed to form the fire fighting bodies of the Department of Forests.

Table 6.5.1

Employment in forestry

Categories of employees	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Foresters (Professional and Sub-professional staff)	272	273	274	277	282	287	284	281	282	284
Clerical staff	21	21	20	19	19	20	20	20	19	19
Regular labourers employed by the Dpt. of Forests	165	162	166	167	161	162	161	158	152	154
Casual labourers employed by the Dpt. of Forests	85	95	108	113	154	161	171	174	221	242
Labourers employed by timber contractors for timber harvesting in State forests	65	43	45	41	38	32	33	23	18	16
Labourers employed by timber contractors for timber harvesting in Private forests	2	3	3	4	2	3	3	2	4	3
Employees in wood processing and wood products industry	2.798	3.043	3.425	3.434	3.343	3.320	3.438	3.104	2.967	2.959
Employees in wooden furniture and picture frame manufacturing	2.750	2.896	2.603	2.252	2.070	2.508	2.451	2.478	2.426	2.340
TOTAL	6.157	6.536	6.644	6.307	6.069	6.493	6.561	6.240	6.089	6.017

Source: Annual Reports, Department of Forests

The number of regular labourers who are directly employed by the Department of Forests exhibits an insignificant downward trend but, the number of casual labourers employed has almost tripled during the same period (1993 – 2002). The observed increase in the employment is due to the efforts of the Department of Forests to become more effective in protecting the forests from the most destructive agent threatening them, the forest fires. For the summer of 2002, 242 casual forest workers were employed to form the fire fighting task force of the Department of Forests.

The through time decrease in the number of workers employed for harvesting and forwarding of timber from the State forests, inter alias, is due to the substantial reduction to the volume of timber harvested from the State forests.

Employment in the wood industry has been quite stable during the last decade despite the great pressure exerted by the growing imports of finished forest products and the reduction to the volume of timber harvested from the State forests which was the main reason for the closure of the sawmill plant of the Cyprus Forest Industries[10] in 2001.

Table 6.5.2

Forest employees by gender categories

Year	Foresters and Clerical Staff			Regular Labourers			Casual Labourers			Forest Trainees		
	Men	Wom.	Total	M	W	T	M	W	T	M	W	T
2001	288	13	301	136	19	155	190	31	221	11	0	11
2002	290	13	303	136	19	155	209	33	242	10	0	10

Source: Department of Forests

Since Cyprus forests are managed for multiple use and many forest employees are engaged in different activities throughout the year, it is difficult to separate them by forestry activity.

Table 6.5.3

Professional Foresters, Forest Technicians and Forest Trainees in the Department of Forests

Years	Professional Foresters	Forest Technicians	Forest Trainees	Total	Employment by age group		
					<20	20 - 50	>50
2001	24	258	11	293	0	233	60
2002	25	259	10	294	0	236	58

Source: Department of Forests

[10]The Cyprus Forest Industries is a Public Company established in 1970 and registered on the Cyprus Stock Exchange. The main shareholder is the Government of the Republic of Cyprus which holds the 51% of the stock capital.

CRITERION 6: MAINTENANCE OF OTHER SOCIO-ECONOMIC FUNCTIONS AND CONDITIONS

Indicator 6.6: Occupational safety and health

Full text: Frequency of occupational accidents and occupational diseases in forestry

Rationale:

Forestry continues to be one of the most hazardous sectors in most European countries. The prevention of occupational accidents and occupational diseases of the forestry workforce is an important social aspect of SFM.

Occupational accidents are occurrences arising out of, or, in the course of work which result in fatal occupational injuries or non-fatal occupational injury.

Occupational diseases in forestry comprise diseases contracted as a result of an exposure to risk factors arising from work activity.

Quantitative Indicator:

Forestry is considered as a profession with a high risk of physical accidents and diseases. Works like tree felling and logging using chainsaws, timber skidding and forwarding using tractors and winches, timber transportation, site preparation, fire fighting and other works continue to be extremely dangerous. Occupational diseases caused by excessive physical strain affecting neck, back and shoulders, vibrating and noise induced diseases are also common in forestry.

Therefore, safety and health at the forestry environment are of major concern. The Department of Forests as an employer adopted a set of measures promoting safety and health like:

1. **Labour Protection Legislation:** The *Health and Safety at Work Law 89 (I) of 1996 – 2003* which is in line with the ILO Safety and Health Convention and the relevant legislation of the European Union, lays down the broad safe and health obligations and responsibilities of both the employers and the employees. The Department of Labour Inspectorate, under the Ministry of Labour and Social Insurance is the supervising and

enforcing body for this legislation. The enforcement of the provisions of the law is used as a last resort.

2. **Regulations:** In 1987, the Department of Forests adopted and put into practice a series of special regulations on safety and health in forestry. The regulations introduce a series of precautionary measures with the aim of protecting and promoting workers safety and well being, as well as, improving working conditions and working environment. These regulations concern with noise, use of machinery and chemicals, use of personal protecting equipment etc.
3. **Training:** Safety and health aspects have been incorporated in the educational programs of the Cyprus Forestry College for the training of both future foresters and existing staff working for the Department of Forests. Training is considered as one of the most effective measure for preventing accidents and health problems.

Table 6.6.1

Occupational accidents in forestry, harvesting and related activities

Year	Accidents		Gender		Age		Severity	
	No.	Rate, %	Male	Female	<18	>18	Fatal	Non Fatal
2001	6	0,56	6	0	0	6	0	6
2002	1	0,06	1	0	0	1	0	1

Source: Department of Labour Inspectorate, Ministry of Labour and Social Insurance

According to the above data, published by the Department of Labour Inspectorate of Ministry of Labour and Social Insurance, the rate of accidents (Number of accidents per 100 employees) among forestry workers relative to other industries is very low. The highest rate of occupational accidents in Cyprus occurs in:

- the Constructions Sector (29%),
- the Hotels and Restaurants (13%) and,
- the Food and Drinks Industry (8%).

Well implemented safety and health programs improve both productivity and also economic profitability.

CRITERION 6: MAINTENANCE OF OTHER SOCIO-ECONOMIC FUNCTIONS AND CONDITIONS

Indicator 6.7: Wood consumption

Full text: Consumption per head of wood and products derived from wood

Rationale:

Sound use of wood, a renewable and friendly raw material, is an essential part of the sustainable development of the forest and forest products sector. Income from sales of wood and forest products is the most important element in the economic sustainability of the sector.

This indicator demonstrates the intensity of wood consumption, and may be correlated with other indicators, notable population and GDP.

Taken with indicator 6.8 (trade in wood), it indicates how the country's own forest resources contribute to the provision of raw materials or the domestic markets and those abroad and whether this is sustainable.

Primary processed products (i.e. sawnwood, wood based panels, pulp, paper and paperboard) as well as wood used in the rough and energy wood should be included. Secondary processed products (e.g. furniture, paper products, joinery) should not be included to avoid double counting and because of problems with conversion factors.

The use of wood instead of non-renewable raw material is an indicator of sustainable consumption patterns in a society.

Quantitative Indicator:

Cyprus is considered as a net importing country for wood and wood-based products. 92% of the total wood market is made up of imported wood mainly from Europe, Africa, Russia and America. The exports of wood and wood products are negligible.

The total production of round wood in 2002 was closed to 12 000 m^3 and that was only a tiny portion of the local consumption.

Table 6.7.1
Wood consumption in Cyprus

	2001				2002				2003			
Product	Production	Imports	Exports	Consumption	Production	Imports	Exports	Consumption	Production	Imports	Exports	Consumption
Round-wood, 1.000m^3	18,311	3,105	0,060	21,356	15,423	2,287	0	17,710	11,990	0,781	0	12,771
Wood Charcoal, 1.000 mt	3,000	13,797	0,031	16,766	3,000	21,487	0,009	24,478	3,000	4,343	0	7,343
Wood Chips and Particles, 1.000 m^3	5,500	48,200	0	53,700	5,000	0,070	0	5,070	4,000	0,031	0	4,031
Wood Residues, 1.000 m^3	0	731,257	0	731,257	0	1,131	0,021	1,110	0	1,224	0	1,224
Sawn-Wood, 1.000 m^3	8,601	77,275	0,160	85,716	7,463	84,478	0,245	91,696	5,645	183,085	0,397	188,333
Wood-Based Panels												
- Veneer sheets, 1.000 m^3	0	1,644	0,014	1,630	0	2,200	0,051	2,149	0	1,916	0	1,916
- Plywood, 1.000 m^3	4,200	30,532	0,038	34,694	2,600	55,546	0,059	58,087	2,340	16,629	0,074	18,895
- Particle Board, 1.000 m^3	0	46,273	0,079	46,194	0	53,602	0	53,602	0	64,380	0	64,380
- Fiberboard, 1.000 m^3	0	30,427	0,002	30,425	0	22,874	0,006	22,568	0	31,752	0,008	31,744
Wood Pulp, 1.000 mt	0	2,553	0	2,553	0	4,133	0,015	4,118	0	2,766	0,039	2,727
Other Pulp, 1.000 mt	0	0	0	0	0	0,036	0	0,036	0	0,024	0	0,024
Recovered Paper, 1.000 mt	14,412	0	14,412	0	11,371	0	11,371	0	11,696	0	11,969	0
Paper and Paperboard, 1.000 mt	0	55,550	0,235	55,315	0	57,715	0,350	57,365	0	60,216	2,656	57,56

Source: Department of Forests

CRITERION 6: MAINTENANCE OF OTHER SOCIO-ECONOMIC FUNCTIONS AND CONDITIONS

Indicator 6.8: Trade in wood

Full text: Imports and exports of wood and products derived from wood

Rationale:

International trade plays an important role in supplying renewable products at competitive prices to consumers world wide, and helps to encourage the economic sustainability of the forest sector in many exporting countries.

Quantitative Indicator:

Cyprus is a net importing country of wood and wood products. It depends to a great extend, on wood imports either in the unprocessed form or processed products like sawnwood, wood-based panels etc. Small quantities of wood and wood products imported are re-exported to neighboring countries.

