

Study on the Development and Marketing of Non-Market Forest Products and Services

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Study Report



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1. INTRODUCTION

The importance of sustainable management of non-market forest goods and services has increased during the last few years. This is also reflected in a number of policy documents within the EU. The new *EU Rural Development Regulation* speaks about the “non-productive investments”, as investments to enhance the public amenity value of forests. The stakeholder consultation process within the *EU Forestry Strategy* and the report of the strategy’s implementation identify the issue of creating markets for currently non-market forest goods and services as an emerging issue. Finally, the *EU Forest Action Plan (2007-2011)* places the valuation and compensation for non-market forest goods and services as one of its 18 key actions.

The issues related to non-market forest goods and services involve social and economic dimensions. Unlike market forest goods and services, non-market ones are not traditionally traded and their value is not defined by the market price. At the same time the access to non-market forest goods and services is largely unlimited and free in most of the EU Member States. These characteristics of non-market goods and services, combined with their growing importance and social demands, can lead to an un-sustainable management of these goods and services.

This study was launched as a response to the challenges, presented in the Forest Action Plan and implementation of the key action for valuation and compensation for non-market forest goods and services. The study aims to acquire summarised information on the state-of-the-art in classification, characterisation and valuation of non-market forest goods and services. It also seeks to find whether the development on theoretical aspects of environmental valuation over the last decades have been, or could be, translated into operational schemes and mechanisms for valuation and compensation for non-market forest goods and services, used as policy instruments. Finally, the study intends to create a foundation for discussion and policy conclusions on the feasibility of application of economic instruments for encouraging and supporting the supply of non-market forest goods and services.

Following these objectives, the following tasks have been accomplished within the Study on the Development and Marketing of Non-Market Forest Products and Services (FORVALUE Study):

- *Task 1:* An overview of all goods and services provided from and by forests in the EU and identification of non-market forest goods and services, including a brief overview of forest ownership, forest users and public access to forests;
- *Task 2:* An overview of estimated values of non-market forest goods and services;
- *Task 3:* An overview of mechanisms compensating for provision of non-market forest goods and services in use in the Member States;
- *Task 4:* Revision of alternatives for applying mechanisms compensating for provision of non-market forest goods and services; and
- *Task 5:* Conclusions and recommendations for development and application of mechanisms compensating for provision of non-market forest goods and services in the EU.

The current report summarises the outcomes of all of the tasks, and gives an outline of the methodology used.

This report is divided into six chapters. Chapter 2 describes the methodological approach of the FORVALUE Study, and chapters 3 to 6 present the main results of the study. Chapter 3 is dedicated to the identification, characterization and classification of forest goods and services. It also identifies and briefly describes the main user groups, forest owners and access to forest goods and services. Finally, it reviews the importance and trends of non-market goods and services in the EU. Chapter 4 is dedicated to the basics of economic valuation and its application in relation to forest goods and

services. It also reviews different valuation methods and estimated values for non-market forest goods and services in Europe. Chapter 5 gives an overview of the financing mechanisms used in the Member States and their applicability for different goods and services. It includes a theoretical review of alternative financing mechanisms for non-market forest goods and services (FG&S) as well as an empirical assessment of their use in Europe and EU Member States (EU MS). It further presents cases for the successful application of the financing mechanisms for different forest goods and services in different EU MS. In total, more than 100 cases have been analysed and collected in a web database which is publicly accessible and shall be maintained after the project. Chapter 6 presents a rational procedure and a possible set of criteria for the selection of financing mechanisms. It follows the principles of multi-criteria analysis and uses this method in an illustrative evaluation of selected concrete case examples from EU MS.

2. METHODOLOGY

In order to achieve the study's general objective – *to acquire summarised information on the state-of-the-art in the field of valuation of and compensation for non-market forest goods and services*, and to reach the specific goals of the study, different research approaches and methodologies were applied; literature review, surveys, expert interviews, case studies and multi-criteria analysis.

2.1 Literature review

A literature review and web search were undertaken for all studied aspects of forest goods and services – their classification, characterisation, importance, trends, valuation, and the financing mechanisms for their provision.

Concerning the classification and characterisation of non-market forest goods and services, various studies on terminology, classification and taxonomy of forest goods and services, as well as on the user groups, ownership structure and public access in the EU, were reviewed. The reviewed studies were mainly focusing on the EU scale (e.g. MCPFE, COST E30 Action); however, where necessary other studies were also considered (e.g. OECD, MEA, UNECE/FAO).

The main sources for the desktop research regarding the importance of forest goods and services were the MCPFE's State of European Forests (2007), the reports by FAO (2000) and COST Action E30 (2007).

With regards to the economic valuation of non-market forest goods and services, the literature review focuses on the methodological aspect of the economic valuation and on a number of valuation studies for the most important non-market forest goods and services.

The literature review and web-searches provided basic information on different types of financing mechanisms globally, in the EU and other European countries. These consisted mainly of scientific and professional publications. The purpose was to analyse the marketing difficulties of non-market forest goods and services, to develop a typology of financing mechanisms, to give a theoretical characterisation of different types of financing mechanisms, and to provide an overview of the current use of financing mechanisms in the EU MS. Concerning the classification and characterisation of non-market forest goods and services, various studies on terminology, classification and taxonomy of forest goods and services, as well as on the user groups, ownership structure and public access in the EU, were reviewed. The reviewed studies were mainly focusing on the EU scale (e.g. MCPFE, COST E30 Action), however where necessary also other studies were considered (e.g. OECD, MEA, UNECE/FAO).

