Conservation and Sustainable Management of Forests in Central and Eastern European Countries

Phare

What is Phare ?

Since the start of the restructuring of the political and economic system in the countries of Central and Eastern Europe in 1989, the EU Commission has on behalf of the member states of the European Union provided support and assistance to the restructuring of these societies. The primary instrument for this support has been the Phare programme, which is mainly aiming at providing technical assistance and know-how to the countries in Central and Eastern Europe. Phare is one of the largest assistance programmes of this kind.

At present, ten Central and Eastern Europe countries are candidate countries for membership of the European Union. These are Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. These countries are currently undertaking various measures to comply with the so-called European Union "Acquis Communitaire", which is a common European Union law complex.
Besides these ten countries, Bosnia and Herzegovina and Albania also benefit from the EU assistance through the Phare programme.

In order to further advance the process of approximation to the Acquis Communitaire, the European Union has taken a number of additional initiatives to further support the applicant countries by preparing them for accession. Part of this is the up-coming ISPA initiative (Instrument for Structural Policies for Pre-Accession), which will be implemented in the period 2000-2006. The ISPA initiative will assist the countries in meeting the environmental acquis and in adapting to EU Environmental legislation. The priority sectors for ISPA are the environment and transport sectors.

Through its various programmes of assistance the Commission works in close collaboration with the countries to be supported in order to identify how funds should be allocated. This ensures that EU funding is relevant to each government's own priorities. Each country takes the responsibility for running its own programmes.

List of authors

Multi-country Report

Introduction	**Gérard Van Driessche, Roman Longauer, Július Novotný**
1. Forest resources of the PHARE countries	**Roman Longauer**
2. Protective, conservation and special forest functions	**Roman Longauer, Diana Krajmerová**
3. Protection of forests and monitoring of forest condition	**Roman Longauer, Martin Černý, Blanka Maňkovská**
4. Legal and political frameworks, organisation and ownership structures	**Gretta Goldenman, Frank Flasche**
	Ivan Kolenka, Birger Solberg
5. Forest biodiversity - conservation and management	**Emil Klimo, Ladislav Paule, Roman Longauer**
6. Forest information, education and public relations	**Pierre Dimanche, Niall McCormick**

National Reports:

Albania:	**Dr. Spiro Karadumi**, Forest and Pasture Research Institute, Tirana,
Bosnia and Herzegovina:	**Prof. Dr. Božidar Kulušić**, Forestry Faculty, University of Sarajevo, Federation BiH
	Prof. Dr. Ratko Čomić, Forestry Faculty, University of Banja Luka, Republic of Srpska
Bulgaria:	**Dr. Petar Zhelev**, Faculty of Forestry, University of Forestry, Sofia
Czech Republic:	**Dr. Pavel Moravčík**, Institute for Forest Ecosystem Research, Jílové u Prahy
Estonia:	**Dr. Henn Korjus**, Dept. of Forest Management, Estonian Agricultural University, Tartu
Hungary:	**Dr. Márton Sódor, Mr. Miklós Tóth, Mr. András Szepesi, Mr. László Kolozs**, all from the State Forest Service; **Ms. Piroska Esztó**, Ministry of Environment, Project Steering Committee representative; **Mr. Tamás Marghescu**, Special Adviser, Environment Management Institute.
Latvia:	**Dr. Jānis Bisenieks**, State Forest Service, Riga
Lithuania:	**Dr. Vytautas Suchockas; Dr. Olgirda Belova; Prof. Stasys Karazija; Dr. Alfas Pliûra; Dr. Stasys Mizaras** - all from the Lithuanian Forest Research Institute, Girionys; **Dr. Valdas Vaičiiunas**, Ministry of Agriculture and Forestry; **Dr. A. Rutkauskas; Prof. Dr. Habil. A. Kuliešis**, Lithuanian Forest Inventory and Management Institute.
FYRO Macedonia:	**Prof. Dr. Aleksandar Andonoski**, Faculty of Forestry, Univ. of Ss. Kiril and Metodij, Skopje
Poland:	**Prof. Dr. Ryszard Siwecki**, Institute of Dendrology, Polish Academy of Sciences, Kórnik
Romania:	**Prof. Dr. Ştefan Tamaş**, Forestry Faculty, Transilvania University, Brašov
Slovakia:	**Dr. Ľubomír Scheer**, Faculty of Forestry, Technical University, Zvolen
Slovenia:	**Dr. Primož Simončič**, Forestry Institute of Slovenia, Ljubljana

National Questionnaire:

Philippe Bordeau, Prospect C&S, Brussels, Belgium
Frank Flasche, Prospect C&S, Brussels, Belgium
Ján Ilavský, Forest Research Institute Zvolen, Slovakia
Roman Longauer, Forest Research Institute, Zvolen, Slovakia
Niall McCormick, Space Applications Institute, EC Joint Research Centre, Ispra, Italy
Július Novotný, Forest Research Institute, Zvolen, Slovakia
Gérard Van Driessche, Prospect C&S, Brussels, Belgium

Steering Committee Representatives:

Albania: **Arben Pustina**; Bosnia and Herzegovina: **Faruk Mekić** and **Ratko Čomić**; Bulgaria: **Mira Mileva**; Czech Republic: **Jiří Pondělíček**; Estonia: **Aleksander Leemet**; Hungary: **Piroska Esztó**; Latvia: **Uldis Kalnietis**; Lithuania: **Gediminas Raščius**; FYROM: **Nadica Dzerkovska**; Poland: **Tomasz Wójcik**; Romania: **Claudiu Zaharescu**; Slovakia: **Viliam Stockmann**; Slovenia: **Milan Hočevar.**

Brochure:

Christine Haffner: Coordinator; **Hans Roulund**: Senior Forester; **Roman Longauer**: Technical Advisor; **Ian Taylor**: English Text Editor; **Michel Bouchi-Lamontagne (BL Communication)**: Graphic Designer; **Nils Bo Wille Jorgensen**: GIS and database integration expert; **Gérard Van Driessche**: Technical Advisor (Introduction, Chapter 5, Conclusion).
Authors of photographs: **A. Eglistis** p. 5 top; **Goodshoot** cover, p. 7, 21, 49, 63, 79; **V. Hošek** p. 5 bottom, p. 35; **S. Karadumi** p. 78; **G. Man** p. 53; **J. Öövel** p. 37, 42, 47, 69; **M. Sódor** p. 39, 44, 51 top; **G. Van Driessche** p. 51 bottom, 52; **J. Vladovič** p. 6, 77.

This brochure has been prepared by the Phare Environment Consortium.

The European Union's PHARE Programme Phare

ISBN: 92-828-8416-3 - Catalog N°: GU-23-99-435-EN-C

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Foreword

The Central and Eastern European Countries (CEECs) are undergoing processes of economic transformation which impact on their legal, structural and social conditions and on the environment. These transformations have consequences for the sustainable management of renewable natural resources, including forests, and for their conservation. The need for co-operation in the areas of forest protection and management with these countries has been clearly identified in the resolutions of the Ministerial Conferences on the Protection of Forests in Europe, mainly in Resolution 3 "Forestry Cooperation with Countries with Economies in Transition" of the Second Ministerial Conference held in Helsinki in 1993.

A first step in structuring co-operation in the forestry sector with CEECs was to obtain a clear picture of the situation; the trends, the threats, and the opportunities. To this end, a study was designed within the framework of the Phare Multi-Beneficiary Environment Programme, between 1996 and 1998. This study, entitled "Preparation of a Multi-Country Forestry Programme" can be seen as the outcome of the concern of the international community and particularly of the European Union to follow the developing situation of forests in the CEECs and, by providing an analysis of the legal and political framework in the forestry sector, to assist the CEECs in their pre-accession efforts and in the approximation of legislation process.

Comprehensive information on general and country-specific forestry issues was collected, in order to develop country profiles and identify priorities for action on forest and nature conservation. The experience and information available from other relevant initiatives (e.g. Follow-Up Process of the Ministerial Conferences on the Protection of Forests in Europe, UN-ECE/FAO Temperate and Boreal Forest Resources Assessment 2000, UN Convention on Biodiversity, etc.) have also been used. The information processed and collected in the Final Report of the study provides a potential common platform for decisions, allowing comparison of the results of transformation and an examination of common priorities in the CEE region.

The "Preparation of a Multi-Country Forestry Programme" Report was mainly targeted at the forestry technical community. In that form, it would not function as a popularisation tool nor be particularly easy to use as a reference for decision makers or interest groups. It was therefore decided that a major part of the report should be made available in a more accessible form to a larger public. The brochure before you is the result of this process. It extracts the most important trends and conclusions about the sustainable management of forests and conservation practices, and about the legal, political and organisational frameworks relating to forestry in the CEECs. The full text of the more detailed technical Report can be accessed on the Internet at www.fris.sk.

Michele Amedeo
Task Manager, Phare Multi-Beneficiary Environment Programme

Introduction

The area of forest in the 13 Countries with Economies in Transition participating in the Phare Programme is approximately 39 million hectares, or one-third of their total area. The economic position of forestry however and its resources varies widely among the countries concerned. Many of them count among the most forested countries in the continent, and the forests thus play a very important role in their society and culture and also in their national economies. The share of forest land is especially high in Slovenia (54%), Bosnia and Herzegovina (53%), Estonia (47%), Latvia (43%) and Slovakia (41%). Although some of the countries have a lower proportion of forest cover it is much higher in the Phare partner countries than the European average - which was 30% at the beginning of the 1990s.

The gradual increase of forests is a general trend observed in nearly all Eastern European countries both in terms of the extent of cover and the volume of wood resources. But along with this generally positive trend, some negative tendencies have been encountered, namely an increase in the extent of forest damage. Both abiotic and biotic impacts threaten the stability of forest ecosystems. These impacts can be regional, like the influence of air pollution resulting in forest die-back which is mainly concentrated in but not restricted to the so-called "Black Triangle" (Czech Republic, Germany and Poland.) Or the impacts can be specific, like storm damage or the almost uncontrollable insect pest attacks in Bosnia and Herzegovina, Czech Republic, Romania and Slovakia, or the uncontrolled deforestation apparently due to economic factors in Albania and parts of Bosnia and Herzegovina.. As in the EU, these tendencies are often linked to inappropriate forest management in the previous decades, which has destabilised forest ecosystems and is seen in inadequate management control, use of non-native tree species and monocultures. However, like the conflicts often found at various levels between the forestry sector and environmental bodies, these elements are not confined to the Countries with Economies in Transition.

Seminatural forest ecosystem, dominated by Norway spruce (Picea abies) and Scots pine (Pinus sylvestris), typical of the Baltic region.

Specific aspects of the forestry sector in the Phare partner countries are linked to challenges raised by the political and economic transition. Each of these challenges can also be taken as an opportunity. A review is needed of the institutional and legal frameworks in particular, taking full advantage of the acquis communautaire.

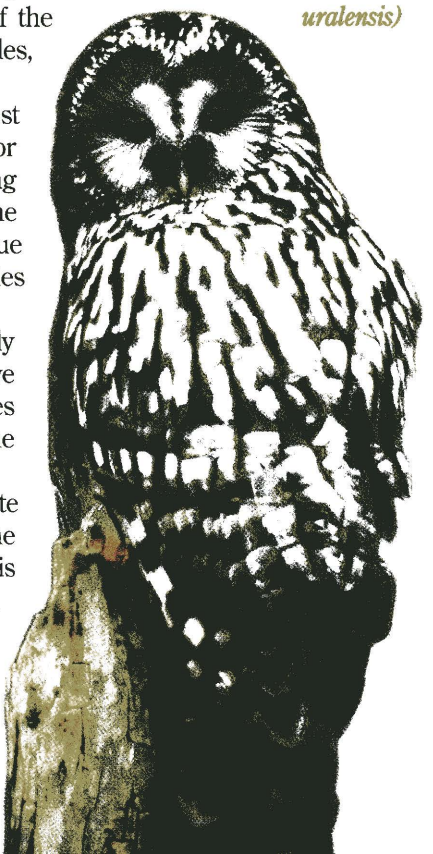
The *acquis communautaire* includes the directives, regulations, and decisions adopted on the basis of the various Treaties which together make up the primary law of the European Union and Communities. It is the term used to describe all the principles, policies, laws and objectives that have been agreed by the European Union.

There are numerous specific problems and this brochure presents some of the most acute. A major discussion centres on the restitution of land to previous owners or their legal successors (who often have little affinity with forestry.) The resulting division of land can have negative economic and environmental effects, as does the lack of experience in forest management of most of the new owners. The same is true for the decrease in output and the marketing crisis in the wood processing industries in some of the countries.

The problem of land restitution has generally been successfully resolved, chiefly through the development of clear regulations for forest owners, and by supportive measures like the provision of extension services. The question of forest economies and related environmental issues requires further systematic attention and the transition will probably take longer here than expected.

The effects of a lack of financial resources is often evident throughout the complete sector, from the income-generating forestry business, through to education and the lack of attention to environmental aspects of forest management. Investment is lacking and the whole industrial sector often needs to be reorganised and modernised. Unfortunately, this frequently leads to a long-term erosion of the sustainability of the forestry sector because it fails to generate enough income to cover expenditure or the funds get transferred to other sectors of the economy.

Ural owl (Strix uralensis)



On a more positive note, the Countries with Economies in Transition are the custodians of a wealth of competence and experience in forest management and in forestry in general. Genuinely committed to sustainable forest management, these countries offer a level of knowledge and skill developed through centuries of experimentation and study. It is there that many important concepts have been developed, in particular the practise of "close to nature" management. The brochure also presents a glimpse of the wealth of resources of the forest ecosystems in the Phare countries, their biodiversity, both of plants and animals, the preservation of endemic and rare species, the frequent presence of patches of virgin forest and the opportunities for ecological networks. We will see that, despite major regional differences, the variety of pristine ecosystems from the Baltic to the Black Sea presents a valuable enrichment of the European environment.

It is evident that the forestry sector in the Countries in Transition faces many challenges. Fortunately, many obstacles have been or are being eliminated, thanks also to a common effort between the EU and the Countries with Economies in Transition.

Poplar plantation.

Bear in Romania.

Cultural and conservation values of forests - open forest and natural amphitheater Martaluzka on the Kralova hola (King's meadow) - a recognised mountain monument of Slovakia.

The brochure is made up of 5 chapters.

Chapter 1 presents the forest resources of the Phare countries. More particularly, the reader will become acquainted with the structure of the forest resources, long term trends, indications on fellings and removals, and a presentation of forest management types.

Chapter 2 discusses the protective, conservation and special functions of forests. This chapter focuses on the concept of multi-purpose forest management.

Chapter 3 approaches the importance of forests in ecological networks and their invaluable wider role in the sustainable conservation of biodiversity.

Chapter 4 concerns the protection and monitoring of forests. This is focused in particular on problems of forest ecosystem stability and the impacts of biotic and abiotic stresses.

Chapter 5 presents the legal and institutional framework in the 13 Phare partner countries, with special attention to the harmonisation of the legislation according to the *acquis communautaire*.

Chapter 1

FOREST RESOURCES OF THE PHARE COUNTRIES

FOREST RESOURCES OF THE PHARE COUNTRIES

The Phare countries have undergone a series of important and complex political and economic changes in the past decade which have been accompanied by new challenges in the development of an international environment and forestry policy. Despite their different forest ecosystems, these countries in transition have all benefited from a very strong forestry tradition and longstanding policies in forest management and education.
The challenges to be faced in attaining sustainable forest management have often involved overcoming effects of the transition such as a lack of institutional and budgetary capacity, creating the necessary legal frameworks and setting up implementation and enforcement capacities for the forestry sector. For wood and wood products, effective production and marketing skills also have to be developed.
In this section we look at the distribution of forest throughout the region, the factors which have influenced its growth and change and the management policies which influence its development.

THE COMPOSITION OF THE PHARE FORESTS

The geographical area of the region covering the Phare countries is 1,183,946 km^2 of which 389,600 km^2 are covered in forest. Only a small part of this is natural forest, which is mostly found in nature reserves and national parks. For the last 300 years or more most of the forest has been managed and a large part of this is man made.

DISTRIBUTION OF FORESTS

In the Baltic region (especially Estonia, Latvia, Lithuania, and Northern Poland), a large proportion of forest is relatively evenly distributed in each country. In the South East, on the contrary, the forests are concentrated in the mountains: The Carpathians in Romania, Balkan and Rodopy in Bulgaria, Dinarids in Albania, Bosnia and FYRO Macedonia. This is only partially due to the natural conditions, because forests originally also covered the foothills and a part of the lowlands there. They have been converted into agricultural lands and settlements. There are also relatively extensive barren areas in some regions. Forest degradation appears to be getting worse in Albania. Due to the war and the unfavourable economic situation, insufficient regeneration of harvested forests is especially noticeable in Bosnia and Herzegovina.

The illustration opposite gives an overview of different types of land use, forest, agricultural land, and other land. It also gives an indication of forest land as a proportion of the total area of the different Phare countries. (This does not include other wooded land outside forests.) It is always difficult to compare statistics from different countries, due to differences in definitions. However in principle the different Phare countries do not deviate too much from the FAO definition. Due to climatic differences and to the differing degrees and priorities of economic development, the forest resources of the Phare countries vary in extent and in the types of forest ecosystems. In general the area of forest is found to be higher in the Phare countries than the European average - which was 30% at the beginning of the 1990s. Forests

The FAO defines Forest as:

Land with tree grown cover (or equivalent stocking level) > 10% and area > 0.5 ha. The trees should be able to reach a minimum height of 5 m at maturity in situ. It may consist either of closed forest where trees of varying heights and the undergrowth cover a high proportion of the ground, or of open forest formations with a continuous vegetation cover in which tree crown exceeds 10%. Young natural stands and all plantations established for forestry purposes which have yet to reach a crown density of 10% or a tree height of 5 m are

and wood products thus seem to play an important role in the culture and economy of these countries. While the proportion of forest land exceeds the European average significantly in several countries such as Slovenia (54%), Bosnia and Herzegovina (53%), Estonia (47%), Latvia (43%) and Slovakia (41%), Hungary is forested well below this level with less than 20% of forest coverage [1].

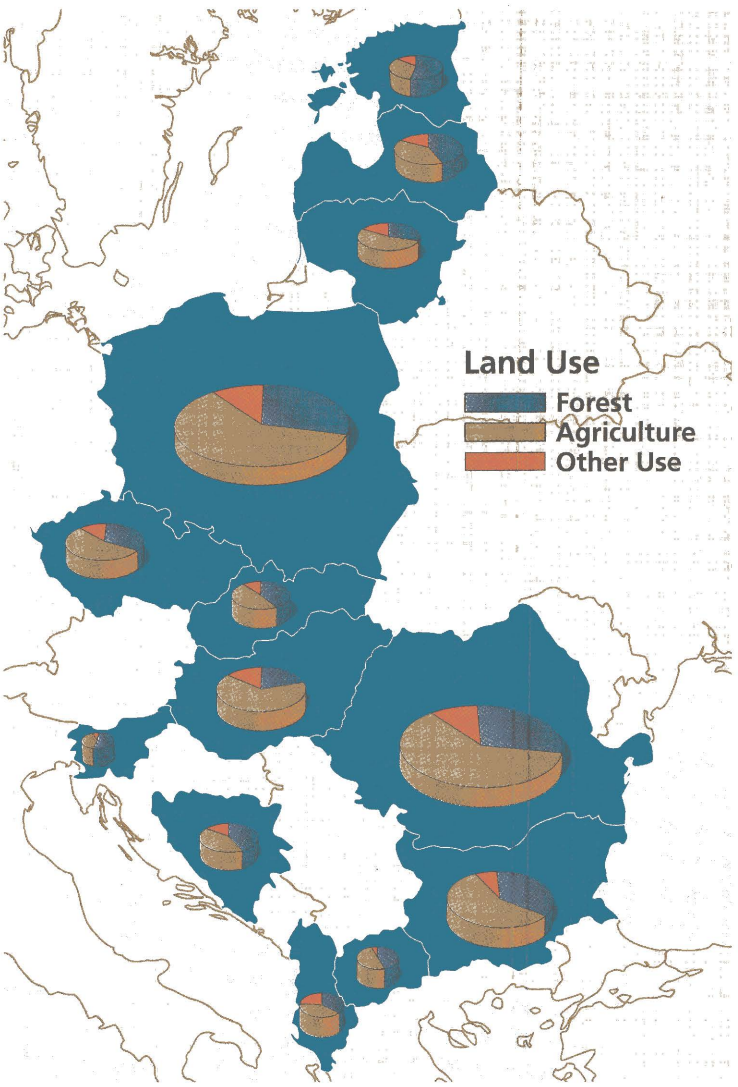
THE CLASSIFICATION OF FOREST TYPES AND TREE SPECIES

The principal factors which determine natural forest vegetation and the structure of forest ecosystems are the specific climate, as well as the composition of the soil, the parent rock and water. According to their common features, forests are classified into ecological forest zones and further stratified into ecotones. The forests found in the central and eastern European (CEE) countries are often classified in the following way:

- boreal coniferous forests,
- mixed ecotonal forests,
- broadleaved deciduous forests,
- evergreen mixed Mediterranean forests.

The boreal forests in Estonia, Latvia and Lithuania are dominated by the Scots pine, Norway spruce and birch, with a mixture of aspen and alders.
The mixed ecotonal forests are generally richer in tree species and ecosystems because there are also oaks, more noble hardwoods, beech and silver fir. This is most likely due to greater variation in soil types, elevation, temperature and rainfall.
The broadleaved deciduous forests contain few coniferous species. They are usually dominated by beech or oak with a mixture of other broadleaved species. They will often have a higher biodiversity than the boreal coniferous forests. The richest diversity in the forests is found in the South-Eastern region of Europe where mixed Mediterranean forest also occurs. All tree species occurring in the latter two zones plus a broad variety of new ones give rise to diverse and complex forest ecosystems.

Land use pattern in the PHARE countries



The area of each circle represents the area of the country.

included, along with temporarily unstocked areas which are expected to revert to forest.

Forests include:

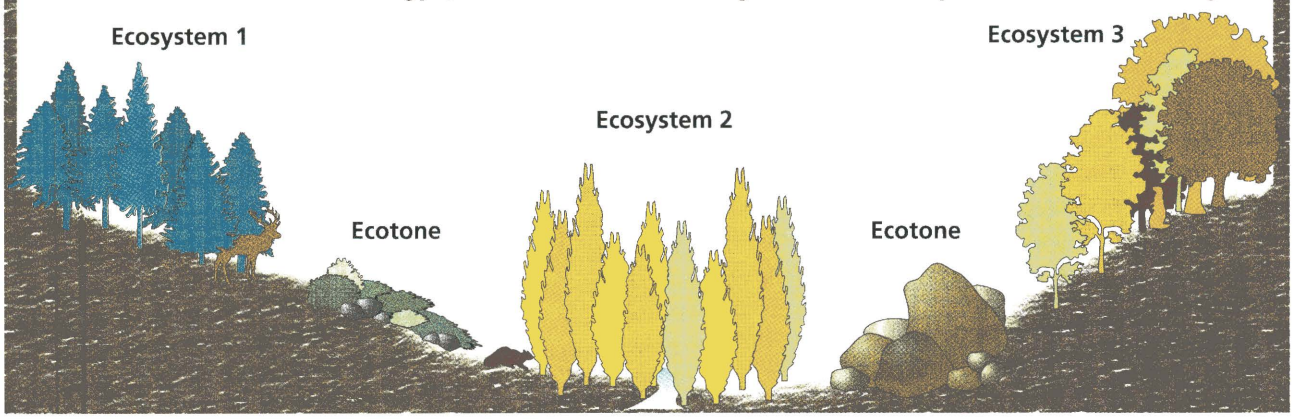
forest nurseries and seed orchards, forest roads, cleared tracts, firebreaks and other small open areas within the forest; forest in national parks, nature reserves and other protected areas such as those of special environmental, scientific, historical, cultural and spiritual interest; windbreaks and shelterbelts of trees with an area of more than 0.5 ha and a width of more than 20 m. Rubber plantations and cork oak stands are included.

Actual and natural forest tree species composition

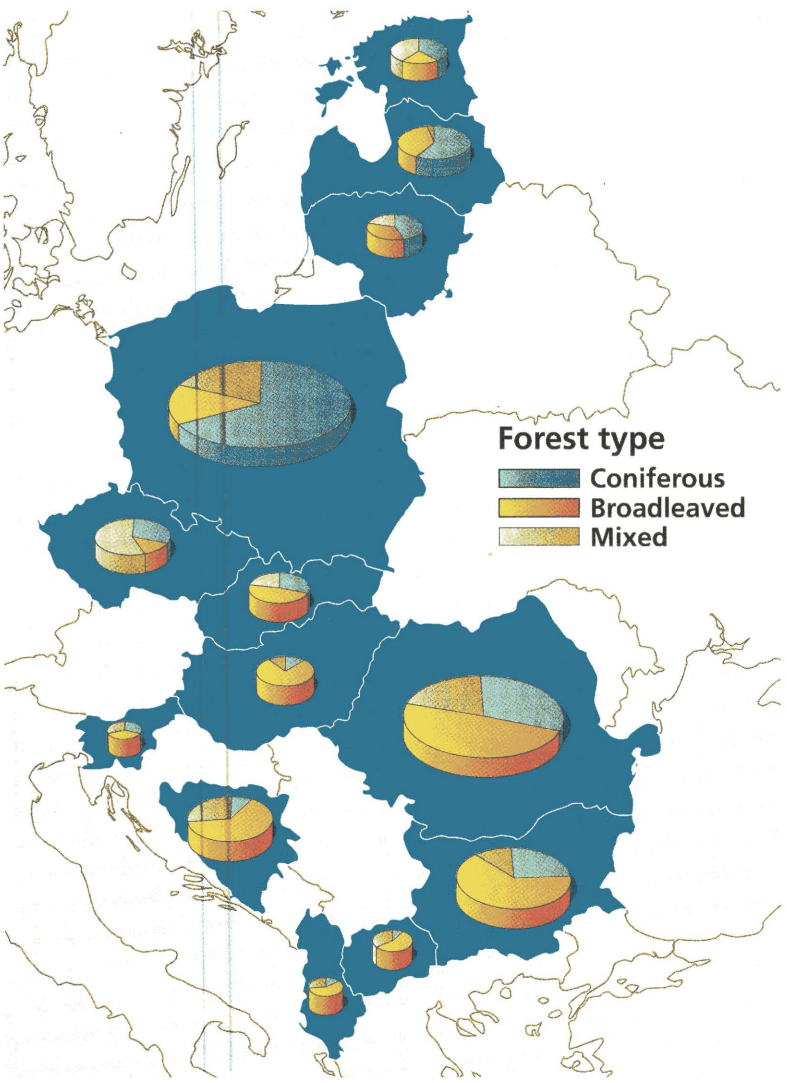
It is important to understand that there is no ideal ecosystem and there is great variety in biodiversity between ecosystems. Ecosystems with high biodiversity are found in areas with high rainfall and high temperatures such as the tropical rainforest. In contrast, ecosystems in the most northern part of the boreal forest with low temperatures have low biodiversity. This is also the case for the savannah type forests, where low rainfall is the main influence.
Man made forests often have lower biodiversity than natural forests in the same location. This is because policy and management often give preference to the species of greatest economic importance. On the

Ecological forest zones, ecosystems and ecotones.

An ecosystem is an area with certain soil and climate conditions, where all living organisms, trees, herbs, birds, animals, insects, and micro organisms interact with each other, and in their composition differ from neighbouring ecosystems. A forest swamp is an ecosystem, which differs from the surrounding forest at higher and therefore better drained soils. Ecological forest zones are zones of forest ecosystems which share critical factors, i.e. soil types, range of temperature and rainfall. They differ from other ecosystems with respect to these factors. Ecotones are the boundary lines or transitional areas between ecosystems.
It is important to understand that there is no distinct border between ecosystems. Indeed, it is important to realise that there is no ideal ecotype, ecozone or ecotone. They all differ in composition and biodiversity.



Land use pattern in the PHARE countries



other hand a number of exotic species have been introduced in the man made forest and this has increased the overall biodiversity.
The map below provides a representation of the actual forest tree composition in the different Phare countries.[2]

Presence of natural forest tree species

Nearly all the forests in Europe have been managed for hundreds of years. The most important correlation in the Phare forests between what is growing there now and the tree species you would expect to occur naturally can be seen in Slovenia, Bosnia and Herzegovina, Bulgaria, Albania and FYRO Macedonia. A second group of countries with a high correspondence includes the Baltic States (Estonia, Latvia and Lithuania). The figures for the Czech Republic, Hungary, Slovakia and probably also Poland[3] show that species composition has been substantially changed in a large part of the forest area.

In most countries, the proportions of coniferous, broadleaved and mixed forests have remained almost stable. In the southern region, the area of conifers actually increased over the past 50 years but this trend has not continued into the 1990s. In the Czech Republic, Slovakia and Poland, both long and short-term trends show a development in favour of the broadleaved tree species. This can partly be explained by the lower stability in certain areas, as well as by the extensive damage which air pollution has caused especially to coniferous forests in some of the forest area.

PURE AND MIXED FORESTS OF CONIFERS AND BROADLEAF, HIGH FOREST AND COPPICE

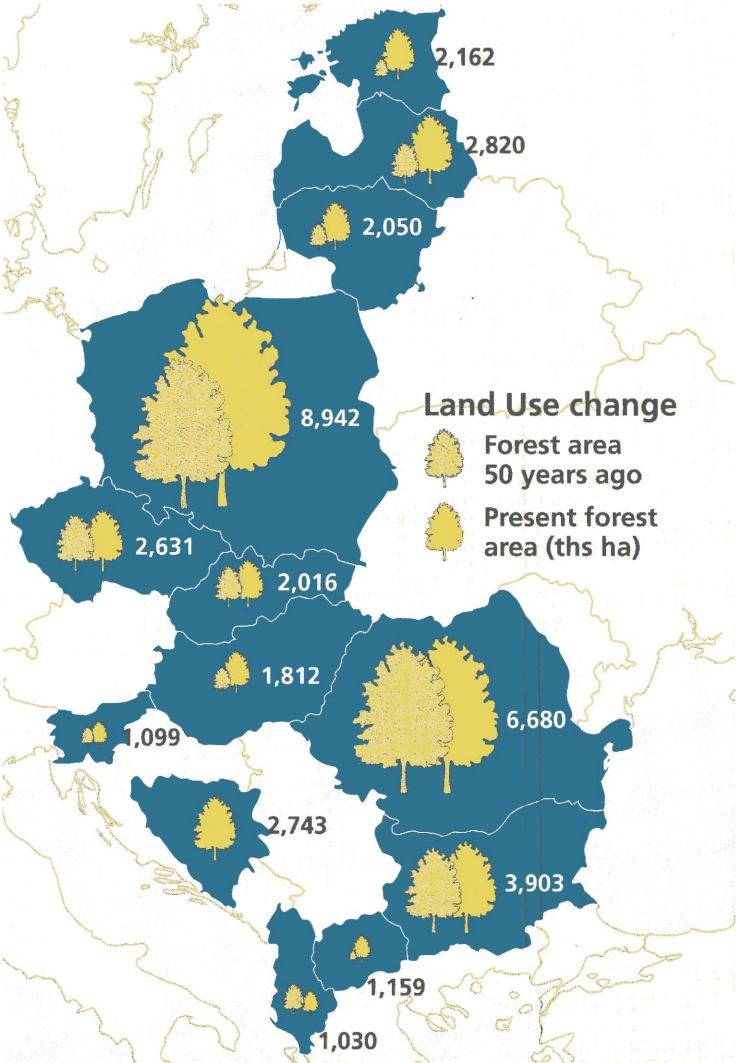
Country	Year	Predominant. coniferous	Predominant. broadleaved	Mixed forests	High Forest		Coppice	
		%	%	%	1000 ha	%	1000 ha	%
Albania	1995	14	59	27	471	46	559	54
Bosnia and Herzegovina	1990	8	65	27	1330	61	868	39
Bulgaria	1995	24	65	11	2084	63	1250	37
Czech Rep.	1996	31	13	56	2627	99,8	4	~0
Estonia	1996	39	21	40	2015	100	0	0
Hungary	1996	11	78	10	1258	69	553	31
Latvia	1994	59	39	3	2512	89	308	11
Lithuania	1996	45	35	20	1978	100	0	0
FYRO Macedonia	1995	9	56	35	263	29	643	71
Poland	1992-6	67	15	18	8942	100	0	0
Romania	1990	31	49	20	5248	93	369	7
Slovakia	1996	31	48	22	1924	97	64	3
Slovenia	1996	31	38	31	979	89	120	11

GROWTH AND CHANGE IN THE PHARE FORESTS

Comparative data shows that the area of forests has increased in almost all the Phare countries in the last 50 years. The overall expansion of forest land was especially remarkable in the Baltic region - with figures showing increases as significant as 125% in Estonia, 75% in Lithuania and 61% in Latvia. The increase of forest cover was also high in FYRO Macedonia with a recorded increase equivalent to 110% while a 56% increase has occurred in Hungary since 1950. Besides these comparative increases, Poland shows the highest recorded absolute increment of forest area - 2.3 million hectares. In the remaining Phare countries forest growth has been between 7% and 25%, Albania being the only exception with a decrease in forest cover of 22% between 1950 and 1995.

The trend of forest expansion has continued in the majority of Phare countries right into the 1990s. In Albania, the area of forests has decreased only very little (by 14,500 hectares) and the area of other wooded land increased. In Bosnia and Herzegovina, the national co-ordinators for both entities have reported a reduction, although earlier references (such as for 1970) seemed to indicate stability and even an upward trend. The reductions indicated may reflect a more recent development.