Table 6.8.1

Imports and exports of wood and wood products

	2000		2001		2002	
Product	Imports m^3	Exports m^3	Imports m^3	Exports m^3	Imports m^3	Exports m^3
Round-wood, m^3	2.105	4	3.105	60	2.287	0
Wood Charcoal, mt	14.302	3	13.797	31	21.487	9
Wood Chips and Particles, m^3	84.302	0	77	0	70	0
Wood Residues, m^3	704.295	30	1.097	0	1.131	21
Sawn-Wood, m^3	66.803	19.308	77.275	160	84.478	245
Wood-Based Panels						
- Veneer sheets, m^3	1.615	6	1.664	14	2.200	51
- Plywood, m^3	17.790	134	30.532	38	55.546	59
- Particle Board, m^3	41.020	24	46.273	79	53.602	0
- Fiberboard, m^3	20.469	2	30.427	1	22.874	12
Wood Pulp, mt	1.974	86	2.553	0	4.133	15
Other Pulp, mt	6	0	14	0	36	0
Recovered Paper, mt	1	10.956	0	11.412	0	11.371
Paper and Paperboard, mt	54.613	1.030	55.543	239	57.715	350

Source: Department of Forests

After the approval of the National Forest Program (nfp) and the new Forest Policy Statement by the Council of Ministers in 2001, which are design to promote the multiple use of the forests, a decision was taken by the Department of Forests to reduce the annual yield taken from the State forests of the island to 8.000 m^3. This yield drops the harvesting-to-increment ratio to 0,2 and in no way can cover the local timber needs. Therefore, the market is mainly satisfied by imports of wood and wood products form Europe, Africa, Russia and America.

CRITERION 6: MAINTENANCE OF OTHER SOCIO-ECONOMIC FUNCTIONS AND CONDITIONS

Indicator 6.9: Energy from wood resources

Full text: Share of wood energy in total energy consumption, classified by origin of wood

Rationale:

Wood is one of the major sources of renewable energy, whose importance is often underestimated, notably because of measurement problems. The objective of this indicator is to measure the relative importance of energy from wood compared to other sources of energy. This also helps to assess the sustainability of the energy sector in a country. Wood energy arises from a number of different sources, many of which are difficult to measure.

Quantitative Indicator:

In general, wood fuels consist of the following commodities: fuel-wood, charcoal and black liquor. Fuel-wood and charcoal are derived from forest, trees outside the forest, wood processing industries and recycled wooden products. Black liquor or Lignin is a by-product of chemical pulping.

In Cyprus, wood energy arises from fuel-wood and charcoal and not from black liquor due to the absence of pulp and paper industry. Fuel-wood use is especially common in the rural areas for heating purposes. Charcoal is widely used by Cypriot people mainly for the preparation of the traditional barbeque known as “souvla”.

Table 6.9.1
Production and Consumption of Wood Fuels

Wood Fuel	Year		
A. Round Wood (Fuel-wood from State forests. Some of this wood is converted to charcoals)	2000 m^3	2001 m^3	2002 m^3
* Local Production -Coniferous	4.845	5.974	4.514
-Non-Coniferous	585	581	698
* Net Imports	0	34	33
Total	5.430	6.589	5.245
B. Charcoal	mt	mt	mt
* Local Production	3.000	3.000	3.000
* Net Imports	14.299	13.766	21.478
Total	17.299	16.766	24.478

Source: Department of Forests

On average, the annual per capita consumption of fuel-wood (for year 2002) was estimated to be around 0,007 m^3 where as, the per capita consumption of charcoal for the same year was closed to 0,033 mt.

The amount of annual wood fuels consumption is assumed to be equal to the amount of wood fuels production and import.

The share of wood fuel in the total energy requirements of the island is quite low. Fuel-wood is widely used by rural people since it is the cheapest and most accessible source of energy for household heating needs. In some cases, this is harvested at no monetary costs. Urbanization and rising income are the main reasons for which people switched to other forms of energy, reducing the share of wood fuels in the total energy needs and lowering the per capita consumption.

Cyprus is highly dependent on imported energy, primarily crude oil and refined products. Solar energy is the most popular renewable energy used in Cyprus. The appreciation of Cyprus people for using renewable energy sources is reflected in the fact that Cyprus is the leading country in the world in installing solar collectors per capita (0,86 m^2). Currently, more than 90% of the dwellings in Cyprus are equipped with solar water heaters whereas more than 50% of the hotels are equipped with solar collection systems of a total area of 40.000m^2. Solar energy is also popular for other non-thermal applications. Photovoltaic cells are also becoming very popular in displacing electricity produced by fossil fuel generators.

CRITERION 6: MAINTENANCE OF OTHER SOCIO-ECONOMIC FUNCTIONS AND CONDITIONS

Indicator 6.10: Accessibility for recreation

Full text: Area of forest and other wooded land where public has access for recreational purposes and indication of intensity for use

Rationale:

Ownership patterns and property rights affect public access to forest and other wooded land. Access to forests enables people to benefit from the recreation value of forests which contributes to quality of life. Since many recreational uses are not marketable or based on legal or effective rights of free access, this indicator complements any data under indicator 3.3 (non-wood goods) and 3.4 (services) from the societal point of view.

Quantitative Indicator:

Cyprus besides the clear blue sea, the fine beaches, the ancient ruins and historical sites, the idyllic landscapes and the unique pine scented forests, provides a wide range of recreational opportunities like picnicking, camping, hiking, biking, climbing, hunting, fishing, skiing, bird-watching, sightseeing and observing wildlife.

Public ownership of the majority of Cyprus forests that are managed for multiple uses, allows free and unrestricted accessibility for forest recreation opportunities. Access is also unrestricted in most private forests and other wooded land. Notwithstanding the relevant legislation, it is accustom that any person may enter any private or State forest for reasonable recreational purposes. According to the national legislation, whenever the access or use is not for reasonable purposes, the forest owner or the Director of the Department of Forests can completely prohibit the access. Some activities though like the lighting of a fire, camping and hunting are either completely prohibited in some areas (i.e. in Nature Reserves) or allowed under special circumstances.

The effects of forest recreation on individuals and on the society are a lot. Recreation gives the chance to reduce stress, exercise body and mind, with direct effects on health, happiness and productivity.

The Department of Forests is responsible for the creation, improvement and expansion of picnic sites, camping places, nature trails, biking trails, visitor centers as well as for the establishment, development and maintenance of National Forests Parks in the State forests.

There are today 41 picnic sites in the State forests of the island with a total capacity of 20.810 persons. All picnic sites provide sitting and table facilities, sanitary facilities, hearths for cooking, drinking water and children play grounds.

Table 6.10.1

Picnic Sites

S/N	Picnic Site	Forest Division	Capacity	Year of Establishment
1	Academia	Lefkosia	180	1996
2	Mandra tou Kambiou	Lefkosia	1.600	1972
3	Konia	Lefkosia	560	1972
4	S.W. Entrance of Athalassa N.F.P	Lefkosia	400	1994
5	Profitis Elias	Lefkosia	120	1973
6	Kornos	Lefkosia	600	1976
7	Gavo Greko	Lefkosia	120	1995
8	Agios Georgios Athalassas	Lefkosia	150	1991
9	Rizoelia	Lefkosia	150	2003
10	Agia Paraskevi	Lemessos	665	1979
11	Kakomallis	Lemessos	355	1980
12	Polemidia	Lemessos	200	2003
13	Xyliadou Dam	Adelphi	675	1984
14	Gefiri Panayias	Adelphi	35	1998
15	Kapouras	Adelphi	200	1965
16	Platania	Troodos	2.660	1969
17	Argolachania (Mesa Potamos)	Troodos	560	1982
18	Livadi tou Pashia	Troodos	1.280	1981
19	Kampos tou Livadiou	Troodos	660	1992
20	Armirolivado	Troodos	2.080	1985
21	Trooditissa (Xerokolimbos)	Troodos	630	1979
22	Kambin tou Kalogeriou	Troodos	560	1971
23	Assinou	Troodos	120	1974
24	Prodromos Dam	Forestry College	250	2002
25	Marathos	Forestry College	300	1974
26	Xerargaka	Forestry College	650	1976
27	Gefiri tou Livadiou	Pafos	400	1991
28	Monashillaka	Pafos	600	1988
29	Xystarouda	Pafos	250	1978
30	Komititzi	Pafos	400	1974

31	Timi Communal Forest	Pafos	700	1987
32	Stavros tis Psokas	Pafos	600	1970
33	Agia	Pafos	250	1971
34	Smygies	Pafos	400	1986
35	Agios Merkourios	Pafos	350	1995
36	Papaloukas	Pafos	200	1986
37	Pera Vasa	Pafos	200	1995
38	Kalonomati	Pafos	120	2001
39	Agia Varvara	Pafos	120	1994
40	Mavralis	Pafos	410	1995
41	Agios Antonios	Larnaka	50	2001
		TOTAL	20.810	

Source: Department of Forests

For the visitors who want to prolong their stay in the forests of the island, 6 camping sites with a capacity of about 2 500 persons have been established.

Table 6.10.2

Camping sites within State forests

S/N	Forest - Locality	Administrator - Lessee	Tents – Caravans - Buildings	Capacity
1	Troodos – Platania	Department of Forests	150	600
2	Troodos	Troodos Communal Board	170	650
3	Troodos – Kampi tou Kalogerou	Department of Forests	80	320
4	Forestry College – Prodromos Dam	Department of Forests	30	100
5	Yialia – Polis	Cyprus Tourism Organization	200	700
6	Stavros tis Psokas	Department of Forests	60	150
			Total	2 520

Source: Department of Forests

Another s even camping sites found in the State forests of the island are used by special groups as shown in the following table.

Table 6.10.3

Camping sites within State forest for special use by specific groups

S/N	Forest - Locality	Administrator - Lessee	Tents – Caravans - Buildings	Capacity
1	Limassol – Kakomallis	Mitropolis Lemessou	1	30
2	Troodos	Girl Guide (scouts)	6	60
3	Troodos - Asprogremmos	Association of Parent and Teachers of Limassol	8	60
4	Troodos	Pancyprian Public Employees' Trade Union	3	50

5	Troodos (Loumata ton Aeton)	Scouts	25	150
6	Troodos – Platania	Scouts	15	100
7	Troodos	Iera Kardia Scholi Ayias Marias	2	20
8	Troodos (Pashia Livadi)	American Academy	25	150
9	Troodos (Pashia Livadi – Rocky Point)	American College of Girls (Cairo)	10	60
10	Troodos – Cyprus Forestry College	Pancyprian Greek Teachers' Organization	25	100
11	Kara ton Glion	Scouts	47	180
			Total	960

Source: Department of Forests

For the visitors who wish to walk and at the same time acquire knowledge on the flora, the fauna and the forest ecosystem in general, 49 nature trails are also available. 174 km of these nature trails are passing through the State forests and the rest 26 km are passing through private forests and other wooded land.