2.2 Survey

Throughout the course of the study a questionnaire survey was conducted in the EU MS. The purpose of which was to obtain information about the importance and trends of non-market forest goods and services; the application of financing mechanisms in the EU and to identify cases of alternative financing mechanisms.

The questionnaire is related to the work of the Project Tasks 1, 3 and 4, and it consisted of three parts:

- A. Current relative importance, trends, accessibility and area of production of forest goods and services.
- B. Financing mechanisms used in the EU countries and their application for forest goods and services.

C. Examples of innovative financing mechanisms for non-market forest goods and services in the countries.

The objective of the first part of the questionnaire was to gather information on the relative importance of different types of forest goods and services in the EU Member States. The respondents were asked to rank the relative importance of forest goods and services (from 1 – not important; to 5 – very important), according to their own perceptions about the total benefits forest goods and services provide to the society.

The aim of the second part (Part B) of the questionnaire was to produce an overview of financing mechanisms used in the EU-27. For this purpose, the respondents were asked to name financing mechanisms used in their own country, to relate them to different goods and services, and to indicate the frequency of use. In total, 10 groups of public, private and mixed financing mechanisms were considered (Annex 21).

Finally, the last part of the questionnaire aimed to acquire information on the most innovative examples of financing mechanisms used in the EU countries. The goal for this was to provide innovative examples of financing mechanisms, which would be used for detailed analysis and material for a multi-criteria analysis (MCA) of alternative financing mechanisms. In total, 35 cases of financing mechanisms were reported from 13 countries.

The questionnaire was distributed to all EU Member States, the Confederation of the European Forest Owners (CEPF), state forest enterprises (EUSTAFOR members) and ENGOs. Out of 39 responses, 26 answers were from governments, four from CEPF members, six from state forest enterprises, and three from ENGOs. For the analysis, the main data sources were the official responses of the EU Member States, while the responses coming from other sources were used to check consistency.

2.3 Expert interviews

The expert interviews served as a complement to the information from the literature review and the questionnaire, about the overview and application of financing mechanisms. In general, the interviews focused on identifying types and examples of innovative financing mechanisms.

The contacted experts were from European Commission (DG Agriculture and Rural Development, DG Environment, EUROSTAT), the Standing Forestry Committee Working Group on Valuation and Compensation Methods of Non-Wood Forest Goods and Services (WG 1), European and national forest owners organisations (CEPF, Nordic Family Forestry, ELO, EUSTAFOR, COPA-COGECA, METO), environmental NGOs, universities, research institutes, and others (for details see Annex 1).

For additional data collection also international research networks and projects consortia were used. The used networks were the European Forest Institute Mediterranean regional office (EFIMED) and Project Centre INNFORCE, the COST Actions E30 and E51, and others. The included project consortia were the EU FP6 IP EFORWOOD, EU FP6 GoFOR, Erasmus Sokrates IP INNO-FOREST, and the FOPER project (network of research organisation in the Western Balkan region). In addition also conferences organised or co-organised by the EFI PC Innoforce Vienna office and its members were used to collect expert addresses and case studies (Annex 1).

2.4 Innovation case database

The collection of concrete examples in the application of financing mechanisms was based on written documents, websites and personal communication. The communications were mostly started by e-mail and usually followed up by telephone. The data collection followed a common scheme of inquiry

but did not apply strict interview guidelines, because the content and the flow of the interviews was case specific (i.e. depending on the information available from other sources).

Snow-balling technique was used to find further examples in the application of financing mechanisms, contact persons, as well as for finding additional information. Furthermore, also the second questionnaire (see Annex 24) was used as an additional information source.

The interviews used a common interview guide which was adapted according to the type of actors interviewed and according to the type of information missing for the description of the single cases. The questions covered the following: problem situation; institutional framework; characterisation of the activity and the firm; characterisation of the financing mechanisms involved; chronology of the case; actors involved (e.g. authorities; extension services; NGO's; research institutions; firm networks and cooperation); and their role (e.g. information, coordination, financing), as well as analysis/evaluation (see Annex 2).

The case database provides the following main information:

- country, carrier of the project;
- description of the project;
- types of innovation (goods and services),;
- financing mechanism; and
- start-ups and non start-ups, etc.

The provided cases may be further sorted by the following criteria:

- date of entry;
- country name; and
- title

The cases are presented in a short overview table. By clicking on the magnifying glass on the left side, the full information is given.

The case database is publicly accessible and may be used for forest owners and interest groups, extension services, authorities, research institutes, universities, teachers, and many more. It is planned to be further maintained by the EFI PC INNOFORCE. The name of the database and the URL are: Innoforce Database of Innovation Cases in Forestry (<http://cases.boku.ac.at/>)

A short description and a screenshot of the website are provided in Annex 23.

2.5 Multi-Criteria Analysis (MCA)

To evaluate the main characteristics and performances of alternative financing mechanisms a Multi Criteria Analysis (MCA) was conducted. The MCA is a decision making tool used to reach consensus about the characteristics and performances of different policy instruments, or alternatives. In the MCA each stakeholder participating in the evaluation process enters their judgment (or score), and contributes to a jointly reached conclusion about a policy instrument or alternative.

In the FORVALUE study, the MCA was conducted for 11 cases of innovative (or alternative) financing mechanisms. These 'alternative' cases were selected from a total of 35 cases of financing mechanisms reported in the questionnaire. The selection of the cases for which the MCA was done, regarded their *innovativeness, availability of information and geographical distribution*.