The extent of the area declared as forest land is largely determined by the definition of forest in the Forest Acts of the specific countries. As mentioned earlier the national definitions do not always match those of the FAO in several of the Phare countries, the difference lying especially in the definition of



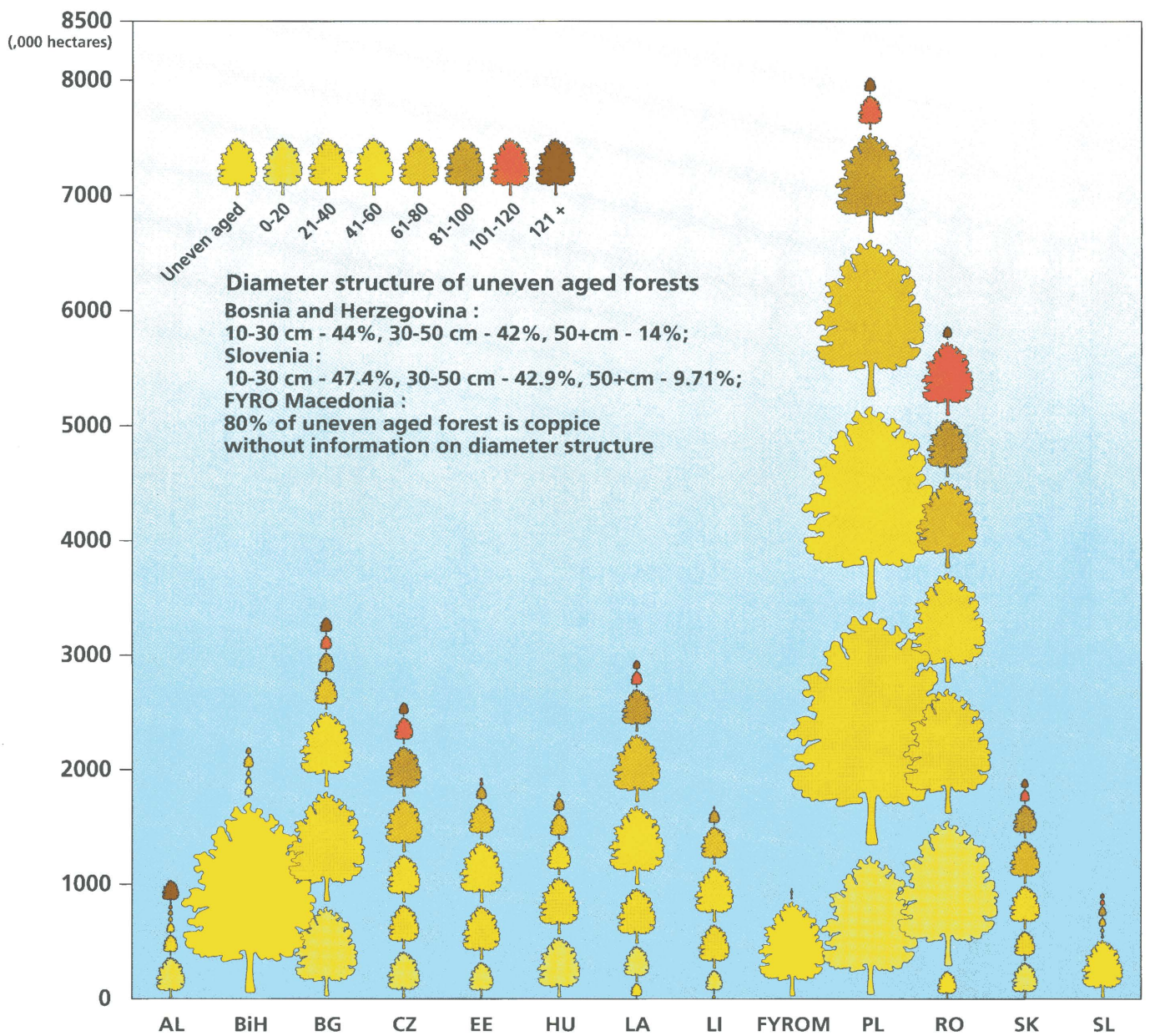
Changes in forest land

the minimum size of a woodlot, which is often taken to be higher than the limit set out by the FAO.
If the FAO definition is used, the area designated as 'forest' would be higher especially in the Czech Republic, Slovakia and probably also in Hungary - as only closed stands are considered to be a forest in these countries. On the other hand, the area defined as forest in Bosnia and FYRO Macedonia would decrease as the current national definition also includes bare lands (degraded coppice) which make up around 20% of the declared forest land.

AGE STRUCTURES

Information on the age and diameter structures of forest stands is collected for the purposes of forest management planning and decision-making at national, regional and local levels. It provides also an interesting insight into forest history. The major areas of medium-age stands (40-80 years) with a high increment and rapidly increasing growing stock are found in Estonia, Latvia and Slovakia. This is mainly a consequence of higher felling intensities between the 1930s and 1950s, (which encouraged enhanced forest regeneration) and conversion of abandoned land to forest after World War II. Young stands between 20-40 years are over-represented in Bulgaria, Hungary and Poland. They are a result of forest restoration, afforestation and conversion of abandoned lands. In Hungary, this feature is also due to the shorter rotation ages of poplar stands, black locust and partly also oak coppice.
'Even aged' forest normally refers to clear cutting or shelterwood management systems. 'Uneven aged'

AGE STRUCTURE OF EVEN AGED FORESTS AND DIAMETER STRUCTURE OF UNEVEN AGED FORESTS.
Based on data collected from national experts in the CEECs within the framework of the report on the Preparation of a multi-country forestry program, Phare program, September 1998, Annex 2, Table 3.



normally refers to systems with individual fellings and natural regeneration. The proportion of uneven-aged forests is highest in Bosnia and Herzegovina (1,758,000 ha or 64%), Slovenia (558,000 ha or 51% of total forest area) and FYRO Macedonia (65% of high forests). The selection and shelterwood management systems are traditionally widely applied in these three countries in order to adjust the forest management to specific natural conditions and difficult mountainous terrain. In an effort to achieve greater stability, even-aged forests are converted into uneven-aged ones wherever conditions allow. In other countries, the areas of uneven aged forests are smaller and usually classified into partial age classes by the national forest inventory.

GROWING STOCK AND INCREMENTS

The review of the total and mean growing stocks i.e. the total volume of wood, and total and mean gross increment i.e. the total and average production of wood measured in terms of living trees per hectare is provided in the table below. The total growing stock is the total volume of the trees in m^3. The mean growing stock is the mean volume of the trees in m^3/ha. The gross annual increment is the amount of wood produced by the trees every year here measured in million m^3. The mean annual increment is the increment per ha measured in m^3.

GROWING STOCK AND INCREMENTS IN FORESTS OF THE PHARE COUNTRIES

Country	Year	Total growing stock (mil. m^3)	Mean volume of growing stock (m^3/ha)	Mean gross annual increment (m^3/ha)
Albania	1995	83	81	1.36
Bosnia	1990	345	156	4.73
Bulgaria	1995	467	141	3.87
Czech Republic	1996	684	260	6.97
Estonia	1996	314	146	4.71
Hungary	1996	315	197	6.62
Latvia	1997	502	178	5.82
Lithuania	1996	362	183	6.35
FYRO Macedonia	1979	74	82	2.07
Poland	1992-96	1908	213	6.25
Romania	1995	1350	217	5.47
Slovakia	1996	511	257	7.22
Slovenia	1996	311	266	7.10

The total growing stock is found to be highest in Poland (1,908 mil. m^3) and Romania (1,350 mil. m^3), which are the countries with the largest forest areas. The highest growing stock per hectare of forest is typically found in the central part of Central and Eastern Europe, reaching 266 m^3 in Slovenia, 257 m^3 in Slovakia and 234 m^3 in the Czech Republic. This is partly due to growing conditions and partly to a forest management tradition with relatively high felling ages. Albania and FYRO Macedonia on the other hand are countries with the lowest growing stocks (81 and 82 m^3.ha-1, respectively) because they have the largest proportion of coppice and degraded forests.

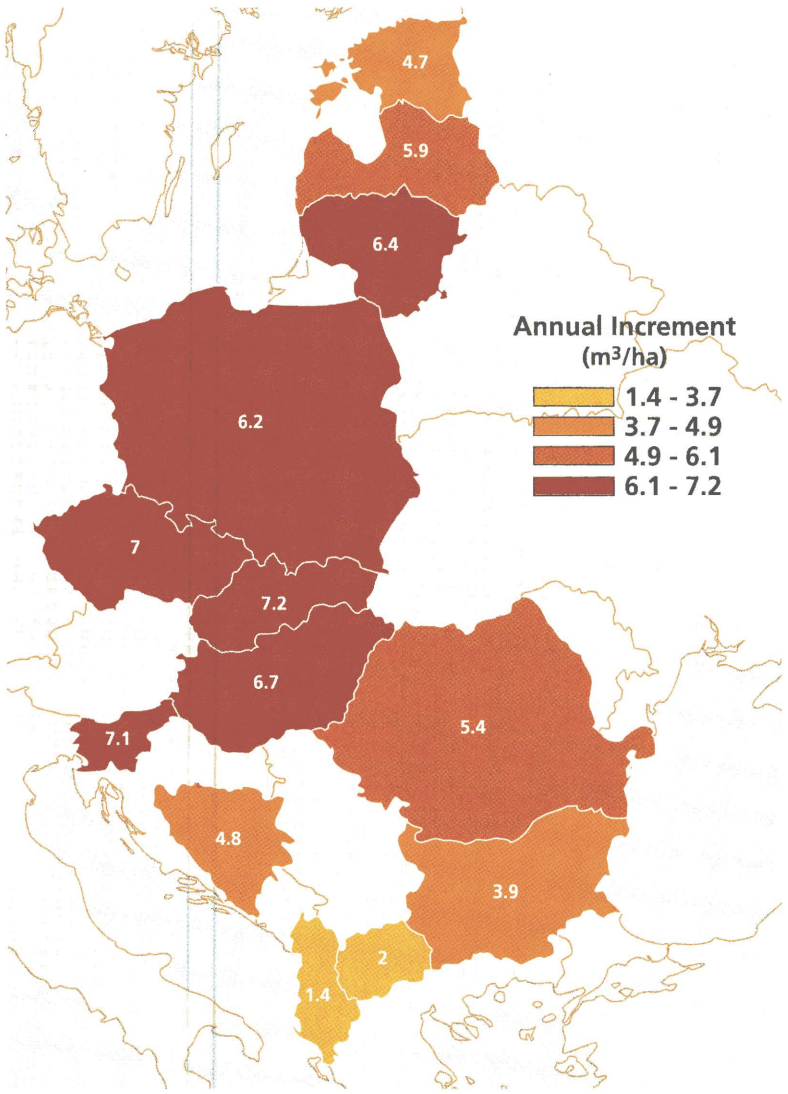
In the CEE, as in the whole of Europe, two main factors contribute to the growth of wood resources: the expansion of the area of forests and the increasing average growing stock per hectare of forest. The latter is partly due to long term forest management practices. The growing stock and increments are reported "higher than expected" compared to earlier generations of forests and there are larger areas of fast growing coniferous and broadleaved forests to be found in some countries. Scientific studies also point to the fertilising effect of deposited emissions, namely high nitrogen content in rainwater, which have increased rather than decreased the increment of wood in forests.[4] An increase in the carbon dioxide in the atmosphere and the use of genetically improved material will further accelerate the growth, but has had hardly any effect as yet.

The average growing stock per hectare is a quantitative but partly also a qualitative indicator. Besides the natural conditions, tree species and age structure, its value is influenced especially by long-term forest management concepts. It has been increasing both in the short and long term in all Phare countries, except perhaps for Albania. The following factors should be mentioned in this respect:

- The rhythm of growth of a forest changes throughout its lifetime. At first the growth is slow, then there is a fast middle period followed by a slow period. The increase in the growing stock figures in many countries is, to a large extent, a consequence of the over-representation of the most productive sector - the medium-aged forests. It contributes, for instance, 56% to the total increase of wood stock in the Czech forests[5].

• It has been advocated that accumulation of growing stocks was part of sustainable forest management. High standing volumes are still considered a production advantage - although sometimes on account of the stability of forests.

Net annual increment of wood per hectare



The significance of actual and potential increments

The expected gross annual increment per hectare of forest reflects a view of the potential productivity of the site, which is determined by the climate and soil. But potential forest vegetation has changed considerably and actual increments depend also on the age structure, tree species composition (softwoods versus hardwoods), health status and the occurrence of coppice and degraded forest types. In order to avoid confusion when comparing countries with different natural conditions and forest histories, the 'climatic increment potentials' of forest vegetation zones[6] were employed as a criterion showing to what extent the actual growth corresponds to the potential forest production. This exercise shows that the actual increments per hectare of forest, i.e. what is growing now in the forest, are higher than the potential in the northern and central CEE countries, and lower in the "Mediterranean" group. This is mainly due to the more intensive forest management and the use of faster growing species in the northern and central CEE countries which have resulted in much higher production than expected. Many factors however may have changed the site conditions from when the index was derived in the 1950s. For instance, the changed composition of the atmosphere and air pollution with a high nitrogen deposition may have increased forest growth especially in the Central Region, while climatic extremes produced the opposite effect in south eastern Europe.

FELLINGS AND REMOVALS

The 'removal of wood' accounts for all extraction of wood both legal and illegal, from the forest. With increasing living standards, illegal felling in Europe is generally decreasing. Removals take place in all types of forests, except in forest reserves and other specifically conserved areas.

Felling may take place in different ways. In forest areas managed by "close to nature" methods, felling is targeted on individual trees, which have reached a certain marketable size. Such open spots are usually regenerated naturally. In areas managed by clear cuttings, the stands are thinned at regular intervals to get rid of the badly formed trees and obtain a higher increment on the better ones. When the stand is mature it is clear cut, and the area lacking natural regeneration is replanted. After disasters, windfalls, and fires marketable wood is also removed.The volume of felling and removals depends on the area of forests and it is therefore largest in Poland (26.2 mil. m^3) and Romania (13.1 mil. m^3).

The intensity of felling presented as a percentage of the net annual increment was adopted as a basis of comparison between the different European countries and regions. In this context, data on the Phare countries show the felling to be below the European average of 70%, with the exception of the Czech Republic, Poland and Albania. In the other countries compared, the felling intensity varies between just 50 and 60% - with a minimum below 40% in Bulgaria, Romania and Slovenia.

The actual felling intensities decreased in the majority of Phare countries in comparison with the 1980s. This can be related to the economic recession, low domestic demand, insufficient performance of the wood processing industries, and partly also to re-organisation and restitution of ownership. Considering that economic recovery is often slow, this trend is very likely to continue. With the exception of Poland, the Czech Republic, Hungary and Slovakia, there is hardly any correspondence between the current situation and the optimistic forecasts found in European Timber Trends and Prospects (ETTSV) made in the first half of 1990s[7].

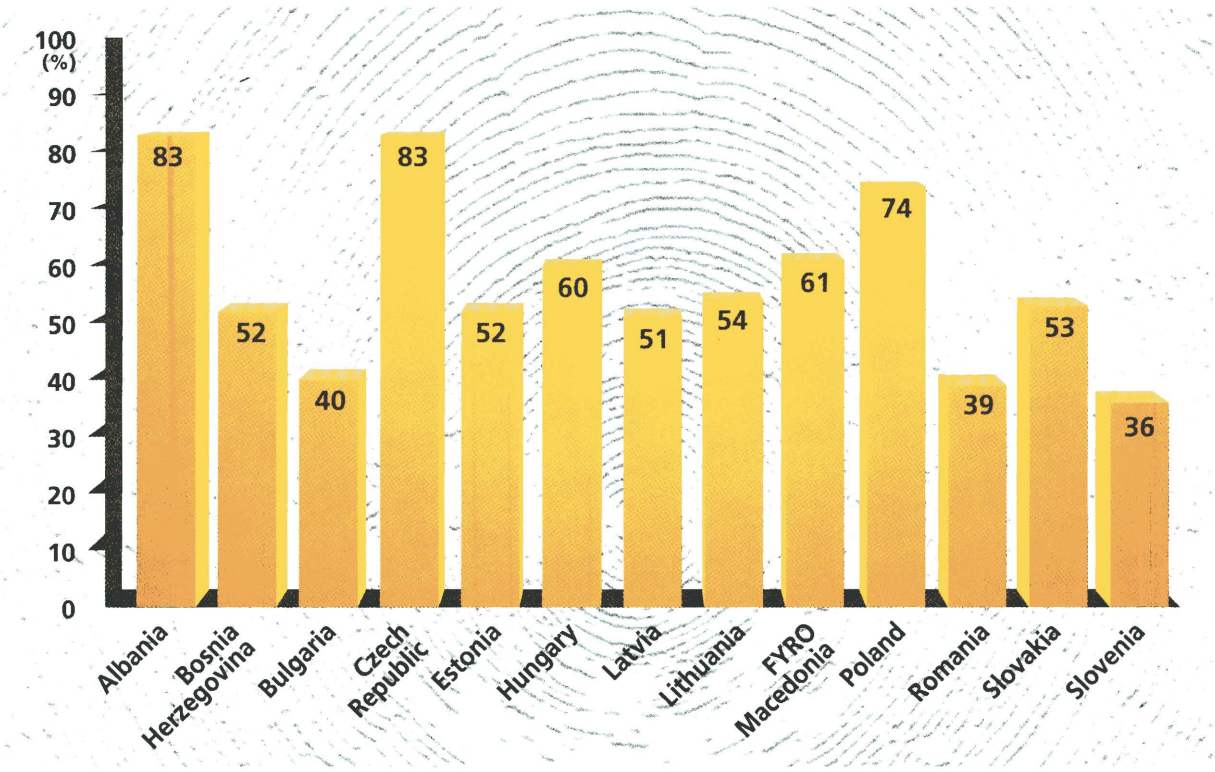
Data concerning Albania should be treated separately, because of the over-exploitation of forests (felling exceeding annual wood increment) which was indicated by the UN-ECE/FAO statistics up to 1990. This only began to change in the mid 1990s when the increment was for the first time higher than fellings (including illegal felling which made up approximately 40% of the annual cut in 1994-95.)

FELLING AS A PERCENTAGE OF NET ANNUAL INCREMENT IN DIFFERENT REGIONS IN EUROPE (SOURCE: ECE/TIM/DP/8, ECE/TIM/SP/12)

Region	UN-ECE/FAO 1993-1995	Projected - ETTSV 2000	2010	2020
Europe	70	71	72	72
Nordic Countries [1]	68	62	59	56
Baltic Countries [2]	56	69	83	88
Central Europe [3]	72	69	70	72
EU12	75	79	81	83
Eastern Europe [4]	63	66	68	70

[1] - Finland, Norway, Sweden; [2] - Estonia, Latvia, Lithuania; [3] - Austria, Switzerland; [4] - Bulgaria, Czech Republic, Hungary, Poland, Romania, Slovakia

FELLINGS IN THE MID 1990s AS A PERCENTAGE OF THE NET ANNUAL INCREMENT (NAI). Calculated following the UN-ECE/FAO TBFRA-2000.



Implications of long-term low fellings

The general trend of forest resources in the Phare countries is one of growth both in quantitative and also qualitative terms. The general characteristic for much of the temperate zone in the northern hemisphere has been towards a general rapid increase in the volume of growing stock with an associated large overproduction of wood. This runs against most public opinion which often confuses the severe shortage of wood in the tropics with the situation in the temperate zone. As mentioned earlier, this is mainly due to 100-300 years of more effective and sustainable forest management, but also in recent decades we could include afforestation of agricultural land and degraded forest land, use of improved plant material, deposition of nitrogen and

increasing CO_2 levels. It should be noted, however, that the long-term continuation of low fellings leads to such a large accumulation of growing stock that it may put the stability of forests at risk.

This apparent paradox is explained as follows:
Air pollution, the growth of conifers outside their natural range, and many other interventions make the forests less stable and susceptible to diseases and pests. The synergy of these factors reduces the life expectation of forest tree species especially in Central Europe, where growing stocks are the highest in Europe, and rotation ages of Norway spruce and Scots pine, for example, are found to be longer than in southern Finland. As a consequence, not only air pollution but also the practice of retaining forests which are biologically too old contributes to inferior forest condition in the region. One of the tools which could be considered in some CEE countries is to introduce shorter rotation periods in order to improve the potential stability of such forests, as they do in Switzerland where selective shortening of rotation is combined with temporarily increased felling. This could assist in counteracting some of the unplanned and uncontrollable processes found in the Czech Republic and Slovakia where the incidental fellings have exceeded 50% of the annual cut over the last 10 years.

SHORT AND LONG-TERM TRENDS IN TOTAL FELLING, INTERMEDIATE FELLING AND REMOVAL OF LOSSES

	Trends	AL	BiH	BG	CZ	EE	HU	LA	LI	FYROM	PL	RO	SK	SL
Total fellings & removals	short-term	↗	S	↘	S	↗	↘	↗	↗	S	↗	S	↘	↘
	long-term	↗	↗	↗	↗	↗	S	S	↗	↗	↗	S	S	↗
Intermediate felling	short-term	↗	↘		S	↗	S	↗	↗		↗	↘	S	↘
	long-term	↗	↗		↗	↗	↗	↗	↗		↗	S	S	↗
Fellings of losses	short-term	↗	↗		S	↗	S	S	↗	↗	S	↗	↗	↗
	long-term	↘	↗		↗	↗	↗	↗	↗	↗	↗	S	↗	

↗ *increase,* ↘ *decrease, s: stable, clear: no data*

Intermediate fellings (thinning, selection, sanitary cutting)

In Bosnia and Slovenia, where multi-purpose forestry and uneven-aged forests predominate, nearly all fellings are considered intermediate because they are done using a selection system with a long or unlimited regeneration period. Albania represents an opposite extreme with an exceptionally low volume of intermediate fellings and wood being cut in the final felling without any systematic silvicultural care of younger forest stands.
In the remaining countries, the share of intermediate fellings compared to the total removals varies between 12% in the Czech Republic and 64% in Poland. The proportion of wood from intermediate fellings has been increasing for a long time, but a lower interest in operations at or below the margin of economic return, has meant that this trend has not continued in many countries in the 1990s.

Removals of losses

The term "removals of losses" includes sanitary felling and a large proportion of incidental, unplanned fellings due to natural events such as serious forest damage by storms, heavy ice and snow, pests, diseases, or other factors, which have always taken place. Such fellings are undesirable from an economic point of view, since they are more costly to carry out and the actual value of the wood is often lower. Furthermore it often opens up the forest in a way that creates a high risk of further damage. Through sustainable management planning and methods such risks could be avoided.
Estonia, Latvia and all South-Eastern European countries report considerably lower removals of losses than countries of the central region. In the mid 1990s, the highest fellings of losses were reported in the Czech Republic (76%), Slovakia (56%) and Slovenia (48%). In the case of the Czech Republic and Slovakia, air pollution, changed tree species composition and the dominance of even aged stands in susceptible age classes appear to be the main predisposing factors.
Removals of losses seem to be generally increasing in the long-term, with the short-term development shown to be relatively stable only in Hungary and Latvia. Whereas larger fluctuations are found in Albania and FYRO

Macedonia, losses seem stable in the 1990s, but at abnormally high levels in the Czech Republic and in Poland. This is most probably linked to severe pollution.
Individual damaging factors show regional variations. Insects and pests are considered the most important single damaging factors in Latvia and Lithuania, whereas windstorms, ice, snow and other physical damage predominate in the central countries. Specific factors such as fires, animals and illegal cutting characterise the damage found in Albania, Bosnia and Herzegovina and FYRO Macedonia. This will be discussed in more detail in the section on the monitoring of forest condition.

FOREST MANAGEMENT SYSTEMS

Three terms are used to describe the various systems for harvesting and re-establishment of forests: clear cutting, selection and shelterwood.

- **Clear cutting** was the most widely used management system in previous centuries in terms of man made forests. This involves felling of smaller or larger areas followed by planting of the new generation of trees. (see table below). This is mostly suited for lowland forests, but if the clear cut areas are not too extensive and the slopes not too steep it has advantages also in mountainous forests. The advantages are both technical and economic.

- **Selection systems** never open up the forest. Trees for harvesting are selected and cut individually or in groups, and new young trees take over. This method has advantages on steep slopes where there is a danger of erosion and where "close to nature" forest is encouraged.

- **Shelterwood systems** refer to the practice of leaving part of the mature forest intact after felling of a larger area. This could either be in rows of different sizes and spacing or as a light canopy cover. The last is most often used in connection with natural regeneration.

The "close-to-nature" selection and shelterwood systems traditionally predominate in Slovenia, Bosnia and Herzegovina, and in the high forests of FYRO Macedonia. This is partly explained by the long-term effort to establish multi-purpose forest management in the former Yugoslav countries. The shelterwood system also prevails in Romania and Bulgaria.

The applicability of clear-cutting as a sustainable management system needs to be assessed in the context of the specific natural processes and site conditions in individual forest zones. Whereas the system is quite inappropriate in mountain forest areas due to the risk of erosion and insufficient self-sowing regeneration, it is worth considering as a close-to-nature practice in a large part of semi-boreal coniferous forests. This would apply to Estonia, Latvia and Lithuania for example, where fires and storms which clear bigger forest tracts are components of natural forest dynamics.

REVIEW OF MANAGEMENT SYSTEMS APPLIED IN INDIVIDUAL PHARE COUNTRIES (%)

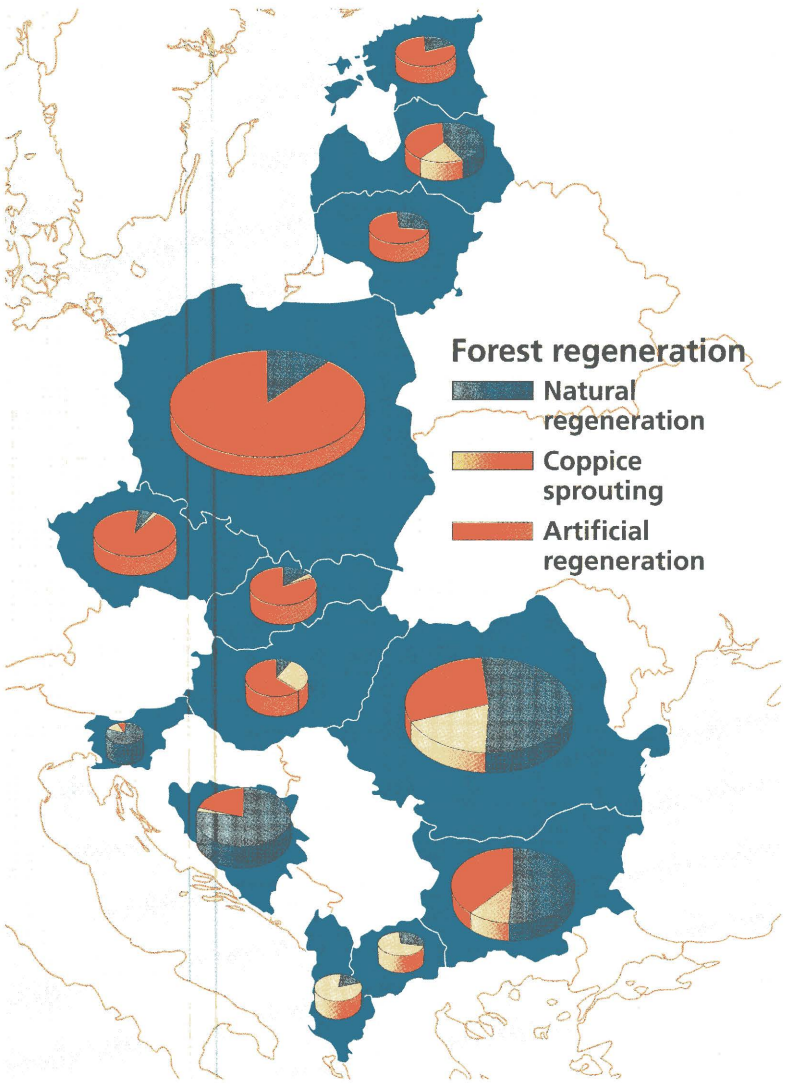
Management system	BiH	CZ	HU	LA	LI	FYROM	PL	RO	SK	SL
Small area clearcutting	5	91	81	95	84	71*	69	18	40	
Selection	15	1		5	15	4	7	4	5	5-10
Group selection	50						17			70
Shelterwood	16	7	19			25		72	50	20
Reconstruction &others	14				1		7	6	5	

**FYRO Macedonia – clearcutting allowed only in the coppice (71% of forests)*
No data for Albania, Bulgaria and Estonia.

FOREST REGENERATION

The regeneration of forests is either natural i.e. germinating from seeds from mature trees, or artificial i.e. planted with nursery grown plants or sown with seeds harvested and cleaned to a high degree of germination. An additional method is coppicing i.e. sprouts from stumps of the annually harvested forest area. This method only applies to certain species.

Structure of forest regeneration



Artificial regeneration is so far the most commonly used way of re-establishing forest. The advantages are that one can use genetically superior material which usually gives a higher survival rate and a more uniform crop. It is therefore generally used where wood production is a major objective.

Natural regeneration is possible for a number of species on certain sites. It normally gives a more variable forest type with a mixture of species and ages. It is mostly used where conservation and recreation are the main purposes of the forest and where the risk of erosion is high. A combination of natural regeneration supplemented with plantings is also found.
Natural regeneration is the main management practice in the annually regenerated forest areas in South-Eastern Europe. It is found throughout Bosnia and Herzegovina, Bulgaria, FYRO Macedonia and Romania. In other parts of the CEE it is only in Slovenia that it is the dominant practice (93%). Natural regeneration is traditionally very limited indeed in the Czech Republic (5%), Poland (7%), Hungary (8%), and Slovakia (10%). There may be a trend in future towards a larger percentage of natural regeneration as the demand for non-wood benefits from forests including landscape and nature conservation increases, while the economic importance of forest products has been decreasing in many countries recently.

In the EU and other "western" European countries with a forestry tradition and natural conditions similar to the Baltic and central parts of the CEE, the proportion of natural regeneration is apparently higher. For example, throughout the 1990s it accounted for approximately 90% in Switzerland, 84% in Austria and 40% in Germany.
The highest proportional use of coppice sprouting is found in Albania and FYRO Macedonia. The trend in the 1990s in Albania and Bosnia and Herzegovina seems to be generally unfavourable in terms of forest regeneration. Natural regeneration in these countries has been low with a recent history of largely uncontrolled fellings. Supplementary planting, which would normally be applied in such cases, has been omitted due to severe financial and technical limitations.

High forest and coppice degradation

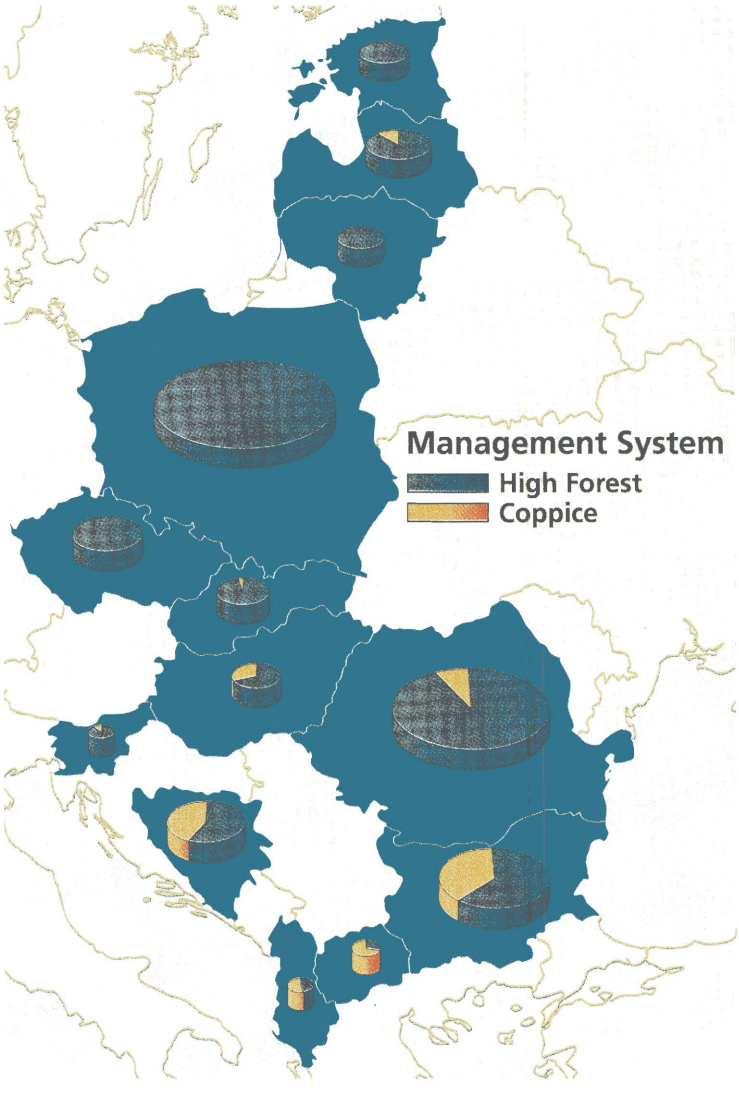
The natural domination of high forests is to be found in all the forested areas of Europe. Coppice, i.e. shoots sprouting from the roots of felled trees with some scattered trees of seedling origin, was originally limited to quite specific environmental and agricultural conditions. It has spread mainly as a consequence of uncontrolled harvesting where there was no attention to regeneration of the predominantly oak forests. Coppice is thus considered to be a partially degraded forest resulting from a long-term attitude to forest as a source of fuel, household wood, and area for pasture. In most CEE countries, it is found as a heritage of the past and not as a result of more recent regular forest management.

The actual occurrence of coppice relates only to the broadleaved tree species (especially oaks), because the coniferous species do not sprout. Coppice prevails in FYRO Macedonia (71%) and Albania (54.3%) and it amounts to more than 30% also in Bosnia and Herzegovina (39%), Bulgaria (37%) and Hungary (30%). There have been efforts to convert coppice into high forests, especially after World War II. In spite of some limited success, the actual proportion of coppice is decreasing in the long term in the CEE region - even in those countries where its share is substantial (Bulgaria, Hungary).

Findings show that there is a clear need for forest restoration in the different Phare countries. In FYRO Macedonia for example degraded coppice amounts to 71,000 hectares and bare lands to approximately

140,000 hectares. In Bosnia and Herzegovina 545,000 hectares of bare lands have to be reforested and in Bulgaria there is a need to press on with the reconstruction of degraded forests. Degraded forests are also common in Albania. Due to economic and technical constraints, these areas of degraded forests in the south-eastern Phare countries are not likely to show much improvement over the next decades.

The ratio of forest managed as either high forest or coppice.