Seven biking trails have also been established by the Department of Forests during the last decade. 216 km of these biking trails are running on asphalted roads and 233 km are running on earthen roads.

The Forest Department has established two visitor centers, one in Troodos National Forest Park and the second one in Athalassa National Forest Park. Both centers have a recreational, educational and informative character. Their objectives are:

- The presentation of the value and function of the forests of the island,
- The presentation of the attempts to protect the forests and the natural heritage,
- The inspiration of the respect and love for the natural resources.

Their establishment is in line with the objectives of the Forest Policy which are the development of the forest sector, the achievement of the maximum social benefit and the quality upgrading of the recreational and social functions and services that the State forests offer to the society.

CRITERION 6: MAINTENANCE OF OTHER SOCIO-ECONOMIC FUNCTIONS AND CONDITIONS

Indicator 6.11: Cultural and spiritual values

Full text: Number of sites within forest and other wooded land designated as having cultural or spiritual values

Rationale:

Forests have many cultural and spiritual values for societies and individuals, notable for religious, aesthetic and historical reasons. Although frequently intangible and/or personal, often theses values are manifested in particular sites which are increasingly being identified, listed and protected. The number of such sites officially designated is a rough indicator of the cultural and spiritual values assigned to its forest by society.

Examples of such sites are archaeological sites in forests, giant or unusual trees, the sites of historical events or of special ceremonies or customs, particularly beautiful landscapes, sites link to famous individuals etc. In many cases the sites concerned will be small in area, so that the unit is number of sites rather than area of forest.

Quantitative Indicator:

Throughout its long history, Cyprus forests have played an important role in the socio-economic aspect of life on the island. From the writings of Eratosthenis (275-195 BC), forests that were covering not only the mountains but also the planes, have been cut down for smelting copper and silver and, for building fleets. Forest and their wood were also used through time for building purposes, for making a variety of articles for household needs or, as a source of energy. Wood was, and still is, a part of the everyday life.

Forests also provided inspiration for many artists, whether in the field of literature, painting, music or other art.

Cyprus forests have many cultural values mainly for historic, aesthetic and religious reasons. Examples of such sites are, for instance, ancient settlements, fortifications and castles, churches and temples, theaters, mining sites, heaps of metal slag, old kilns, old fountains, old bridges, tree natural monuments, particularly beautiful landscapes etc.

Table 6.11.1

Archeological and cultural sites within forests or other wooded land

S/N	Ancient Monument	District	Town / Village
1	Tamassos Settlement	Nicosia	Politiko
2	Soloi Theatre and ancient temples	Nicosia	Karavostasi, Potamos tou Kampou
3	The Palace and Temple of Aipeia at Vouni	Nicosia	Loutros
4	Mining settlement at Alteri, Bronze Age	Nicosia	Galini
5	Heaps of copper slag at Kouloupashis	Nicosia	Mitsero
6	Heaps of ancient copper slag at Kampanolaona	Nicosia	Mylikouri
7	Old fountain	Nicosia	Politiko
8	Heaps of ancient copper slag at Kokkinogia	Nicosia	Sia
9	Heaps of ancient copper slag at Voudomantra	Nicosia	Mitsero
10	The Commandery of the Knights Templar	Larnaka	Choirokoitia
11	Choirokitia Neolithic Settlement	Larnaka	Choirokoitia
12	Remains of ancient copper slag at Skouria	Larnaka	Kalavasos
13	Apollon's Temple at Kourion	Lemessos	Episkopi
14	Part of the hippodrome at Meydan	Lemessos	Episkopi
15	Part of the site and remains of Kourion	Lemessos	Episkopi
16	Part of the Hellenic Ermogenis	Lemessos	Episkopi
17	The fortification walls and remains of Palia Chora	Lemessos	Pano Platres-Prodromos
18	Gefiri tis Elias	Lemessos	Foini
19	Site and remains of copper mines at Platies & Kouries	Lemessos	Asgata
20	Site and remains of ancient copper slag at Lem. forest	Lemessos	Gerasa
21	The old bridge at the locality Eliomylos	Lemessos	Potamiou
22	The Piskopou Bridge	Lemessos	Foini
23	Skarfos Bridge	Pafos	Simou
24	Tjelefos Bridge	Pafos	Agios Nicolaos
25	Roudias Bridge	Pafos	Ayios Ioannis
26	Site and remains of Graeco-Roman and Early Christian town at Agios Georgios	Pafos	Pegeia
27	Remains of a Chalcolithic, Hellenisic, Roman and Medieval Settlement and fortifications	Pafos	Pegeia
28	Heaps of ancient copper slag at Mavrovounia	Pafos	Polis
29	Heaps of ancient copper stay slag at Kavakia	Pafos	Pano Panayia
30	The ruins of church of Agios Mamas	Pafos	Pano Gialia
31	The site and remains of the ruins of the Medieval Castle (Pyrgos tis Rigenas)	Pafos	Neo Chorio
32	The church of Panagia Chrysopateritissa	Pafos	Pomos
33	The Castle of Agios Hilarion	Keryneia	Karmi
34	The Castle of Buffavento	Keryneia	Koutsovendis

Source: Archeological Department

All of the above archeological or cultural sites are found either within the forests or within other wooded land and are protected by the Antiquities Law.

Table 6.11.2

Tree nature monuments of Cyprus

S/N	Latin name	Locality	Owner	Gbh (m)	Ht. (m)	Age
1.	Pinus nigra ssp. pallasiana	Troodos Forest	F.D.	4.20	18	400
2.	Juniperus foetidissima	Troodos Forest	F.D.	4.45	16	450
3.	Quercus alnifolia	Kremmos tis Pellis	F.D.	3.50	10	200
4.	Cedrus brevifolia	Cedar valley	F.D.	2.79	32	200
5.	Quercus infectoria ssp. veneris	Pyrgos tis Rigenas	F.D.	5.35	18	500
6.	Quercus infectoria ssp. veneris	Lania	F.D.	8.10	26	800
7.	Platanus orientalis	Komititzi	F.D	5.52	24	400
8.	Platanus orientalis	Katarraktis near Phini	F.D	6.20	36	500
9.	Pinus nigra ssp. pallaciana	Troodos Forest	F.D.	4.72	20	400
10.	Quercus infectoria ssp. veneris	Ayios Kononas Akamas	F.D.	2.90	16	200
11.	Pinus brutia	Dhkialis Yialia Forest	F.D.	4.07	26	250
12.	Pinus brutia	Teratsia Yialia Forest	F.D.	3.70	36	230
13.	Pinus brutia	Tapatzia Yialia Forest	F.D.	4.12	24	260
14.	Quercus coccifera ssp. calliprinos	Akamas	F.D.	3.10	12	300
15.	Platanus orientalis	Mavres Sykies	F.D.	6.00	28	400
16.	Cedrus brevifolia	Cedar valley	F.D.	2.78	32	150
17.	Quercus alnifolia	Dhkialis Yialia Forest	F.D.	2.77	10	150
18.	Platanus orientalis	Dhkialis Yialia Forest	F.D.	4.60	26	300
19.	Alnus orientalis	Dhkialis Yialia Forest	F.D.	2.80	28	200
20.	Pinus brutia	Marotis Yialia Forest	F.D.	3.78	36	250
21.	Cedrus brevifolia	Pedoulas	F.D.	2.60	16	150
22.	Taxodium distichum	Phasouri	F.D.	2.38	14	72
23.	Pinus brutia	Stavros tis Psokas	F.D.	3.85	50	300
24.	Quercus infectoria ssp. veneris	Stavros tis Psokas	F.D.	3.61	14	350
25.	Pinus brutia	Mosfilia - Aphtoullina	F.D.	4.78	51	350
26.	Juniperus excelsa	Madari	F.D.	1.57	10	300
27.	Alnus orientalis	Platys valley	F.D.	3.10	33	150
28.	Quercus coccifera ssp. calliprinos	Polemidhia	F.D.	3.10 at base	16	250
29.	Quercus coccifera ssp. calliprinos	Polemidhia	F.D.	1.57Y 1.53	8	250
30.	Quercus coccifera ssp. calliprinos	Polemidhia	F.D.	1.36Y 1.55	12	250
31.	Cedrus brevifolia	Vrisi tou Matsima	F.D.	3.63	22	300
32.	Pinus brutia	Pocamatismos	F.D.	3.75	16	250
33.	Pinus nigra ssp. pallasiana	Xerokolympos	F.D.	4.52	20	300
34.	Arbutus andrachne	Kionia - Profitis Elias	F.D.	1.46 at90cm	10	120
35.	Pinus brutia	Vrodisia	F.D.	4.10	32	250
36.	Quercus coccifera ssp. calliprinos	Platanoudhi	F.D.	4.80at base	8	450
37.	Ceratonia siliqua	Polemidia	F.D.	3.10	14	150
38.	Quercus coccifera ssp. calliprinos	Adelfoi Forest (Kriniatis)	F.D.	1.98	10	300
39.	Quercus infectoria ssp. veneris	Adelfoi Forest (Fteritji)	F.D.	3.40	16	250
40.	Ficus sycomorus	Makounta	F.D.	2.31 at base	14	120
41.	Abies cilicica	Platres	F.D.	2.59	24	115

Source: Department of Forests

Beside the above tree nature monument found within the State forests of the island and protected by the forest law, ten (10) other trees or group of trees found outside the State

forests are declared as Tree Nature Monuments and are protected by the Town Planning and Housing Law.

Through this law, areas of aesthetic and landscape value have been declared as Coastal Reserves (like Lara–Toxeftra), Nature Protection Shores and Regions (like Cape Cavo Greco, Makronisos, Ranti forest and Cape of Akamas), and Areas for the Protection of Nature and Protected Landscapes (cliffs, gorges, salt lakes etc.).