In order to collect the additional information about the selected cases necessary for conducting the MCA, a second questionnaire was sent to contact persons of the selected case examples. Based on the obtained information a summary of main characteristics and a short description of each alternative

case were produced and the MCA conducted. In total, 22 cases are described in detail; for 11 cases the MCA was conducted, since their descriptions were available in time.

In the MCA, three evaluation aspects were considered: feasibility; applicability; and effects of financing mechanisms. Each of these aspects further consisted of specific criteria, resulting in total of eight evaluating criteria (for more details see chapter 6.4.3 and annexes 24 and 26): legal feasibility; institutional feasibility; social feasibility; preparation, technical applicability; transaction costs; effectiveness; and side effects. The main task of the evaluation of financing mechanisms, within the MCA, was to assign importance weights and performance scores to the criteria of financing mechanism¹ in each case. The evaluation was done by 12 experts, of which nine experts were from the Standing Forestry Committee Working Group on Valuation and Compensation Methods of Non-Wood Forest Goods and Services, while three were from the project consortia (for detailed information see Annex 26). For this purpose, the evaluators were provided with short descriptions and evaluation tables for each case of alternative financing mechanism.

Based on the evaluation scores and weights, for each of the selected financing mechanisms performances in terms of their feasibility, applicability and effects were estimated.

2.6 Complementarity of the methods

The methodology was designed to be efficient and the use of the different types of quantitative and qualitative methods aimed to produce sound and reliable results. The literature review should provide the most fundamental information. The survey, expert interviews and questionnaire help fill in any gaps in the knowledge from scientific literature and web searches. The interviews and case studies allow for the most up-to-date research developments to be included, as they may be unavailable elsewhere. Likewise, the combination of survey and interviews was done to cover any gaps in information from EU countries. Furthermore, the survey provided a standardised comparison of countries and the case collection provided in-depth information on real cases; an otherwise difficult task using the standardised surveys. The MCA for the selected cases gave a reliable evaluation and is used to cross-check the conclusions from the qualitative case analyses. A methodological triangulation was used (i.e. the combination of different techniques/methods covered under similar questions), which allows for the results to be cross-checked. This is particularly recommended for studies that aim to give sound, comprehensive overview of the information in certain problem areas.

The combination of methods proved to be valuable because each method had weaknesses: the literature search did not cover all countries; the questionnaire survey did not provide the same amount or quality of information for all countries; and the limited resources did not allow for expert interviews in all countries.

Each method provided certain information that was not available from the other sources. Limitations exist for the direct comparison of single countries because of the limited number of interviews and respondents to the survey. It should be noted that the study, did not give detailed information on individual countries but instead provide a general overview on the situation in the European Union.

In sum, information from the different methods was consistent, which increased the reliability of the main results and conclusions of the study.

¹ The prescribed *weights* refer to the relative importance of the criteria, while the *scores* refer to the performances of the mechanism respecting the particular criteria.

3. FOREST GOODS AND SERVICES IN THE EU

Chapter 3 is dedicated to the identification, characterisation and classification of all forest goods and services. It also reviews the importance and trends of non-market goods and services in the EU. Furthermore, it identifies and briefly describes the user groups, forest owners and access to forest goods and services. Finally, it provides a summary of the analysis on the importance and trends of non-market forest goods and services in the EU countries.

3.1 Review and classification of forest goods and services

Forests ecosystems provide a multiplicity of goods and services of crucial ecological, social and economic importance for the sustainability of our society. Forest goods and services represent the benefits that human populations derive, directly or indirectly, from forest ecosystems functions (MEA 2005) and are therefore an inherently anthropogenic concept, since it is the presence of human beings as valuing agents that enables the translation of the basic ecological structures and processes of forests into value-laden entities.

Due to the growing importance of forest goods and services an increasing amount of information is being collected on the ecological and also on the socio-economic value of goods and services provided by forests. However, much of this information is collected and presented at incompatible scales or it has been classified differently. In order to make comparative ecological or economic analysis possible, standardized frameworks for assessing the importance of forest goods and services are needed. In response to this challenge, many authors have developed and presented different conceptual frameworks and typologies for describing and classifying ecosystems services (see Constanza *et al.* 1997, Daily 1999, De Groot *et al.* 2002, MEA 2005) or, in the context of forestry, forest goods and services (see Sekot & Schwarzbauer 1995, Merlo & Croitoru 2005, MEA 2005, Mantau *et al.* 2007) in a clear and consistent manner.

Table 1: Classification schemes for non-wood forest products

Classification factor	Used for	By	Examples
Product type	International reporting of trade statistics	Customs and Excise, FAO	Chandrasekharan (1995)
End use	Valuation and bioprospecting	Ethnobotanists	Prance <i>et al.</i> (1987) Boom (1989) van Valkenburg (1997) Salick <i>et al.</i> (1995) Malhotra <i>et al.</i> (1991)
Plant form and part	Strategic in-forest resource inventory	Foresters Resource managers	Kleinn <i>et al.</i> (1996) Wong (1998) Cunningham (2001)
Family and overall size	Hunting quotas	Wildlife managers	FitzGibbon <i>et al.</i> (1995) Lahm (1993)
Management characteristics	Management planning	Resource managers	Wiersum (1999)

Different classification schemes have been elaborated for different specific purposes and therefore all have advantages or disadvantages depending on the context in which they might be applied. For example, Wong (2000) identified five basic approaches to the classification of forest goods and services (as shown in Table 1), but many other classifications exist. The classification schemes address different dimensions of forest goods and services and perform different purposes.