Afforestation of bare lands and abandoned agricultural lands

Both natural succession from abandoned lands to forest and artificial afforestation contributed to forest expansion in the Phare partner-countries after World War II. Afforestation played an important role in a number of countries such as Hungary, FYRO Macedonia and Poland. In Hungary; the 650,000 ha of forests planted actually corresponds to nearly all the recorded increase in the forest cover. In Poland, 1,227,000 hectares of planted forests account for 50% of the total increase and in FYRO Macedonia, 177,000 hectares of bare lands were re-afforested. The afforestation of the past 50 years also represents approximately 15% (or 375,000 ha) of the current forest area in Bosnia and Herzegovina.

A number of Phare countries are considering either medium or long term afforestation of extensive areas of marginal agricultural land.
Government-approved Afforestation Programmes for low-productivity or abandoned lands have been continued or revived in Poland, Hungary, FYRO Macedonia and Slovakia. The increase of forest cover is one of the priorities of the Romanian forestry development programme and state financial assistance for afforestation is provided in the Czech Republic and, to a limited extent, also in Latvia and Poland. Within the framework of the Phare programme, demonstration sites for afforestation of private lands have been established over the whole of Latvia.

Recent experiences in some countries (Czech Republic, Slovakia and Latvia) indicate that afforestation is rather expensive in the light of the current economic situation. The total expenditures range between 1,000 and 1,300 ECU per hectare in the Czech Republic and Slovakia. Costs are also increased due to complex administrative procedures and legal regulations in the sectors of agriculture and environment. Natural colonisation of abandoned lands will thus play an important role in the extension of forests in many countries in the future, especially in the Baltic and central part of the CEE region.

Forests managed according to a management plan or management guidelines

In the majority of Phare countries, the Forest Management Plan is considered a basic, legally binding instruction for forest management. Since the 1950s, all forests have been managed in this way in the Czech Republic, Bulgaria, Latvia, Romania and Slovakia, since 1970 in Hungary and 1990 in Slovenia. In Estonia, Lithuania, Poland, FYRO Macedonia and the Republic of Srpska in BiH, at least 85% of forests are managed according to management plans. In FYRO Macedonia, for instance, only small private forests and young plantations on bare lands which are not considered to be regular forest yet, are exempt from such plans. Albania with only 40% has the lowest proportion of forests managed according to a national plan or guidelines but the area covered by the management plans has been increasing.

Notes

[1] It has to be noted that the actual area covered by forests is lower than the land designated as forest land in some countries due to cleared tracts and barren lands, forest roads, firebreaks and small open areas within the forest being included in the national statistics. In comparison to the data above, in the case of Bosnia and Herzegovina the 21,980 km² of forest covered land is equivalent to 43% of the total area, in Bulgaria the 33,570 km², would represent 30%, in Estonia 20,016 km² make up 45% of forest covered land, in FYRO Macedonia - 9,659 km² correspond to 38%, in Romania - 60,220 km² - to 25% of the total area.

[2] The detailed data on actual forest tree species composition are provided in Annex 2, Table 2 Final report on the Preparation of a multi-country forestry program, Phare program, September 1998.

[3] No information was available for Poland.

[4] Kuusela, K., 1994: Forest Resources in Europe 1950-1990. European Forest Institute Research Report I. Cambridge University Press.

Spiecker, H. et al. (eds.), 1996: Growth Trends in European Forests - Studies from 12 Countries. Springer Verlag, Heidelberg, Germany.

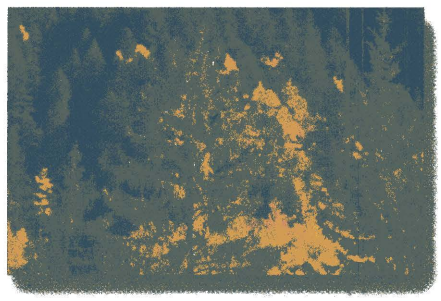
[5] Report on Forestry in the Czech Republic 1996.

[6] The climatic potentials calculated as CVP-indices, are based on the precondition that the increment of stem volume is primarily the function of climatic parameters in areas where the climate has had enough time to develop the soils (ex Kuusela 1994). The mean temperature of the warmest month, the range between the mean temperature of the warmest and coldest month, the mean annual rainfall and the growing season in humid months, are the independent parameters of the CVP index.

[7] The data for 1993-1995 were adopted from the UN-ECE/FAO statistics (EC/TIM/SP12) while the most recent data were taken from National Reports and should be identical with the national TBFRA-2000. The long-term forecasts follow the assessment of the European Timber Trends and Prospects (ETTSV, ECE/TIM/DP/8).

Chapter 2

PROTECTIVE, CONSERVATION AND SPECIAL FUNCTIONS



PROTECTIVE, CONSERVATION AND SPECIAL FUNCTIONS

From primeval times right through to the development of complex and technologically sophisticated societies, the forest has been a constant element of human civilisation. It provided both food and shelter for early communities, but as their technology became more sophisticated they began to make demands on the forest which its regenerative capacity could not meet. The depletion of forest resources that resulted from this trend has been at the core of the development of forestry as a science and of the practice of conserving and managing forests and forest lands in order to ensure continuity in the availability of forest products, conditions and functions. The role of the forest in society has always been multi-functional, with great variety in the emphasis given to productive, protective, social, cultural and conservation values.

THE FUNCTIONS OF FORESTS

The end of the Middle Ages saw an increase in human populations and an associated reduction of the area of forests. It is a comparatively recent development for conservation to be given the same importance as wood production and for large areas to be re-afforested and degraded forests restored. The first stages of managed forestry based on laws and regulations focused mainly on the supply of forest products, but it was often also concerned with wildlife and the protection of forests. Forestry management which lacks sound ecological foundations eventually gives way to an ecologically based system which takes on board the aim of sustaining the functional process of forests and the sustainability of their products.

Modern society, even more dependent on wood and other forest derived commodities despite the availability of a broad range of alternative materials, is giving increased importance to the social and environmental functions of forests. From among the economically motivated functions, the demand for regular water supply, protection, conservation and recreational services has increased and this trend is likely to continue.

A number of forest functions have been identified

- ***The commodity functions*** *which include Wood production, the status and potential of which has been partly described in the previous chapter; and other commodity functions (cork, seeds, berries, mushrooms, game, grazing and fodder for domestic animals, medicinal and decorative plants, source material for handcrafts.)*

- ***The protective function*** *: emphasises the role of forests and afforestation in the control of erosion, landslides, avalanches, floods, silting, wind damage, noise and as a buffer on pollutant emissions. This function includes the protection of forest perimeters to prevent the erosion of the upper limits or the encroachment of steppe into the lower edges of forests. The protection of water courses, reservoirs and stabilisation of the watersheds form part of the protective function and have important economic implications. Water stabilisation is ensured especially through the protection of watershed forests by close to nature management with no clear cutting. The forest cover ensures that the flow from a steep area is slowed down which evens out fluctuations in rivers and prevents erosion. In special cases, protected and sometimes special-purpose forests are designated for this particular purpose.*

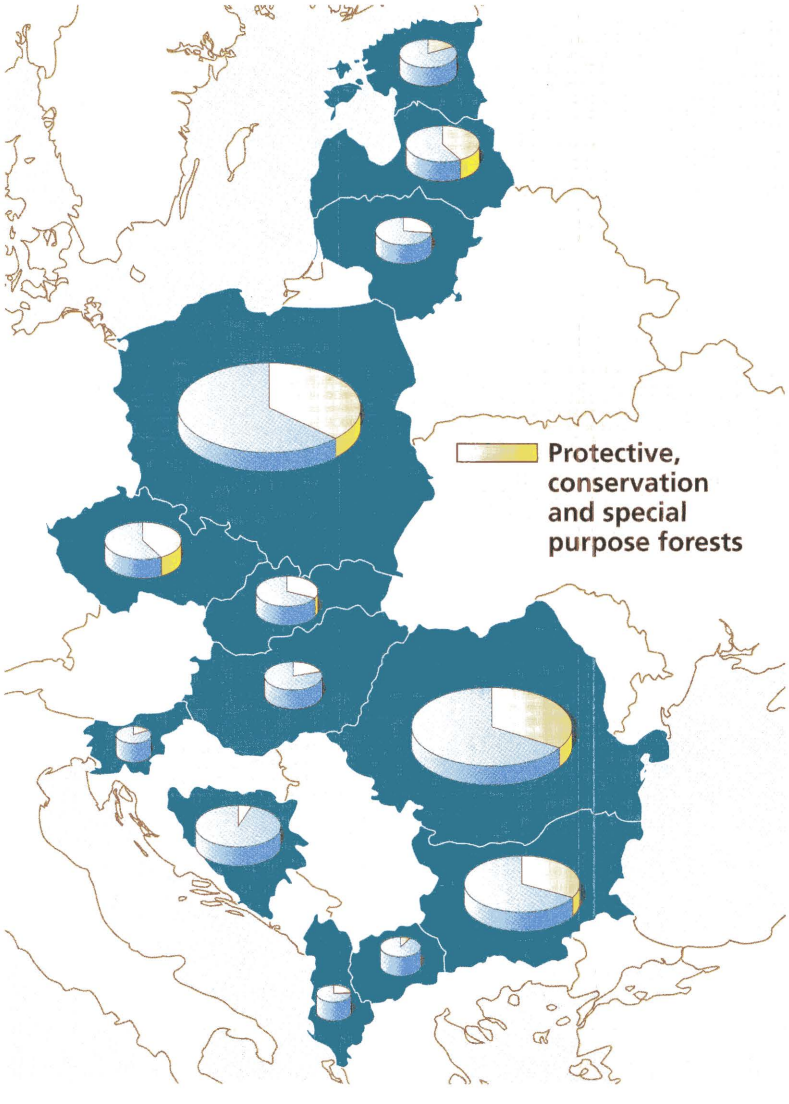
- ***The social function*** *: This function comprises recreation, tourism and leisure related activities, including hunting and fishing. In the countries of Central-Eastern Europe, it is very often associated and also largely overlaps with the potential of forests to provide non-wood products such as berries, mushrooms, nuts, medicinal and decorative plants for household consumption.*

THE DEVELOPMENT OF MULTIPURPOSE FOREST MANAGEMENT

Forest functions have actually diversified over time and as a result forest management practices are increasingly having to meet multipurpose requirements including such environmental functions as sustainability, nature conservation and water management, as well as community functions such as recreation, culture and aesthetics.

The importance of non-wood values associated with forests has been increasingly underlined in public surveys and is considered in some cases as more important than the productive forest functions. There has been a general trend in the Phare countries to delineate large forest areas for the priority fulfilment of non-commodity functions, such as for protection, nature-conservation or recreation, as well as for special reasons such as water management, forests in polluted areas or in military zones. Exceptions are found in Albania where the area of forest designated for water and settlement protection has been decreasing, and in Hungary where the area of forest managed for settlement protection and recreation functions decreased in the nineties, due probably to reclassification into other categories.

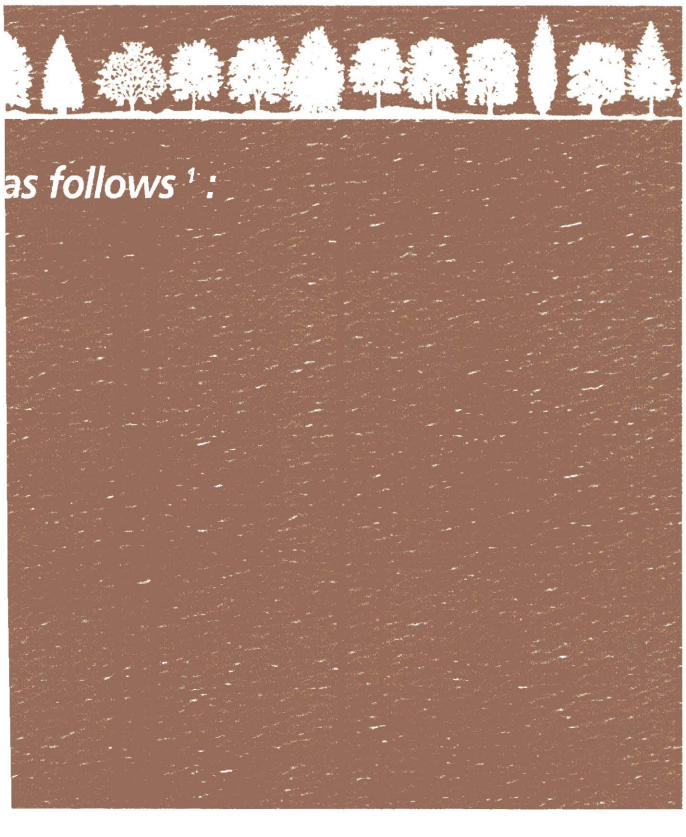
Quantitative review of forests with the priority of non-production functions



The new emphasis on non-productive functions requires modification of forest management practices and entails additional costs and possibly limitations on wood production, which raises the issue of compensation for such loss.

In the case of a sound, economically balanced or even profit-making forestry sector, compensation for providing non-productive benefits does not seem a priority issue. The management costs associated with the increased demand for "public beneficial functions of forests" are however only rarely compensated by the state and often reduced in times of economic downturn leading to chronic crisis in the formerly largely state-supported forestry sectors of several CEE countries.

The issue of compensation for special-purpose management comes into focus especially when forestry is loss making. This is frequently the case in the developed countries in Western Europe where there are high labour costs. On the other hand increasing labour costs can often result in decreasing intensive management in areas where access is difficult such as mountain forests, turning them into protection and conservation forests.



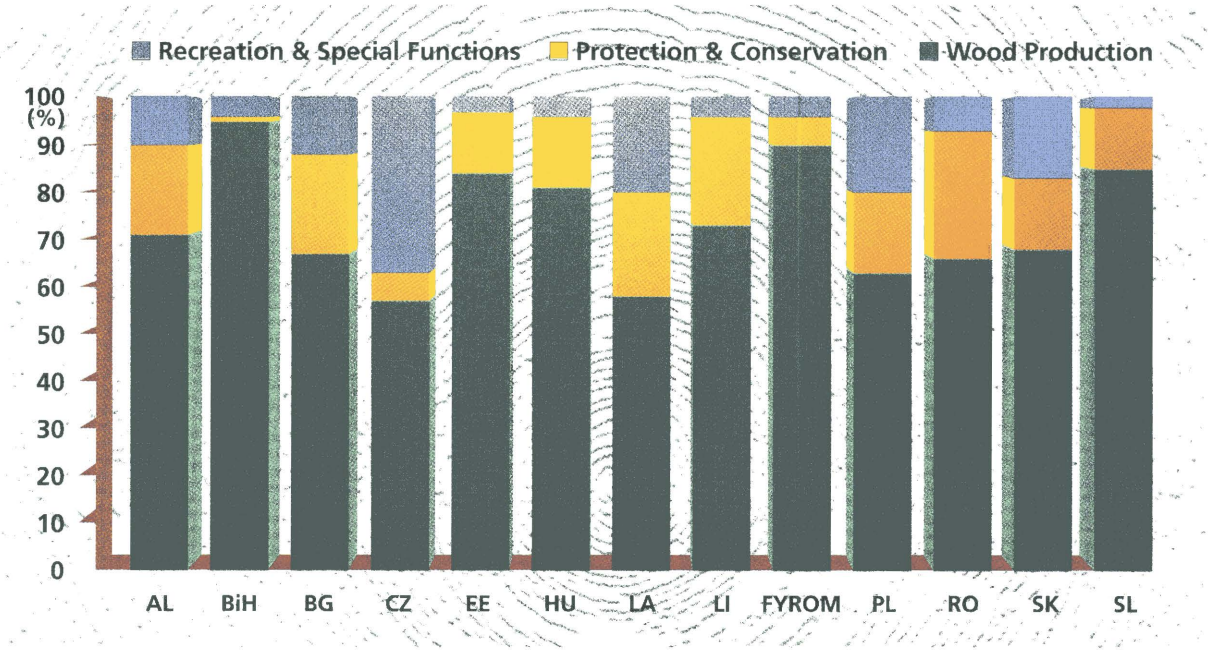
FORESTS WITH PRIORITY PROTECTIVE AND SPECIAL FUNCTIONS

Forests designated for the primary fulfilment of functions other than wood production, such as protection, conservation and special purposes represent a high proportion of the total forest area in the CEE region -31%, the equivalent of 11,76 million hectares. The proportion exceeds 30% in Bulgaria, the Czech Republic, Latvia, Poland, Romania and Slovakia, with percentage ranges of between 10 % to 30% in Albania, Estonia, Hungary, Lithuania and Slovenia. In Bosnia and FYRO Macedonia such forests officially account for less than 10% however the multi-purpose forestry concept is the traditional approach in both these countries.
The main reasons given for the delineation of protective and conservation forests include soil and water protection, environmental and ecological protection, and the protection of settlements. The forests with assigned nature conservation functions include nature reserves, national parks, protected landscapes, protected habitats and sites of biological significance, monuments and natural heritage sites. The combined area of the protective and nature conservation forests in the CEE region is 6,760,000 hectares which represents 18% of the total area of forests in the Phare countries.

Forests designated for **protective functions** include extreme sites, areas requiring special water and soil protection, alpine tree limits and sub-alpine zones protecting lands and settlements in lower elevations. If they are to perform these protective functions they need a relatively high degree of stability achievable only through an uneven forest age structure and tree species diversity. The majority of the present protection forests were formerly logged. Many of them have suffered severe air pollution or have been exposed to other direct human activity, such as fires, grazing, resin collection and the production of charcoal. Many of them were established through large-scale reforestation in watershed, eroded and deforested areas. As a result of this, their structures are different from the structure of the natural forest and their capacity for regeneration has been reduced. Systematic nature-conforming management is probably the best way to maintain their protective functions. In many CEE countries however this receives little attention nor is there the financial or technical capacity to do so.

The forests where **special functions** other than protection and nature conservation predominate account for roughly 5 million hectares or 13% of the total forest area. The category is dominated by recreational, resort, urban and suburban forest parks. Whereas the definition of forests managed for special purposes is very country-specific, recreation, urban and resort forests are found in nearly all countries. There is also a tradition of delineating special forests for research, education, and hunting as well as for buffering of environmental pollution. This category includes also forests declining due to air-pollution which are separately delineated in the Czech Republic, Poland, Slovakia and Romania where they represent approximately 5% of the forest.land. This latter sub-category makes up 63%, 28% and 19%, of the proportion of forest with other than productive functions, in the Czech Republic, Poland and Slovakia respectively.

PROPORTIONS OF FORESTS WITH PREDOMINATING PROTECTIVE, SPECIAL AND WOOD PRODUCTION FUNCTIONS



RECREATIONAL FUNCTIONS OF FORESTS

In a recent survey of forest functions of the Phare countries, the most frequently visited and attractive forests have been declared to be forests with priority recreational and therapeutic value in nearly all the countries. Forest management, maintenance and enlargement of forest infrastructure are carried out there in support of recreation, tourism and leisure activities.
The importance of **public access to forest** is being recognised as a public interest and it is usually supported or guaranteed by legislation in the majority of Phare countries. Free access to the forests, especially if it includes the opportunity to collect forest fruits, mushrooms and medicinal herbs free of charge is an important element in enhancing the recreational role of forests.
In the CEE region it is typical to find relatively free access to forests. The current proportion of the area from which the public is excluded does not exceed 10% as a rule. The areas of publicly owned forest not accessible to the general public have been more or less stable over recent decades in all Phare countries.
The main reasons given for preventing public access to forest are nature conservation, restriction by private owners, ownership of forests by the army or military industries, protection of water sources and hunting. Additional limitations apply to access by cars unless using public or seasonally open roads to sporting centres and health resorts.
More recently, the restitution of ownership has acquired importance as new regulations allow private owners to restrict access to their woodlots. In Poland, this could theoretically influence 24% of forests but up till now such restriction of public access has seldom been applied. There has been some indication however of a possible trend towards closing forests to the public for this very reason in Estonia, Hungary, Lithuania, Romania and Slovakia.

Reports from all the Phare countries acknowledge the major importance of recreation as a public-beneficial function of forests and studies refer to selected areas such as national parks, recreation resorts with a high seasonal concentration of visitors, and suburban forests. Along with the most famous recreation sites, the national parks and protected areas have the highest aesthetic, cultural and scientific status.
Inventories of visitor patterns indicate highly frequented forests in the Baltic States, Poland, and Slovakia. In Estonia and Lithuania, however a decrease in the recreational value of forests has been encountered, possibly partly due to holidays being spent in foreign countries. The interest in hunting, which has been a traditional recreational, partly management and partly commercially forest-related activity, has been decreasing in many countries, such as the Czech Republic, Hungary and Romania.

Assessing the costs of protective, conservation and other public-beneficial forest functions

As far as the monetary assessment of the demand for services and the monetary value of public-beneficial functions of forests goes, very little information is available. Systematic research into the financial values of protective functions and socio-economic values has been taking place specifically in Poland and Slovakia. Research into the value of non-productive functions in Bosnia and Herzegovina refers to the hygienic functions of forests and to dust and the reduction of micro-organisms in water. There is a high probability that similar research has been carried out also in other countries and will be able to provide a scientific basis for increased support of special functions of forests in the future.
The forests' protective, nature conservation and recreation functions have been ranked as priorities and can be regarded as requiring more attention than wood production. At present, income from sales of wood goes in part to support the "public" functions but in times of increasing commercial pressure the forestry sector is more interested in the direct reimbursement of these special management costs. Apart from that, these functions receive little attention either at the decision-making or at the operational levels. This situation is further compounded by a lack of transparent, widely agreed methods for the assessment of the real costs of forestry activities including the non-productive functions and services.

NON-WOOD PRODUCTS FROM FORESTS

The importance of non-wood products is recognised in the majority of the Phare countries and a number of legal regulations refer to them. Non-commercial collection and use of non-wood forest products is generally free and is considered a public right. The commercial use of forest products requires, however, the agreement of forest owners or forest authorities in nearly all Phare countries. There are certain limitations in Bulgaria and Romania, where licensing or hiring of forest from local authorities for picking of forest fruits exist in parallel but there is a right to pick produce for personal consumption without any clear quantitative limit. Clear quantitative limits are given in the legal regulations of Slovenia and Bosnia.

At present, the picking of fruits, berries, mushrooms and herbs retains some importance in all the CEE region. Besides household consumption, forest products have traditionally been marketed and also exported from several countries. The demand for them has been relatively stable. The same is true for medicinal plants and oil extracts. There is an indication of decreasing demand in several Phare countries for Christmas trees, hunting, furs, oil extracts and tannins, but commercial hunting and sales of venison remain generally important.

Estimates of the potential production of non-wood products are available in Latvia, Lithuania, the Czech Republic, Slovakia and Albania. These estimates are based on an inventory of areas occupied by fruit-bearing shrubs, forest types rich in medicinal plants, and assessments of the quality of hunting grounds.

The Czech Republic is currently the only Phare country with a complete inventory of the annual harvest of forest products. The results of a 3-year study confirmed very high household use of forest berries and mushrooms; the picking of which is nearly always linked with tourism and weekend recreation. The harvest per household represented 9-15 kg of berries and mushrooms in 1994-1996 with an estimated total market value of 70 million ECU representing 25% of the total value of annual wood deliveries. Similar estimates for Bosnia and Herzegovina show that the value of secondary forest products may represent 10% of the total forest production there.

Detailed statistics concerning the commercial harvesting and marketing of forest fruits, berries and other products are available in Romania, Bulgaria, and FYRO Macedonia and the marketing of secondary forest products is also well documented in Lithuania and Slovakia. The example from the Czech Republic shows however, that official statistics cover only a small part of the actual harvest and largely underestimate the real situation since they do not cover household consumption especially of rural populations.

From among the non-wood products and services, the best statistics, methodological and organisational background are found relating to hunting and its products. Reliable information is available from traditional hunting statistics as to the numbers of game, annual catches, value of furs, skins and trophies.

NON-WOOD FOREST PRODUCTS MENTIONED IN THE NATIONAL REPORTS

PRODUCT/COUNTRY	AL	BiH	BG	CZ	EE	HU	LAT	LIT	FYROM	PL	RO	SK	SL
Fruits and berries	+	+		+	+	+	+	+	+	+	+	+	+
Mushrooms	+	+		+	+	+	+	+	+	+	+	+	+
Herbs	+	+		+	+	+	+	+	+	+	+	+	+
Honey					+	+					+	+	+
Venison		+		+	+	+		+		+	+	+	
Fodder	+										+		
Seed	+					+							
Roots	+												
Flowers	+				+								
Christmas trees				+	+	+	+	+	-	+	+	+	+
Birch boughs							+						
Leaves and branches	+	+				+	+				+	+	
Mosses and lichens	+				+				+			+	
Hunting trophies		+		+	+	+		+				+	
Furs					+	+		+			+	+	
Living game												+	
Cork	+										+		
Resin						+	+						
Oils and extracts	+	+				+	+		+				+
Tannins						+					+		+
Handcraft and household material					+	+					+	+	

This might be due in part to the fact that economic records held by travel agencies on hunting tourism are also relatively reliable. Commercial hunting has been common in Romania, Bulgaria, Hungary, Slovenia, the Czech Republic and Slovakia. Development intentions are mentioned in FYRO Macedonia and Bosnia and Herzegovina. Conflicts about damage to forests overpopulated by game were mentioned in Latvia, the Czech Republic, Slovakia, and Slovenia.

This evidence would indicate that complementary forest production seems to have a large potential for development in the Phare countries. This includes traditional forest production - fruits, nuts, mushrooms, decorative items, handicrafts, Christmas trees, and other new products. Few available national inventories as yet provide a clear economic indication of the importance of complementary forest products and hunting, or associated social benefits such as recreation. The interests of policy makers in the development of rural areas through the support of new economic activities and rural tourism could be extended to an examination of the economic potential of complementary wood products. The forestry sector itself has a more active role to play by surmounting traditional opinions and practices, collating fragmentary knowledge, bridging the information gaps and developing the necessary supportive structures.

NATURE CONSERVATION AND FORESTS

The importance of forests in the global concern for conservation of biological diversity has been a driving force behind a large number of international programmes and projects on sustainable forest management. Extended forest ecosystems originally dominated large areas of all the Phare countries. With the steady deforestation over large areas the remaining forests became in many cases the best preserved parts of their natural environment. A similar development has occurred in non-forest enclaves or in temporarily deforested areas of forests which serve as refuges for rare and endangered species. Forests have also persisted especially in mountains and inaccessible terrains which possess intrinsically high amenity values.

In contrast with Western Europe where several countries faced nearly complete deforestation at the end of the middle-ages, forests have been continuously present in most of their current area in the Phare countries. These forests maintain a high degree of semi-natural status until now, helped by low intensity management and provide a habitat for many rare species of animals which have disappeared from the western part of Europe. These include for example the bear, the wolf, the lynx, the wildcat, the beaver, the moose and many birds of prey.

With the use of appropriate sustainable management practices in the forestry sector, adequate habitats can be secured for the rare species closely related to forests. Current distribution areas especially of big predators have even been expanding and the bear for instance, is now to be found at least occasionally in all of the Phare countries. Similar trends apply to the wolf and the lynx. The reverse is also true with the stagnation and even decrease in the numbers of capercaillie (*Tetrao urogallus*) and black grouse (*Lyrurus tetrix*) in the central Phare countries, and many birds of prey are still on the verge of extinction in the whole of the CEE region.

PRESERVATION OF NATURAL CONDITION IN THE FORESTS OF CEE COUNTRIES [2]

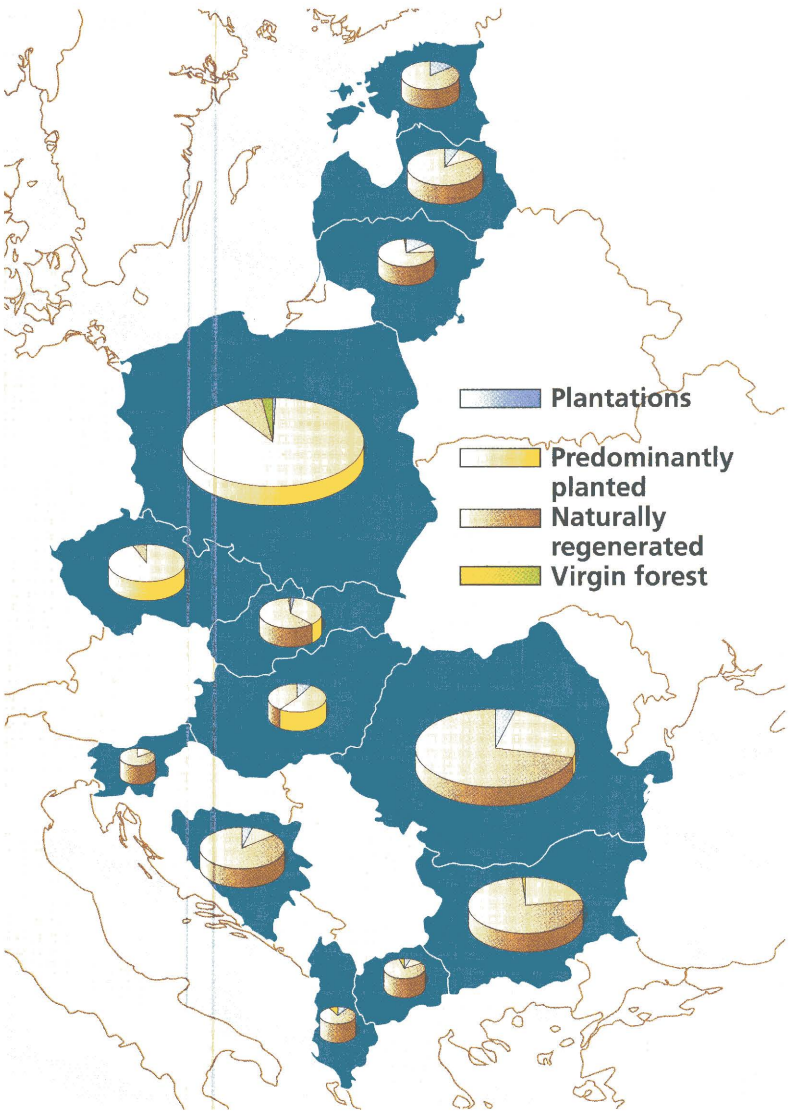
Country	Year	Plantations (%)	Predominant. planted (%) (man-made to seminatural) forests		Predominant. naturally regenerated (seminatural) forests (%)	Virgin forests (undisturbed by man) (%)
			Predominant. coniferous	Predominant. broadleaved		
Albania	1995	8.8	-	-	83	8.2
Bosnia	1990	3	8	1.9	87	0.1
Bulgaria	1995	6	9	12	72	1
Czech Republic*	1996	-	76	18	6	0.05
Estonia	1996	8	9	2	80	1
Hungary	1996	8	53		39	-
Latvia*	1994	5.3	10.3	-	84.2	0.2
Lithuania*	1996	14.7	9.4	0.4	74.4	1.1
FYRO Macedonia	1995	5	9.5	0.5	81	4.5*
Poland	1992	2.2	65	23.2	7.4	2.2*
Romania	1985		29		71	< 0.1
Slovakia	1996	1.3	34.9	7.8	55	1
Slovenia	1996	0.1	15		84.9	0.03

** Czech Republic - no special records for the category of plantations*

** FYRO Macedonia and Poland - area of virgin forests includes also seminatural forest types.*

** Estonia, Latvia and Lithuania - statistics may overestimate proportions of predominantly naturally regenerated forests.*

Degree of preservation of natural condition in forests of PHARE countries.



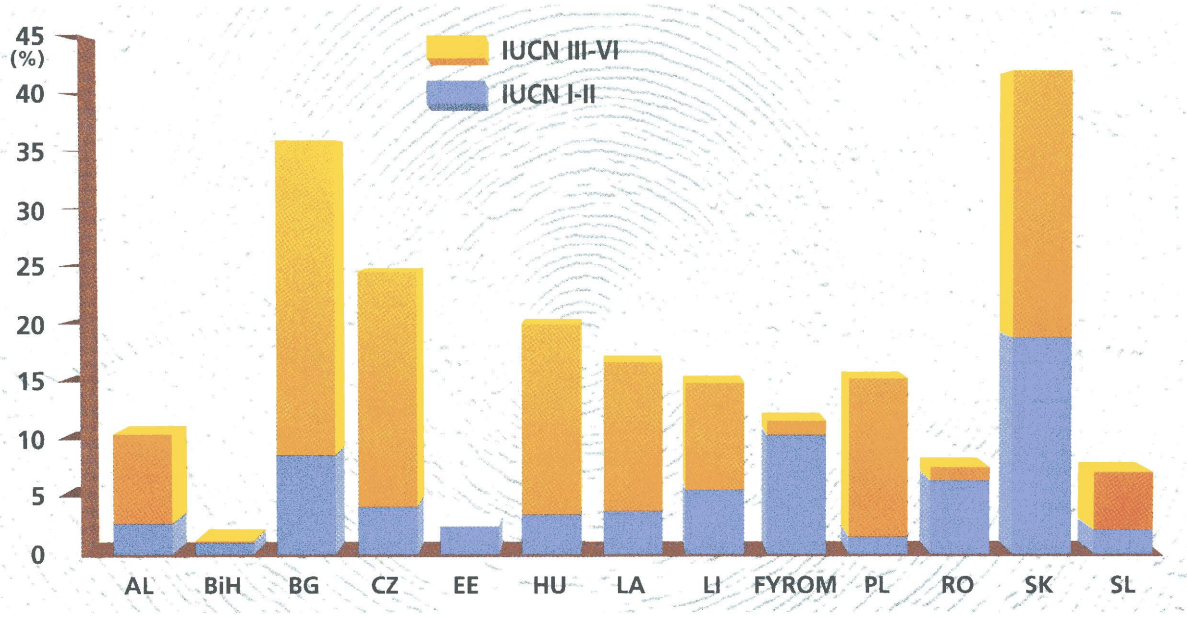
The specific nature conservation function in forests and the related conservation activities in the CEE region have historically been responses to the loss or potential loss of forest values and have been accompanied by efforts for the preservation of the last remnants of virgin forests. The Zofin virgin forest in southern Bohemia, for example has been strictly protected since 1828 and similar examples of very early nature conservation projects are found in most of the Phare countries. In the middle of the 20th century, when autonomous systems of nature conservation were developed, the forestry-educated personnel represented the core of national nature conservation agencies and this is still the case both in the field and in administration.