Table 6.11.3

Other protected sites – Cliffs

S/N	Name	Location	District
1	Gremmoi Pissouriou	Pissouri	Lemessos
2	Mantilokremmos	Kato Dris	Larnaka
3	Falkonopatra	Kato Lefkara	Larnaka
4	Koullouropetra	Kornos	Larnaka
5	Akron Pomou	Pomos	Pafos
6	Pambela	Neo Chorio	Pafos
7	Episkopi	Episkopi	Pafos
8	Asprogremmos	Amargeti – Agia Marina	Pafos
9	Ziripillis	Kelogethara – Agia Marina	Pafos
10	Pachnoutis	Asprogia – Panayia	Pafos
11	Salamiou	Salamiou	Pafos
12	Aspro Pigadi	Kelogethara – Salamiou	Pafos
13	Kremmasti - Kaminouthkia	Pano Panayia	Pafos
14	Atokremmos	Pano Panayia	Pafos
15	Pyrkoi	Panao Panayia	Pafos
16	Koukos	Pano Panayia	Pafos
17	Vloythkia - Zapithos	Pano Panayia	Pafos
18	Capnismenos	Arminou – Agios Nikolaos	Pafos
19	Tzerina	Agios Ioannis	Pafos
20	Chanoutarides	Agios Ioannis	Pafos
21	CavoGrego	Agia Napa	Agia Napa

Source: Department of Forests

Table 6.11.4

Other protected sites – Gorges

S/N	Name	Location	District
1	Stenoi	Kykkos to Panayia road	Lefkosia
2	Mavroi Kremmoi	Kykkos to Panayia road	Lefkosia
3	Mala	Kykkos to Panayia road	Lefkosia
4	Madari	Saranti	Lefkosia
5	Potamos Fterikoudion	Fterikoudi	Lefkosia
6	Krisfigeto Filani	Filani	Lefkosia
7	Trozena	Gerovasa	Lemessos
8	Koronion	Kathikas	Pafos
9	Falkonia	Kathikas-Peyia	Pafos
10	Koufon	Kathikas-Pano Arodes	Pafos
11	Avakas	Pano Arodes-Kato Arodes	Pafos
12	Kranasi - Ambelagia	Androlikou	Pafos
13	Kardamillis	Androlikou	Pafos
14	Petrakis	Androlikou	Pafos
15	Atichoullis	Paristerona	Pafos
16	Cha Potami	Alektora-PanoArchimadrita-Kouklia	Pafos

Source: Department of Forests

Table 6.11.4

Other protected sites – Mountain Tops

S/N	Name	Location	District
1	Stavrovouni	Stavrovouni	Larnaka
2	Xylias	Kornos	Larnaka
3	Stavropevkos	Odou	Larnaka
4	Papoutsa-Aetomouti	Palechori	Lefkosia
5	Platy	Alona	Lefkosia
6	Drakontas	Pedoulas	Lefkosia
7	Agios Elias	Tris Elies	Lemessos
8	Pipis	Pyrga-Mosphiloti	Lefkosia

Source: Department of Forests

QUALITATIVE INDICATORS FOR SUSTAINABLE FOREST MANAGEMENT

A. Overall policies, institutions and instruments for sustainable forest management

A.1 Overall policies

A.1.1 National Forest Program

The Department of Forests, with the assistance of experts from FAO, completed in 1999 and put in force as from 2001, a National Forest Program (nfp) covering the current decade (2000-2009). The National Forest Program specifies, in general terms, the actions that need to be taken to implement a new strategy for the development of the forest sector and for the improvement of sustainable forest management in Cyprus.

The main objectives of this program are the forest protection and development, the forest management on a sustainable basis and, the rationalist and prudent multiple use of forest.

The National Forest Program comprises the following three parts:

- The Rural Betterment Strategy,
- The Action Plan and,
- The new Forest Policy Statement, which replaces the one issued in 1950 and reconfirmed in 1960.

The Rural Betterment Strategy, which aims at safeguarding and expanding forest resources for the benefit of the whole community while capturing the advantages of development based on ecotourism, concerns with the following five action areas:

- Action to protect and enhance forest cover, water supplies, wildlife and national heritage in State forests,
- Afforestation and restoration of degraded land in the wider countryside,
- Safeguarding particular places inside and outside the State forests with outstanding scenery, cultural importance and exceptional ecological or scientific interest, and developing them for recreation and tourism where this does not conflict with conservation aims,
- Encouraging, guiding and controlling recreation and tourism development through Local Plans, zoning and development permits, in conformity with Town and Country

Planning Regulations, on the strict proviso that State forests will on no account be used for building development,

- Providing information and publicity about the forest and the flora and fauna they contain, directed particularly at schools, colleges, tourists and the general public, using up-to-date information technology and interpretation techniques.

This strategy is a broad statement of aims. The National Forest Program is a flexible program indicating the general direction to be taken without providing the step by step procedures for further development of the forest sector.

The strategy builds on the capabilities and expertise of the Department of Forests by spreading them more widely through collaboration with other ministries, departments and agencies. The Department of Forests can initiate action in the State forests (which it controls) and extend its operations, by agreement with others, either acting alone or by joint ventures, to other rural areas outside the main forests.

The National Forest Program contains several sub-programs, each consisting of several projects dealing with the following groups of activities:

- Afforestation and Silviculture,
- Production of timber and non timber products,
- Protection against fires and other hazards,
- Conservation of ecosystems, flora, fauna and heritage,
- Production of water of good quality and quantity,
- Preparation of local plans and village development,
- Institutional reform, modernization and capacity building.

The implementation of the National Forest Program depends on joint action with other government ministries, departments and agencies, and with individuals and organizations in the private sector, NGOs etc. The Department of Forests is the leading agency, generating momentum and providing continuity, coordination and accountability.

The new forest policy statement sets out the framework for the strategic objectives and provides guidance for their achievement. It includes the general conditions that must be observed and the detailed policy objectives that will be followed when implementing the

National Forest Program. The forest policy aims at the protection and improvement of the natural environment of Cyprus for the benefits of all citizens and the improvement of the social functions and services that the Cyprus forests offer to the society.

Further more, a Rural Development Plan has been developed, covering the three year period 2004 – 2006. This plan is co-financed by the European Union and includes the following forestry measures:

1. Afforestation and silviculture,
2. Protection of forests against fires and other natural disasters and the reforestation of burned areas,
3. Afforestation of non agricultural land and investments for the conservation and improvement of the economical, ecological and social functions of forests,
4. Investment to improve the harvesting processing and marketing of forestry products.

A.1.2 Action plan for the protection of the environment

An action plan for the protection of the environment was also prepared based on an environmental review and the action plan prepared by the World Bank in 1993. The W.B. action plan is a comprehensive report prepared in 1995 comparing the country's environmental policy and legislation with those of the EU. The plan was discussed by the council for the environment and approved by the Council of Ministers and is the formal environmental policy document of the government. The plan was formulated and expanded in 2000 to become the national program for the adoption of the environmental acquis communataire of the EU. The action plan includes a series of measures for the reinforcement of the policy management and protection of nature, landscapes and wildlife etc.

A.2 Institutional Framework

The main body responsible for the protection and management of the State forest as well as for the supervision and control of the private forests of the island is the Department of Forests which operates under the Ministry of Agriculture, Natural Resources and Environment.

The Department of Forests administers the State forests and is responsible for the formulation of the forest policy and the National Forest Program, the development of plans for forest expansion and forest development, the recreational development of the forests, the formulation and execution of fire protection programs, the execution of forest inventories and the drawing up of forest management proposals, the execution and promotion of research programs, the promotion of the country's co-operation with the European Union and other International Organizations, etc.

The Department of Forests is structured in headquarters (located in the capital Nicosia) and three forest divisions. The headquarters consist of five sectors as follows:

Sector I: Lands, Surveys and Forest Expansion,

Sector II: Parks and Environment,

Sector III: Forest Engineering, Protection and Utilization,

Sector IV: Management and Computerization,

Sector V: Research, Publicity and Silviculture.

At the headquarters there is also the Planning and the International Relations section.

The State forest of Cyprus is divided into the following three forest divisions:

A. Nicosia/ Larnaka / Famagusta Forest Division: The headquarters are found at Athalassa and are responsible for the management of Nicosia, Larnaka and Famagusta forests.
B. Troodos Forest Division: The headquarters are found at Platania and are responsible for the management of Troodos, Adelphi and Limassol forests.
C. Paphos Forest Division: The headquarters are found at Stavros tis Psokas and are responsible for the management of Pafos, Akamas and Ranti forests.

The personnel of the Department of Forests consist of 25 professional foresters and 267 foresters, graduates of the Cyprus Forestry College. The Cyprus Forestry College is a governmental institution of tertiary education and runs under the Department of Forests with main objective the training of the Department's sub-professional staff.

Besides the Department of Forests, some other ministries and agencies that have a wide range of executive responsibilities over various environmental issues and contribute to the sustainable management of the Cyprus forests are the following:

- The Ministry of Agriculture, Natural Resources and Environment, through its various departments (Agriculture, Animal Husbandry, Veterinary Service, Meteorological Service, Land Consolidation, Mines Service, Environmental Service, Fisheries and Marine Research, Water Development, Geological Survey and Agricultural Research Institute) has a wide range of executive functions on environmental issues. These functions refer to the protection of the quality of surface and ground waters and the sea, management of water resources, aquaculture, meteorology, protected areas, soil conservation, fertilizers and pesticides, reuse of treat effluent, hazardous waste management, mines and quarries, control and monitoring and combating marine pollution, marine ecology, herbaria and gene banks, organic farming, protection of flora and fauna, agriculture and animal husbandry waste, industrial waste treatment, rehabilitation of sites, health and welfare of animals, etc.
- The Environmental Service of the Ministry of Agriculture, Natural Resources and Environment which is mandated to advice on environmental policy, ensures implementation and co-ordinate with the Planning Bureau the process for the adoption of the EU environmental policy and legislation. It also chairs the committee on environmental impact assessment, oversees the enforcement of the larger part of the Law on the Control of Water Pollution, promotes environmental awareness and training and disseminates information on the environment. The service is also the administrative arm of the Environmental Committee and the council for the Environment. In addition, it is the National Focal Point for the CSD, MCSD, SMAP, INFOTERRA, UNEP, and the conventions of CITES, Bern, Basel, Vienna, Biological Diversity, Desertification, Climate Change, Ramsar, and the Environmental Impact Assessment in the Transboundary Context,
- The Department of Agriculture has taken the role of coordinator for the formulation and implementation of Rural Development Plan submitted for funding under the EU rural development legislation. Measures which are envisaged concern agriculture, animal husbandry, water, forestry, small rural processing industries, veterinary service, agricultural research, land consolidation, agricultural roads, renovation of

villages etc. The formulation of the plan has involved extensive consultations with all concerned Government Departments, local authorities and Farmers' Trade Unions.