Depending on the purpose of the classification, various factors and criteria are considered (e.g. example the ecosystem functions, the end-use of the product, type of users, economic value, property regimes, management characteristics, etc.). However, none of the classification schemes are universal, and all of them have advantages or disadvantages, depending on the context of their application. Bearing in mind the FORVALUE objectives and its main accent on the non-market forest goods and services, four classification approaches, were considered and are describe in more detail. These approaches are based on (1) functional groupings (de Groot *et al.* 2002), (2) the economic values and type of use (e.g. direct use, indirect use, option and passive values) (Merlo 2005), (3) the public/private nature of the goods and services, (4) a holistic approach (based on the tripartite resource-product-user) (Mantau *et al.* 2007).

3.1.1 Forest Functional Classification

The Millennium Ecosystem Assessment (2005) proposes two classification schemes. A general classification, for all ecosystem types (see Annex 3) and a more specific one related to forest goods and services (see Figure 1). Both schemes are based on the functional classification of goods and services and are closely related to the schemes proposed by Daily (1999), Constanza *et al.* (1997), De Groot *et al.* (2002).

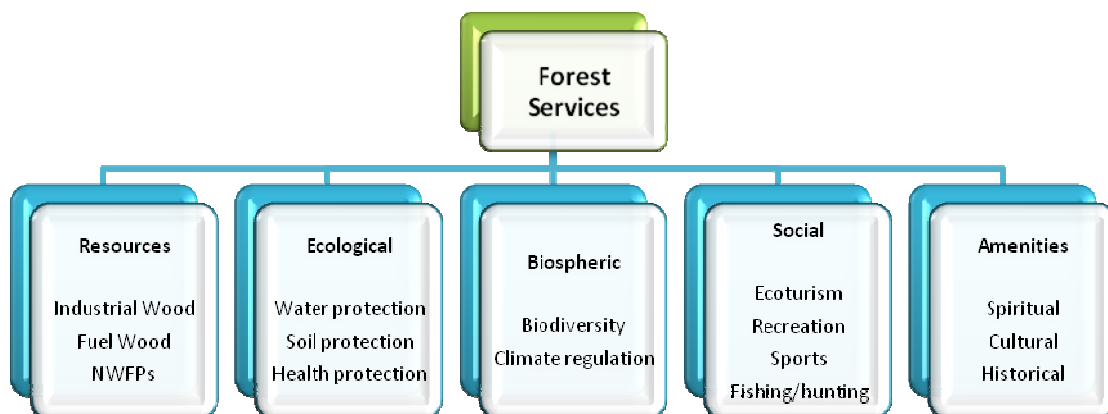


Figure 1: Major Classes of forest services (Source: MEA 2005)

According to the scheme for forests, the services are divided into five main categories: *resources*; *ecological*; *biospheric*; *social*; and *amenities*². The resources category refers to all goods that may be obtained from forests (wood and non-wood); the ecological services are those related to protection of water, soil and health; the biospheric services are mainly climate regulation and biodiversity protection; while social and amenity services comprise of different types of recreational activities and the cultural importance of forests. A complete description and characterization of the main and sub- categories is given in Annex 4.

3.1.2 TEV classification

The concept of the Total Economic Value is another approach to categorise forest goods and services. This classification is based on the different benefits that people may obtain from forest goods and services (see Figure 2). It distinguishes between use and non-use values. The former are related to the direct or indirect use of goods and services, while the latter refers to benefits obtained due to the

² The general scheme divides the services into four categories: *provisioning*, *regulating*, *cultural* and *supporting* (see Annex 3) (MEA 2005).

knowledge that an ecosystem exists or might be preserved for future generations. This concept is described in more details in the Chapter 4 of this report.

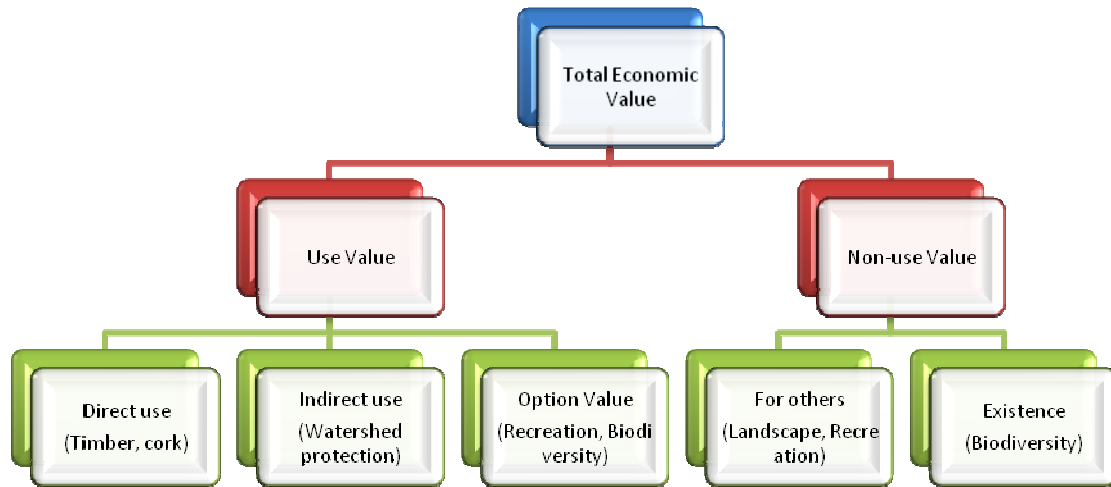


Figure 2: Total Economic Value approach classification

3.1.3 Public/private forest goods and services

Forest goods and services can also be classified according to their public/private nature. This classification is important for designing appropriate mechanisms for ensuring their sustainable and efficient provision.