Nature conservation areas and forest management

In the drive for the protection of the best preserved parts of nature, large conservation areas have been designated in all of the CEE region with areas multiplying in some of the Phare countries over the last 2 decades. Large areas of forests formerly managed for other than conservation functions are now included in the IUCN categories I: strict nature reserves and II: national parks.

It should be pointed out that the actual area of forests with primarily nature conservation functions does not necessarily correspond exactly with the areas designated under the IUCN categories. One of the main reasons for this is variability in particular national classification systems. Similarly the system for conservation of forest tree gene resources is established in all Phare countries but only in some of them are the gene reserve forests and seed stands listed as conservation forests. In the majority of cases

STRICT NATURE RESERVES & NATIONAL PARKS (IUCN I + II), AND LOWER RANK CONSERVATION AREAS (IUCN III-VI) IN THE FORESTS OF PHARE COUNTRIES [3]



IUCN protected area categories

Ia : Strict nature reserve managed mainly for science;

Ib : Strict nature reserve managed mainly for wilderness protection;
to protect nature and maintain natural processes in an undisturbed state in order to have ecologically representative examples of natural environment available for scientific study, environmental monitoring, education and for the maintenance of genetic resources in a dynamic and evolutionary state

II : National Park managed mainly for ecosystem protection and recreation;
to protect outstanding natural and scenic areas of national and international significance for scientific, educational and recreational use. These are relatively large natural areas not materially altered by human activity where extractive resource uses are not allowed.

III: National monument managed mainly for conservation of specific natural features;
to protect and preserve nationally significant natural features because of their special interest or unique characteristics. These are relatively small areas focused on protection of special features.

IV: Habitat/species management area managed mainly for conservation through management intervention;
to assure the natural conditions necessary to protect nationally significant species, groups of species, biotic communities, or physical features of the environment where these may require special human manipulation for their perpetuation. Controlled harvesting of some resources can be permitted.

V: Protected landscape/seascape managed mainly for landscape or seascape conservation and recreation;
to maintain nationally significant natural landscapes which are characteristic of the harmonious interaction of man and land while providing opportunities for public enjoyment through recreation and tourism within the normal life style and economic activity of these areas. These are mixed cultural/natural landscapes of high scenic value where traditional land users are maintained.

VI: Managed resource protected area managed mainly for the sustainable use of natural ecosystems;
to protect the natural resources of the area for future use and prevent or contain development activities that could affect the resource pending the establishment of objectives which are based upon appropriate knowledge and planning. This is an intermediary category used until a permanent classification can be determined. ***(IUCN 1994)***

the gene conservation areas are listed within protective forests or protected by special management plans (Bulgaria, the Czech Republic, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia). The issue of developing a common set of parameters for a global classification system for forests is and has been on the agenda of international bodies such as the FAO, in co-operation with the UN-ECE and UNEP and it will be assessed in the context of the next global forest resources assessment for the year 2000.

The findings of the Phare multicountry forestry report[3] show that the coverage of forest according to the IUCN categories I-II (for nature reserves and national parks respectively) compared to the total forest and other wooded land is by far the highest in Slovakia, followed by Bulgaria and FYRO Macedonia.
Actual percentages of IUCN categories III-VI are also the highest in Slovakia, followed by Bulgaria and the Czech Republic. The percentage of both groups of nature conservation areas has been increasing over the past 50 years and this trend is also to be found in most countries in the region during the transition period, with the exception of Bosnia, FYRO Macedonia, Latvia and Lithuania.
It is difficult to transform forests stands, eliminate long-term difficulties and promote new concepts of forest management in a short time especially in recently declared national parks. This can often give rise to conflicts involving both forestry and nature conservation sectors where there can be a general deficiency of knowledge about the process of transition to close-to-nature forestry. Under current economic conditions, there will only be a limited intention to make substantial changes in the traditional forestry practices where the scope for compensation may be limited or non-existent.

Virgin forests

While forests are usually the most natural part of the environment of Central and Southern Europe, it is the natural forests that are particularly worthy of preservation. The concept of natural forest is often discussed with respect to its important role in the conservation of biological diversity and its value stretches beyond this into the cultural and scientific realms. The actual difficulty in identifying the real extent of natural forests is often associated with problems of definition. Naturalness is often characterised by such elements as the complex spatial structure, the composition and distribution of indigenous species, a wide range of ages within tree species, as well as the presence of dead or decaying trees[4]. Numerous studies assessing the natural dynamics and regeneration of forest ecosystems have been carried out by scientists from a wide range of relevant disciplines and have given us a sound knowledge base in ecology and forestry.
The near absence of natural forests in the western part of Europe[5] further underlines the importance of the fragments of virgin forests preserved in Central and Eastern Europe. Seen in a European context they represent a real treasure.

The preliminary results of the inventory of natural forests of Central-Eastern Europe carried out within the WWF European Forest Programme[6] confirm the validity of the Phare multicountry report findings. The declared area may be partly reduced with regard to the minimum plot sizes, in respect of air pollution or overpopulation by game. Mountain forests predominate but intact riverain and lowland forests are also found, e.g. in Romania and Albania. The extended area of virgin forest found in Albania is quite exceptional but at the same time the situation is not without complications. One of the factors in this context is that the natural forests in inaccessible mountains have shrunk considerably over the past 5 decades and this trend has continued also in the 1990s.

QUANTITATIVE SUMMARY OF NATURE CONSERVATION FUNCTIONS OF FORESTS IN PHARE COUNTRIES: FOREST IN THE IUCN CATEGORIES I-II AND III-VI, STRICTLY PROTECTED FOREST RESERVES, AND VIRGIN FORESTS [7]

Country	Year	Total forest area (ths ha)	IUCN I+II (ths ha)	IUCN III-VI (ths ha)	Strict forest reserves (ths ha)	Virgin Forests (ths ha)
Albania	1997	1857.	149.8	144.8	7	84.8
Bosnia	1990	2743.0	27.6	4.1	7	apr. 2.2
Bulgaria	1995	3357.0	290.0		81	apr. 33.5
Czech Republic	1997	2631.0	109.0	537.0	31	2.0
Estonia	1997	2162.0	52.0		1.9	2.0
Hungary	1996	1811.0	62.4	299.1	3	0
Latvia	1997	2820.0	106.0	365.0	39	4.0 (3-10)
Lithuania	1996	2050.0	114.7	190.4	30	22.5
FYRO Macedonia	1996	1071.7	111.0	13.2	2.6	apr. 10.5
Poland	1996	8942.0	132.0	1232.0	46	(196.7)*
Romania	1996	6220.0	397.4*	71.5	130	apr.6.0
Slovakia	1996	1988.0	373.1	458.0	92	20 (18-30)
Slovenia	1996	1166.0	24.4	58.7	15	3.5

** Romania - 13 national parks declared by the order of the Minister of Environment 7/1990, but only 2 of them with an area of 22,300 ha, have a valid legal status. FYROM, Poland - includes ancient seminatural forests.*

Forest related plant and animal species

The forests are usually considered to be the best preserved parts of the natural environment. Also in the CEE countries they provide numerous examples of the ecosystems which formerly dominated these territories. It is generally believed that the forest related species are less threatened, partly due to lower levels of human interference and to their seminatural conditions. Nevertheless, the forest encompasses many rare habitats such as bogs, swamps, sub-alpine open forests and alpine meadows, ridges, cliffs and other sites which provide a refuge for rare species.
This section provides an insight into the extent and condition of species diversity in the CEE countries. Information was sought about groups of individual plant and animal species, including trees, flowering plants

IUCN Red List Categories

EXTINCT (EX) *A taxon is Extinct when there is no reasonable doubt that the last individual has died.*

EXTINCT IN THE WILD (EW) *A taxon is Extinct in the wild when it is known only to survive in cultivation, in captivity or as a naturalised population (or populations) well outside the past range. A taxon is presumed extinct in the wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.*

CRITICALLY ENDANGERED (CR) *A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future.*

ENDANGERED (EN) *A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future.*

VULNERABLE (VU) *A taxon is Vulnerable when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future.*

LOWER RISK (LR) *A taxon is Lower Risk when it has been evaluated, does not satisfy the criteria for any of the categories Critically Endangered, Endangered or Vulnerable. Taxa included in the Lower Risk category can be separated into three subcategories:*

- *Conservation Dependent (cd). Taxa which are the focus of a continuing taxon-specific or habitat-specific conservation programme targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories above within a period of five years.*
- *Near Threatened (nt). Taxa which do not qualify for Conservation Dependent, but which are close to qualifying for Vulnerable.*
- *Least Concern (lc). Taxa which do not qualify for Conservation Dependent or Near Threatened.*

DATA DEFICIENT (DD) *A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution is lacking. Data Deficient is therefore not a category of threat or Lower Risk. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and threatened status. If the range of a taxon is suspected to be relatively circumscribed, if a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.*

NOT EVALUATED (NE) *A taxon is Not Evaluated when it is has not yet been assessed against the criteria.*

(Prepared by the IUCN Species Survival Commission As approved by the 40th meeting of the IUCN Council, Gland, Switzerland 30 November 1994)

other than trees, ferns, mosses, lichens, mammals, birds and other vertebrates (reptiles, amphibians and fish). For each group, the questions aimed to ascertain the total number of species in a country and the number of forest-related species. In both categories the number of endangered species was requested. The term "endangered species" refers to the IUCN categories[9]: Extinct in the Wild, Critically Endangered, Endangered, and Vulnerable, listed in national or other available red books[10].

While the total numbers of species in individual groups and the total proportions of endangered species are known for the majority of the countries, data on forest-related species, however useful they might be, appear to be rudimentary.

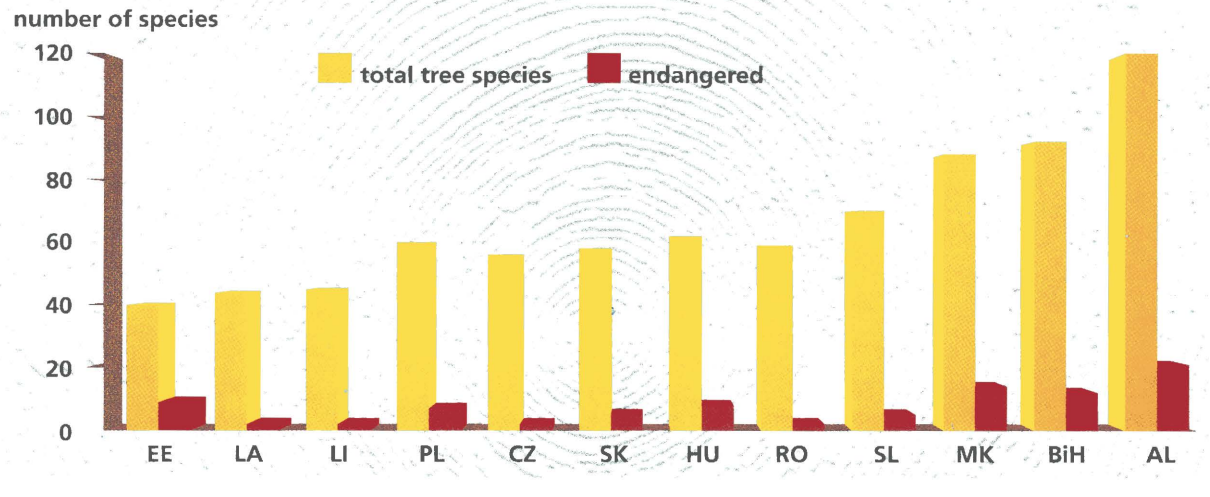
The most thorough information available seems to be for forest trees. They dominate forest ecosystems and predetermine also the diversity of other forest organisms. Relatively few forest trees are considered to be threatened despite the fragmentation of forests and the effects of management on their structure. The higher proportion of threatened trees in Poland, for instance, results from the occurrence of many species at their northern distribution limit where by their nature they are rare or vulnerable. The countries of south-eastern Europe possess a greater number of native tree species and more of them are endangered compared with the northern areas. This could be due to natural rarity, but human pressure also has had the longest influence in these parts.

The wych elm (*Ulmus glabra*) and smooth-leaved (field) elm (*Ulmus minor*) have gone into decline throughout the CEE region due to Dutch elm disease caused by virulent races of the fungus *Ophiostoma ulmi*. The gene resources of European black poplar (*Populus nigra*) are considered threatened due to hybridisation with planted Euro-American hybrid poplars. Wild fruit tree species form a specific group, vulnerable in those forests where primary attention is paid to major and economically important forest trees. Fortunately, interest in several formerly neglected wild fruit tree species has gradually been increasing. For the wild cherry (*Prunus avium*), wild pear (*Pyrus communis*) and wild service tree (*Sorbus torminalis*) this is due to the commercial value of their wood which can be substituted for questionable imports from tropical forests.

Several endemic tree species occur in the CEE countries. Bosnia is the country of origin of a narrow endemic Serbian spruce (*Picea omorika*), planted for its amenity value all over Europe. FYRO Macedonia has isolated natural occurrences of horse chestnut (*Aesculus hippocastanum*). The Macedonian pine (*Pinus peuce, syn. Pinus heldreichii*), Bosnian pine (*Pinus leucodermis*), and hybrid Greek fir (*Abies borisii-regis*) are native to Bosnia, Bulgaria, FYRO Macedonia and Albania.

Conservation of the genetic resources of forest tree species has been the primary goal of the European Forest Genetic Resources Programme (EUFORGEN) established in the follow-up to the Ministerial Conferences on the Protection of Forests in Europe. The majority of CEE countries have been participating in EUFORGEN networks.

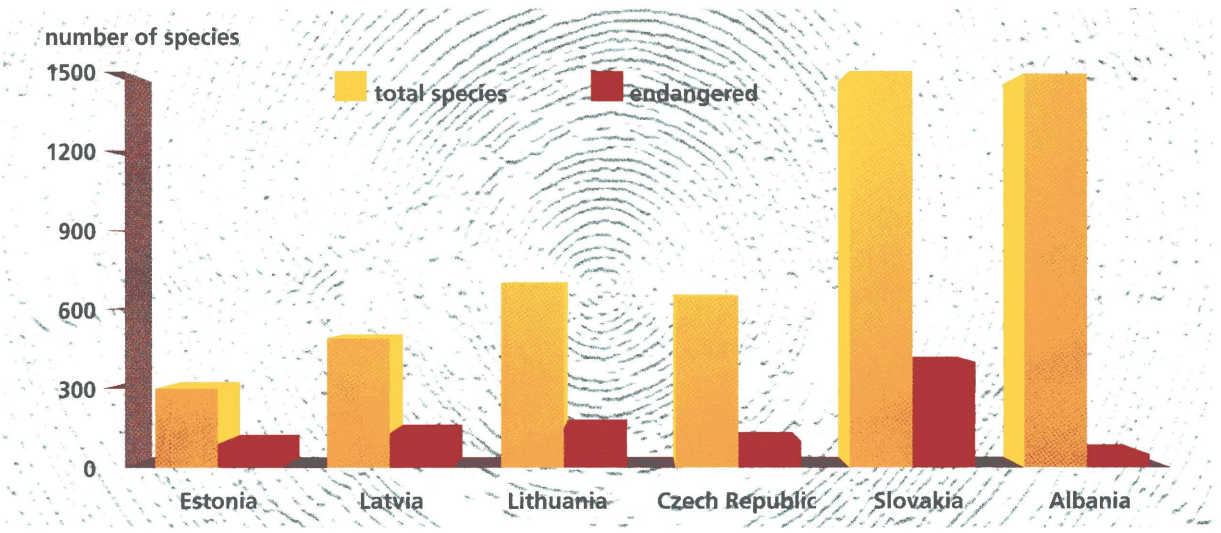
NATIVE FOREST TREE SPECIES IN THE CEE COUNTRIES



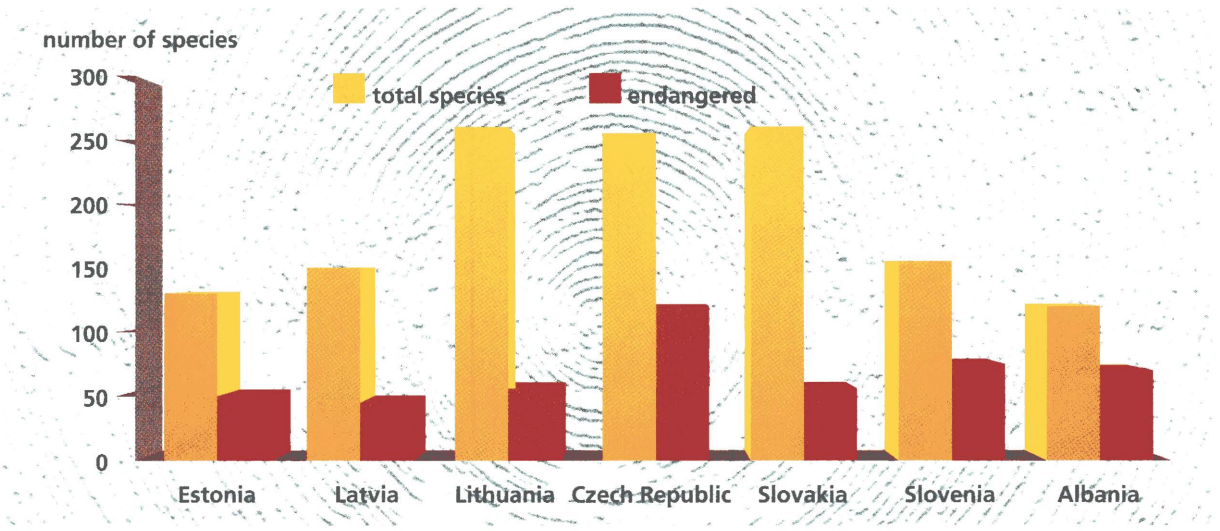
In some of the CEE countries, more complete data have also been available about other plants. Drawing from the summary numbers, the lichens and ferns seem to belong to the most endangered group with the percentage of endangered species often above 20%. For lichens, the group most sensitive to air pollution, an endangered proportion of 40% is reported from the Czech Republic and Slovakia.

An apparently large proportion of mammals, birds, reptiles and amphibians are referred to as endangered. Threats to this group appear to be greater in the more westerly situated Czech Republic and Slovenia, but also in Albania and FYRO Macedonia with a significant loss of forest habitats. In FYRO Macedonia, for example, 82% of mammals and 62% of birds are classified as endangered. It should be noted in this connection however, that the large semi-natural forests of the CEE countries provide a habitat for many rare species of animals which have long disappeared from the major part of western Europe.

FLOWERING PLANTS OTHER THAN TREES REFERRED TO AS FOREST-RELATED



FOREST-RELATED MAMMAL AND BIRD SPECIES



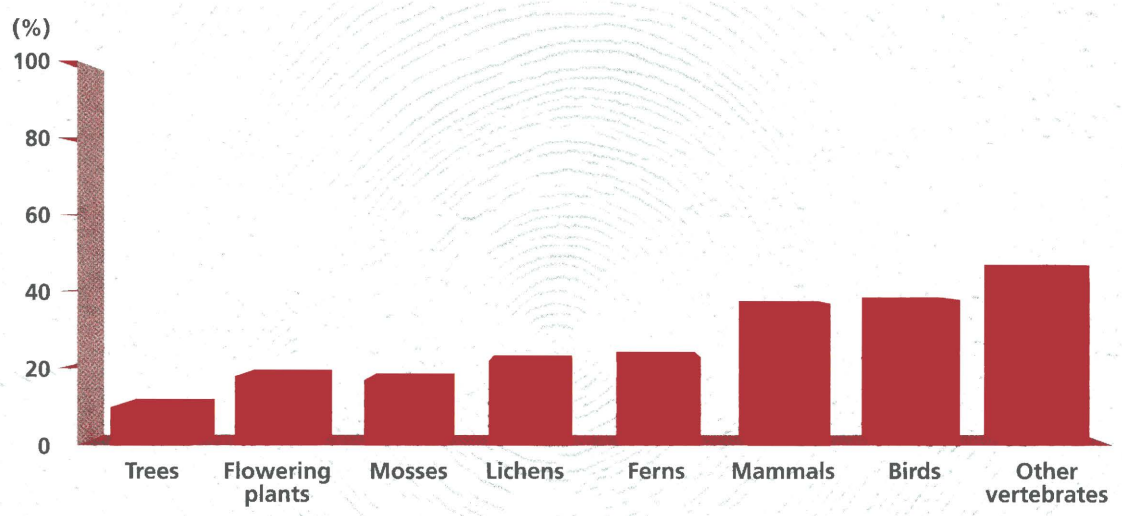
These species include for instance, European bison, brown bear, wolf, lynx, European mink, European beaver and golden eagle. The diversity of the animal kingdom of central and eastern Europe includes also many species and subspecies of reptiles, amphibians, birds and mammals which are not found elsewhere in Europe[11].

Such animal species have been the central concern of several international treaties to which the CEE countries are also signatories: the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Convention on the Conservation of the European Wildlife and Natural Habitats (the Bern Convention on species and habitats, and in future for the Emerald network of sites), and the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention).

In spite of frequent gaps in the information, including national red lists for many groups of species, some inferences still can be drawn. First, relatively high numbers of forest-related plants and animals are endangered. Second, the proportions of endangered species are not lower when it comes to forest-related species compared to the total number of species in a country. Third, the species most frequently referred to as endangered are those sensitive to external stresses and those which are naturally rare or have a specific ecology. These include a large quantity of mosses, lichens and ferns from among the plants while reptiles and amphibians predominate among the animals.

Trends in the number of endangered species vary between countries and species groups. Although an increase in the percentage of threatened species is frequently mentioned, many countries consider their forest-related species to be stable. In Lithuania and Latvia, for instance, the number of forest-related vascular plants, lichens and birds classified as endangered has probably decreased thanks to improved environmental conditions in forests.

THE PROPORTION OF ENDANGERED FOREST RELATED PLANTS AND ANIMALS



It should be noted that the information presented may be influenced by the size of a country and also probably by the willingness to list a species as endangered. Availability of information is another important factor, especially for fungi, lichens, mosses and invertebrates. In other words, the more complex or less accessible to observation the species groups are, the more scanty the data about them will be.
Attention should be paid to the gaps in the data on forest-related species reported in many CEE countries which would indicate the lack of a proper basis for identification and conservation of threatened species. This issue is important in relation to public and professional awareness, and also the potential to improve conservation of valuable forest biotopes through the application of appropriate management practices. Protection of valuable forest biotopes has become a regular part of forest surveys and management planning e.g. in Latvia, Lithuania and Slovenia. It is likely to spread also to other CEE countries.

Notes

[1] *Kuusela, K., 1994: Forest Resources in Europe 1950-1990. European Forest Institute Research Report I. Cambridge University Press.*

[2] *Data about natural forests, semi-natural managed and used forests and plantations refer to the UN-ECE/FAO Temperate and Boreal Forest Resource Assessment TBFRA-2000. Subdivisions into predominantly planted and predominantly naturally regenerated forest stands are estimates based on the records of origin and structure of forest stands, actual and potential tree species composition from national forest inventories (Preparation of a multi-country forestry programme, Phare programme, September 1998).*

[3] *Ministry of Agriculture, Rural Development and Fisheries of Portugal - Liaison Unit in Lisbon, 1998: Follow-up Reports of the Ministerial Conferences on the Protection of Forests in Europe. Volume II: Sustainable Forest Management in Europe. Special Report on the Follow-up and the implementation of Resolutions H1 and H2 of the Helsinki Ministerial Conference. Data for Estonia, FYRO Macedonia and Romania are based on the national reports (Preparation of a multi-country forestry programme, Phare programme, September 1998.*

[4] *FAO, 1997: State of the Worlds' Forests, page 13.*

[5] *The Inventory (WWF 1994) in Western Europe has shown that there are only a few fragments with a total area of several hundreds of hectares of virgin forests in Austria and Switzerland, and some 1,500 hectares of such forest is found in northern Greece. Larger areas of intact forests are preserved only in the Nordic region (Finland, Sweden, Norway).*

[6] *WWF project Inventory of Natural and Seminatural Forests of Central and Eastern Europe.*

[7] *Is based on the responses to the Phare forestry multicountry surveys; wherever appropriate national co-ordinators were asked to provide the same data as included in their final contribution to the Temperate and Boreal Forests Resources Assessment TBFRA, which have not been finalised in all cases.*

[8] *More detailed information is presented in Annex I, Table 9 of the original multicountry report, (Preparation of a multi-country forestry programme, Phare programme, September 1998).*

[9] *IUCN, 1996: IUCN Red List of Threatened Animals. IUCN Gland, Switzerland*

[10] *IUCN, 1997: Red List Categories. As approved by the 40th meeting of the IUCN Council, 1994. IUCN Species Survival Commission, Gland, Switzerland*

[11] *European Environment Agency, 1998: Europe's Environment: The Second Assessment. Office for Official Publications of the European Communities & Elsevier Science Ltd.*

Chapter 3

BIODIVERSITY AND ECOLOGICAL NETWORKS

Increasing global concern about the conservation of biodiversity, especially at ecosystem and species levels, has led to increasing demands for the designation of protected areas and the identification of priority areas for conservation. Biodiversity is one of the most important attributes of a biological community, such as a forest. It has emerged as one of the major environmental concerns in the debate over the world-wide depletion of forests and has since become a matter of scientific interest and public concern. Preservation of biodiversity is one of the fundamental roles of the forest and needs to be seen as an integral component of forestry management both at national and global level.

THE CONCEPT OF BIODIVERSITY

The Convention on Biological Diversity defines biodiversity as "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the complexes of which they are part; this includes diversity within species, between species and of ecosystems themselves."

When discussing biodiversity, a number of different measures can be used and it can include the following elements:

- genetic diversity within species, ensuring their capacity for adaptation and evolutionary development
- local and regional diversity of flora and fauna (this is the most commonly used measure of biodiversity and is often measured by species richness, evenness of distribution and structural diversity)
- local and regional diversity of ecosystems (variation in the species composition and/or structure of different ecological communities found in a landscape)
- the occurrence of ecological processes (natural and semi-natural forest dynamics) within ecosystems
- ecological networks and interactions between different ecosystems (corridors connecting different ecosystems, and the exchange of individuals and species between ecosystems)

The total number of known species or organisms world-wide is over 1.4 million, of which about 250,000 are plants, 44,000 vertebrates and 750,000 insects. Obviously, there are many more organisms which have not yet been identified or catalogued, fungi being a striking example with only 69,000 species known out of an estimated 1.5 million! The remaining known species or organisms are various micro-organisms, algae and invertebrates. Biodiversity allows species and ecosystems to adapt themselves to changing environments or to various stresses, providing humans with countless opportunities for discovery, exploitation and selection. Unfortunately, an increasing quantity of species is being permanently lost, resulting in a loss of genetic material with consequences for dependent or related organisms.

Some species are linked to their habitats. Some organisms can only live and reproduce within a particular range of parameters (temperature, light, nutrients, soil, etc.). Major reasons for the loss of biodiversity are the loss or fragmentation of habitats. Other species have a greater ability to adapt to other environments or to migrate to areas which differ from their original habitat.

FOREST BIODIVERSITY

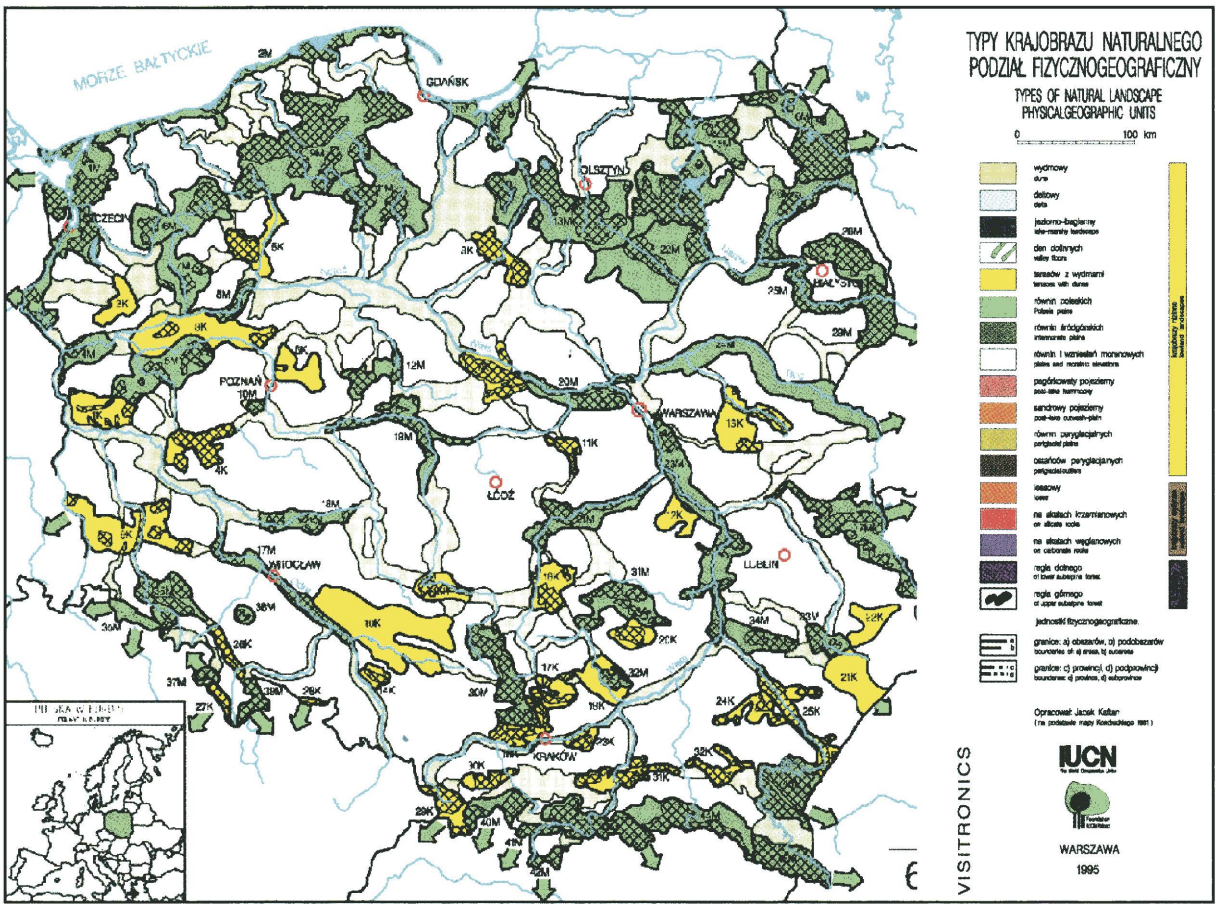
For two hundred years up to the first decades of this century forest management and afforestation resulted in extensive monocultures due to a large demand for wood to meet basic human needs. The high production levels in this type of forestry led to an overproduction of wood in the temperate and boreal forests. Such forests develop little biodiversity and where they cover huge areas they can be subject to catastrophic damage by insects, storms and diseases.
Loss of forest biodiversity is characterised both by the total loss of forest cover (i.e. conversion to agriculture, urban areas, roads, etc.) as well as by the loss of biodiversity components within forests (so-called degradation).

A mature biodiversity rich forest. The presence of dead- wood is necessary for the proliferation of insect, plant, and fungal species living on decaying biomass, which become rare in man-made forests. The mixture of trees of different ages, shrub, herb and animal species allows for an optimal exploitation of the various layers and resources of the ecosystem.

Loss of biodiversity can be due to a variety of reasons. These include certain types of forest management (conversion to uniform and improved silvicultural systems), uncontrolled exploitation, fragmentation and loss of canopy. However in general, forest ecosystems preserve a higher degree of naturalness and natural diversity of species and ecosystems than any man-made agricultural ecosystem.
Within the last decades the basic demand for wood and wood products has been met in the industrial part of the world, and an increased demand for other uses of the forests has arisen, e.g. for recreation, aesthetic and cultural purposes. These are better served by mixed stands and close-to-nature management, with high biodiversity and proper nature conservation in appropriate areas.
A large number of forestry and conservation problems arising from changes in management systems could actually be solved more easily with practical demonstrations of improved forest management practices at national and international level. Examples of the provision of demonstration forest areas at national level can be found in Poland and in Latvia, where a network on 'Afforestation of Non-Forest Lands' was set up with the assistance of the Phare programme. On a European level, a network for demonstrating close-to-nature management of forests was set up by the "Pro Silva" organisation. Along with the establishment of protected areas at the national level, international efforts are necessary both to assess the status of cross-border ecosystems and to ensure the most effective use of international resources.

THE CONCEPT OF ECOLOGICAL NETWORKS

Nature conservation used to be based on the protection of sites. Areas of particular ecological interest were identified, and human intervention was limited. The protected areas which resulted were often isolated in an environmental desert, surrounded by vast expanses of hostile territory (intensive agriculture, constructed areas, monocultures, etc). To make things worse, protected areas were too often designated not on the basis of their ecological worth, but because of their low economic value.
The resulting patches of protected sites can be compared to islands with isolated populations that cannot interact with neighbouring or distant habitats. The consequence (depending on the initial population size, the extent of the protected areas and the potential for accidental increase of the populations by the arrival of native or imported species) is the genetic erosion of the various species concerned. This eventually results in their disappearance or decreased adaptability to external pressures.
Habitats that have become isolated cannot maintain their original species richness, unless they are connected with similar habitats elsewhere. Obviously, many factors influence the resilience of species in protected areas. The effects of isolation will be counterbalanced by the size of the protected area, and the size and diversity of



The design of an ecological network for Poland provides an overview of the final result: an integrated structure of areas enjoying defined levels of protection and allowing for the preservation, rehabilitation and protection of environment. Various degrees of protection, as well as the geographical distribution of protected areas, avoid the fragmentation of the ecosystems. (IUCN)

its original species. Potential accidental migrations will depend on the distance between areas inhabited by certain species, and can have either beneficial (maintenance of biodiversity) or detrimental effects (competition by invasive species). Ecological networks tend to increase the possibility of migration, by providing corridors.

SPATIAL COHERENCE

Ecological principles have now evolved to include landscape. The theories of Island Biogeography and Metapopulation introduce "spatial coherence" as a planning issue for nature conservation and physical planning. The idea supporting ecological networks is that populations should be able to migrate from one inhabited area (be it protected or not) to another. The result would be increased energy flows, genetic migrations and adaptation to local conditions. When resources in one area are scarce, populations can migrate to avoid starving. Similarly, migration can fill gaps in empty sites.
As we can see, the concept of ecological networks is based on the introduction of coherent spatial structures. Core areas, corridors, buffer areas and restoration areas are central to ecological networks. A complete network design will include each of these supporting elements. As in more "classical" nature conservation, the use of various levels of protection is associated with ecological networks. In order to allow multiple use of the network – avoiding useless or excessive restrictions – the level of protection will be adapted to local needs. This will range from strict protection (restrictions on recreational use, for example) to partial limitations on economic uses.