- The Town Planning and Housing Department of the Ministry of Interior which deals with town and country planning issues and is responsible for the implementation of the Town and Country Planning Law and Regulations,
- The Department of Lands and Surveys is responsible for government land other than the State forests. It cooperates with the Department of Forests in the declaration of State land ("hali" land) as State forest, in the training of forest officers in land surveying etc.
- The Ministry of Commerce, Industry and Tourism deals with industrial estates, energy management and conservation, exploitation of new and renewable sources of energy, the management of grants scheme which assist manufacturing industries in installing waste treatment systems, and accreditation and EMAS, etc.
- The Cyprus Tourism Organization (CTO), under the Ministry of Commerce, Industry and Tourism, is responsible for tourism development and for the promotion of agrotourism in the Republic of Cyprus. CTO is a statutory body responsible for tourist planning and research and the development and marketing of the tourist product,
- The Cyprus Forest Industries ltd., is a Public Company established in 1970 and registered on the Cyprus Stock Exchange. The main shareholder is the Government of the Republic of Cyprus owning the 51% of the stock capital. The remaining 49% belongs to 600 private shareholders. The company is the only producer of industrial wood panels on the island,
- The Planning Bureau, under the Ministry of Finance, is in charge of the preparation of five year Strategic Development Plans for the balanced development of the island's economy and has responsibility for the broader co-ordination of the EU accession process,
- The Ministry of Labour and Social Insurance is the competent authority for the administration and enforcement of the Atmospheric Pollution Control Law and the Safety and Health at Work Law. It also administers part of the Water Pollution Control Law,
- The Game Fund is in charge of the enforcement of the Game and Wild Birds Protection and Development Law, which regulates hunting and game improvements,
- The District Administration and the local authorities,

- The Fires Service, Ministry of Justice and Public Order is the authority responsible for fire fighting in urban and adjacent areas and co-operates frequently with the Department of Forests in fighting fires in rural areas.

Besides the above ministries and agencies that contribute to the sustainable management of the Cyprus forests, there are more than 30 environmental or environmentally conceded NGO's (Non Governmental Organizations).

The involvement of NGOs in environmental policy formulation is actively encouraged. Under the new law on EIA, the Federation of Environmental and Ecological Organizations participates as a member in the EIA assessment committee. Also a number of NGOs are members of the council for the environment and the steering committee for protected areas, whilst they are consistently invited to express their views during hearing at the Parliamentary Environment Committee. The awareness raising activities of NGOs is supported by financial assistance for specific actions. All the active NGOs receive an annual grand from the Government.

The forest policy gives the opportunity to all interested parties like inhabitants of communities, local authorities, forest owners and environmental NGOs to express their opinion and make comments on each future management project. Their comments and opinions are taken into consideration in the planning and later in decision making. The multi stakeholder participation in the procedure of National Forest Program formulation has been proven of vital importance and it can be considered as an excellent example of broad social dialogue for matters relevant to the forest sector.

A.3 Legal / Regulatory Framework

A new National Forest Policy has been prepared replacing the existing forest policy issued in 1950 and reconfirmed after the independence in 1960. The new policy is directly related to the actions required to achieve the aims set out in the National Forest Program. The Forest Policy Statement sets out the strategy and provides guidance for its implementation. It includes the general conditions that must be observed and the detailed policy objectives that will be followed for the implementation of the National Forest Program.

The policy objectives are related to the following subprograms:

A. **Afforestation and silviculture;** the subprogram concerns with the physical condition of the State forests and the wider country side. Afforestation, on the one hand, aims at increasing the forest area and silvicultural operations, and on the other hand, seeks to improve the forest quality for conservation purposes,
B. **Production of timber and non wood products;** the aim is to increase economic and social benefits from the State forests and wider countryside,
C. **Protection against fires and other hazards;** the aim is to increase the effectiveness of protective measures in the State forests and adjacent land, and to extend the fire control system to cover other rural areas,
D. **Conservation of ecosystems, flora, and heritage**; It is concerned with a wide range of conservation objectives related to ecosystems, flora and heritage,
E. **Water;** It is concerned with the management and protection of watersheds. The subprogram seeks to extend and improve the vegetation cover, prevent soil erosion and increase permeability in the main water catchment areas,
F. **Local plans and village development;** The aim is to encourage appropriate development, based on ecotourism, within the framework of comprehensive area plans,
G. **Institutional reform, modernization and capacity building;** the aim is to carry out the necessary changes and take measures to overcome various institutional limitations in achieving forest sector development.

Cyprus environmental policy has been revised from its foundation recently as a result of the process for harmonization with the European Union incorporating in its chapters more than 300 directives and regulations. The majority of the environmental legislation was carefully revised to fully transpose the EU environmental acquis into Cyprus law.

The Forest Legislation which covers both the Forest Law (Laws 14/1967, 49/1987, 44/1991) and the Forest Regulations (1967, 1988, 1991), issued for the best application of the Forest Law, has been amended from time to time since its first enactment in 1879.

The current Forest Laws constitute the basic legal framework of the island for the protection and management of Cyprus forests and OWL. They regulate matters concerning the management and the protection of the forest, forest exploitation, forest improvement and expansion etc. Particularly, these laws determine the specific protection measures for the maintenance, improvement and expansion of forests and natural environment. They also secure the protection from excessive interventions and prohibit the devastation and inappropriate use of the forests.

The Forest Laws contain provisions for matters outside the State forest and for different non-State forest industries.

An action plan for the protection of the environment was prepared based on an environmental review and the action plan prepared by the World Bank in 1993 (a comprehensive report which compared the country's environmental policy and legislation with those of the EU and identified areas of action), as well as on the outcomes of the Barbados and Tunis conferences on the sustainable development of small island states and of Mediterranean countries, respectively and on the environmental legislation and policy of the EU. The plan was discussed by the council for the environment and approved by the Council of Ministers and is the formal environmental policy document of the government. The plan was formulated and expanded in 2000 to become the national program for the adoption of the environmental acquis communataire of the EU. The program includes a series of measures for the reinforcement of the policy management and protection of nature, landscapes and wildlife etc. Besides the Forest Laws, there are several other laws aiming at the protection of Cyprus forests and environment as well as at the improvement of the quality of life. Many of these laws are the result of the transposition of the EU environmental acquis into Cyprus Law. The main laws are:

- The Town and Country Planning Law (No. 90/1972, 56/1982, 7/1990, 28/1991, 91(1)/1992, 55(1)/1993, 72(1)/1998, 59(1)/1999 and 142(1)/1999),
- The law for the Convention for the Conservation and the Protection of the Mediterranean Sea against Pollution (No.20(III)/2001),

- The law for the Convention on Migratory Species, Migratory Birds (No. 17(III)/2001),
- The law for the Convention on Wetlands of International Importance (No.8(III)/2001),
- The law for the Convention on Combat Desertification (No.23(III)/1999),
- The law for the Convention on Biological Diversity (No.4(III)/1996),
- The law for the Convention on Conservation of the European Wildlife and Natural Habitats (No. 24/1988),
- The law for the Convention on Conservation on the International Trade of Endangered Species of Wild Fauna and Flora (No.20/1974),
- The Control of Atmospheric Pollution Law (70/91),
- The Animal Health and Welfare Law (No. 46(I)/1994),
- The Fisheries Law (Cap 134) and Regulations (273/90, 94/94),
- The Protection and Improvement of Game and Wild Birds Law (39/74, 27/91, 107/91),
- The Game Fund Law (No. 38/1974, 39/1974, 158/1990) etc.

During the accession process, Cyprus Government gave great emphasis on the transposition of the following EU environmental legislation:

EU Environmental Legislation:

- Council Resolution of 15/12/1998 on a forestry strategy for the European Union,
- Regulation (EC)2152/2003 concerning monitoring of forests and environmental interactions in the Community (Forest Focus),
- Regulation (EEC)2158/92 on the protection of Communal forests against fire,
- Regulation (EEC)3528/86 on the protection of the Community's forests against atmospheric pollution,
- Regulation (EEC)1615/89 for the establishment of a European Forestry Information and Communication System (EFICS),
- Regulation (EC)2494/2000 on measures to promote the conservation and sustainable management of tropical forests and other forests in developing countries,
- Regulation (EC)804/94 for a European Forest Fire Information System,
- Regulation 1257/99 on support for rural development from the European Agricultural Guidance and Guarantee Fund (EAGGF),

- Regulation 1467/94 on conservation, characterization, collection and utilization of genetic resources in agriculture,
- Regulation (EC)338/97 on the protection of species of wild fauna and flora by regulating trade therein,
- Regulation (EC)2473/98 suspending the introduction into the community of specimens of certain species of wild fauna and flora,
- Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora,
- Directive 99/105/EC on the marketing of forest reproductive material,
- Directive 68/89/EEC on wood in the rough,
- Directive 2000/29 on protective measures against the introduction into the Community of organisms harmful to plants and plant products and against their spread within the Community,
- Directive 92/43 EEC on the Conservation of Natural Habitats and the Wild Fauna and Flora,
- Directive 79/409/EEC on the Conservation of Wild Birds,
- Directive 2003/47/EC on Public Access to Environmental Information,
- Decision 96/493/EC concerning the signing and provisional application of the International Tropical Timber Agreement (1994) on behalf of the European Union.

A series of international conventions for the protection of the environment has been also ratified by Cyprus. These conventions are:

- Conservation on the International Trade of Endangered Species of Wild Fauna and Flora (CITES), ratified on October 18, 1974 and entered into force on July 1, 1975,
- Convention concerning the Protection of the World Cultural and Natural Heritage 1972 (23/1975),
- Convention on the Conservation of the European Wildlife and Natural Habitats (Bern Convention) 1979 (24/1988),
- Convention on the Long Range Transboundary Air Pollution (1979) and its Protocol on the Long – Term Financing of the co-operative Program for Monitoring the Evaluation of the Long-Range Transmission of Air Pollutants in Europe (EMEP) 1984 (184/1991),

- Convention on the Protection of the Ozone Layer and Montreal Protocol on substances that Deplete the Ozone Layer 1985 (19(III)/1992, 7(III)/1994),
- Convention for the Protection of Vertebrate Animals Used for Experimental and other Scientific Purposes (9(III)/93),
- Convention on Biological Diversity (and the Biosafety Protocol), ratified on July 10, 1996,
- UN Framework Convention on Climate Change (ratified on October 15, 1997 and entered into force on January 13, 1998) and the Kyoto Protocol to the Framework Convention,
- UN Convention on Combat Desertification (UNCCD) 1999 (23(III)/1999),
- Convention for the Conservation and the Protection of the Mediterranean Sea against Pollution (1979),
- Global Convention on the control of the transboundary movement of Hazardous Wastes and their Disposal,
- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention). Signatory to the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and the Contiguous Atlantic Area – ACCO, and to the Memorandum of understanding Conservation Measures for the Slender-billed Curlew – CURL, entered into force on November 1, 2001,
- Convention on EIA in transboundary context,
- Convention on Wetlands of International Importance especially as Waterfowl Habitats (Ramsar Convention), entered into force on November 11, 2001,
- Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention), ratified on September 19, 2003,
- Convention concerning the protection of the World Natural and Cultural Heritage (World Heritage Convention), ratified on August 14, 2004.