All goods and services can be generally grouped in four categories according to two characteristics: excludability and rivalry in consumption.

Excludability refers to whether a non-buyer can benefit from the good or not. Excludability depends on the physical characteristics of the good and is based on the property rights regime. Every private good is excludable, as the owner can exclude other individuals from consuming it (e.g. timber). Some goods, however, are not excludable. Air quality or biodiversity protection, are examples of such goods.

Table 2: Typology of goods

		Rivalry in consumption	
		Low (Collective consumption)	High (Private consumption)
Excludability	Difficult (Unlimited access)	Public goods (Biodiversity)	Common-pool resources (Game)
	Easy (Limited access)	Toll (club) goods (Recreation areas)	Private goods (Wood)

The second distinctive characteristic of goods is *rivalry in consumption*. If the consumption of the good by one agent precludes its use by other agents, then there exists rivalry in consumption. Private goods clearly possess this characteristic – the same mushrooms cannot be consumed by several individuals at the same time (private consumption). However, there are goods which lack this property. Scenic beauty is one of such goods – an individual admiring a nice landscape does not prevent other individuals from doing the same (collective consumption).

An additional and related characteristic of the goods and services is worth mentioning in this respect, as it has important implications on the design of payment mechanisms for their use. This characteristic is *congestibility*. A good is congestible if its use by one individual reduces the benefits accrued from its use to other users. For example, mushroom picking is a congestible activity, because the number of mushrooms that are collected by one individual reduces the number of mushrooms that can be collected by other individuals. Congested recreational areas are also considered as a disamenity. Better air quality, in turn, is not congestible, because it increases the wellbeing of an individual regardless of how many other citizens there are.

Private goods are both excludable and rival (e.g. firewood). *Public goods*³, in turn, are both non-excludable and non-rival. Once these goods are produced, no one can be excluded from the benefits and additional agents can use it at virtually zero marginal cost (*free-riding*). Private economic agents (individuals or firms) have insufficient incentives to produce public goods, because they cannot reap the benefits arising from the production of these goods. As a consequence, suboptimal amount of public goods is produced.

A broad spectrum of goods and services are located on the private/public continuum. *Club goods* are excludable and rival, because the group of users can be restricted according to property rights. Recreation areas and hunting reserves are examples of such goods. *Common-pool resources* are rival and non-excludable. Open access to these resources often results in their over-exploitation (*tragedy of the commons*), because every user has an incentive to capture the benefits as quickly as possible before someone else gets them. Game is a typical example of this type of good.

The division of the FGS according to their public/private nature is relevant for the analysis of their marketability or potential marketability. Private goods with well defined and enforceable property rights are usually market goods, whereas public goods tend to be non-market goods.

3.1.4 Holistic classification of forest goods and services

A different way to classify goods and service is proposed by Mantau *et al.* (2007). The authors argue that the complexity of forest ecosystems requires an open and flexible classification, which relates ecological and economic aspects of forest uses and can be easily adapted to new requirements (e.g. emerging of new forest goods and services). They propose a classification that addresses the goods and services on three basic levels: resource, product and user. The resource is the basis for any output and it may be subdivided into resources for goods (e.g. energy, land, water, plants) and for services (personal, recreation, social and environment). The product is a marketable good or service, made from resources (e.g. plants can be made into decorative plants). Users are represented by any group of people who benefit from a product. Examples for this classification are given in Table 3.

Mantau *et al.* stress that one of the advantages of this classification is that it highlights the fact that forest product transactions involve the transformation of resources into products which have to be successful in markets geared towards the end user. Thus, the main underlying idea of this classification is that any resource can be transformed into a marketable product.

³ Note that the distinction between public and private goods refers to their characterisation in terms of rivalry and excludability, and not whether the provider of the good is a private agent (an individual or a firm) or a public body.

Table 3: Examples of different forest goods and services (adapted from Mantau *et al.* 2007)

	Resource	Product	User
Goods	Material	Industrial wood	Sawmills
	Energy	Fuelwood	Households
	Fibre	Baskets	Wholesaler
	Carbon	Equity funds	Investors
	Water	Bottled water	Wholesaler
	Air	Afforested land	Communities
	Plants	Erosion control	State
	Foodstuff	Nuts	Confectionary manufacturer
	Medicine	Herbs	Pharmaceutical industry
	Extractives	Dyestuff	Textile industry
	Live seeds	Trees	Tree nursery
Services	Personal	Well-being	Tourists
	Personal	Training	Forestry workers
	Recreation	Extreme mountain biking	Youth
	Recreation	Camp grounds	Families
	Social	Healthy exercise	People with heart conditions
	Social	Culture	Community arts group
	Environmental	Infiltration capacity	Floodplain properties
	Environmental	Biodiversity	Plants

3.1.5 Concluding remarks on classification of forest goods and services

The classification above (Table 3) indicates that there may be many possible ways to classify forest goods and services, and their usefulness depends on the goals and the needs of the user of the classification scheme. The forest functional classification is an ecosystem based classification – starting from the ecosystem functions, and where the goods and services are derived. The TEV classification is use based – it classifies the goods and services according to how society benefits from them. The holistic classification is an open and flexible classification, which relates ecological and economic aspects of forest uses. The classification, based on the private/public status is tailored to understand the economic nature of the goods and services and also provides an input in policy design. To show the compatibility of the different classification schemes, in Annex 5 we prepared a combined classification of forest goods and services, by using the TEV and public/private status approach together with the functional grouping approach.