Core areas are those zones that contain unique, characteristic, or otherwise valuable landscapes and habitats. Their preservation contributes to the protection both of biodiversity and of natural beauty. The level of protection of core areas should be highest, as they shelter those elements most in need of protection.

Corridors are features essential to migration, dispersion, energy flows and genetic exchanges. They link various core areas allowing for these exchanges, and end the isolation and "island" situations.

Buffer areas surround zones of particular interest (generally core areas) in order to limit or buffer negative impacts from outside. Limitations on certain economic or recreational activities in buffer areas, prevent them from affecting the protected core zones.

Restoration areas enable the rehabilitation or restoration of potential natural areas. These can be important for the global design of the network, or may represent a high environmental and ecological potential. We have indicated above that only the less favourable sites, dry and poor in nutrients, tend to be left for nature, while the more interesting zones are generally used for agriculture. Restoration supports the return of rich and interesting areas to nature.

The design of a network might look simple in theory, but it is a highly complicated task as it often has to combine conflicting interests. Different species do not always have the same needs and a prioritisation and combination of goals may be necessary. For instance, the shape and location of corridors depend on the species they are to "carry"; opting for a forest rather than for meadows will favour certain species as compared to others and vice-versa.

Ecological corridor in intensively managed farmland.

The selection and identification of the elements of an ecological network is a long process based on a comprehensive overview of natural and human activities. A considerable amount of data needs to be collected and analysed in this process. Tools such as forestry cover maps, land cover maps, biotope maps, water quality maps, biodiversity monitoring data, maps of potential natural vegetation and the like need to be used to provide the basis for a coherent network. The EU initiatives CORINE Biodiversity and CORINE Land Cover provide invaluable tools for such a task.

Maps of forest sites and forest types showing, to a greater or lesser degree of completeness, the species and age structure of forest stands and of forest soils, have been identified in all of the Phare countries with the exception of Albania. In the majority of the countries a map of actual and potential vegetation is also available. One of the major difficulties however is that these maps have not usually been prepared according to the same criteria. National or institutional scientific schools of thought differ, which makes the development of unified criteria all the more important when it comes to application at regional or global levels.

The definition of criteria is important in the process of prioritisation (for instance in describing the size of habitats, how representative they are, their scientific or aesthetic value and in assessing the threat of extinction.)

When defining criteria, it is important to know which species are threatened. Species may be threatened in a country but not globally, or they might be threatened in Europe but not in a particular country. In all cases, an invaluable tool is the **Red List of Endangered Species** (see information box in chapter 3), which lists all the species that are endangered, according to the acuteness of the danger. When defining any criteria, it is important to include the protection of animals listed in the Red List. Any habitat sheltering one or more particularly threatened species will be protected accordingly.

In general, it is true to say that there are no **central species diversity databases** in most Phare countries or at least they are only at their inception. Some countries have, however, local databases dealing with special communities, particularly for the purpose of registration of endangered species. From the perspective of organising central databases, it would be useful to adopt a methodology which would standardise common basic procedures across all interested countries.

Ecological networks are significant not only within countries, they also need to be extended between neighbouring countries. Co-operation in the design of frameworks by neighbouring countries is therefore required and this could lead to the realisation of a European frontier-free natural zone

STEPS IN DESIGNING AN ECOLOGICAL NETWORK

We have seen above that the first step in designing an ecological network would be to define areas of particular importance. This activity depends on the definition of criteria, and careful analysis of the data. At this stage an attempt would be made to balance various potential land uses, based on set priorities. As we know, the data provides important elements in site selection (particularly species data), but in many cases data is not available from systematic inventories, and this makes the selection more complicated. The presence of other elements adds to the complexity of the task. Decision-makers must first be able to identify the landscape elements that define a particular corridor, and then understand the way that individuals and local populations respond to it. The efficiency of a type of corridor in allowing the movement of species cannot easily be defined when you include a large variety of organisms (big and small mammals, small insects, birds, etc). In many cases, a corridor will not be a single habitat (e.g. a river or a forest), but a patchwork of different habitats, acting as steps in a staircase. The presence of individuals of other species, such as predators which could influence the migration or survival of a target species, is another example, in what is just a glimpse of the complications involved in designing a network.

Yet, once all the information is gathered, priorities and criteria defined and the analysis is completed, one can expect to end up with a network design, at least "on paper". The subsequent step, in a very simplified procedure, would be to ensure that all the elements enjoy the necessary level of protection. This includes defining the exact extent of the areas, ensuring that they are all available for protection (e.g. some might be in private ownership) and obtaining all the necessary local support.

Once the zones and their roles are defined, it is necessary to enforce the measures for their protection and to implement some sort of monitoring and whatever is necessary for the "management" of the network (rehabilitation, protection, awareness, training, etc). Establishing the status of the network by providing the appropriate level of legal protection is the first step in implementation.

Governments and civic groups have understood the importance of co-operation, and recognise that the involvement of the public and of NGOs is fundamental. Activities by NGOs could be considered to be as important as those led by national institutes, both for improving the level of knowledge, and for raising awareness. Such organisations may co-operate closely and constructively with each other and along with national authorities. Often directly supported by national or extra-territorial (e.g. UN) authorities, these organisations are recognised as world leaders in the establishment of ecological networks and in the protection of biodiversity. Just to mention a few without any intention of creating a hierarchy, we can cite the IUCN, the European Centre for Nature Conservation and the World Conservation Monitoring Centre, among others.

THE IMPORTANCE OF FORESTS IN ECOLOGICAL NETWORKS

Forests are primary natural features, both for the area they cover and the impact they have on their surroundings. They cover large portions of Europe, though much less than formerly. Forests in Europe have been influenced by centuries of human activity, so that there remains practically no virgin or original forest except for a few small patches, which usually consist however of a large variety of species, fauna and flora.

The functions of forests are manifold, as discussed in the previous chapter. Forests are particularly important to ecological networks both for sheltering an array of various animal and vegetal species that otherwise would probably disappear and for allowing movement of the species concerned.

The obvious roles of forests in ecological networks are that they can act as core areas, buffer areas, corridors and restoration areas. Any forest, from a virgin forest, a forest with particular biodiversity or a forest protecting a slope from erosion, could be considered a core area which needs particular protection. A forest stretching for a significant length, giving passage through particularly inhospitable regions (highly inhabited) becomes a perfect opportunity to create a corridor. On the other hand, a forest or part of it can represent a valuable buffer zone for a core area. Finally, restoration of degraded areas will very often start with pioneer planting to recreate a forest.

Obviously, the initial distribution of woods in a country – and in the neighbouring countries – will greatly influence the opportunity to use them in ecological networks. The degree of human activity, and of degradation, will also influence the role of forests. A very fragmented forest cover can be both an advantage and an inconvenience, depending on its relative importance. If forests are scattered but cover an important portion of a country (as in the Baltic States), this represents an important opportunity to extend a network

over the whole of the country, with the result that as the forests become connected they lose their isolation. In such a situation, a whole territory can contribute to nature conservation. On the other hand, if forests are very scattered because the relative cover is very small, then it is much more difficult to "promote" them. Then the creation of new forested areas and linking corridors would be necessary, with an intensive policy (if finances allow it) of re-afforestation (such as is found in Hungary), provided this does not damage other important habitats.

Forests are not the only important features for ecological networks. All the elements of a network (core areas, corridors, buffer zones, etc) are usually multifunctional biotopes which can be perceived as islands or units in a matrix interacting with and depending on each other. Forests seem particularly important because of their cultural importance, but overall they shelter only a relatively small proportion of global biodiversity. All of the elements are important and in need of conservation, including for instance meadows and wetlands (see below), dunes and polders, seashores and so on. Rivers and roads also contribute to ecological networks; rivers for the clear reason that they provide shelter and transport, roads simply because their banks are often lined with shrubs and plants and – being linear structures – they function as channels for migration.

The purpose of this brochure is to provide information on an important environmental feature, forests. Other ecosystems are equally important to the environment and to biodiversity preservation. For instance, scrub and grasslands ecosystems, which provide a large number of habitat types. Grasslands provide a wonderful biodiversity of plants, which themselves shelter an array of animals such as insects or birds. As illustration, 1,041 species of insects in Austria depend on dry grassland.

A proper balance needs to be kept between all habitat types when designing ecological networks.

INTERNATIONAL INITIATIVES

The protection and conservation of biodiversity is at the centre of converging strategies for the protection of nature world-wide. It has become evident that one of the key elements in safeguarding a healthy environment for future generations is maintaining a high level of biological diversity. Even in protected areas, species become extinct. Experts realise that our knowledge of the dynamics involved in nature protection provides us with new opportunities for improving the way in which we organise nature protection.

One of the key events in setting the new trends was 'Rio' the United Nations Convention on Biological Diversity (1992, Rio de Janeiro). Over 160 countries signed the Convention, which aims at preserving biological diversity, encouraging the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources. The Convention builds on a

The Habitats Directive

(92/43/EEC as amended by 97/62/EC)

The Habitats Directive aims to promote the maintenance of biodiversity within the Member States through conservation of natural habitats and of wild fauna and flora. It requires measures to be taken to maintain or restore, at favourable conservation status, habitats and species which are endangered, vulnerable, rare or endemic and requiring particular attention. A European ecological network of special conservation areas hosting natural habitats (Annex I of the Directive) and habitats of species (Annex II) is to be established.

The network, Natura 2000, includes special protection areas for wild birds, designated by Member States under Directive 79/409/EEC. Member States are required to draw up lists of sites within their territory which are of potential EU importance. These lists serve as the basis for the compilation of a single list, (Annex I), of sites of EU importance which require particular protection obligations. Member States must designate listed areas as Special Areas of Conservation requiring necessary conservation measures. These include appropriate management plans and appropriate statutory, administrative or contractual measures which correspond to the ecological requirements of the habitats and species present in these areas and assessment of any plans or projects which are likely to have a significant effect on the sites. Land use planning policies should focus on encouraging management of landscapes which are essential for migration, dispersal and genetic exchange of wild species.

Member States must also establish a system of strict protection for animals and plant species listed in Annex IV, prohibiting deliberate collection, capture or killing of all such species or the deterioration or destruction of breeding sites or resting places. Member States must establish management and monitoring of the protected areas. A Community co-financing mechanism is provided for in the Directive.

Many species depend on the presence of dead wood for their survival.

number of regulations and earlier Conventions, one being the Ramsar (1971) Convention on Wetlands of International Importance. Others include the CITES (1973) Convention on International Trade in Endangered Species of Wild Fauna and Flora and the Bern (1979) Convention on Conservation of European Wildlife and Natural Habitats.

Rio 1992 gave a new impetus to international activities. It coincided with the "Habitat" Directive, the Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora. The Habitat Directive is the most important EU instrument for nature protection, and anticipates the preparation and setting-up of Sites of Community Importance for inclusion in "Natura 2000", a network of representative habitats.

Countries due to join the EU need to "harmonise" their legislation, which in the environmental sector is particularly affected by the Habitats Directive. In the EU, the implementation of Natura 2000 is lagging behind schedule, which does not help the situation for the candidate countries in Central and Eastern Europe (CEEs). Some of these countries seem to be ahead of the EU in this area, having designed their network and taken the necessary legal steps to implement it, while others have had more pressing priorities.

Nevertheless, there are numerous initiatives particularly at the European level that contribute to the improvement of protection and to the setting-up of a continent-wide network. We have mentioned the Natura 2000 network at the EU level, with which other countries are associated. We should also note the EMERALD network aiming at the implementation of the Bern Convention (1979). The Bern Convention and the Habitats Directive (1992) follow identical objectives, aimed at the conservation of wild flora, fauna and natural habitats. While the Habitats Directive relates more or less directly to a large portion of the European continent, EMERALD concerns the whole of Europe and part of Africa. Both initiatives are nevertheless closely co-ordinated and do not overlap. The 1995 ministerial conference "Environment for Europe" in Sofia identified the need for a "Pan European Biodiversity and Landscape Diversity Strategy", including several action plans. The first action plan is the establishment of a pan-European ecological network. Principally an information exchange and co-ordinating initiative, the strategy addresses all biological and landscape initiatives within a single European overview, reinforcing the implementation of existing measures and identifying whatever complementary actions are necessary.

BIODIVERSITY LEGISLATION AND STRATEGIES IN THE PHARE COUNTRIES

Within the framework of the Phare multicountry project on forests, basic information was collected on policy and programmes for biodiversity protection as well as on the selection of demonstration areas for sustainable forestry. The reports show that the concepts of sustainable forestry and biodiversity protection are often part of existing or amended forestry Laws and that national strategies for biodiversity protection are being gradually developed and translated into practical procedures in forest management. The process has been helped along by the outcomes and impacts of Ministerial Conferences on the Protection of Forests in Europe (Strasbourg 1990, Helsinki 1994, Lisbon 1998) as well as by the efforts of national scientific forestry institutions in the Phare countries and their European partners.

Forest Laws were adopted or at least amended after 1990 in all the participating Phare countries with the exception of the Federation of Bosnia and Herzegovina where specific forestry legislation is currently under preparation. The Conference of ministers responsible for forestry, particularly the Helsinki Ministerial Conference and its follow-up activities encouraged the development of new strategic concepts for forestry and the concepts of biodiversity protection and sustainable development can now be found in most of these legal frameworks. Even though new legislation, policies or programmes on environmental protection and nature protection are being developed which recognise the need for preservation of biodiversity, there is still no separate legislation concerning protection of biodiversity in the majority of countries. In Estonia, for example an Act on Sustainable Development has been developed and specific National Biodiversity Strategies and plans were approved by the governments and parliament of Slovakia (1997), Lithuania (1998), and the government of Latvia (1995). In Bulgaria, Poland and Hungary specific biodiversity strategies are under preparation. In most other Phare countries, more general environmental or nature conservation strategies are being developed.

THE IMPORTANCE OF ECOLOGICAL NETWORKS AT A EUROPEAN LEVEL

We can recognise from this brief overview, the importance of "ignoring borders" when discussing ecological networks. The whole strategy behind developing such tools is to allow migration of species and associated fluxes (e.g. energy). This migration modifies the impact of excessive human activity and development particularly in Europe on inter-connecting isolated species. The principle is obviously valid for both intra- and inter- state relationships.

The migration of bears from Bosnia is a good illustration. These large animals were victims of the conflict in that country; many bears were killed, some falling victim to mines, yet some of them managed to "escape" Bosnia and were found back north in Croatia and Slovenia. Now we have reports that these animals are slowly heading back to their original territory.

Other examples include features of particular importance split between two countries. The Bialowieza Primeval Forest spans both Poland and Belarus. The national park includes some of the few, if not the only remaining European wild bison. It is obvious that their population is very small and that any further fragmentation is undesirable. Similar examples can be found across virtually any border in Europe. Restricting an ecological network to one country makes little sense.

THE INFLUENCE OF CEECs AND ITS CONNECTION WITH THE EC

Inter-state collaboration within the EU is a novel concept. Co-operation between the EU and its neighbours (particularly the 13 Phare partner countries) is more recent yet nonetheless quite fruitful. The prospective EU Member States are sometimes taking the lead in realising ecological networks, and they certainly have the assets. Forest cover in many CEECs is much superior to the EU and it even includes a few strips of virgin forest. Other notable features are also present and are often in an untouched condition. The Baltic States – with a very low population density – are rich in wetlands and forests, Bulgaria and Albania have pristine mountains, Hungary and Poland host a large variety of birds. There can be unfortunate reasons for this situation as in some Baltic States, where large portions of the country were forbidden zones during the Soviet occupation, because of their proximity to the border.

Nature in the CEECs is often less fragmented, less degraded, less spoilt than in the more densely populated EU countries. Species that have long disappeared in the EU flourish in the CEECs. With proper migration corridors, along with the availability of shelter and protection in the EU, and with carefully designed reintroduction plans, we might hope to see the return of species long eradicated from our surroundings. Bears from Slovenia in the Pyrénées and lynxes from Slovakia in Germany are an example of such an endeavour.

The CEECs can bring back so many animals that are extinct in the EU, while preserving large strips of untouched areas "back home" so that future generations can see for themselves what Europe once looked like. One advantage that we have in this process, is that we currently have a synchronised approach to the creation of ecological networks in the EU and in the CEECs.

ECOLOGICAL NETWORKS IN THE CEECs

The 13 CEECs have all gone some distance down the road of designing an ecological network. Some countries are further ahead than some of their EU counterparts, while others are still dealing with more urgent problems. Various types of networks have been designed – and their implementation is being studied or is underway

Multi-species beech forest.

– in many of the CEECs. Implementation however can often lag behind the design of a network. Often the appropriate laws or regulations need to be put in place before a national government can actually implement the network, while in some cases there might be disagreements on its design. Nevertheless countries such as the Czech Republic, Estonia, Hungary, Lithuania, Poland and Slovakia, are actively pursuing the best design solutions for their networks. In all these cases, thorough reviews have been implemented of the national situation and available data. Based on these reviews and on national criteria, proposals have been submitted to public scrutiny.

The situation in other regions is less advanced. The legal framework is under preparation and the needs for monitoring and data production are being studied. Obviously, one of the main elements is public participation. We have seen that public participation can also reduce the need for monitoring and other costs and contribute to the establishment of a network design.

CONSERVATION OF FOREST GENETIC RESOURCES

The preservation of biodiversity is particularly relevant when we consider the fact that we do not know what demands we might make on current unexploited genetic resources. The huge variety of unknown characteristics hidden in species could provide a range of uses in manufacturing, medicine, chemistry, protection against pests and adaptation to changing conditions. One example is the adaptability that genetic variability could offer for a plant's response to climatic changes or to so-called "acid rain."

LEGAL FRAMEWORKS, CLASSIFICATION AND CONSERVATION OF FOREST GENETIC RESOURCES

Some of the Phare countries studied have a very long tradition of legislative guidelines dealing with reproductive material and seed procurement (Czech Republic and Slovakia for example have had this since 1938.) Some countries however, especially in the southern region, have yet to issue relevant legislation

covering gene resources, seed procurement and transfer. In some cases, as in Poland, seed legislation is valid for the state forests only and there are no binding regulations for private forests.
Most countries consider the stands approved for seed procurement to be the basic conservation units of forest genetic resources. They are usually classified into two categories: protected and managed, and extend to the size of a forest compartment (1 to 20 ha). Some countries also consider nature and forest reserves to be forest tree gene conservation units. There is no doubt these reserves provide effective gene conservation, especially where their areas are large enough. It should be noted, however, that the strict conservation areas (IUCN Category I) are fully excluded from forest management practices and no technical interventions are allowed within them thus prohibiting procurement of seed or other reproductive material.
There are also significant differences in *ex situ* conservation practices, which are frequently based on seed orchards, clone archives, and experimental plots. In most cases these are only of limited applicability for gene conservation due to the limited population sizes of the collected material. Forest seed banks were established in Bulgaria, the Czech Republic, Latvia, Poland, Slovakia and Slovenia and in Lithuania it is linked to seed bank for agricultural crops.

A review of practices in the Phare countries suggests that the national systems for the conservation of forest genetic resources often focus on the commercially important tree species. Special attention is paid to minor tree species is paid in Slovenia, Bulgaria, Hungary and the Czech Republic. In the remaining countries, only partial steps have been made in this direction. It should be noted, however, that the minor, scarcer species (noble hardwoods, wild fruit trees, etc.) are often much more vulnerable to inappropriate management, air pollution and the loss of natural habitats due to changes in site conditions.
It is especially in the south-eastern Phare countries that forest tree genetic resources of international importance can be found. Bosnia is the country of origin of a narrow endemic *Picea omorika* which is planted in parks throughout Europe. Bulgaria and FYRO Macedonia possess isolated natural occurrences of horse chestnut (*Aesculus hippocastanum*). Bosnia, Bulgaria, FYRO Macedonia and Albania are home to another three endemic conifers: Macedonian pine (*Pinus peuce*, syn. *heldreichii*), Bosnian pine (*Pinus leucodermis*), and hybrid Greek fir (*Abies borisii-regis*). All are typical of high amenity value trees and show extraordinary vigour and vitality - even when used for re-establishment of forests in polluted areas.
As regards trade in forest seed and reproduction material, it should be noted that large areas of semi-natural forests still predominate in the majority of the Phare countries, especially in the Carpathians and Balkans. This is already relatively rare in Western Europe.

From the point of view of gene conservation, it is important to preserve this indigenous gene pool and let it develop without interfering in natural selection, migration and mutation. This can be done in two ways: 1) by preventing plantings of imported seeds and plants of the species in question. 2) by establishing large nature reserves where human interference is not allowed.
One of the general recommendations to the Phare countries would be to be cautious especially with imports of seeds and plants of those tree species which are naturally rare and vulnerable, and where adequate conservation of the indigenous gene-pool has not yet been secured.

REVIEW OF FOREST TREE GENE CONSERVATION ACTIVITIES IN PHARE COUNTRIES

	AL	BG	BiH	CZ	EE	HU	LA	LI	FYROM	PL	RO	SK	SL
In-situ													
Approved seed collection stands, partly or fully protected	●	●	●	●		●	●	●	●	●	●	●	●
Gene Reserve Forests				●	●			●			●	●	
Plus Trees		●	●	●	●	●	●	●	●	●	●	●	
Other specific measures			●										
Ex situ													
Clonal archives		●	●	●	●	●	●	●		●	●	●	●
Seed Orchards		●	●	●	●	●	●	●	●	●	●	●	●
Generative reproductive plantations		●		●								●	
Seed/gene bank		●		●	●		●	●		●	(●)	●	(●)
Provenance trials		●	●	●		●	●	●		●	●	●	●

Specific measures: Bosnia & Herzegovina - protected natural populations of endemic Picea omorika and Pinus leucodermis. Seed banks: (●) Romania, Slovenia - seed stores with partial gene conservation purpose

GENE RESERVE FORESTS

A gene reserve forest is a native forest, where gene conservation of forest trees is implemented. It has to be large enough (usually over 100 hectares) to encompass natural genetic diversity, permit adequate internal pollination and allow the existence of several age classes. Management should ideally be kept close-to-nature in order to fulfil the priority objectives of ensuring the continuation of forest tree populations and not disturbing the natural evolutionary processes. A strict regime involving conformation to nature, large sizes and the inclusion only of semi-natural forests allows for conservation of entire ecosystems and their biodiversity. This therefore is what ranks the gene reserve forests among the most worthwhile conservation areas.

From among the Phare countries gene reserve forests should still be established in the national gene conservation systems of Albania, Bosnia and Herzegovina, Bulgaria, FYRO Macedonia, Hungary, Poland and Slovenia. Approved stands and nature reserves are often considered to be substitutes for gene reserve forests in several countries, but they can fulfil this function only if they are of adequate size and if the necessary legislation (both for forestry and nature protection) protects their use for long-term gene conservation. This is partially the case in Poland and Bulgaria, where the size and management of many protected seed stands fully match the requirements for gene reserve forests. The system of gene reserve forests could be established in almost all countries concerned if representative networks of the occasionally scattered conservation units were to be developed and close-to-nature management more strictly applied.

IN SITU CONSERVATION OF FOREST GENETIC RESOURCES IN PHARE COUNTRIES

Country	Approved seed stands partly or fully protected (number / area)	Plus trees (number)	Gene reserve forests (number / area)
Albania	88 / 5,818 ha*	-	*
Bosnia and Herzegovina	111 / 1,550 ha	245	4 / 16.3 ha*
Bulgaria	5,272 / 72,263 ha	7,200	84 / 62,500 ha
Czech Republic	53.282 / 146,204 ha	8,252/30 species	255 / 122,215 ha
Estonia	-	606	10 / 3,540 ha
Hungary	416 / 4,492 ha	1,190*	-
Latvia	*	940	23 / 5,487 ha
Lithuania	77 / 776.6 ha	801	206 / 9060.7*
FYRO Macedonia	57 / 540 ha	206	-
Poland	Total 246,800 ha*	5,296*/17 species	*
Romania	2,333 / 70,288	780	347 / 11,304*
Slovakia	13,737 / 55,509	3,204	68 / 23,694
Slovenia	404 / 2,800 ha	-	177/10,410*

* *Approved seed stands, plus trees.*
Hungary – only plus trees of poplars and oaks in clonal archives
Poland – total area of registered seed stands includes 1,070 fully protected stands with area of 15,847 ha
Plus trees include 538 tested elite trees

* *Gene reserve forests:*
Albania – Gene reserve forests included in the Integrated Nature Reserves as species management areas
Bosnia and Herzegovina – Protected natural populations of Picea omorika and Pinus leucodermis
Lithuania – Gene reserve forests include strict gene reserves (4 / 5,904 ha) and other small-size reserves (202 / 3,156.7 ha)
Poland – considerable part of approved seed stands fulfill criteria for gene reserve forests
Romania – area of strictly protected nuclei of forest gene reserves
Slovenia – network of forest reserves as gene reserve forests and for research

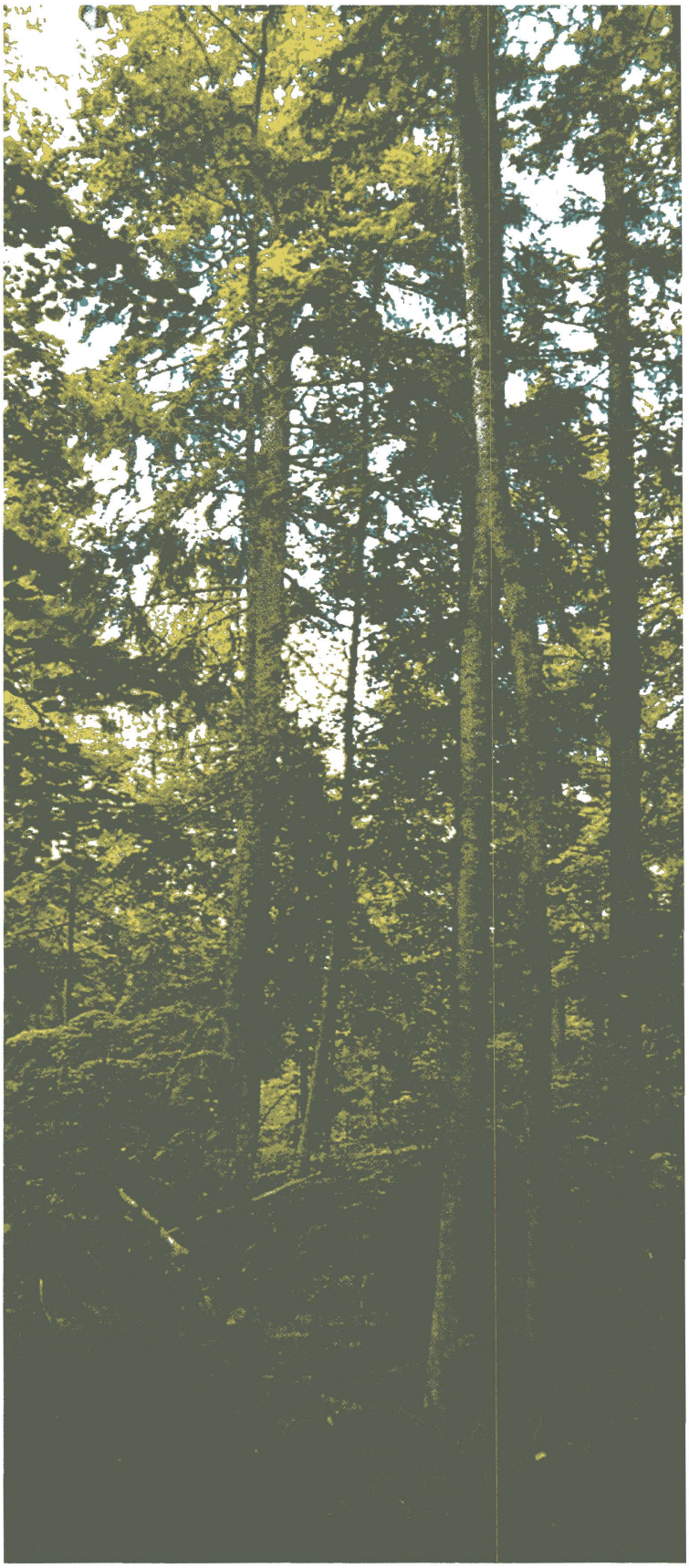
THE CONSERVATION OF GENETIC DIVERSITY IS OF CROSS-BORDER IMPORTANCE

Most of the Phare countries actively participate in the EUFORGEN programme aimed at international co-operation in the field of forest gene resource conservation and utilisation. For those that have not been able to join the programme yet due to the difficult economic situation, post-war adjustments or political problems (Bulgaria, FYRO Macedonia, Bosnia and Herzegovina, and Albania) participation could help to stabilise their national capacities and improve information transfer and knowledge levels in the national forestry institutions.
There is generally a high degree of variation in legislation between these countries accompanied often by the lack of compatible national directories of forest tree genetic resources based on standard international nomenclature.

ADDITIONAL IMPORTANT ELEMENTS

When reviewing the most important problem areas in the area of biodiversity, the Phare countries generally identified the demonstration of sustainable forest management and biodiversity preservation in specially designated demonstration forest areas as an important priority. This would include:

- Establishment of demonstration areas on sustainable forest management and biodiversity protection for production forests, protective forests and forests of nature conservation areas;
- Harmonisation and enforcement of legislation concerning biodiversity protection in forest ecosystems.
- Optimisation of the structure and organisation of management of National Parks, nature reserves and protected areas;
- Restoration in man-made forests: monocultures, reforested agricultural lands, degraded forest types - in various climatic conditions /forest zones;
- Development of operational level guidelines for forest biodiversity mapping and protection, including storage systems for and the use of data; practical assessment and protection of biodiversity especially in rare and other vulnerable forest areas (e.g. floodplain forests and wetlands).



Ancient forest in Järvselja (Estonia).

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Chapter 4

PROTECTION AND MONITORING OF FORESTS

The aim of this section is to give a basic insight into the general health of the CEE forests, to describe the threats to their well-being and provide information on damage from different causes. Such damage may be due to factors such as insects or diseases, high winds, the effects of game and grazing, or it may stem from air pollution, forest fires, illegal felling or other human intervention, such as agriculture, recreation or war. The type of damage and its extent, resulting in the loss of vitality, productivity, or even in the death of forests, is closely linked to the internal environmental stability of particular forest areas.
Information on forest condition and protection is one of the key parts of the annual forestry reports of nearly all the Phare countries. The assessment of forest health and forest damage is an intrinsic part of regional and local forest inventories and they also include information on the occurrence of harmful factors and pests.

INTERNAL FACTORS INFLUENCING THE ENVIRONMENTAL STABILITY OF FORESTS

THE COMPOSITION OF TREE SPECIES

Species composition varies from country to country and in several countries (especially in the central region), non-native species prevail in more than half of the total forest area. Forest stands with changed tree species composition are usually even aged, because they are generally established as plantings after clear-cutting the old stand. In contrast, natural regeneration of the existing forest more often occurs in smaller segments of different ages.
It is generally recognised that ecosystems with a semi-natural structure are often more stable and resilient. In countries such as the Czech Republic and Poland the stability of forests has been reduced as the tree species composition has changed, often in favour of non-native, man-made forests. This is also found to be the case regionally and to a lesser degree in Romania, Bosnia, Latvia, and Lithuania.
The evaluation of forest damage is often assessed on the basis of knowledge of the age structure or the diameter structure in uneven aged forests. These structures vary considerably between countries, for example younger classes of trees which are more resistant to unfavourable environmental conditions prevail in Hungary. Similar age structures are typically found in Poland, Latvia, Lithuania and Estonia.
Separate assessments of forest health and damage to forests should be done for high forests and for coppice. Due to the different ecology of high and low forest, it is difficult to compare the degree and intensity of forest damage between northern and southern Phare countries. Countries with a large proportion of forest in the older age classes will often be considered as having a higher level of damage than countries with a preponderance of younger forest. This pattern will change naturally over time, as the age composition changes.

DAMAGE TO FORESTS BY BIOTIC AND ABIOTIC FACTORS

Biotic factors include other living organisms, such as browsing animals, insects and plants like weeds and in particular fungi.
Abiotic factors include for example frost, snow, drought, wind, fire and air-pollution

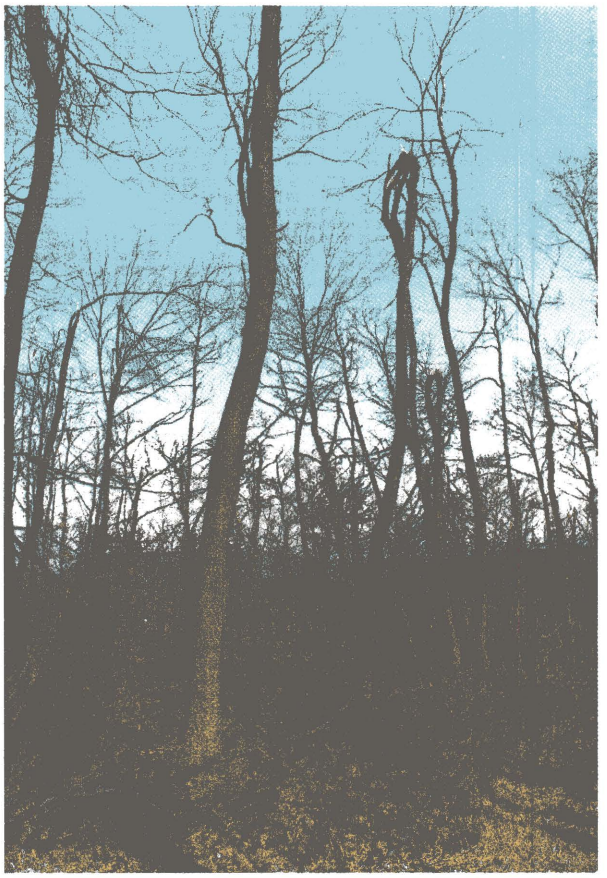
The following types of damage have been encountered in Central and Eastern European forests:

- Serious damage by insect pests or diseases
- Damage by high winds
- Damage by game and/or grazing
- Damage due to air-pollution
- Other man-made damage (such as illegal felling, agriculture, recreation, war...)
- Fire damage

HIGH DAMAGE LEVELS AND SUSTAINABLE FOREST MANAGEMENT

High winds, snow, frost, and insect pests are the most important causes of damage to forests and generally seem to be on the increase. They are however frequently only the final cause of forest destruction, and are often preceded by the accumulation of several predisposing factors such as a change in forest structure, severe and long-term air pollution, and abnormal climatic situations. The incidence of windthrow, for instance, is apparently higher in even aged forests where the tree species structure has changed. This is particularly the case for Norway spruce, which has a flat root system and therefore a lower stability in high wind than for example Scots pine, larch or oak.