A.4 Financial Instruments / Economic Policy

The annual contribution of forestry in the economy of Cyprus is negligible The GDP of the island for 2001 was 5,880 million pounds of which forestry, forest based industries and wood furniture manufacturing accounted for only 1,126%. The contribution of forestry during the particular year was accounted for only the 0,026% of the total GDP where as the contribution of timber based industries (sawmilling, wood based panels and wooden pallets) as well as wooden furniture manufacturing was accounted for 1,100% of the total GDP.

The level of investment in Cyprus Forestry is considered to be very low in relation to the investments in other sectors and branches of the productive activities in Cyprus. The annual Gross Fixed Capital Formation related to forestry, for the period between 1995 and 2001, was only 0.17 per cent. Forestry Funding are credits coming from the ordinary budget, the investment budget, the European Union and other sources.

Private forestry is characterized by what is known as passive ownership and there is almost no management and therefore, the level of investment is even lower. Some subsidies are coming from national and community sources.

The Council of Ministers approved the action plan for forestry (2000 – 2009) which designates the new forest policy which is based on the multiple use of forests on the basis of sustainable management adopted. From 2004, the State and private forestry will get allocations through “Rural Development” and will be financed by the Government and the European Union.

The cost for the implementation of the National Forest Program and its activities is estimated to be around 10.2 million pounds per year.

A.5 Information Data to Implement Policy Framework

The means of collection of information regarding the State forests in Cyprus are: The forest inventories, mapping of forest resources and research.

The Department of Forests adopted the Continuous Forest Inventories (CFI) in the productive forests since 1981. Three forest inventories were carried out (1981-1982, 1991-1992, 2001-2002) with main aim the investigation of the condition of productive forests, the investigation of the progress of forest stands, as well as the collection of further information for the development of a rational management based on the sustainable management of the forest. The contribution of CFI to the evaluation of forests resources, formulation of forestry policy and planning of forest development is significant.

CFI provides accurate data in relation to the area of forests, volume, increment, mortality, quality and category of harvested timber. It also provides comparable data and allows forest parameters to be analyzed over the time.

Several other types of inventories were also carried out in Cyprus for the investigation of the distribution of forests and other wooded land area by type of ownership, management type, forest species etc.

In 1996, a forest inventory was carried out at Tripillos nature reserves area using permanent sample plots.

In the context of managing forests, the Department of Forests carried out a series of mapping like the:

- Mapping of forest areas,
- Mapping of forest stands according to species and stage of development in 1965,
- Mapping of productive forests using aerial photographs and field visits,
- Mapping of the State and private forests and other wooded land according to the vegetation type between the years 1996 – 1999.

The Department of Forests in the frame of rationale management of the forest has carried out a series of projects or research programs related to forest resources. Some of the most important projects and research programs are:

- Monitoring of the air pollution effects on forests while participating in the ICP – Forests, since 2001,
- Participation in the European Forest Genetic Resources Network (EUFORGEN), since 2000,
- Research on the "Die-back of Cyprus Cedar (Cedrus brevifolia) at Pafos Forest" in 2001,
- Ex-situ measures for the protection of the Genetic Resources of Cedrus brevifolia and Juniperus excelsa,
- A model for the valuation of statistical and dynamic elements of Pinus brutia forests (1994 – 1996) in cooperation with Dr. Apatsides. Researcher of the Institute of Forest Research within the framework of Greek-Cyprus co-operation,
- Cooperative investigation of the natural regeneration of the forest of Pinus brutia in Greece and Cyprus (1996 – 1999) in co-operation with Dr. K. Radoglou, Researcher of the Institute of Forest Research in Thesaloniki in the framework of Greek-Cyprus Co-operation,
- The ecology and management of Bonelli's Eagle (Hieraaetus fasciatus) in Cyprus (2000-2002),
- The conservation of Griffon Vulture (Gyps fulvus) in Cyprus (2000-2003),
- The Barn owl (Tyoto alba) as a mean of biological control (2003),
- The Fox (Vulpes vulpes indutus) and conservation measures (2000),
- The impacts to the Avifauna from the of the antenna Pluto II establishment to the Limassol Salt Lake,
- Implementation of new techniques for the study, protection and management of island population of Griffon vulture (Gyps fulvus) in Greece (Crete) and Cyprus (2001-2003),
- Special areas of conservation (Directive 92/43/EEC) in Cyprus (1999-2002). Life Third Countries. European Union (DGXI) Ministry of Agriculture, Natural Resources and Environment.

B. Policies, institutions and instruments by policy area:

B1. Land use and forest area and OWL

According to the results of a survey, carried out by the Department of Forests between the years 1996 and 1999 with the use of remote sensing techniques and field surveys, 41,77 percent of the total area of the island is covered by forest and other wooded land. 11,54 per cent of the total land area is covered by State forest and 7,11 per cent of the land is covered by private forest. The State and private OWL cover the 5,48 per cent and 17,63 per cent of the total area of the island respectively.

According to the Forest Law, the State forests of the island are classified into: Main State Forest and Minor State Forest. The Main State Forest is further sub-classified into Permanent Forest Reserves, Nature Reserves and National Forest Parks. On the other hand, Minor State Forest is sub-classified into Communal Forests, Municipal Forests, Grazing Areas, Nursery Areas and Multiple Use Forests.

National Forest Park means a Main State Forest that may be declared by the Council of Ministers as a forest to provide amenities and recreation to the general public. Nature Reserve means the Main State Forest that may be declared by the Council of Ministers as a forest appropriate to provide complete and permanent protection of the flora and fauna.

The main management objectives of the legally designated National Forest Parks are:

- The protection of the environment,
- The provision of recreation and amenity,
- The protection and conservation of natural heritage,
- The promotion of environmental education and information of the public,
- The study of ecological processes and the promotion of their scientific use.

The management objectives of the Nature Reserves are:

- The complete protection of species of flora and fauna,
- The preservation and protection of their biotopes,
- The conservation and protection of the natural elements and values of the area,
- The scientific research.

The Forest Law, beside others, delegates the authority to the Director of the Department of Forests to make rules for the protection and the use of these areas.

The changes in the land use in the public forests are prohibited by the Forest Laws of 1967, 1987 and 1991. Forest Law and Regulations secure the protection mainly of the State forests from unlawful interventions of third persons as well as from other factors like forest fires. State forest areas destroyed by fires or any other causes are reforested and their conversion to other uses is prohibited.

Changes in the use of the private forests or of other wooded land is not restricted by any law or regulation. Private forests may be transferred at any time to other uses and private treeless areas may be afforested. The main reason of private forest land use change is the building of country houses, ecotourism development, and the conversion into agricultural lands. Private forests destroyed either by fire or any other factors are usually reforested even though this is not obligatory. The Rural Development Plan, which covers the three year period 2004 – 2006, includes measures for the reforestation of these areas.

The maintenance and expansion of the forest land is a main aim of the National Forest Program. One of the key objectives of this program is the protection of the existing forests but also the expansion of them where and when this is possible. The new country's forest strategy aims to increase woodland cover through afforestation and reforestation with appropriate species in appropriate locations. Specifically, the woodland cover can be increased by afforestation of bare land, waste government land (hali-land) and agricultural land, and reforestation of degraded sites and burnt areas.

B2. Carbon balance

Cyprus is a party to the UN Framework Convention on Climate Change (19(III)/1997) (UNFCCC) and acceded to the Kyoto Protocol in 1999. The target of this convention is the reduction and stabilization of greenhouse gas emissions and the restoration of the CO_2 emissions to the 1990 levels.

In 2001 the Ministry of Agriculture, Natural Resources and Environment commissioned a study for the preparation of an integrated plan with main aim to set out in an organized basis a monitoring and reporting system and propose a full strategy for reducing green house gas

emissions. In the meantime, a variety of measures on energy efficiency and energy conservation were pursued.

Cyprus is almost totally dependent on imported energy. Energy production is predominantly oil based. During the last decade though, the utilization of renewable energy sources has increased substantially. In the year 2000, The Ministry of Commerce, Industry and Tourism established the Cyprus Institute of Energy (CIE) with mission:

- the development and the promotion of renewable energy sources (wind, solar, biomass, hydro and other forms of renewable energy),
- the promotion of the conservation and rational utilization of energy and,
- the expansion of the usage of financially viable energy technologies.

Solar energy heaters are being used for meeting the domestic hot water needs of the Cypriot family for some decades. The preferences of Cypriots in using alternative energy sources is reflected in the fact that Cyprus is the leading country in the world in installed solar collectors per capita (0.86 m^2). Currently more than 90% of the dwellings in Cyprus are equipped with solar water heaters, whereas more than 50% of the hotels are equipped with solar collection systems of a total area of 40.000 m^2.

Solar energy is being used in Cyprus in other non thermal applications as well. Photovoltaic cells are powering telecommunication receivers and transmitters at remote areas. Furthermore, the Cyprus Telecommunications authority has installed photovoltaic cells on telephone booths.

Within the context of the policy for the further utilization of renewable energy sources, the Electricity Authority of Cyprus adopted a decision to purchase electricity produced from alternative sources and fuels at a price higher than what it costs the Authority to produce. This measure is considered as a milestone for encouraging the sustainable development of renewable energy sources in the field of electricity production.

The use of wind for electricity production is currently being examined by the Electricity Authority of Cyprus Telecommunications Authority, and other private organizations. A study for energy production from biomass has indicated that it could be economically feasible, especially in the case of biogas production from pig manure.

In order to promote energy efficiency, the Government has introduced a grants scheme for the undertaking of investments in the field of energy conservation in the manufacturing industry, the hotel sector and agriculture.

B3. Health and vitality

Atmospheric Pollution

The first law (no. 70/91) for the control of atmospheric pollution was enacted in 1991. Among others, the law was providing Air Quality Objectives related to NO_2, O_3, CO, SO_2, Pb. etc. The Atmospheric Pollution Control Law has been amended in 2002 to cover issues such as ambient air quality, air pollution by ozone, hazardous waste incineration etc.

The harmonization with the European Union legislation has resulted in the development of new laws and regulations related to atmospheric pollution, forest health and vitality.