3.1.6 Non-market forest goods and services

In the context of the present project, which aims at providing summarised information on the state-of-the-art in the field of valuation of and compensation for non-market forest goods and services, it is also important to define which forest goods and services can be regarded as non-market.

A fundamental distinction in economics is between market and non-market goods and services. Goods and services in a free market economy are sold for prices that reflect a balance between the costs of production and what people are willing to pay. Some forest goods and services, such as timber, are traded in markets; thus their value can be directly observed (market prices). Conversely, a non-market good or service is something that is neither bought nor sold directly. Therefore, a non-market good does not have an observable monetary value.

Finally by using the label **non-market goods and services** it is referring to forest goods and services that cannot be bought or sold in a traditional market and are provided to the community as a whole free of charge, or to individual consumers either free of charge or at a symbolic fee which is well below production costs (OECD 2000). Annex 6 lists the known market and non-market forest goods and services. The structure of the list follows the functional classification (presented in section 3.1.1), dividing forest goods and services into five main categories (resources, biospheric, ecological, social, and amenities⁴). Since all of the goods and services might produce different end uses/effects, they were further divided into end products and services. While in Annex 6 table 6.1 reports market forest goods and services, table 6.2 provides the summary. It should be noted, the same groups and types of forest goods and services, as used in Annex 6, will be used in the rest of the report.

Even if the lists are holding over 200 different end products and services, it should be noted that they are most likely not complete. The reason for the incompleteness of the lists is due to the continually changing uses and the importance society ascribes to different forest goods and services. Meaning that new goods and services are appearing or already existing goods and services are used in new ways. Thus, the lists should be taken as points of reference for easier understanding of the issues described in the rest of the report and a reminder of the vast number of different benefits forests' provide to society.

Before moving on to the next chapter, where the importance of different non-market forest goods and services in Europe is explained, some basic terms should be explained to avoid ambiguity.

Very often there is confusion when using the terms “*non-wood forest products*”, “*non-timber forest products*”, and “*non-market forest goods and services*”. While the first two terms refer to forest goods only with respect to their physical characteristics (not wooden), the last term refers to the market position of certain goods and services. Thus “**non-wood forest products** are goods of biological origin other than wood derived from forest, other wooded land and trees outside the forest” (FAO 1999). Consequently, timber, chips, charcoal and fuel wood, as well as small wooden products such as tools, household equipment and carvings are excluded from this category of forest products. In contrast, **non-timber forest products** also include fuel wood and small wooden products (FAO 1999).

3.2 Importance of non-market forest goods and services in the EU

The relationship humans have with forests and forestry is continually changing. These changes became relevant in the last decades, when the demand for ecological, social and cultural services from forests significantly increased, while the importance of some traditional goods and services decreased (e.g. resin, fodder). In the following sections the importance and trends of importance of non-market forest goods and services in the EU is given. According to the scope of the study only EU-27 Member States are considered.

For the analysis of importance and trends two main data sources were used. The data reported in the MCPFE report (2007) is based on common pan-European indicators for sustainable forest management. However, this data is limited only to some of the non-market goods and services (water and soil protection, biodiversity protection, spiritual and cultural services, recreation and leisure). Thus, to give a more complete picture of the situation, additional results obtained from a

⁴ A description of the main groups and goods and services can be found in Annex 2.

questionnaire⁵ are also presented. Detailed analysis of the questionnaire results is given in (Annex 8).

The questionnaire results on the 'relative importance' of non-market forest goods and services presents the respondents' perception of all the benefits derived from forest goods and services, ranked from 'not important' to 'very important' (for a detailed list of respondents see Annex 8). Other information from the questionnaire (e.g. the percentage of forest area and the trends of importance) also support the results on the relative importance: smaller rank of importance corresponds to smaller percentage of area and smaller trends of importance, and vice versa. (Annex 8). Finally, it should be made clear that the importance of non-market forest goods and services, as presented here, does not refer to their economic value or market prices.

In the following presentation of the results, non-market forest goods and services are classified according to the forest functional classification adopted by MEA (2005), namely ecological, biospheric, social, and amenities (for details see Annex 4). Furthermore, in order to provide a better overview, the countries were grouped into five regions: Central Europe, Nordic/Baltic, North-West Europe and South East Europe⁶.

3.2.1 Importance and trends of ecological services

The ecological services taken into account in this report are those related to protection and regulation of water, protection of soil and health. According to the results of the conducted survey these services are, in general, considered as important. All services are deemed to be equally as important (Annex 8, Table 8.4). However, as Figure 3 indicates, there are some differences, with regards to the different regions. This was especially noted in the South-Eastern countries where these services were given a far great level of importance then in Nordic countries (Figure 3).

Regarding these services, the MCPFE reports the percentage of forests designated for soil and water protection. In the EU-27 countries, 11.2 % of the total forest area is managed for soil and water protection (MCPFE 2007). The countries with the highest share of forests designated for water and soil protection are Germany (34%), Romania and Belgium (each 25%) and Poland (21%), while Cyprus, Ireland and the Netherlands reported that no forests are assigned for this purpose (for details see Annex 7, Table 7.1). Nevertheless, since most forests are multi-functional to some degree, these functions are supplied by many other forests not explicitly designated as protection forests. Thus, the MCPFE indicators provide only a partial picture of the actual protection of water and soil provided by European forests.