Air pollution still represents the most important stress factor for forests in the central region of the CEE countries such as in the Czech Republic, in Poland and in Slovakia. At a more specific regional level, significant air pollution is recorded in Romania and Bulgaria, mainly due to the Maritsa East power station in Bulgaria, which is the largest generator of sulphur emissions in Europe.



Forest damage because of rime (Hungary).

Damage due to conflict in a Bosnian village.

AREAS OF SERIOUSLY DAMAGED FORESTS[1]

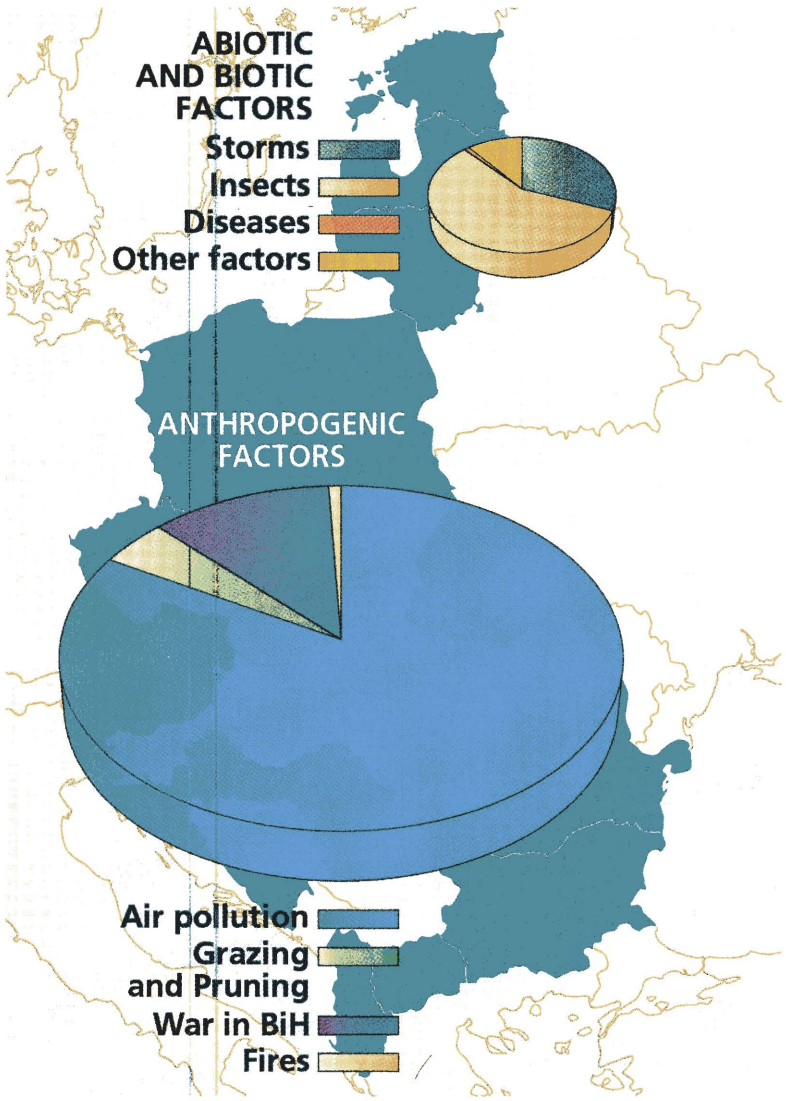
The area of forest seriously damaged by storms, insects, diseases, fires and other biotic and abiotic causes, accounts for approximately 1.1 million hectares or 2.8% of the total forest area in the Phare countries.

Of this total, storms account for 342,000 hectares, damage caused by insects 630,500 hectares, and decline due to disease makes up at least 11,000 hectares of the total damaged area. In the Czech Republic, Romania, Slovakia, and in Slovenia, considerable damage by snow and frost has been recorded in recent years[2].

Damage due to human factors affects approximately 3.2 million hectares of forests (approx. 8% of total forest area), of which 2.85 million hectares is damage by air pollution. Another important factor in this category must be mentioned, namely the consequences of the war in Bosnia which has left an area of 400,000 hectares of mine-fields in both entities of Bosnia and Herzegovina. Serious damage by grazing and pruning is reported on 150,000 hectares of forest area in the Phare countries, with exceptionally severe occurrences in Albania.
The yearly total of burnt forest accounts for 27,000 hectares. Illegal felling accounts for only a few per cent of the total annual cut, with the exception of Albania where the proportion is close to 40%. It is of increased importance also in Bosnia and Herzegovina

where it made up 42% of the incidental felling and represented almost 7% of the total annual cut in 1990[3].

Combination of data on the areas and volumes shows clearly that the countries with the highest felling of losses (Czech Republic, Poland, Slovakia, Slovenia, Romania) encounter also the largest forest damage by air pollution, frost, snow, and insect pests.



Extent of the damage to forests in Phare countries.

Deforestation (illegal cutting) near to accessible and inhabited areas in Bosnia is a severe threat to the sustainability of forests, but a unique source of revenues and fuel for war struck populations.

FELLINGS OF LOSSES AND INCIDENTAL FELLINGS

In the Phare-countries, in common with forestry practise elsewhere, felling takes place according to a plan based on economic judgements and considerations as to the stability of the forest. Unintentional fellings, i.e. fellings of losses and unplanned fellings, due to damage of a biotic or abiotic character result in severe economic losses and lower stability, because the forest is exposed to a higher risk of windthrows often followed by insect attacks.

Very high felling of losses or unplanned felling is a long-term problem especially in the Czech Republic, in Poland, in the Slovak Republic, and also in the Slovenian, Romanian and Lithuanian forestry sectors. The high proportion of incidental felling found in Albania should be treated with caution since it probably equates almost entirely to illegal cutting.
When looking at the contribution of individual damaging factors in the total felling of losses, a number of trends can be extracted. In the Baltic countries insect pests and diseases appear to be the most significant factors in this category. In the Czech Republic, Slovakia, Slovenia and Romania, abiotic damage, such as high winds, snow and frost is most

PROPORTION OF FELLING OF LOSSES OR INCIDENTAL FELLING ON THE TOTAL ANNUAL CUT.

Country	AL	BiH	BG	CZ	EE	HU	LA	LI	FYROM	PL	RO	SK	SL
Reference period	94	90	96	90-96	95	96	96	91-96	95	96	90-96	90-96	96
Proportion	40%	16%	16%	60%	8%	12%	21%	30%	13%	36%	30%	53%	47%
Short-term trend	↗↘	↗		S	↗	S	S	↗	↗↘	S	↗	↗	↗
Long-term trend	↘	↗		↗	↗	↗	↗	↗↘	↗↘	↗	S	↗	

↗ *increase,* ↘ *decrease, S: stable, whitebox: no data available.*

significant, especially in forest stands where tree species composition has changed and in the mountain forests. In South-eastern Europe we typically find more frequent damage by fires, such as recorded in FYRO Macedonia and in Bulgaria. In Albania illegal cutting, grazing and intensive pruning of forest trees for fodder are common and the illegal cutting of forests has also been identified as a consequence of the war in Bosnia and Herzegovina.

Severe windthrow (November 5, 1995) in a 115 year old spruce stand in the Covasna Forest Range, Romania.

FOREST FIRES

The largest areas of burnt forests are recorded each year in the south - in Bulgaria and FYRO Macedonia. A high incidence of fires affecting relatively large areas of forests is reported also from Poland. In the reference period 1990-1995 the number of forest fires was increasing in Albania, Poland, in the Czech Republic and in Slovakia. Fortunately, this trend does not seem to be continuing and decreases have been reported in Estonia, Lithuania, FYRO Macedonia and Slovenia in 1995-1996. However there has been a series of large forest fires in Bulgaria, Czech Republic, FYRO Macedonia, Poland and Slovakia the most severe being in 1992-1993[4].

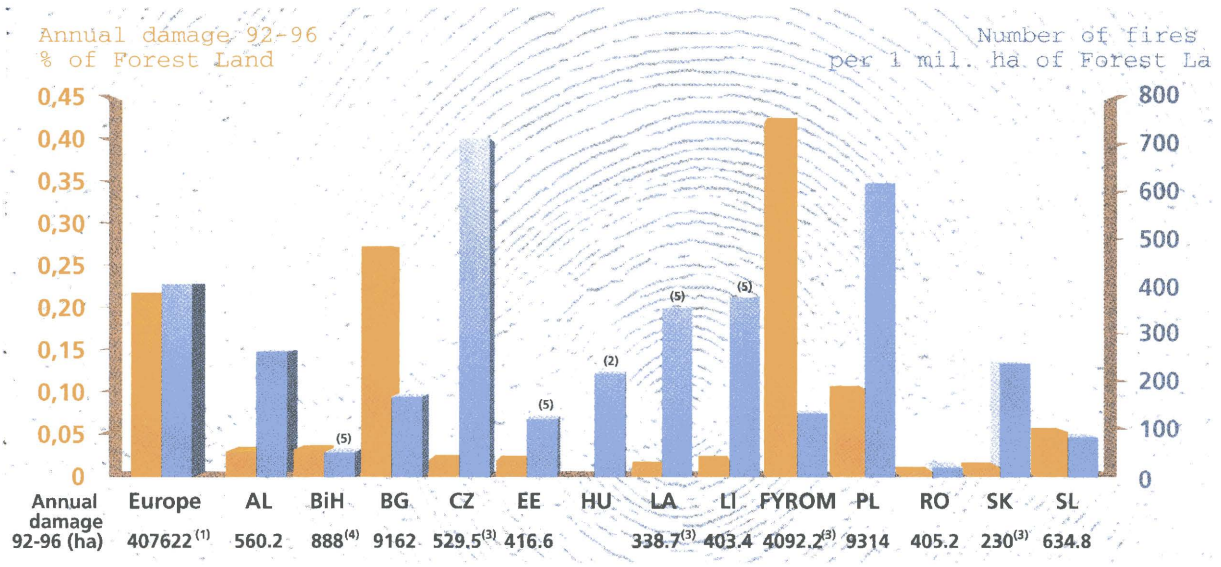
SPECIFIC FOREST DAMAGE

The decline of oak is an example of chronic forest damage, a phenomenon that accelerated especially in the 1980s and is still to be found throughout Europe. Among the Phare countries, Hungary and Romania seem most seriously affected by this type of damage. This is also a worrying example of another classification of specific damage - that of an indigenous tree species in its natural ecological environment.

Disturbances in tree nutrition and nutrient balance are regarded as indirect forest damage, being caused by the high deposition of air pollutants, especially of nitrogen and forest soil acidification. Poland, the Czech Republic, Slovakia and Slovenia seem to have been hardest hit by this imbalance due mainly to air pollution with nitrogen oxide deposition exceeding 20 kg/ha/year in some of these countries, well above the toxic levels. In the Czech Republic, examples of damage to conifers as a result of nutrition disturbances have been shown up by a change of needle colour in such tree species as Norway spruce and Scots pine.

The increasing incidence of climatic extremes is known to have a particularly harsh effect on those forests that are already affected by air pollution, those that have undergone changed tree species composition and those that have been inappropriately managed. These climatic extremes have accounted for direct damaging factors like drought, heavy snow and frost and have been catalysts of insect depredation at the beginning of the 1990s in the Czech Republic, Slovakia, FYRO Macedonia, as well as in Bosnia and Herzegovina more recently .

ANNUAL DAMAGE BY FOREST FIRES IN PHARE COUNTRIES, AVERAGE 1991-1996 (SOURCE: FOREST FIRE STATISTICS, ECE/TIM/BULL/47/4, 48/4, 49/4)



[1] *Summary for Europe without former USSR, Yugoslavia, Hungary and Ireland (forest areas adopted from KUUSELA 1994)*

[2] *Hungary: Indicative data, no official statistics available*

[3] *Czech Republic, Latvia, FYRO Macedonia, Slovakia: 4-year average 1993-1996*

[4] *Bosnia and Herzegovina - 3-year average 1993-1995*

[5] *Bosnia and Herzegovina, Estonia, Latvia, Lithuania - 5-year average 1992-1996*

AIR POLLUTION AND ITS EFFECTS ON FORESTS

Man-made emissions especially of sulphur and nitrogen persist in the atmosphere chemically unchanged for up to 3 days. The primary polluting agents then move with the air and affect large areas of forests. The graphic representation below provides a summary of the volumes of basic air pollutants emitted in the Phare countries in the two reference years, 1980 and 1994. Two principal conclusions can be drawn from the comparison between 1980 and 1994:

- The national emissions of sulphur oxides decreased considerably over this period, in many cases by 50%.
- Only moderate decreases in nitrogen oxides and ammonium were recorded. These emissions have shown an increase in Poland, which releases the largest quantity of nitrogen compounds of all the Phare countries.

NATIONAL EMISSIONS OF SULPHUR, NITROGEN OXIDES AND AMMONIUM (1,000 TONS PER YEAR IN TERMS OF PURE NITROGEN) IN THE PHARE COUNTRIES

Country	Sulphur oxides		Nitrogen oxides		Ammonia	
	1980	1994	1980	1994	1980	1994
Albania	60	60	9	9	25	25
Bulgaria	1,025	742	127	100	266	120
Bosnia and Herzegovina	..	..	..	..	..	..
Czech Republic	1,128	635	285	112	86	76
Estonia	138	70	22	13	24	24
Hungary	816	370	83	56	140	115
Latvia	58	58	28	28	31	31
Lithuania	111	111	48	48	69	69
FYRO Macedonia	..	..	..	..	..	..
Poland	2,050	1,302	374	336	45.3	316
Romania	881	280	112	135	306	306
Slovakia	390	116	60	53	51	39
Slovenia	118	88	15	20	22	22

Source: Forest Conditions in Europe, 1997.

Acid rain and its effects on forests

When the air pollutants SO_x (SO_2 and sulphate), NO_y (NO_x, nitric acid and nitrate) and NH_x (NH_3, and NH_4 ammonium) are deposited on the surface from the atmosphere, a number of problems arise which are often referred to as acidification.

The accelerated release of these pollutants to the air by the combustion of fossil fuels and other industrial materials leads to a significant increase in the atmospheric loadings of these gases which then start combining with water to be converted to sulphuric and nitric acid. These strong acids are highly ionised and in consequence the concentration of hydrogen ions in the atmosphere is greatly increased. Acidity is a measure of the concentration of hydrogen ions. These processes therefore lead to an increase in atmospheric acidity. This acidity is in turn deposited in ecosystems by rain, snow and fog or by dust, with the latter capable of contributing up to 50% of the deposition of acidity. Acid rain can also result from the release of chlorine and hydrocarbons into the atmosphere.

Acid deposition in Europe originates mainly from pollutants coming from European emissions resulting largely from the combustion of fossil fuels (SO_2 and NO_x) and agricultural activities (NH_3). Today, more than 70% of the total atmospheric SO_2 emissions stem from coal combustion in thermoelectric power plants while motor vehicles account for about 50% of total atmospheric NO_x emissions in Europe[5].

Due to the spatial distribution of the emissions and the difference in their chemical composition, the relative contribution of these pollutants to the overall deposition of acid across Europe varies. In Central and Eastern Europe for example sulphur is predominant, whereas in Western and Southern Europe NO_x is more important.

Nowadays emphasis would be laid on the fact that it is not the acidity of the precipitation itself that causes the main concern but rather the acidification of particular ecosystems, such as soils and water. In such cases an imbalance occurs between the total deposition of sulphur and nitrogen by precipitation and dry deposition, which affects the ecosystem's capacity to use the compounds and to cope with the direct exposure of the vegetation to atmospheric pollution. There is clear evidence for example of acid deposition leading to accelerated leaching of calcium out of forest floors.

Many ecosystems but especially forests, are buffered against acid rain, as their chemical systems are able to resist change in the concentration of various ions in solution, without significant change in their pH which is the measure of acidity. It is clear however that acidic precipitation has a direct effect on vegetation, including for example accelerated foliage leaching, disturbance of metabolism, interference with reproduction and increases in susceptibility to other stresses[6].

The recognition that acid deposition can cause an important threat to ecosystems has led to a series of international initiatives to reduce emissions. These will be discussed below.

CO-ORDINATION STRUCTURES AND MONITORING SYSTEMS

In the middle of the 1980's public attention was drawn to the problem of increased forest degradation in some Central European countries and other parts of Europe. This stimulated a number of research projects, mainly at the instigation of Germany and the Nordic countries and led to the development of national survey methods to quantify forest and tree conditions. There were problems however in comparing the results of the different surveys and it was not until 1985-1986 that a harmonisation process was started. This is when the Executive Body for the Convention on Long-Range Transboundary Air Pollution of the UNECE established the International Co-operative Program on Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests). A transnational EU survey was then initiated under Council Regulation 86/3528/EEC which led to the development of a periodic inventory of forest damage.

The co-ordination of activities at European level for the protection of forests against atmospheric pollution is now the responsibility of two framework structures:

1. The Convention on Long-range Transboundary Air Pollution (CLRTAP), the first internationally binding instrument to deal with problems of air pollution on a broad regional basis. The Convention's work was based on national monitoring inputs and was partly funded by UNEP between 1985 and 1990.

The Convention established the International Co-operative Program on Assessment and Monitoring of Air

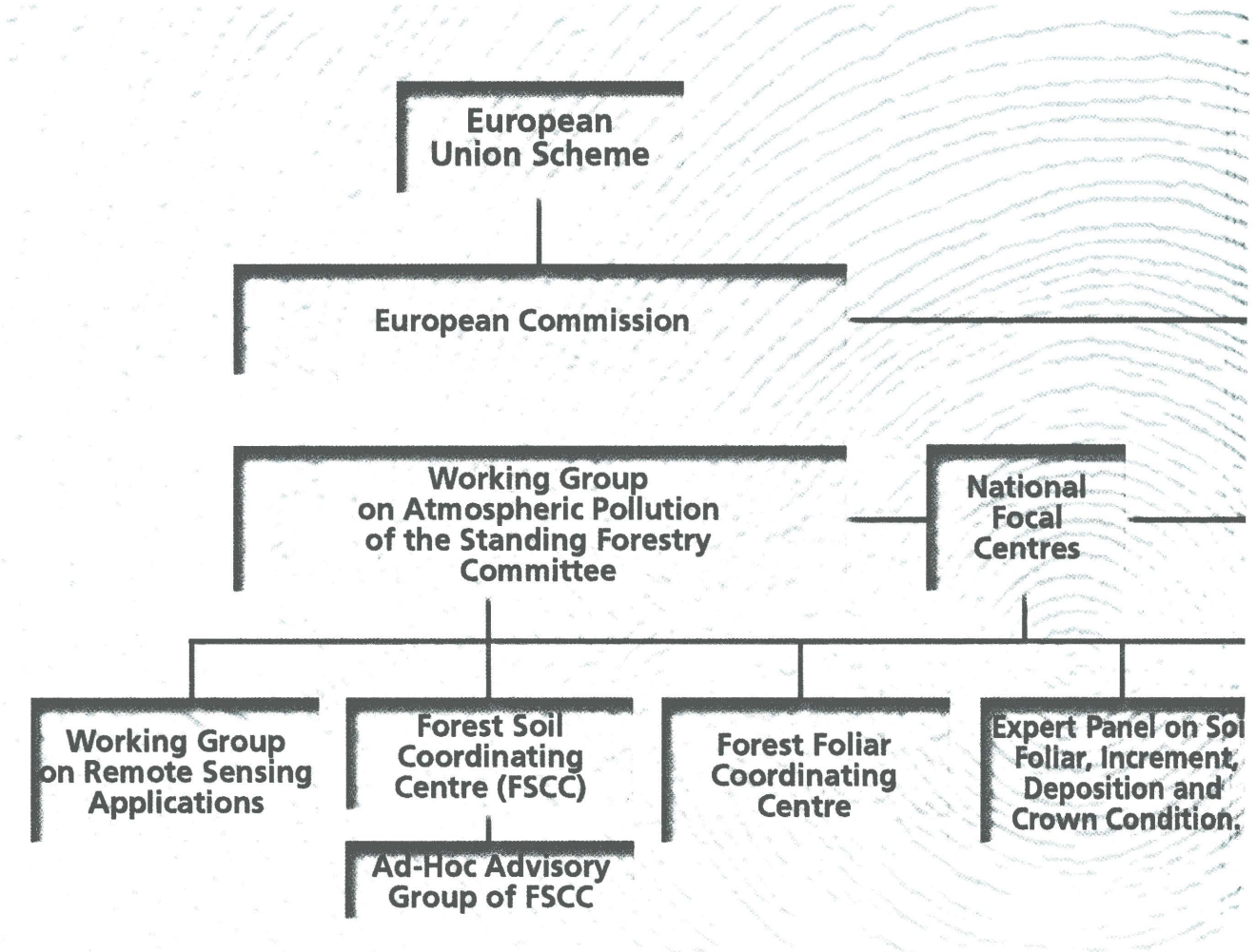
Pollution Effects on Forests in 1985 in the UN-ECE region. ICP Forests, as it is known, was set up to meet the need for sophisticated information on forest condition in response to the widespread damage to forests in the 70s and early 80s.

2.The EU Scheme on the Protection of Forests against Atmospheric Pollution (EEC Regulation 3528/86) established in order to protect the EU forests against atmospheric pollution and to contribute, in particular, to safeguarding the protective potential of agriculture. Member States are encouraged to carry out field experiments and pilot projects to:

- improve methods for observing and measuring damage to forests;
- increase the understanding of atmospheric pollution in forests and its effects on forests;
- devise methods of maintaining and restoring damaged forests.

In order to support the implementation of the European Union Scheme, the Standing Forestry Committee's Working Group on Atmospheric Pollution was established, in which the Member States were represented. This led to the development of methods for the establishment of a periodic inventory (laid down in Commission Regulation (EEC) N° 1696/87) and a systematic grid of observation plots (16x16 km), as well as the start of a yearly crown condition assessment based on a common methodology[7].
In 1992 this scheme was further extended to include intensive monitoring through the adoption of Council Regulation (EEC) N° 2157/92. This decision was intended to provide a better understanding of the impact of air pollution and other factors on forest ecosystems.
Further incentives to reinforce research and monitoring of forest health in the European countries was given by the Ministerial Conferences on the Protection of Forests in Europe which took place in Strasbourg 1990. Resolution 1 of this Conference supported the development of a European network of permanent sample plots for monitoring of forest ecosystems.

INTERNATIONAL CO-OPERATION IN THE FIELD OF PROTECTION OF FORESTS AGAINST POLLUTION



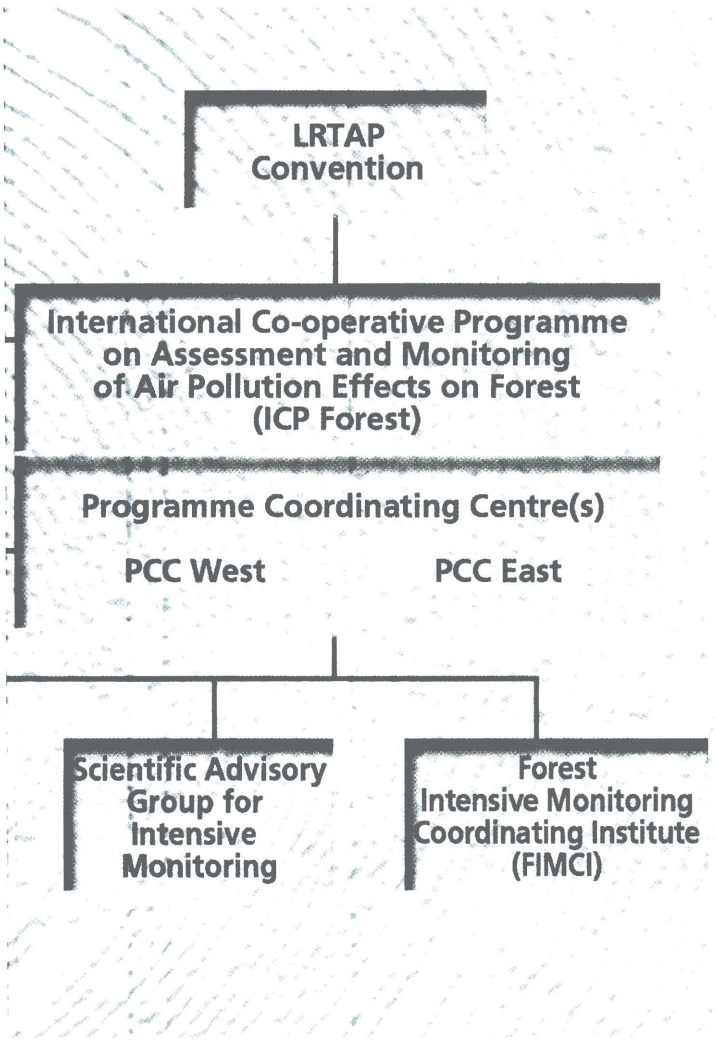
INTERNATIONAL CO-OPERATIVE PROGRAM ON ASSESSMENT AND MONITORING OF AIR POLLUTION EFFECTS ON FORESTS IN THE UN-ECE REGION – (ICP FORESTS)

The ICP forests is one of six co-operative programs within the Working Group "Effects", one of four subsidiary bodies of the Convention on Long-range Transboundary Air Pollution. Ten CEE countries joined the ICP Forests between 1986 and 1991. Information on forest health from a large part of former Yugoslavia, signatory country of the Strasbourg Resolution 1, is still missing. Albania has been participating in the ICP Forests scheme in the framework of the Forestry Development Program of the World Bank[8].

Within the ICP Forests, the annual forest tree crown condition assessment is conducted in a uniform 16x16 km trans-national grid composed of more than 5,000 plots over the whole of Europe. Mandatory and optional investigations have been carried out in the monitoring plots of Levels* I, II and III. Thirty-one countries participate in the Level I monitoring. Besides the Crown Condition Assessment, Expert Panels on Forest Soils, Foliar Analyses, Increment Analyses and Deposition were established. For co-ordination and evaluation of soil data, a Forest Soil Co-ordinating Center was set up in 1993. Following a similar rationale, the Forest Intensive Monitoring Co-ordinating Institute (FIMCI) was established in 1994. This institute is also a consultative body to the EC DG VI for management and evaluation of data of the Pan-European Program for the Intensive Monitoring of Forest Ecosystems, which partially corresponds to the ICP Forests.

The Environmental Monitoring European Program, (EMEP), is another monitoring scheme that provides an important source of information on air pollution and its effect on forest health. Similar to the ICP Forests, the EMEP is one of four subsidiary bodies of the Convention on Long-range Transboundary Air Pollution. The task of the EMEP is to keep and process basic data on air pollution, which is essential for the evaluation of the effects of air pollution on forest ecosystems. Since the beginning of the 1980's it has made available data sequences for the main air pollutants for the majority of European countries.

An extension of the monitoring network to include Central-Eastern European Countries was made with the assistance of the Nordic Council of Ministers and its first monitoring cycle was completed in 1990-1991. From among the CEE countries, it covered only the Czech Republic, Poland, Slovakia, and partly Romania. The second monitoring cycle 1995-1996 also covered Estonia, Latvia, Lithuania, Slovenia and a large part of Romania. The monitoring technique is based on the fact that concentrations of heavy metals in mosses are closely correlated with their atmospheric deposition.



AIR POLLUTION LEVELS

A number of trends have been compiled (on a regional basis in Central and Eastern Europe) of the effects of air pollutants on forests, within the framework of the EMEP Program and ICP-Forests defoliation monitoring[9]. Air pollution levels in the Central region seem comparatively the highest. Critical levels of gaseous pollutants (O_3, SO_2, NO_X) and the total critical load of sulphur and nitrogen have generally been exceeded in most of the central region countries.

CURRENT TRENDS IN POLLUTANT CONCENTRATIONS AND DEPOSITIONS:

Sulphur -: Overall concentrations of sulphur oxides seem to have generally decreased by 30-50% in the past decade and the wet deposition of sulphur oxides has seen a reduction by 20-40%, accompanied by less acidic water precipitation.

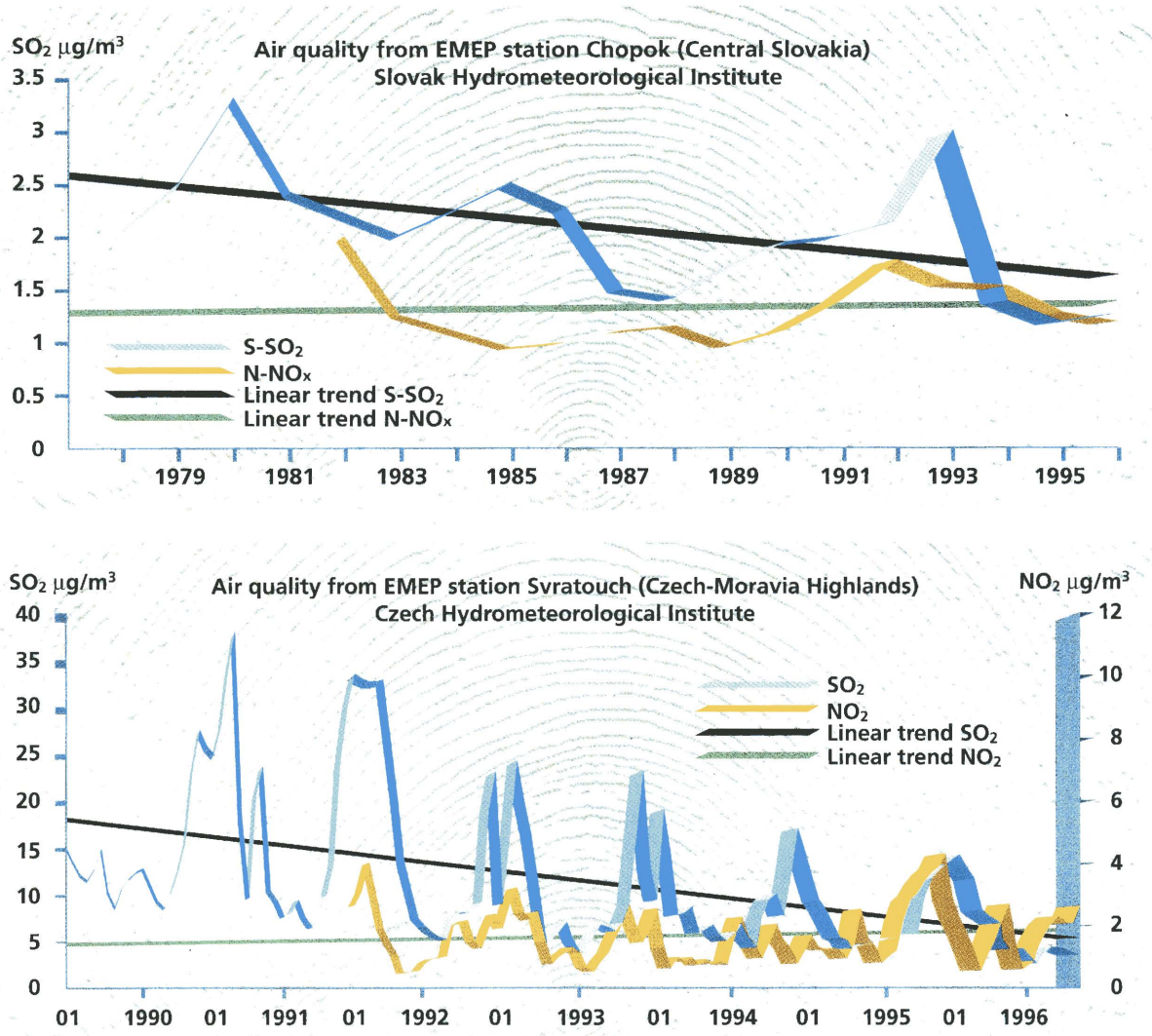
Nitrogen -: There does not seem to be a clear general

	Northern CEECs Estonia, Latvia, Lithuania, northern Poland	Central CEECs Czech Republic, Poland, Slovakia, Hungary	South-eastern CEECs Romania, Bulgaria, Bosnia,FYRO Macedonia, Albania + Slovenia
SO_2	low	significant	significant
NO_2	low	significant	low
NH_3	low	low	low
Ozone	significant	significant	significant
Excess of Critical Loads of Nitrogen	significant	very significant effects	low
Excess of Critical Loads of Sulphur	significant	very significant effects	low

trend in the concentrations of nitrogen compounds in the atmosphere, apart from a slight increase observed in some regions, most probably due to an increase in car traffic. Similar considerations apply to the wet deposition of nitrogen which remains generally unchanged or shows slight increases locally.

Tropospheric ozone: Ozone is a secondary product of photochemical reactions in the atmosphere associated with air pollution. It is of growing importance as, since the establishment of the EMEP, its average concentrations were annually increasing by 0.5 ppb. In recent years, the increases have slowed down or almost stopped.

CONCENTRATIONS OF SO2 AND NOX RECORDED IN TWO REGIONAL EMEP STATIONS IN CZECH REPUBLIC AND SLOVAKIA BETWEEN 1990 AND 1996



Chopok, Central Slovakia, 2,000 m a.s.l., Svratouch, Eastern Bohemia, 600 m a.s.l.
Results: SO_2 decreasing, NO_x unchanged or slightly rising.

THE EFFECTS OF AIR POLLUTION ON FORESTS OF THE PHARE COUNTRIES

There are large differences in the levels of forest defoliation found in the different Phare countries. Average defoliation levels in Poland, the Czech Republic, Slovakia and Bulgaria have been found to be the highest in Europe, whereas in all the other Phare countries fairly low defoliation levels are typical. A comparison between 1990 and 1996 indicates that whereas there is a general improvement in many Phare countries, this is not the case for those with the highest defoliation levels. As a general trend conifers show higher defoliation than broadleaved tree species, and their condition has on the whole deteriorated in Bulgaria, Czech Republic and Latvia, whereas the condition of broadleaves seems to have improved in most countries.