Cyprus is nowadays committed to the following international conventions and agreements for the air pollution control:

- The convention on Long Range Transboundary Air Pollution (1979) and its Protocol on the Long – Term Financing of the co-operative Program for Monitoring the Evaluation of the Long-Range Transmission of Air Pollutants in Europe (EMEP) 1984 (184/1991); Cyprus is a party to this convention since 1991, but for some reasons, it has not been made possible to ratify the SO_2 and NO_2 protocols of the convention. However, measures for SO_2 and NO_x reduction have been introduced in line with the relevant protocols.
- The convention on the Protection of the Ozone Layer and Montreal Protocol on substances that Deplete the Ozone Layer 1985 (19(III)/1992, 7(III)/1994),
- The UN Framework Convention on Climate Change (19(III)/1997) (UNFCCC) and the Kyoto Protocol to the Framework Convention.

The European program "Protection of Communal Forest against Atmospheric Pollution" and the "International Cooperation Programme on the Assessment and Monitoring of Air Pollution Effects on Forest", which was established in 1985 by the UN, are two related programmes in which Cyprus participates through the implementation of the regulation 3528/86. Nowadays, 38 countries participate in the above program, including all the EU member countries.

The Department of Forests of Cyprus has been nominated as the National Focal Center of the program in Cyprus and is responsible for the collection, validation, evaluation, storage and management of the monitoring data. The National Focal Center collaborates with the coordinating centers of the program in Europe which has the responsibility of aggregating, processing the research part of the program on a European and international level.

The objectives of this program are:

- To provide a periodic overview on the spatial and temporal variation in forest condition in relation to anthropogenic and natural stress factors,
- To contribute to a better understanding of the relationships between the condition of forest ecosystem and anthropogenic and natural stress factors,
- To contribute to the calculation of critical levels and loads of various chemical substances which are accumulated in forest ecosystems,
- To help obtain a better understanding on forest ecosystem process and the interaction between its various components etc.

The following ten research activities have been developed for the achievement of the objectives of the program:

1. Visual assessment of forest crown condition,
2. Sampling and analysis of forest soil,
3. Sampling and analysis of forest soil solution,
4. Sampling and analysis of needles and leaves of forest trees,
5. Estimation of growth and yield of forest stands,
6. Sampling and chemical analysis of deposition (precipitation, snow, hail), measurement of air pollution in forest stands,
7. Meteorological observations,
8. Assessment of forest ground vegetation,
9. Phenological observations of forest cover,
10. Monitoring of air quality and assessment of ozone injury on forests.

Substances that deplete the ozone layer

Cyprus is not a producer but a minor consumer of such substances, as the quantities involved are small. The Ministry of Commerce, Industry and Tourism applied a system of import quotas which were reduced each year. The local market is adequately responding to

international developments. Nearly all aerosol companies are using odorless gas instead of CFCs.

Cyprus ratified the Montreal Protocol in 1992 and it's London Amendment in 1994. In April of 2001, the Copenhagen, Vienna and Montreal II amendments to the Montreal Protocol were ratified (No. 9(III)/2001) empowering the Ministry of Agriculture, Natural resources and environment to issue regulations to review ODS permits and grand licenses.

A study for the strategic planning for ODS control was completed in 2001. The objectives were to prepare a program for compliance with the Montreal protocol with regards to reduction / elimination of the ODS and the introduction of the necessary control measures.

Forest Fires

Forest fires are the most serious causes of deforestation in Cyprus while urbanization and grazing are light causes of deforestation. The Department of Forests is running two projects on this issue. The first project aims at protecting the Cyprus forests from fires and the second aims at expanding the forest area by the afforestation of waste government land.

Awareness raising and information campaigns on forest fires are continuously conducted by the Department of Forests while personnel are trained in forest protection issues at the Cyprus Forestry College. Cyprus proceeded with the preparation and execution of a new forest fire protection plan for the areas classified as high risk. The preparatory work on the establishment of a national database for all wild fires has also been completed.

Through the Regulation (EEC)2158/92 on the Protection of Communal Forests against Fire aiming at reducing the number of fires and burned areas, a series of activities are funded by the European Union. Forestry activities funded include the construction of fire breaks, fire lookout stations, water tanks, forest roads, as well as works for improving degraded forests.

Forest Insects and Diseases

Cyprus is considered as a healthy country as regards insects and pathogens affecting forest trees and vegetation. The House of Representatives, in the efforts to protect the local plant communities and the plant products, adopted a relevant law and regulations (147(I), 2003) for the prevention of introduction and spreading in Cyprus of such agents affecting plants and plant products. This law is in line with the Directive 2000/29/EU.

Other Environmental Policy

Cyprus has begun to integrate the environment into other policies. The Law on Environmental Impact Assessment (EIA) entered into force in April 2001. It aligns Cypriot law with the EIA Directive. The new law goes beyond the minimum requirements of the Directive regarding the exception of defense projects, the thresholds and categories of Annex I projects, transparency (the Cyprus Federation of Environmental Organizations is a member of the EIA assessment committee) and the role of the environmental authority (Environment Service).

In energy, Cyprus encourages the development of renewable energy sources (primarily solar and wind) and promotes energy efficiency measures in all sectors.

B4. Production and use of wood

The maintenance of wood production is ensured by the National Forest Program and the strategy adopted. However, the timber production to meet the domestic needs for wood products is not a primary objective. The National Forest Program places more emphasis on the maintenance and improvement of environmental quality while meeting the recreational requirements of local people and foreign tourists.

The exploitation of the forest is legislatively regulated through the Forest Law and Regulations. The law regulates timber production, harvesting and trade. The yield is sold as standing trees in the forest through open tenders placed by sawmill owners or wood-cutting associations.

The volume of timber to be removed from the State forests of the island is decided based on the results of CFI that are carried out every ten years. In all cases the volume removed is less than the drain. This way, the principle of sustainability is adopted in its simplest form, the sustain yield.

The use of felling regulations (Rules for Marking in the Pinus brutia and Pinus nigra State forest of Cyprus) which provide guidelines for the silvicultural treatment of the forests of the island, also aim to the maintenances of wood production and improvement of the condition of the forests. The controlled and monitored felling operations prevent unlawful interventions and felling of forest trees.

Biotic and abiotic agents affecting the maintenance of forest resources and the timber production are controlled by different measures.

B5. Production and use of non-wood goods and services, provision of especially recreation

The forests of Cyprus are an important national resource. They provide timber and non-wood products, they protect soils and watersheds, they protect the flora, fauna, biodiversity and national heritage, they contribute to the rural life by providing employment to village communities, they contribute significantly to the beauty of the landscape, they provide opportunities for recreation and they attract visitors from abroad.

The National Forest Program and the new forest strategy aims at safeguarding and expanding forest resources in order to provide, on a sustainable basis, all of the above benefit to the society.

Tourism constitutes a major factor for the economic development of Cyprus. Sustainable tourism development on a clean environment with sufficient natural resources for the satisfaction of the needs of local and foreign people is necessary. The Cyprus policies aim at the improvement of tourism management and the protection of coastal and mountainous regions, better information to tourists regarding the environment, and the improvement of tourist services, so that there is less impact on the environment.

The Department of Forests is cooperating with Cyprus Tourism Organization and other agencies for the implementation of environmental protection measures which will benefit tourism, through the preservation of habitats, the protection of the quality of waters, the control of waste disposal. The department is also cooperating with the CTO for the promotion and the development of the mountainous regions for the benefits of local and foreign visitors.

B6. Biodiversity

Biological diversity means the variety and abundance of life forms, processes, functions and structures of plants, animals, fish, fungi and other microorganisms, including the relative complexity of species, communities, gene pools, and ecosystems at spatial scales that range from local through regional to global. This includes diversity within species, between species and of ecosystems.

The maintenance of the biodiversity is a key objective of the National Forest Program. This program beside other objective ensures the protection of endemic species of wild flora and fauna and their habitats. The safeguarding of the diversity of forest ecosystems can also be achieved through the protection of forest through the establishment of protected areas (Nature Reserves and National Forest Parks) and the wise management of entire forest resources so that the continued survival of endemic species and the adequate protection of fragile habitats is ensured.

International agreements, legislation and various action programs aiming at securing biological diversity and its appropriate enhancement are:

- Regulation (EC)338/97 on the protection of species of wild fauna and flora by regulating trade therein,
- Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora,
- Directive 99/105/EC on the marketing of forest reproductive material,
- Directive 92/43 EEC on the Conservation of Natural Habitats and the Wild Fauna and Flora. This directive aims at creating a European network especially for protected areas under the name **Natura 2000**. The member states agreed to include in this network all areas that are significant for the protection and conservation of biotopes and species. They are also obliged to manage protected areas, in such a way that their special values are conserved. Cyprus within this framework suggested its national list of areas to be included in the network,
- Directive 79/409/EEC on the Conservation of Wild Birds. This directive provides for the appropriate measures that should be taken for the protection, conservation and rational management of wild birds,

- The convention on Biological Diversity and its resolutions adopted at the UN Conference on the Environment and Development which are committed to protect the biodiversity of forest ecosystems,
- Conservation on the International Trade of Endangered Species of Wild Fauna and Flora – CITES – 1973 (20/1974). As regards the trade in endangered species, an amendment to the Animals (Scientific Experiments) Law was enacted in July 2000, taking into account the stricter protection requirements for species covered by this convention,
- Convention on the Conservation of the European Wildlife and Natural Habitats (Bern Convention) 1979 (24/1988),
- Convention for the Protection of Vertebrate Animals Used for Experimental and other Scientific Purposes (9(III)/93),
- Convention on Wetlands of International Importance (Ramsar Convention) as wildlife habitat. In March 2001, the House of Representatives adopted a law for the ratification of this convention,
- Convention for the Protection of Migratory Species of Wild Animals. A bill providing for the ratification of this convention was also approved in July 2001.

B7. Protective forests and OWL

In Cyprus, there are nine (9) different legal national designated protected areas. Some of these coincide with the MCPFE classes of protected areas (MCPFE class 1.1 - Nature Reserves and MCPFE Class 1.2 – National Forest Parks). These areas are protected by the Forest Law. Provisions for the protection and conservation of Protective forests and OWL are contained in the Forest Law and Regulations as well as in a new legislation adopted lately by the House of Representatives concerning with the protection of ecosystems and their functions (Framework Law on the Environment and the Protection of Nature). In addition several other laws contain relevant provisions.

B8. Economic viability

The level of investment in Cyprus Forestry is considered to be very low in relation to the investments in other sectors and branches of the productive activities in Cyprus. The contribution of forestry to the Gross Domestic Production is far below 1 %.