⁵ The full questionnaire is available in Annex 11 of this report.

⁶ The regional division of the MS countries is explained in Introduction section of Annex 8.

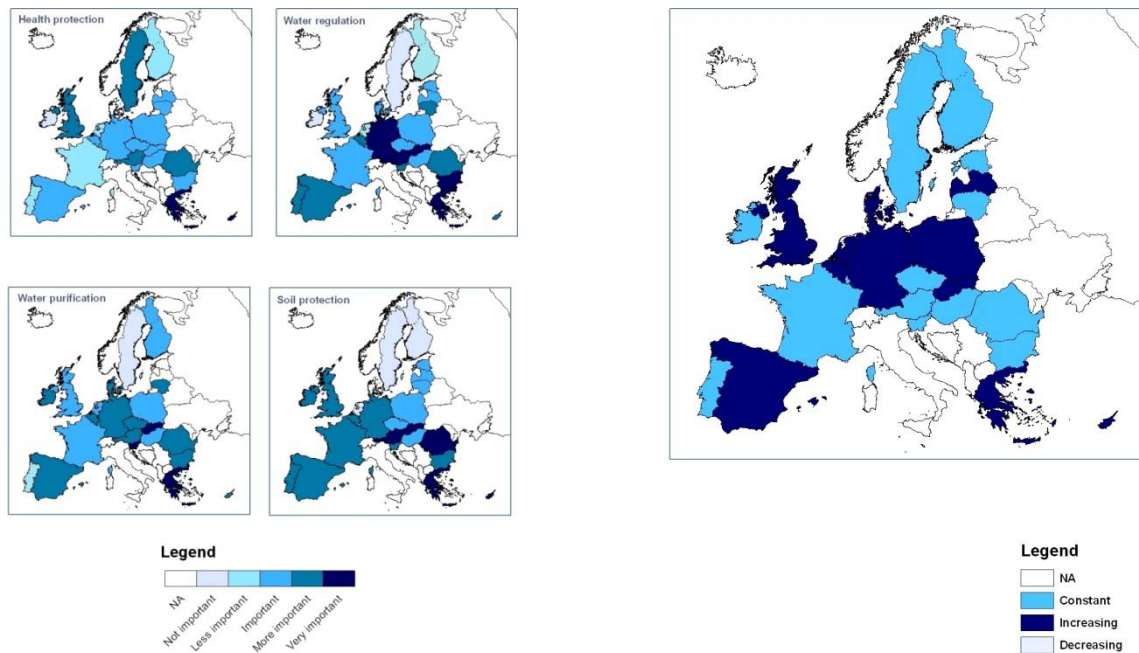


Figure 3: Relative importance of ecological services (left) and their trend of importance (right)

In terms of the trends of the ecological services, the respondents also stated that the level of importance of these services is increasing (Figure 3). The MCPFE data on forests managed for water and soil protection, underlines this finding, since, from 2000 to 2005, 12 countries have increased the area for this purpose, while only three (Spain, Estonia and Hungary) mark decreasing trends (Figure 4).

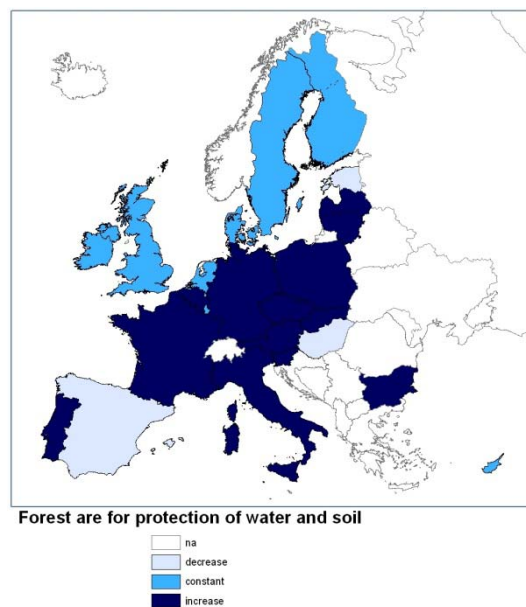


Figure 4: Changes in forest area for protection of water and soil (period 2000-2005) (source: MCPFE 2007)

3.2.2 Importance and trends of biospheric services

Regulation of climate and air quality, carbon sequestration and biodiversity protection are listed under the category of biospheric services. In the responses from the questionnaire all the services

were considered as important (see Annex 8, Table 8.7). Especially, biodiversity protection which is considered very important, as it received the highest score for importance throughout all of Europe (Figure 5). In the ecological services group some differences exist between regions. Again South Eastern countries put the highest rank of importance (Annex 8, Table 8.7).

The MCPFE data contains only indicators on biodiversity protection and carbon sequestration, which can be used as proxies to express the importance of these services.

Indicators on biodiversity include: (i) forest area managed for biodiversity by applying no or minimum intervention, (ii) forest area where biodiversity is conserved through active management and (iii) forest area for landscape protection. When considering the data for EU-27, the total area of forests managed for biodiversity conservation and protection, by applying minimum intervention, was 3.3%; 3.8%, was for conservation through active management; and 10.1% of the forests are managed for landscape protection. The highest share of forest for biodiversity protection, if including only the first two of the above mentioned indicators, have Luxembourg, Germany, Italy and Denmark. On the other hand, landscape protection prevails mainly in central and western European countries. The countries with the highest proportion of such forests are Germany, Portugal, Slovakia, Austria the United Kingdom and the Czech Republic (for more details see Annex 7, Figure 7.1).