PROPORTIONS OF FOREST TREES WITH MORE THAN 25% DEFOLIATION IN 1990 AND 1996[10]

Country	Defoliation (more than 25%)					
	All species		Conifers		Broadleaved	
	1990	1996	1990	1996	1990	1996
Albania		10.5*		10.6*		10.4*
Bulgaria	29.1	39.2	37.4	46.5	17.3	33.0
Bosnia and Herzegovina	10.0*		13.0*	6.0*		
Czech Republic*	45.3*	71.9	46.3*	74.9	37.6*	34.0
Estonia*		14.2	20.0	14.6	5.3	
Hungary	21.7	19.2	23.3	17.8	21.5	19.5
Latvia	36.0	21.2	12.8	25.1	27.0	11.4
Lithuania	20.4	12.6	22.9	12.9	15.8	12.2
FYRO Macedonia						
Poland	38.4	39.7	40.7	40.5	25.6	37.4
Romania	13.0*	16.9	11.0*	10.4	14.0*	18.7
Slovakia	41.5	34.0	55.5	41.0	31.3	28.0
Slovenia	18.2	19.0	24.6	26.0	4.4	15.0

**Albania - 1997; Bosnia and Herzegovina - 1988; - Czech Republic - 1991; Romania - data for 1990.*

Due to methodological constraints, the results of the ICP Forest monitoring provide only a partial insight into the health of forests at a country-specific level, whereas these results seem more reliable on a regional level. This might be partly because the study plots in small and medium size countries are not numerous enough to provide a reliable estimate with reference to the variation of forest sites and other environmental conditions. Also monitoring plots may not be representative of all forest types and strata, (e.g. the age structure may distort the picture - younger trees generally being more healthy than older ones) and defoliation alone is not considered a universal parameter of tree health.

FOREST SOIL CONDITION MONITORING WITHIN ICP FORESTS

A central forest soil database with information on 4,532 plots in 23 countries, 15 of which are EU members has already been established under the ICP Forests, and will be extended by more than 1,000 plots from 8 additional countries. Most monitoring plots are situated at the intersection points of a 16x16 km grid. Information from only 5 Phare countries, namely the Czech Republic, Hungary, Lithuania, Slovakia and Slovenia was included in its first monitoring report[11].

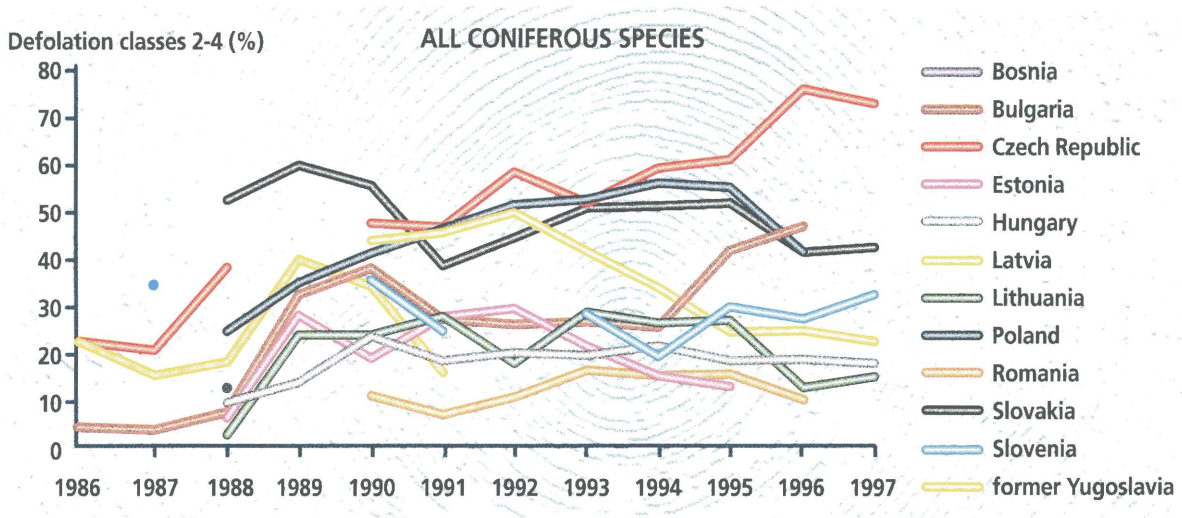
Considering the fact that there has only been one round of soil analyses conducted up to now, no far-reaching conclusions concerning the effects of air pollution on forest soils can be made. Nonetheless, higher nitrogen contents in the organic layer of forest soils were found in areas receiving a high atmospheric deposition load as compared to other parts of Europe. Atmospheric deposition has also led to the occurrence of high levels of heavy metals in industrialised areas. Contaminated forest soils are commonly found in the Central European region - the Czech Republic, Poland, Slovakia and surprisingly, also in Lithuania where depositions of zinc, lead and cadmium have been recorded.

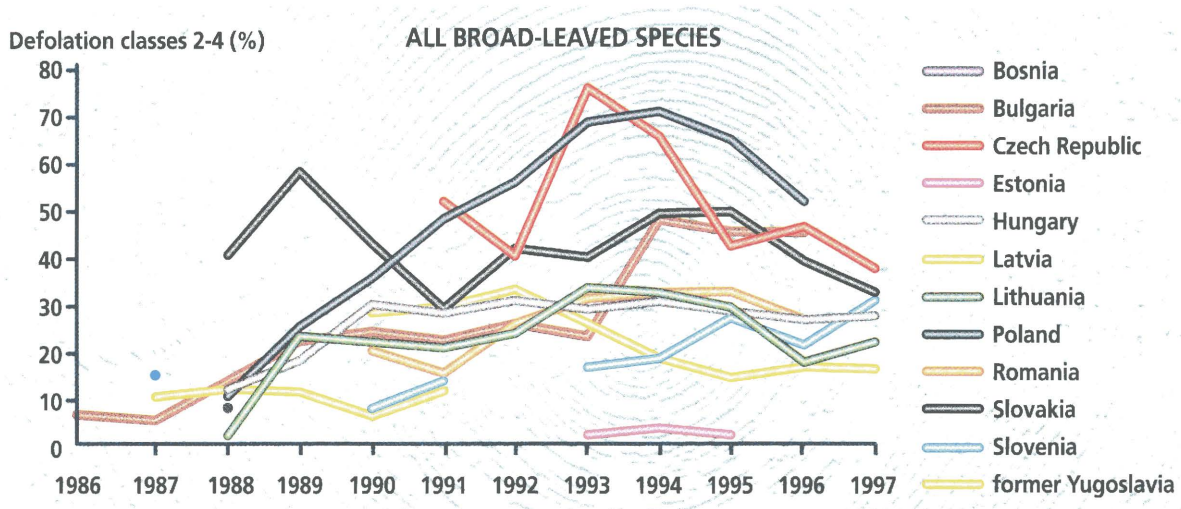
MONITORING OF HEAVY METAL DEPOSITIONS

The first inventory that took place in 1990-1991 revealed very high heavy metal pollution in Poland and Slovakia. The concentrations of copper, zinc, lead, nickel, mercury, and arsenic in the mosses from the

industrial regions of the Polish and Czech Silesia (South-western Poland, North-eastern Czech Republic) and central Slovakia, were found to be the highest in Europe. These results strongly support the conclusion that the area constitutes a second "Black Triangle" in Central-Eastern Europe.
During the second monitoring cycle in 1995-96[12], heavy metal pollution was found to have decreased in the regions of Polish and Czech Silesia, and northern Slovakia, although the loads remained relatively higher there in comparison with other areas. A very high accumulation of heavy metals was also found in the Polish and Slovak mountains, southeast of Silesia. As there are no larger local emission sources, this pollution must be due to long-distance transfer by prevailing north-west winds. An additional occurrence of heavy metal pollution was detected in northern-central Romania with high levels of pollution by copper, chromium, nickel, lead and vanadium.

PERCENTAGES OF SERIOUSLY DEFOLIATED CONIFER AND BROADLEAVED TREE SPECIES (DEFOLIATION MORE THAN 25%) DURING THE PERIOD OF ASSESSMENT IN PHARE COUNTRIES





AIR POLLUTION FORECASTS IN THE PHARE COUNTRIES:

• Concentrations of sulphur compounds in the atmosphere will probably remain at the level of the mid-nineties in the future. In view of the expected economic growth, any further decrease of these pollutants is not likely in the CEE region. High concentrations of sulphur oxides and deposition of sulphur will remain significant polluting agents especially in the central CEE countries.

• As a general trend, concentrations of nitrogen compounds in the atmosphere have not decreased. In the coming period, the nitrogen cycle will play a key role in the nutrient balance and health of forests influenced by air pollution. On the one hand nitrogen is a necessary and important nutrient, which promotes health and growth, on the other hand, above a certain level the concentrations are toxic.

• The occurrence of high levels of heavy metal pollution could continue to be important in northern Bohemia, in the cross-border region of southern Poland, in the north-eastern region of the Czech Republic, in northern Slovakia, and in the northern and central regions of Romania.

• Ozone concentrations will probably continue to increase in the region in the coming years. In years with less sunlight (i.e. photochemically unfavourable years), this pollutant is especially likely to damage the mountain forests.

Convention on Long-Range Transboundary Air Pollution - International Cooperative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests) and EU Scheme on the Protection of Forests against Atmospheric Pollution

The Objective of the Pan-European Monitoring System is, in relation to the protection of forests, a deeper insight into the functioning and change of the forest ecosystem.
In complex and hierarchically ordered ecosystems like forests, predominantly non-linear reactions to external stress such as air pollution, can be expected. Thus, monitoring on different levels of ecosystems is essential to gain knowledge about the possible causes of visible dysfunctions and disturbances of forests.
For these purposes information on forest functioning and actual conditions is needed, including their spatial and temporal variation, cause-effect-relations and interactions of forest compartments.

Two levels of intensity in forest monitoring are applied in the ICP Forests and EU programme:

Level I: The major aim is to monitor crown condition changes on a large scale. Every year defoliation and discolouration are assessed in a crown condition survey using the 16x16 km grid in up to 35 participating countries. The results are reported yearly. On mostly the same plots the soil condition and the element contents of leaves and needles were assessed once to achieve information on the spatial pattern of forest condition.
Level II aims at recognition of key factors in the functioning of different ecosystem types. This is accomplished by means of permanent monitoring plots, which were selected to be typical of their special regions.
An implementation of the Level III programme on a smaller number of plots might be considered by ICP Forests in future with in-depth studies of cause-effect relationships

PRIORITIES

The following forest damage issues have been identified by the Phare countries as priorities:
• The need to address the stability of forest stands as a strategic priority in combination with their productive functions, especially in forest areas with long-term high forest damage.

• The need to improve silvicultural methods for the re-establishment of forest stands previously destroyed by storms, fires, pests and diseases, or air pollution.

• The need for a co-ordinated action programme to control forest damage by insect pests and diseases; including training courses and demonstrations of forest protection, safeguarding the health and vitality of forests. This should include the international exchange of experts.

• The need for standardisation and enhancement of information on serious damage to forests (including the improvement of forest inventories on the health and vitality of trees/stands, soil and environmental conditions) and a better exploitation of information from ongoing forest monitoring programmes.

Notes

[1] Data is based on the Phare multi-country forestry project. The information in hectares or cubic meters of harvested wood is summarised in Annex I, Table 8 of this report. Some national statistics refer to the harvested areas, others to the seriously damaged but not necessarily felled stands. The volumes of incidentally harvested wood (Annex I Table 8) obtained from the operational records appears to be more reliable.

[2] In the Czech Republic this accounted for 2.186 million m^3 /year, in Romania for 1.8 million m^3/year since 1995, and in Slovakia for 0.786 million m^3/year.

[3] The area of forests seriously damaged by individual factors must be treated, however, as indicative, because the data from individual countries differ qualitatively.

[4] The review of forest fires is based on the statistics published by the Timber Section of the UN-ECE/FAO. Due to large variations in the number of fires and area of burnt forest, yearly averages were calculated for 1992-1996.

[5] European Environmental Agency, 1995: Europe's Environment, the Dobris Assessment, pp 36-48

[6] Tamm and Cowling, 1976: Acidic precipitation and forest vegetation, pp 848-855

[7] Source: Green Europe, European Commission, 1996: Protection of forests in the European Union against Atmospheric Pollution, 1987-1996

[8] A more detailed description of the forest monitoring systems operating in the Phare countries, including a more detailed review of the ICP forest monitoring, can be found in Annex II, Table 3 of the Phare multicountry report (footnote).

[9] EMEP/CCE yearly report series and database, and ICP-Forests defoliation monitoring (Forest Condition in Europe 1997, Ten years of forest condition monitoring in Europe, 1997),

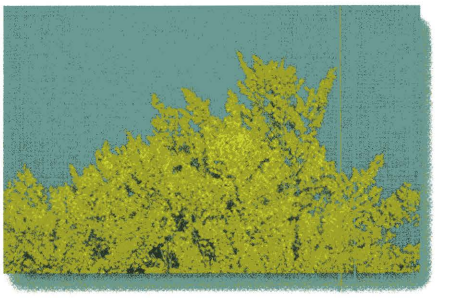
[10] Source: Agren, Ch., Elvingson, P., 1997: Still with us. NGO Secretariat on Acid Rain, Götteborg, Sweden, p. 48

[11] "Forest Soil Condition in Europe" published 1997.

[12] So far, only partial results of the second heavy metals monitoring cycle in Europe have been published. The primary data are processed under the leadership of Prof. Ake Ruhling, the Institute of Ecology, Lund, Sweden, and Prof. Eiliv Steinnes, the University of Trondheim, Norway.

Chapter 5

LEGAL AND POLITICAL FRAMEWORKS, ORGANISATION AND OWNERSHIP STRUCTURES



This section is not only based on the Phare multi-country forestry report, but also takes into account the outcome of three regional "Objective Oriented Intervention Planning" workshops which took place between December 1997 and January 1998 in Hungary, Slovakia and Lithuania, in order to allow as many interested parties as possible to have an opportunity to express their views. Where possible, comparisons are made with the requirements of relevant EU legislation and policies with respect to forest and biodiversity conservation.

FOREST AND FORESTRY-RELATED LEGISLATION OF THE PHARE COUNTRIES

All of the Phare countries have separate acts or laws dealing with forests. In the transition period, extensive changes in the legal system and organisation frameworks were necessary, having a significant impact on state administration, division of responsibilities, etc. Tensions subsequently arose between traditional forestry structures and more recently developed environmental authorities and organisations (e.g. newly created ministries of the environment, NGOs, etc).
Within forestry, considerable evolution had to take place in order to provide support to private forest owners, and avoid inappropriate forest management through the improvement of forest inventory, management planning and extension systems.
The majority of countries have enacted new laws or extensively revised existing laws since 1991, also taking into account the importance of harmonising their legal framework with the *acquis communautaire.*

For instance, in FYRO Macedonia a fundamental change compared with the 1972 legislation is that the definition of forests includes private as well as state property, and both are subject to forestry planning provisions. The new law divides forests into economic forests and forests for special purposes.

OVERVIEW OF RESPONSIBILITIES FOR FOREST MANAGEMENT AND NATURE CONSERVATION

Country	State Authority Responsible for Forestry	State Authotiy Responsible for Nature Protection
Albania	MA General Directorate of Forests and Rangelands	ME Committee for Environmental Protection
Bosnia & Herzegovina		
- Federation BiH	MA State Forest Enterprises	ME Department of Natural and Cultural Heritage
- Rep. of Srpska	MA Public Enterprise Serbian Forests	ME Department of National Parks
Bulgaria	MA National Forestry Board	ME National Service forNature Protection
Czech Republic	MA Forestry Section	ME Section of Nature and Landscape Protection
Estonia	ME Forestry Department	ME Nature Protection Department
Hungary	MA Office of Forestry	ME Office for Nature Conservation
Latvia	MA Forestry Department	ME Department of Environmental Protection
Lithuania	MA Forestry Department	ME Department of Landscape and Biodiversity
FYRO Macedonia	MA Forestry Department	ME Sector of Environmental Protection
Poland	ME Forestry Department	ME Department of Nature Conservation
Romania	ME Department of Forests	ME Department of Environmental Protection
Slovakia	MA Forestry Section	ME Section of Nature and Landscape Protection
Slovenia	MA State Forest Service	ME Nature Protection Authority

MA - Ministry of Agriculture or its equivalent, ME - Ministry of Environment or its equivalent

New legislation on forest protection and management is expected in Bosnia & Herzegovina, Slovakia and Estonia. Slovakia has carried out a project on "Assistance in Harmonisation of Legislation and Strategy for Development of the Forestry Sector" with the support of the FAO, with the aim of developing new legislation in line with the requirements of the EU. Estonia reported that a new law taking into account the principles of its new forest policy should be in force by the end of 1997. Most countries also provided references to a range of supplementary regulations and legislation essential for forest protection and forest management. For example, given the traditional utilization of forests, it is not surprising that all countries, with the exception of Estonia, have in force regulations on hunting. Most countries also have regulations in place covering cutting or felling of forests.

With regard to the EU's requirements in the area of forest fires (cf. Regulation EEC/2158/92 on forest fire protection, as amended), specific legislation appears not to be relevant, with the exception of the high risk countries in the southern part of Europe where Albania and FYRO Macedonia have regulations in place on forest fires.

It was not possible to determine from the information provided whether the Phare countries have in place forest classification and monitoring schemes comparable to the scheme established in the Council Regulation on Atmospheric Pollution (EEC/3528/86, as amended). A ministerial order in place in the Czech Republic dealing with determination of threatened zones in forests may be an example of a comparable legal instrument. Slovakia also appears to have rules in this area.

The EU has several measures in place to encourage forest improvement, including financial support for afforestation[1]. A number of Phare countries, such as the Czech Republic, Estonia, Latvia, FYRO Macedonia and Romania, have also put in place rules covering forest improvements such as afforestation and regeneration. In some cases these have included schemes to support improvement of forests financially, such as the forestry funds established in Slovakia, Lithuania, and Slovenia.

It appears that only a few countries – Czech Republic, FYRO Macedonia, Hungary, Lithuania and Slovakia have put in place eco-labelling schemes similar to those established in Regulation EEC/880/92. No specific information was gathered concerning the coverage of paper or other forest-related products under these national schemes.

The current situation in the EU regarding Forest policy

There is no common EU forest policy and in application of the principle of subsidiarity, responsibility lies with the Member States. Nevertheless, there is a large body of EU legislation, regulations and measures affecting the forestry sector directly or indirectly. Their main content is described below. At Community level, the Standing Forestry Committee has become the Member States' main co-ordinating body for all common issues with a direct impact on the development and management of forests within the EU. The European parliament has invited the Commission to put forward, on the basis of Articles 43, 130 and 235 of the Treaty, a proposal for a European Forestry Strategy.

The Community aid scheme for forestry measures in agriculture (Regulation 2080/92) is based on economic and environmental considerations. As one of the accompanying measures of the 1992 CAP reform, it aims to control agricultural production and contribute to a long-term improvement in forest resources. In addition, it aims to encourage forms of countryside management which are more compatible with environmental balance, combating the greenhouse effect and absorbing carbon dioxide. Financial aid is granted on a contractual basis to cover the costs of afforestation, maintenance, income losses from afforested agricultural land and investments for the improvement of farm woodlands, such as forest fire prevention measures. The financial aid is granted on the basis of afforestation programmes established by the Member States. At present, there are programmes covering the whole of the EU's territory. The measures under Regulation 2080/92 are co-financed by the EU at a rate of 75 % in Objective 1 areas and 50 % in others. The afforestation measures were expected to generate about 700,000 ha of forests by 1997 and to contribute to the improvement of about 300,000 ha of existing woodlands.

Development and enhancement of forests (Regulation 1610/89) provides for measures to promote forests within the operational programmes for rural and less-developed regions (Objectives 5b and 1). Priority has been given to areas in which forests can help boost the economy and create jobs, where it is important to tackle erosion and protect soil and water and where the role of forests as a resource for tourism and recreation can be developed.

OVERVIEW OF THE FOREST ACTS AND FOREST POLICIES - STATUS END 1997

Country	Forest Act	Forest Policy or Programme
Albania	1992, amended 1994	Envisaged in the Albanian Forest Development Project of the World Bank
Bosnia & Herzegovina	Federation BiH 1993, amendments prepared Republic of Srpska 1994	Long-term Development Programme adopted 1986, After the war, intention to reactivate it in both parts of the country
Bulgaria	1997	Concept of National Forest Policy 1995
Czech Republic	1995	Principles of State Forest Policy 1994
Estonia	1993, amended 1995, new act prepared	Estonian Forest Policy 1993
Hungary	1996	Forest policy guidelines included in Forest Act
Latvia	1994, amendments 1995, 1996, 1997	Forest Policy of Latvia, 1998
Lithuania	1994, amended 1996, 1997	Forestry and Wood Processing Industry Development Programme 1994, updated 1996
FYRO Macedonia	1997	Guidelines provided in the Strategy on Development of Agriculture, Forestry and Water Management 1991
Poland	1995	National Policy on Forests,1997
Romania	1962, amended 1996	Strategy for Development of Silviculture (1995)
Slovakia	1977, amendments 1993, 1995	Principles of State Forest Policy (1993), updated policy under preparation
Slovenia	1993	Forest Development Programme of Slovenia (1995)

NATURE PROTECTION LEGISLATION

All of the countries, with the exception of Bosnia & Herzegovina and Slovenia, have separate laws or acts dealing with nature protection. Most countries which have separate nature protection laws have enacted them since 1991. Bulgaria has revised its 1967 Act on Nature Protection several times, most recently in 1991. Slovenia is in the course of preparing a new Act on Nature Conservation which will replace the present Act on the Protection of the Natural Heritage dating from 1981. Bosnia & Herzegovina has no separate act on nature protection other than its 1985 Law on Protection and Utilization of Cultural-Historical and Natural Inheritance. However, a new law on nature protection is under preparation and was expected to come into force in 1998. With the exception of Bulgaria, none of the Phare countries have current legislation issued prior to 1991. Several countries - including Albania, Bosnia & Herzegovina, Estonia, Hungary, Latvia, Lithuania and Poland - also have some form of legislation in force dealing with special protected natural or forest areas.

INTERNATIONAL CONVENTIONS AND RESOLUTIONS

A number of Phare countries have become parties to the Bern Convention and to the Convention on International Trade in Endangered Species (CITES). These international legal instruments form the basis for many of the obligations under EU nature protection and biodiversity law. The Bern Convention for example, is implemented in the EU through the Habitats Directive. Approximation with EU requirements therefore requires accession to these international instruments, as well as transposition of the EU requirements into national law. The table below provides an overview of the status of each Phare country's fulfilment of these international conventions.

In addition, as mentioned above, three Ministerial Conferences on the Protection of Forests in Europe developed a co-ordinated approach aimed at the protection and sustainable management of European forests. These conferences have resulted in three sets of resolutions named after the cities where they took place, Strasbourg, Helsinki and Lisbon. The table below also shows the status of each Phare country's endorsement of these resolutions. The majority of the Phare partner countries are also signatory to the Lisbon Resolutions (1998) with the exception of Albania, Bosnia and Herzegovina, and FYRO Macedonia.

Phare Country	Convention/Resolution			
	The Strasbourg Resolutions	The Helsinki Resolutions	CITES Convention	Bern Convention
Albania	Signed all six Resolutions	No		Signed, not yet ratified
Bosnia and Herzegovina	Yugoslavia signed all six Resolutions in 1990	No		
Bulgaria	Signed all six Resolutions	Signed all four Resolutions	Accession	Accession and ratification
Czech Republic	Czechoslovakia signed Resolution 1, 2, 4, 5, and 6.	Signed all four Resolutions	Ratification in Czechoslovakia, declaration of succession	Signed and ratified
Estonia	Signed Resolution 1, 2, 3, and 6	Signed all four Resolutions	Accession	Accession and ratification
Hungary	Signed Resolution 1, 2, 4, 5 and 6	Signed all four Resolutions	Accession	Accession and ratification
Latvia	Signed Resolution 1, 2, 3, 5, and 6	Signed all four Resolutions	Accession	Signed and ratified
Lithuania	Signed Resolution 1, 2, 3, 5 and 6	Signed all four Resolutions		Signed and ratified
FYRO Macedonia	Yugoslavia signed all six Resolutions in 1990	No		
Poland	Signed all six Resolutions	Signed all four Resolutions	Ratification	Signed and ratified
Romania	Signed all six Resolutions	Signed all four Resolutions	Accession	Accession and ratification
Slovakia	Czechoslovakia signed Resolution 1, 2, 4, 5, and 6	Signed all four Resolutions	Ratification in Czechoslovakia, declaration of succession	Signed and ratified
Slovenia	Signed all six resolutions	Signed all four Resolutions		

RELATIONSHIP BETWEEN FORESTRY AND NATURE CONSERVATION LEGISLATION AND ADMINISTRATION

There do not seem to be any fundamental discrepancies between the legal regimes for forestry and for nature conservation in the majority of the Phare countries whereas there seems to be an inherent conflict between many forestry-related functions and nature conservation goals. Often negotiation among stakeholders has helped to resolve conflicts between forestry and nature conservation legislation.

Fundamental discrepancies were reported by national contact points in Slovakia, Romania and Bulgaria, particularly at institutional level. For example, the division of competence between the forestry and environmental protection departments is frequently neither well defined nor enacted. When forestry and environmental protection are covered by the same ministry, conflicts of interest can arise when penalties for violations of environmental protection acts are levied against silviculture.

Watershed management raises another potential conflict, in this case between the protective and timber production functions of forests with respect to the prevention of erosion and the regulation of flow. Loss of income due to reduced timber production in protected watersheds - and lack of compensation - is regarded as a problem.

A number of national Co-ordinators noted a lack of clear co-ordination between the authority responsible for forestry and biodiversity within different Ministries (such as, in Bulgaria's case the Ministry of Agriculture, Forests and Land Reform (MAFLR) and the Ministry of Environment and Waters (MEW). Lack of a clear statement of principles and criteria for sustainable management of forests was also often quoted as a problem.

FORESTRY LEGISLATION IN SUPPORT OF BIODIVERSITY - LEGAL REGULATIONS AIMED AT CONSERVATION OF FOREST GENE RESOURCES OF THE PHARE COUNTRIES

Country	Legal regulation for forest gene resources management and conservation
Albania	• Basic provisions included in the Act on Forests, 1992 • Law on seeds and plant reproduction material, 1992 • Instruction on seed collection, seedlings production and reforestation
Bosnia and Herzegovina - Federation BiH	• Law on Seed, No. 21/77/633 • Internal Forestry Regulations included in the Forest Act, new forest act is under preparation
- Republic of Srpska	• No. Internal regulations included in the Forest Act, new forest act is under preparation
Bulgaria	• Basic provisions are in the Act on Forests, 1997 • Instruction for conservation and rational use of the forest gene pool (1991)
Czech Republic	• Basic regulations provided in the Forest Act, 1995 • Regulation 82/1996 of the Ministry of Agriculture on genetic classification and forest regeneration material • Four ministerial executive regulations focused on forest genetic resources since the 80's • Instruction on the seed bank of forest tree species (no.10984/ORLH/284/OPV/1985)
Estonia	• Basic provisions are included in the Forest Act (1993) • Regulation on regeneration of Estonian state forest (1993)
Hungary	• Basic regulations in the Act on Forests and Protection of Forests, 1996 • Act on the state registration of plant varieties, certification, production and use of propagation material, 1996 • Decree 92/1997 of the Ministry of Agriculture on Preservation and Use of Genetic Resources • Adopted OECD rules
Latvia	• Basic regulations in the Act on Forest Management and Utilisation, 1994 • The Rules on Afforestation , 1995) • The Regulations on Final Felling and Regulations on Intermediate Felling (1997) also have a strong impact on preservation of rare and minor forest species
Lithuania	• Basic regulations in Forest Act, 1994 • Forest seed & growing regulations (1993 and 1997) • Forest regeneration regulations (1997) • Regulation on forest plant-material (1997)
FYRO Macedonia	• Regulations included in the Act on Forest, 1997 • Act on Seed and Reproductive Material is under preparation
Poland	• Basic provisions in the Forest Act, 1997 • Program of forest gene pool conservation and selection silviculture for forests for the years 1991-2000 • Forest regionalisation of seeds and transplants (1994) • Adopted OECD rules
Romania	• Basic provisions in the Forest Act, 1996 • Regulation on control of production and use of forest repr. material (1977) • Regulation on production, certification and genetic control of forest reproduction material (1978) • All reproduction material of economic tree species (21) are subject of control
Slovakia	• Basic provisions included in the Forest Act, 1995 • Guidelines on registration of approved seed collection stands and forest reproduction material (1986), new guidelines compliant with the OECD rules under preparation • Guidelines for establishment and maintaining forest seed bank (1987) • Guideline on poplars and willow plantation (1987)
Slovenia	• Basic provisions in Forest Act, 1993 • Act on Seed and Seedlings (1997) • Amendments to the Act on Forest (1998) under revision after EU & OECD in 1996-99

EXAMPLE OF CONFLICTS BETWEEN FORESTRY AND OTHER SECTORS, NGOS AND PUBLIC

When questioned on whether there have been any significant conflicts between forestry and NGOs, public and other sectors; several countries, (Hungary, FYRO Macedonia, Slovenia, and Bulgaria), pointed out that a series of conflicts had taken place with regard to ownership questions and financial compensation issues in the course of the ongoing restitution of forests and the introduction of stricter nature protection laws.

In the report on Hungary, a conflict was mentioned regarding compensation in the forest restitution process between 1992 to 1994. According to the 1992 legislation, protected forests were not to be used for compensating former owners, but were to remain state-owned. Non-protected state-owned forests were considered suitable forms of compensation as were reimbursements. However, the 1993 Act voided the sections in the earlier legislation with respect to compensation through exchange of land or reimbursement, and protected forests were no longer allowed to be reserved for state ownership. Since methods for acquiring property by the state have not yet been clarified and because cooperatives came to an end without legal successors, protected forests became owner-less, and many were handed over to private owners. In response to a suit brought by NGOs, the Constitutional Court declared in 1994 that the amendment to the 1992 law implied by the 1993 law was unconstitutional. This has made it possible for the state to regain the illegally restituted land.

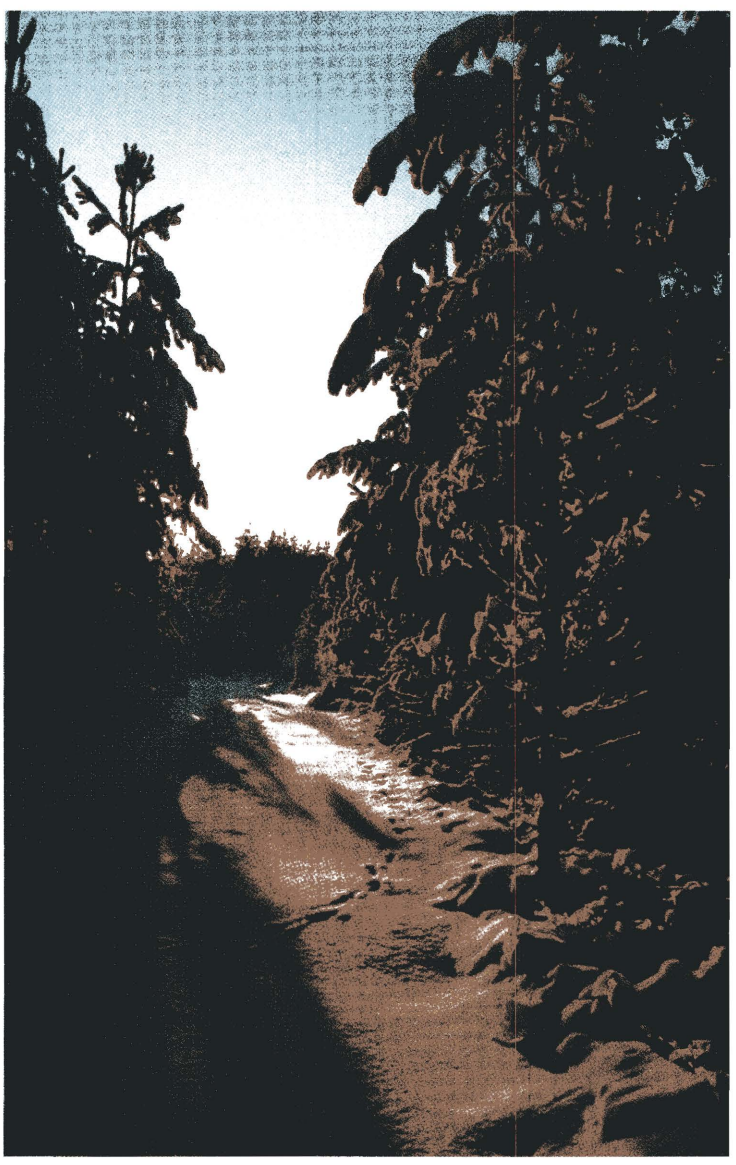
Another compensation conflict occurred in Hungary when compensation bonds were exchanged without taking into account the actual timber value of forest stands. Thus forests went to new private owners at a value calculated solely on the basis of the bare land.

In FYRO Macedonia a new Law on Privatisation which guarantees the restitution of forest to previous forest owners has given rise to several legal disputes. Another potential conflict pointed out by the FYRO Macedonian forest authorities concerns the new territorial division which was introduced during the transition period. This new division increased the territorial units from 34 to 123, and the newly formed units want to deal with forest management at a municipal level. Also the incomplete and inaccurate cadastral division of the forest and forest lands is seen as an emerging problem which will require appropriate solutions.

In the case of Slovenia one of the problems that arose was that the national Hunting Association demanded the preservation of past wildlife management and hunting rights for its members, regardless of the actual ownership of the forests.

Allocation of responsibility for and the approach to forest management has given rise to disagreements in Slovakia, Latvia, Bulgaria and the Czech Republic. In Slovakia, the implementation of the Law on Nature and Landscape Conversion caused several conflicts between the Ministry of Agriculture and the executive branches of the Ministry of Environment, i.e., the Slovak Environmental Agency and the Directorate of National Parks. In addition to the *de jure and de facto* forest management responsibility dispute, the disagreement concerned the implementation of remedial and restoration measures in forests of conservation areas which are declining due to air pollution and outbreaks of pests.