This value refers to only State forestry. Private forestry in Cyprus is almost not existed. Almost no management is carried out and therefore, the level of investment is very low. Some subsidies coming from national and community sources are going to forest protection.

Even though the significance of forestry as driver of the economic growth is negligible, the environmental and social outputs from the Cyprus forests are highly valued by the public. Though, many of these environmental and social outputs do not have a place in market and therefore the forest owner does not have any direct economic benefit of providing them.

Forestry is funded by the State budget, through European Union's Programs and actions, and other sources.

B9. Employment (including safety and health)

The employment policy and programmes are designed and adopted within the framework of the overall national economic and social policy as outlined in the government's Development Plans. One of the basic objectives of the Plans is to encourage the full productive utilization of human resources in conditions of full employment.

The Social Insurance Scheme in Cyprus covers compulsorily every employed or self-employed person in Cyprus. This scheme which is financed by contributions from the employers, the insured persons and the State, provides the following benefits: maternity allowance, sickness benefit, unemployment benefit, old age pension, orphan's benefit, missing person allowance, etc.

Employment legislation covers matters related to Employees Rights, Termination of Employment, Annual Holidays, etc.

The Department of Forests employs a work force which comes from all parts of the island. The employment of people from rural areas contributes significantly to the sustaining of rural economies.

Manpower employed by the department is divided into the following categories:

- Foresters (Professional and Sub-professional staff)
- Clerical staff
- Regular labourers and,
- Casual labourers.

Forestry is also generating employment outside the department by the purchase of supplies and services.

Equal opportunities between men and women

In Cyprus, legislation and constitution give the same opportunities to men and women either in rural or urban areas. However the presence of women in the forestry sector is negligible, as the topic has been socially considered, even until now, as a male sector, at least in certain forest works.

Health and safety at work

The broader issue of risk and accidents from industrial sources is covered by the Health and Safety at Work Law 89(I)/1996 and its amendments: Law 158(I)/2001, Law 25(I)/2002, Law 41(I)/2003 and, Law 99(I)/2003. This law is in line with the ILO Safety and Health Convention and the relevant legislation of the European Union.

The Department of Labour Inspection, under the Ministry of Labour and Social Insurances, is the main body responsible for the existence and the enforcement of this law, the running of the proper system for inspections at work place, the promotion of the prevention of accidents through education, and training etc.

B10. Research, training and education

Research

Scientific research and knowledge have been the backbone of most policy related decisions and actions taken by the Department of Forests. For instance, the development of the National Forest Program and the formulation of new Forest Policy were based on such knowledge. Similarly, the adoption of forestry measures in the Rural Development Plan and the procedure for the formulation of the Cyprus Criteria and Indicators for SFM have also taken into consideration the scientific research and knowledge.

During the last years, there has been a noticeable improvement on the quality, the quantity and the accuracy of information collected by the Department of Forests concerning the state and the development of national forest resources. Collecting mechanisms have been redesigned to comply with modern trends, needs and technologies i.e. GPS, GIS, remote sensing etc. The personnel in charge for the collection of data is continuously trained on the use of instruments and methodologies.

A considerable number of research programs dealing with the management and exploitation of forests resources is elaborated in Cyprus. Some of these are listed at page 139.

The Department makes this information available, on request or through publications, to interested groups. In addition, all this information on forest resources is submitted on a constant basis, to the various international bodies and organizations through various questioners like UNECE, FAO, EUROSTAT, ITTO, TBFRA, MCPFE etc.

The Department of Forests has many times shared its experiences and other relevant information with other countries through bilateral programs (e.g. between Cyprus and Greece), the participation in regional and international meetings, seminars and workshops, as well as exchanges of experts' visits.

The capacity of research institutions in Cyprus has been strengthened, especially during the last years, through various projects and co-operation on national and regional level. Funding is ensured either through the national budget or other international sources. The accession to European Union created a better environment for improving financing of research activities and institutions in Cyprus.

Cyprus is currently participating in the Fifth Framework Program (FP5) for Research, Technological Development and Demonstration Activities (1998 – 2002), and is a full and active member in the COST cooperation network of the European Union since 1999.

The scientific and technological research in Cyprus is promoted by the Research Promotion Foundation (an independent organization governed by a 12-member-board approved by the Council of Ministers) founded in 1996. Some on going programs (research activities) are related to flora and fauna identification, monitoring of water quality, waste treatment, marine life and oceanographic research, mining waste, energy efficiency etc.

Training and Education

The training of the sub-professional staff of the Departments of Forest is carried out at the Cyprus Forestry College which is a Government Institution within the Department of Forests of the Ministry of Agriculture, Natural Resources and Environment. The College was established in 1951 to meet the increasing needs of Cyprus, the Middle East and other interested countries for the training of forest technicians in the general principles of forestry practices. Since its establishment in 1951 and up to 2002, 469 Cypriots and 315 foreign foresters have graduated from the College. The Forestry College is part of the Leonardo da Vinci program and the Socrates/Erasmus educational exchange network and is also participating in several European funding programs.

Having also in mind that training contributes positively to the improvement of productivity, the College organizes various seminars and short courses on various forestry topics for the through-life vocational training of the Department of Forests' employees.

The professional and sub-professional foresters employed by the Department of Forests have the chance for supplementary, extended training on a range of forestry and other courses provided by training organizations either in Cyprus or abroad.

The training of forest labourers, regular or casual, employed by the Department of Forests is carried out through short duration, intensive training programs and seminars organized by the Department on various issues like forest protection, fire fighting, safety rules, use of equipment etc.

B11. Public awareness and participation

Besides timber and other economic outputs, the Cyprus forests produce a range of environmental and social outputs. These intangible benefits from the forests are much more important than the tangible ones and are highly valued by the public.

People in Cyprus are very interested about the protection and management of natural resources and are many times organized in Non Governmental Organizations (NGO) involved in environmental policy formulation. Nowadays, there are more than 30 purely environmental or environmentally conceded NGOs. Under the new law on EIA, the Federation of Environmental and Ecological Organizations participates as a member in the EIA assessment committees. Also a number of NGOs are members of the Council for the environment and the Steering Committee for protected areas, whilst they are consistently invited to express their views during hearing at the Parliamentary Environment Committee. The awareness raising activities of NGOs is supported by financial assistance for specific actions. All the active NGOs receive an annual grand from the Government.

The forest policy gives the opportunity to all interested parties like inhabitants of communities, forest owners and environmental NGOs to express their opinion and make comments on future management projects. Their comments and opinions are taken into consideration in the planning and later in decision making. The multi stakeholder participation in the procedure of National Forest Program formulation has been proven of vital importance and it can be considered as an excellent example of broad social dialogue for matters relevant to the forest sector.

Responsible for the raising of public awareness is mainly the Publicity sector of the Department of Forests. The public awareness on forest and environmental issues is raised by the following activities:

- Giving of lectures and speeches to schools, army camps, communities, and organized groups on the importance and protection of natural resources,
- The organization of exhibition booths in different exhibition events like the Pan-Cyprian Agricultural Exhibition, the Annual International Fair and, the Pan-Cyprian Exhibition of Hunting and Outdoor Gear,
- The organization of ceremonies during the Arbor Week and the Forest Protection Week,

- Preparation and projection of films and broadcasting messages of environmental content in the mass media,
- Preparation and publishing of articles related to protection, development and expansion of forests in newspapers and magazines,
- The preparation and distribution of information material like leaflets, posters, stickers, cards, calendars, etc. related to the fauna, flora, recreation, forest protection, etc.
- Giving of interviews to journalists,
- The establishment and running of Visitors Centers, at Nicosia (Athalassa) and Troodos, for Environmental Education.

B12. Cultural and spiritual values

Within the forests and OWL of the island, one can find several archeological and historical monuments related to past human activities and uses of the forests. Such sites are: ancient settlements, fortifications and castles, churches and temples, theaters, mining sites, heaps of metal slag, old kilns, old fountains and bridges. All of the above sites are protected by the Antiquities Law.

Beside the above archeological and cultural sites, one can meet also nature monument and landscapes of exceptional and outstanding beauty. When these are found within the State forests, they are protected by the Forest Law. Nature Monuments found outside the State forests are declared and protected by the Town Planning and Housing Law.

Appendix I

Pan-European Quantitative Indicators for SFM

Criterion	Quantitative Indicator
CRITERION 1: Maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles	1.1 Forest Area 1.2 Growing Stock 1.3 Age Structure and/or Diameter Distribution 1.4 Carbon Stock
CRITERION 2: Maintenance of forest ecosystem health and vitality	2.1 Deposition of air pollutants 2.2 Soil condition 2.3 Defoliation 2.4 Forest Damage
CRITERION 3: Maintenance and encouragement of productive functions of forests (wood and non-wood)	3.1 Increment and fellings 3.2 Round-wood 3.3 Non-wood goods 3.4 Services 3.5 Forests under management plans
CRITERION 4: Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems	4.1 Tree Species Composition 4.2 Regeneration 4.3 Naturalness 4.4 Introduced Tree Species 4.5 Deadwood 4.6 Genetic Resources 4.7 Landscape Pattern 4.8 Threatened Forest Species 4.9 Protected Forests
CRITERION 5: Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water)	5.1 Protective forests – soil, water and other ecosystem functions 5.2 Protective forests – infrastructure and managed natural resources
CRITERION 6: Maintenance of other socio-economic functions and conditions	6.1 Forest holdings 6.2 Contribution of forest sector to GDP 6.3 Net revenue 6.4 Expenditure for services 6.5 Forest sector workforce 6.6 Occupational safety and health 6.7 Wood consumption 6.8 Trade in wood 6.9 Energy from wood resources 6.10 Accessibility for recreation 6.11 Cultural and spiritual values

II. Pan-European Qualitative Indicators for SFM

A. Overall policies, institutions and instruments for sustainable forest management
- A.1 National Forest Program
- A.2 Institutional frameworks
- A.3 Legal/regulatory frameworks and international commitments
- A.4 Financial instruments/economic policy
- A.5 Informational means

B. Policies/institutions/instruments by policy area
- B.1 Land use and forest area and OWL
- B.2 Carbon balance
- B.3 Health and Vitality
- B.4 Production and use of wood
- B.5 Production and use of non-wood goods and services, provision of especially recreation
- B.6 Biodiversity
- B.7 Protective forests and OWL
- B.8 Economic viability
- B.9 Employment (incl. safety and health)
- B.10 Research, training and education
- B.11 Public awareness and participation
- B.12 Cultural and spiritual values

Appendix II

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