Another dispute between the Slovak Ministry of Agriculture and the State Environmental Fund concerned the financing of restoration measures in forests which were declining due to air pollution. It was as recently as 1997 that the legislation was amended in such a way that half of the fines for air pollution from local sources had to be transferred to the State Fund for Forest Improvement. Controversy also arose when strict nature conservation laws were implemented in Slovakia without financial compensation to landowners and managers.



Pine stand in Kiidjärve forest district (Estonia).

In Latvia, some conflicts to do with forest management have occurred between the forest authorities and the Latvian representation of WWF. In addition some discrepancies between the forestry and environmental sectors were caused by the division of new forest areas into nature conservation and protection. In order to avoid further disputes with the hunting association over game damage to forests, an inventory was carried out in the beginning of the 90s. The Bulgarian forestry sector experienced particular conflicts in the management of protected territories and management of game.
In the Czech Republic, one serious conflict arose between foresters and non-foresters concerning traditional and "green" management of bark beetle attack in the Sumava National Park. Foresters argued for a traditional method involving intensive control including cutting. This approach provoked heavy opposition from the public and NGOs, who suggested that no intervention should take place in order to let the infestation disappear of its own accord. The dispute received considerable public attention, with meetings and conferences being held to discuss possible solutions. Nonetheless, large spruce forests in the Sumava National Park including the most precious natural forests, declined and in the end the Park Directorate put in hand measures to control the bark beetles wherever appropriate.

FORESTRY POLICY IN THE PHARE COUNTRIES

This section provides information on areas which have significant influence on the formulation and implementation of forestry policy. The majority of Phare countries have an officially endorsed forest policy and a corresponding strategy for its implementation[2], and biodiversity issues are often included in their national forest policies.

Data concerning the implementation of forest policy are available in annual reports on forests and forestry which are published in the majority of countries. These reports do not always cover the whole scope of the forestry activities at country level. They refer to the state-owned forests or activities of the state forest authorities and are not usually available to the general public. In all countries, basic forest related information is available in statistical yearbooks.

THE FORESTRY SECTOR AND NATIONAL ECONOMIES[3]

Contribution of forestry (silviculture, protection, harvesting, transport, non-wood services & others) to GDP (Gross Domestic Product):
For most of the countries, the contribution of forestry is in the range of 0.3 - 0.8% of GDP. Only Estonia (1.2%), Latvia (1.3-1.5%) and Slovakia (1.4%) have a contribution over 1% of GDP.

TREND IN THE BASIC ECONOMIC CHARACTERISTICS OF FORESTRY FOR 1990-1997

Changes in selected items in 1990-s	AL	BiH	BG	CZ	EE	HU	LA	LI	FYROM	PL	RO	SK	SL
Contribution to the GDP													
a. forestry	↗ *	↗ *	stable	stable	stable	stable	↗	↗	↗	stable	stable	↗↘	↘
b. wood processing	stable*	↗ *	stable	stable	↗	stable	↗	↗	↗	↗	stable	↗↘	↘
State Financial Support to Forestry	↗ *	no	↘	s	no	↘	no	no	↗↘	↗	↘	↘	↗
Economic Result of the Sector	loss ↗	profit ↗ *	..	profit ↘	profit stable	profit ↘	profit ↗	profit ↘	profit ↗	balance stable	profit ↘	loss ↗	loss ↗
Proportion of Investments to Forestry	↗ *	↗ *	..	stable	↘		↘	stable	↗↘	stable	↘	↘	↘
Income Level as compared with National Average	stable	↗ *	stable	stable	stable	stable	↘	↗	stable	↗	stable	stable	stable
Number of Employees in Forestry	↗ *	↗ *	stable	↘	↘	↘	stable	stable	↗↘	↘	↘	stable	↘

** Albania: decreasing tendencies until 1994, stable or increasing afterwards - * Bosnia and Herzegovina: decreasing tendencies in 1990-1992, no forestry management during the War 1992-1995, since 1995 the characteristics show growing trends - * Bulgaria: no information provided.*

Investment in forestry compared with contribution to GDP

For all countries except Latvia, forestry's relative contribution to GDP (y) is very much higher than the reported investment in the forestry sector(x) . The ratio y/x is around two for most of the countries, except for Slovakia where it is 5.2 and Slovenia where it is 4.0.

Financial support to forestry:

Six of the twelve countries (Bulgaria, Bosnia and Herzegovina, Estonia, Latvia, Lithuania and Poland) report that there is no subsidy to forestry[4]. This should be interpreted with care, because the definition of subsidies used is not clear and may differ from country to country. Assistance through compensation payments and support to activities in the public interest is provided in the majority of the countries, with the exception Bulgaria, Bosnia, Latvia and Lithuania. The forestry sector of Albania is fully dependent on the state budget. In Estonia, state financial support of national forestry institutions is only about a half of the total income from the state owned forests.

Income levels:

Seven countries (Bulgaria, Czech Republic, Estonia, Hungary, FYRO Macedonia, Slovakia and Slovenia) report that the level of income in forestry is below the national average labour earnings. Only two countries (Latvia and Lithuania) report that salaries in forestry are higher than the average.

UNDER-INVESTMENT IN FORESTRY, INSUFFICIENT FINANCIAL RESOURCES

The overall current economic situation of the forestry sector is reported as relatively stable for the majority of the Phare countries. In many cases, however, the financial indicators, i.e. levels of income and cuts in state financial support indicate some deterioration. As a consequence of financial shortages, the level of investment frequently amounts to less than half the contribution of the forestry sectors to the national economy. A need for improvement of the current situation, especially forest economics and financing of forestry activities including compensation for measures in support of forest functions other than wood-production, has been identified as a top priority by the CEE countries[5].

EXTERNAL FINANCIAL SUPPORT

In the Phare countries, financing of forestry is an area highly influenced not only by the present national economic situation, but also by the continuation of the financial policies and financing practices of the former centrally-planned economies. The aims of the financial policy are often not clearly defined, and policy tends to be formulated for the short-term.

In general, support to the forestry sector can take the form of

- subsidies, i.e. direct financial support;
- financial support to particular projects for improvement of forest conditions;
- tax relief for organisations dealing with forestry activities, or
- contributions to interest payments on debts owed to commercial banks.

Following this division broadly, the countries analysed can be divided into the following groups:

a) countries with a state subsidy policy, such as the Czech Republic, Hungary, Slovakia, and Slovenia;
b) countries where selected forestry projects are financially supported by the state, such as in FYRO Macedonia, Poland and Romania;
c) countries without a subsidies policy, where individuals and organisations managing forests are not financially supported by the state and need to cover their financial needs out of their own returns; such as is the case in Estonia, Latvia, Lithuania, Bulgaria;
d) countries where organisations managing forests are directly connected to the state budget such as in Albania;
e) those countries such as both entities of Bosnia and Herzegovina, where no state support could be identified.

The main source of direct external financial support to forestry such as compensation, support of public-beneficial forest functions, subsidies or indirect financial support (e.g. tax relief) is the state budget.
When it comes to the declared purpose of state financial support to forestry, the most commonly cited sectors are subsidies to silviculture, support for afforestation programs, support for restoration and ecological programs. Assistance is also provided in some cases for the preparation of forest management plans, for investments in roads and buildings.

STATE FOREST ADMINISTRATION AND FOREST MANAGEMENT STRUCTURES

The state administration tends to influence economic activities in many countries. It leads to a reduction of the independence of both the state authorities and forest enterprises. To achieve the separation of the state administration from commercial activities, it is necessary to create economic conditions and legislation that allows for the specific features of individual countries.

COMPETENCE OF THE ORGANISATIONS OF STATE ADMINISTRATION OF FORESTRY AND ENVIRONMENT

Often the divisions of responsibilities between the state authorities for forestry and those responsible for the environment are unclear which reduces the efficiency of both and introduces uncertainties which may lead to conflicts. A one-sided emphasis on nature conservation or, on the other hand on the productive functions of forests, is to the detriment of co-ordinated reduction of damage to the forest. It detracts from the protective, recreational and other public beneficial forest functions.
There seems to be a general need for a recognition of the multi-purpose nature of forestry setting wood production alongside public beneficial functions of forests and of the related task of identifying the strategic priorities for forestry in a given country.

THE NEED TO DIVERSIFY ACTIVITIES OF FORESTRY ENTERPRISES INTO COMMERCIAL ACTIVITIES AND WOOD PROCESSING

The forestry sectors of the countries in transition suffer from various economic problems. The relationships between the wood producers and consumers are often unbalanced by the economic power of both partners. The supplier-consumer relations in centrally-planned economies were defined by state regulations. Disintegration of the mechanisms of the centrally-planned economies has led, in many cases, to the breakdown of financial fluidity so that the economic crisis is deepened. Vertical diversification should be a partial but also strategic solution for many of these problems.

Another general concern in all Phare countries is the improvement of the legal, political and economic basis for the provision of external financial support to forestry. Improvements include more objective and transparent mechanisms for the distribution of external financial support and sufficient information about external sources of support to forestry. Another important factor is the evaluation of the efficient use of external financial support (direct and indirect economic effectiveness, increase or improvement of non-productive forest functions, etc.).

FOREST OWNERSHIP - STRUCTURE AND CHALLENGES

ASSOCIATIONS OF FOREST OWNERS

Country	General associations of forest owners		Commercial associations of forest owners	None
	country level	regional level		
Albania	-	-	-	x
Bosnia and Herzegovina	-	-	-	x
- Republic of Srpska	1	-	-	
Bulgaria	2	-	-	
Czech Republic	2	-	1	
Estonia	3	-	-	
FYRO Macedonia	-	-	-	x
Hungary	2	4	3	
Latvia	1	-	-	
Lithuania	1	-	-	
Poland	-	-	1	
Romania	-	-	-	x
Slovakia	2	5		
Slovenia	-	-	-	x

THE INFLUENCE OF FOREST OWNERS' ASSOCIATIONS ON FORESTRY POLICY AND LEGISLATION; THE SUPPORT OF THE STATE FOR FOREST OWNERS' ASSOCIATIONS

The legislation of centrally-planned economies was created in the context of state ownership of forests. Even today, forestry policy is mostly influenced by the strong professional level of state forest management. Small owners often depend economically upon intensive use of their forests. The legislation can contribute to the strengthening of the professional and economic basis of the private forest sector.

LEGAL BASIS FOR RESTITUTION AND RE-PRIVATISATION OF FORESTS

Country	Legal basis	Date
ALB	Act N° 7512	10.08.1991
BIH	in preparation	-
BUL	Act on Restitution of the Forest Land	25.11.1997
CZR	Act N° 229/1991 and decision of the Constitutional Court N° 29/1996 Act N° 172/1991 Decree N°168	1991 1991 15.03.1995
EST	Act on Ownership Reformation	1991
FYROM	Forest Law	?
HUN	Act N° XXV	1991
LAT	Law on Land Reform in Rural Areas of the Republic of Latvia Law on Forest Management and Utilization	1990 (?) 1994
LIT	Law on the Restoration of the Rights of Ownership of Citizens to the Existing Real Property	1997
POL*	Administrative Code	
ROM	Act N° 18	1991
SLK	Act N° 229/1991 and N° 186/1993 Act N° 138/1991 Act N° 282/1993 Act N° 92/1991 Act N° 192/1995 Act N° 181/1995	1991 and 1993 1991 1993 1991 1995 1995
SLN	Act N° 27/1991	1991

** Poland: There is an initiative to restore illegally appropriated forest land to the former owners. The forest ownership structure has not changed since 1989.*

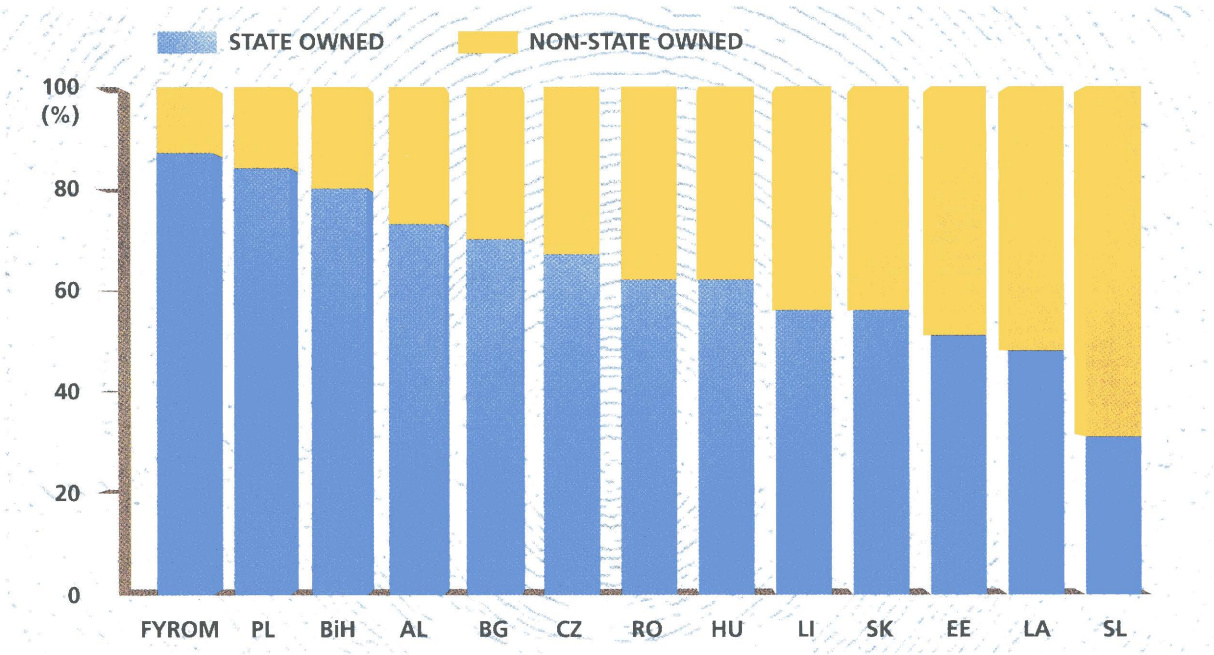
With the exception of Bosnia and Poland, all other Phare countries have already established a legal basis for the systematic restitution of woodlands or the re-privatisation of forest land. The restitution could also take the form of compensation in a form other than land ownership.

There are no strict rules for the restitution of forest infrastructure, even where a legal basis exists. The solutions mainly relate to individual cases and differ with the type, value and level of public importance of the infrastructure. The financial burden on new forest owners with respect to the required forest infrastructure varies widely. The forest infrastructure has to be restituted along with the woodland (at no extra cost) or it has to be paid for. Alternative choices between these two extremes are possible. Furthermore, it should be stated that access by forest owners to roads, the most important of forest infrastructures, seems to be independent of ownership and is therefore assured in all cases.

FOREST OWNERSHIP STRUCTURE

The detailed classification of forest ownership structure has been difficult as the definition of forest ownership classes varies between the different countries. An overall comparison of the structure of ownership has been made below, on the basis of a distinction between state owned and not state owned forest.
Most of the countries expect that the ownership structure after the restitution and re-privatisation will still be characterised by a high proportion of state ownership. The private share of forest land will be less than 25% in seven countries. Six countries are going to have a private share of forest land between 32% and 80%. The average forest ownership structure in these PHARE countries will be the reverse of the ownership structure of the EU member states today.

EXPECTED POST-TRANSITIONAL FOREST OWNERSHIP STRUCTURE (STATE OWNED - NOT STATE OWNED)



The expected post-transitional forest ownership structure needs to be compared to an initial situation with nearly 100% state owned forests at the end of the 80's. Actual ownership structures are close to the expected levels in Slovenia, FYRO Macedonia, Hungary, Czech Republic, Latvia and Slovakia. In the last 3 countries, 3.5%, approximately 6.5% and 7.9% of forests were still awaiting restitution in 1997. Considerable changes to forest ownership will take place especially in Romania and Bulgaria.
The responsibility for forest management of those forest areas in the process of restitution or re-privatisation lies mainly with the state forest authorities. The intensity of forest management seems to vary between guarding the forest land and being aware of illegal use of the forests on one hand and carrying out all needed silvicultural measures, fellings included, on the other.

SUPPORT FOR SMALL PRIVATE FOREST OWNERS

The actual motivation of forest owners to organise themselves seems to be low in most of the countries. This might be partly due to insecure ownership rights, the small scale of forest estates and correspondingly reduced economic expectations. Again, the problem may lie in a lack of professional know-how, in tradition or a bad experience in the past.
The establishment of associations to support forest workers and forest owners has taken different forms in the 13 countries. In Bulgaria, the Czech Republic, Latvia, Hungary and Slovakia, associations for both forest workers and forest owners have been set up and receive state support to a certain degree. In Latvia, both the Trade Union of Forest Workers and the Forest Owners Association are supported by the Ministry of Agriculture and the State Forest Service.
Hungary's 15 forest workers' associations have been in operation for a long time, but are now struggling for survival. On the other hand, forest owners' associations are still considered a new phenomenon in Hungary, which has different types of associations depending on the form of ownership; i.e., state-owned, co-operative or private.

In the Czech Republic the Ministry of Agriculture provides some support to forest owners in the form of office services and information on valid regulations for various forms of associations. Small forest owners' groups are supported by subsidies. There are no special regulations supporting associations of forest workers. Poland has no professional forest workers associations, but has about 1,600 forest land communities. These forest land communities manage the property of the communities, but are not given any state assistance. Lithuania and Slovenia did not mention the existence of forest workers' associations. However, both countries have forest owners associations which are given some assistance in the form of supportive legislation and/or financial aid. Lithuania is preparing a new law aimed at strengthening and developing the private forest sector.

Bosnia and Herzegovina and FYRO Macedonia do not have professional forest workers' or forest owners' associations. Albania, Estonia and Romania do not seem to provide any legislative or institutional support for associations of forest workers and forest owners. In Albania the forests are still mainly in state ownership.

GENERAL TRENDS

Parameter	AL	BiH	BG	CZ	EE	FYROM	HU	LA	LI	PL	RO	SK	SL
Legal basis exists for restitution and re-privatisation	↑	↓	↑	↑	↑	↑	↑	↑	↑	→	↑	↑	↑
Reliable information available on expected ownership structure	↓	→	↗	↑	↗	↑	↑	↗	↗	↗	↓	↑	↗
Management responsibility clarified for forests with unclear ownership or forests under restitution	↑	↑	↑	↑	↑	↑	→	↑	↑	-	↑	↑	↑
Restitution of forest infrastructure solved	?	↓	↑	→	↑	↑	↑	↑	↑	-	↑	→	↑
Institutional or financial support available for the co-operation of small forest owners	↓	↓	↓	→	↓	↓		↓	→	↓	↓	↑	↑

↑ *yes,* ↗ *mainly,* → *partly,* ↓ *no,* ? *no information,* - *not an issue*

Financial or institutional support for forest owners with the aim of stimulating the co-operation of these small and medium forest enterprises is not as yet much developed in the Phare countries. Direct support to forest owners co-operation has been given however in the Czech Republic, and in Lithuania. Slovakia and Slovenia are developing an approach to stimulate co-operation by offering special institutional or financial support exclusively to associations of forest owners.

The legal basis for restitution or re-privatisation of forest and forest infrastructure is generally considered by the Phare countries as insufficient.
A number of gaps in the legislation or rules for administration are apparent in a large number of countries and this hinders the process of restitution. In some countries, there is a problem with the professional management of the forests and maintenance of the forest infrastructure under restitution.

Inappropriate private forest ownership structures and lack of co-operation may detract from sound forest management.
Restitution or re-privatisation does not always result in economically viable forest estates partly due to the insufficient size of forest management units and a lack of co-operation by forest owners. The restitution and re-privatisation of forests and forest infrastructure is a basic process which will determine the future development of the forest sector in the majority of the countries concerned. Sustainable forest management must have a sound economic foundation within the private sector. The problem areas identified above are critical interrelated features in the particular context of the countries concerned. Identification of potential actions and projects to help establish or stabilize non-state forestry sectors needs to be based on a detailed analysis of all aspects of the ownership structures within any particular country.

Note

[1] *cf. the Forest Enhancement Regulation EEC/1610/89 and the Regulation EEC/2080/92 on a Community aid scheme for forestry measures in agriculture*

[2] *The Czech Republic, Estonia, Latvia, Lithuania, Poland, Slovakia, Slovenia and Romania*

[3] *The data below is based on the summary findings of the national questionnaires within the Phare multicountry forestry report and differs in quality and accuracy between countries*

[4] *Latvia reports, however, that subsidies will be implemented in 1998.*

[5] *OOIP workshop conclusions and follow-up report for the Helsinki resolution H3 "Forestry Cooperation with Countries with Economies in Transition".*

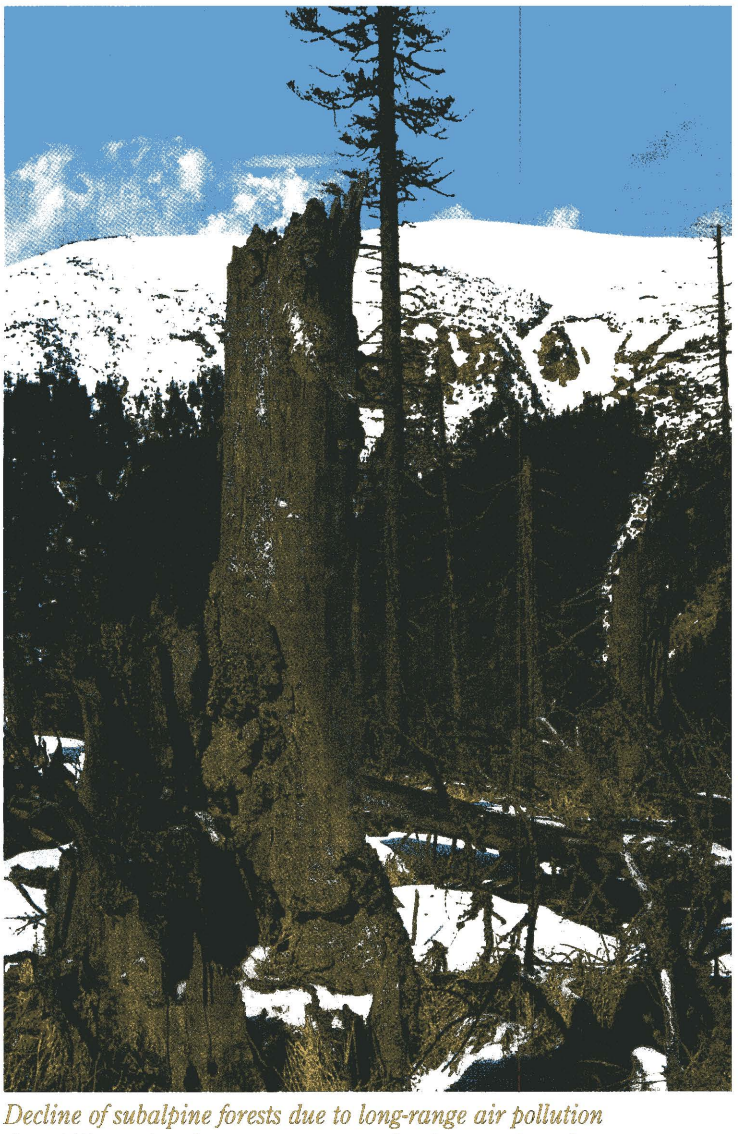
Conclusion

This brochure has drawn together a summary of the findings of a Phare project entitled "Preparation of a Multi-Country Forestry Programme". This unique project aimed to gather information on the condition of the forests and forestry sectors in 13 countries of Central and Eastern Europe, ranging from the Baltic to the Black Sea and the Mediterranean The common feature of all these countries was the transition of their economies, although this element was subject to large country-to-country variation. However a thorough analysis of the natural conditions and traditional uses of forests does indicate regional similarities that allow them to be grouped broadly into "Baltic", "Central" and "Southern" or "Mediterranean" regions. Some features are thus more particular for one region while others are common to all the Phare partner countries and often to the EU member states as well. The specific features include, for instance, the continuing severe air pollution effects and altered forest tree species composition in the Central region, while relatively large areas of degraded forests and frequent forest fires are typical of the Sub-mediterranean areas.

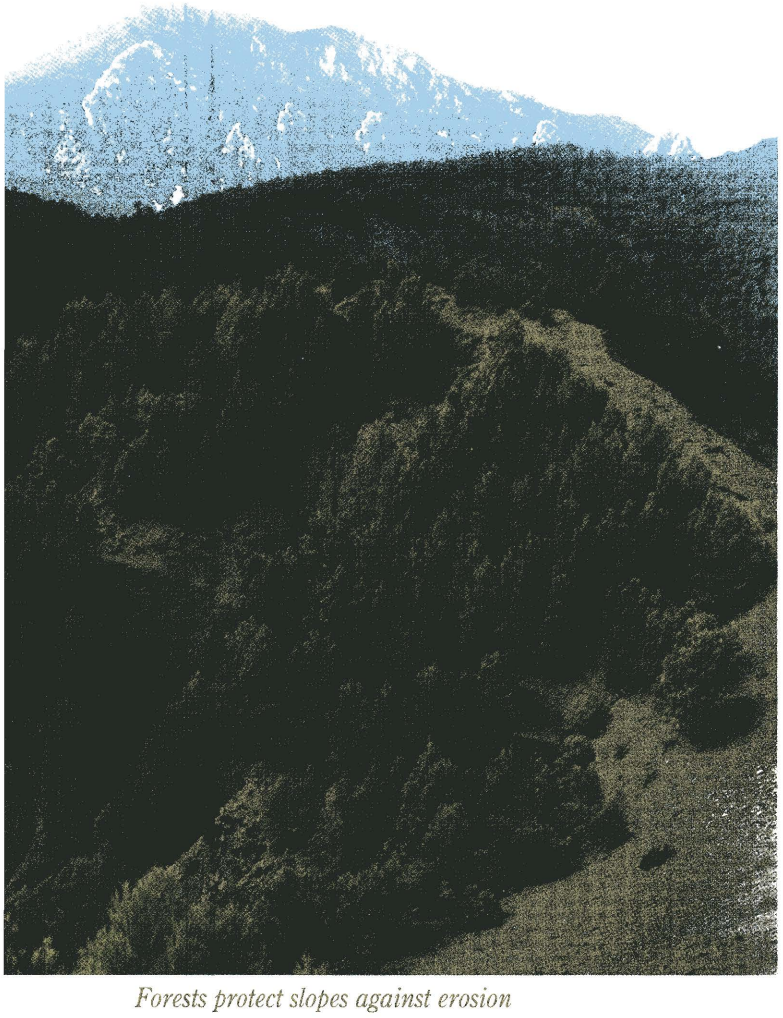
The most impressive figure that appears is the confirmation of a general increase in forest cover. Except for Albania, all the other 12 Phare partner countries indicate a gradual increase of their forests and wood resources over the past 50 years. This increase comes despite evidence of heavy damage by biotic and abiotic factors such as the air pollution already mentioned, along with insects, storms and forest fires. Approximately 10% of the total forest area has been seriously affected in this way. There was a particular increase in forest cover in the Baltic countries: 125% in Estonia, 75% in Lithuania and 65% in Latvia. The restoration of forests in Poland and FYRO Macedonia and the afforestation activities in Hungary are also noteworthy.

When we consider the condition of the forests, it is obvious that their stability is influenced largely by the management regime. In general, man-made forests tend to be more susceptible to the action of external stresses than the seminatural or natural ones. Ability to tolerate stress (both biotic and abiotic) will also differ according to the species composition and also the age structures. Young forests are usually more vigorous, and forest stands of trees of differing ages tend to be more resistant. The ability to fulfil forest functions is considerably reduced in the degraded forest types, especially degraded coppice and semi scrub. The differences in the natural conditions and in the history and traditions of forest management make comparisons of forest condition between the countries and regions somewhat difficult. But the complexity of forest-related issues underlines the indispensability of a sound professional knowledge both of conservation and of the economic value of forests. The same applies to the managers' awareness of the long-term implications of different types of forest uses and applied management systems.

In the transitional period, the economic situation of the forestry sectors has become rather difficult. For a start there have been reductions in direct and indirect state support for forest management and public beneficial functions. Second, the market for wood has been extremely variable in many countries due to structural changes and reduced domestic demand. Poor performance and quality and especially the limited marketing skills in the woodworking industries which are now exposed to external competitive pressure, make this transition of the forest sector even more difficult. Alongside this development, the demand for multi-purpose forest management has increased. This includes more emphasis on the fulfilment of protective, social, cultural and conservation functions. The proportion of forests designed for the primary fulfilment of



Decline of subalpine forests due to long-range air pollution destabilizes the forest ecosystems in lower elevations, increases erosion and adversely affects water balance.



Forests protect slopes against erosion

functions other than wood production has reached an average of 31% of the total forest area in the Phare partner countries, with a tendency towards further increase. The share of strictly protected conservation areas in particular is expected to increase in most Phare partner countries, with the exception of those which have already extended their protected areas (in particular Bulgaria and Slovakia). In spite of the public demand and professional interest, only limited financial incentives can be redirected in most of the countries towards the public-beneficial values of their forests. This is also one of the factors impeding a broader implementation in many Phare countries of the resolutions of the Ministerial Conferences on the Protection of Forests in Europe.

This general tendency towards balancing the various functions of forests opens up the question of assessing the non-commercial values and services provided by those forest sectors which are sometimes neglected. How to evaluate the importance to the national economy of the recreation and protection functions? How to assess the impact of forests on the supply of clean water, the reduction of erosion, and the savings this can produce? Such cost-benefit judgements are important in order to highlight the real contribution and importance of the forestry sector for society, allowing a more accurate assessment of the potential needs of the sector. The current trend is one of low subsidies. The sector thus has to cope with a reduced income from wood production with little or no compensation for the expenditures related to public beneficial functions of forests. One of the results of this, especially noticeable in some countries of the Southern region, is the lack of law enforcement and the damage done to forest resources resulting sometimes in deforestation and frequently in a more insidious deterioration of forest resources.

The lessons learned through the centuries are that forests are a renewable but certainly not an infinite resource and they need proper care and management. Forestry is by definition a long term management concept, with rotation ages reaching 100 years. The results take a long time to become apparent. A further feature of forestry is its special attention to natural processes and careful planning. These have only limited analogies in any other economic sector. Even more crucial in all the countries of Europe is the stability of forests. Whenever possible, foresters try to eliminate the effects of faulty management over previous decades and try to create more stable ecosystems, attending to tree species composition, age structures, protection against pests and diseases and prevention of fires. This explains the importance accorded to "close to nature" management. It is a tool that can help to bring about genuinely multi-purpose forest management, which will be sound economically and deliver sustainable biodiversity.

The knowledge base for multi-purpose management exists and is being shared between both EU Member States and Phare partner countries. What is often lacking in the transition period, besides funds, is a coherent legal framework and stable institutions. The problem most often mentioned in a series of regional Objective Oriented Intervention Planning Seminars which were organised as a part of the Phare project , was the re-structuring of the wood industry, which suffers from a lack of investment and the need to develop new strategies for things like marketing and design. Another problem area is the restitution of forested areas to legal claimants. This often leads to poor management or a drive for short-term profit especially in small-size restituted forest estates. This problem is only found in some of the countries where the state ownership of forests has reduced over the past years. In most of them, the effects of inappropriate management have been curtailed, through the establishment of and support to associations of forest owners, stable extension services and other forms of assistance . Other initiatives have also been useful in bringing about the sustainable management of forests. Forest policies and implementation strategies have been adopted (sometimes as legally binding documents) for enforcement of the legal frameworks in most Phare countries. In the south of the region however, the need for their development or updating is more evident.

Forest management is regulated not only by forestry laws, but also by other environmental and conservation legislation. As one of the common features of the Phare partner countries is their intention to join the EU, it is important that their legislation is harmonised with the *acquis communautaire*. A lot of effort is being invested in the development of the legal framework of the Phare partner countries, nevertheless all the contributors to the brochure stressed the need to develop it further.
One of the achievements of the Phare multi-country study has been to build on existing initiatives to enhance co-operation and information exchange. One of the major complications in gathering and analysing data from various countries, is the difference in definitions and methodologies. It is important to continue and support efforts to standardise information throughout Europe. For the forestry sector, this has been the main objective of the EFICS - European Forest Information and Communication System. The opportunity for the Phare countries to participate in this project as they do in the related activities of the European Environmental Agency would allow easier harmonisation, transfer of knowledge and practical skills in forest inventory, monitoring, management records and data support. The same would apply to the extension to the entire continent of the monitoring undertaken under the UN-ECE/EU International Co-operative Programme on the Assessment and Monitoring of Air Pollution Effects on Forests (ICP-Forests). Among the Phare countries, the basic Level I of ICP-Forests has not yet been developed in FYRO Macedonia, it needs to be re-established after the war in Bosnia and Herzegovina and it has only just started in Albania.

Within the Phare partner countries, it can be said that most of the problems have been properly identified and potential solutions developed, although not always implemented. Despite regional discrepancies, the countries concerned have all made substantial efforts to get through the difficult transition period. The legal frameworks are being adapted, still more training and extension is being provided, and without doubt there is a widening interest in securing the stability of forest ecosystems and sustainable use of forest resources.

There is still much room for debate, between foresters and environmentalists in particular, on the exact definition of sustainable forest management and on the means to achieve it. We believe that these discussions are beneficial for the forests and forestry sectors, as it encourages an active search for solutions which are not always simple. The further development of knowledge, improved communications between the interested parties and increased opportunities to exchange views will keep the debate about forests and their use constructive and beneficial. We doubt that unanimity in concept and analysis will be reached and do not even believe it to be particularly necessary. We have had two opposing schools of thought, defending their own views but both looking for the same result. What the Phare Multi-Country study has achieved, is to demonstrate that it is possible to combine opposing views to reach a consensus on what is required. A consensus on the ways to reach the objectives can surely follow. Finally, we have seen that competence and knowledge are widely shared between the Phare partner countries. A lot remains to be discussed, discovered and tested. Co-operation at all levels, in education, research, exchange of views and experience, will allow not only a further integration of Europe, but also a global improvement in the competence of forestry.

ISBN 92-828-8416-3