In terms of carbon sequestration, MCPFE (2007) reports on the carbon stock of the total woody biomass (including dead wood, above and below ground living woody biomass. In 2005 forests in the EU 27 stored about 8.9 billion tonnes of carbon (MCPFE 2007). The situation in individual countries is proportional to the forest size and conditions. As for the total carbon stored, the forests in Sweden, Germany, Finland, France, Poland and Italy are the most important in the EU-27 (for details see Annex 7, Table 7.2).

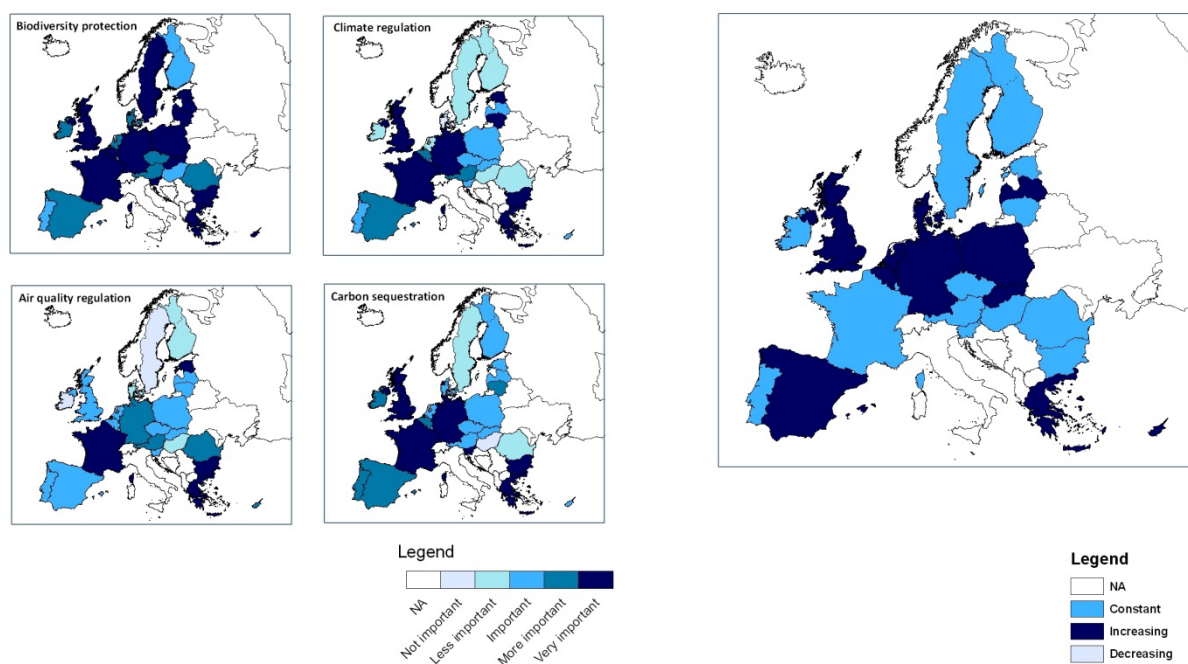
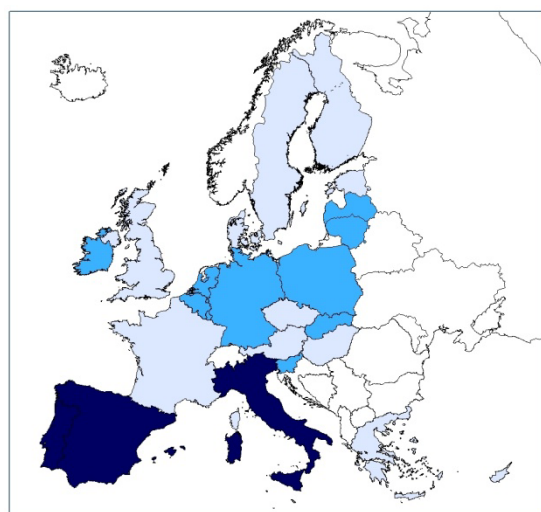


Figure 5: Relative importance of biospheric services (left) and their trend of importance (right)

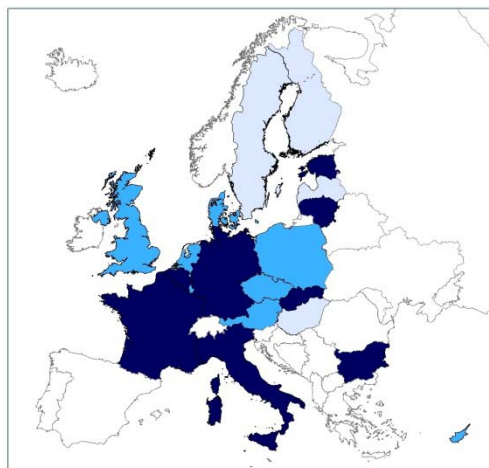
With regards to the trends of biospheric services, responses from the Member States indicate that even though they are very important at present, their level of importance is expected to be even more so in the future (Figure 5) and (Annex 8, Table 8.8).

According to MCPFE, the trends for the data on carbon sequestration and biodiversity protection are also seen to be increasing. From 1990 to 2005, the amount of stored carbon has increased in all countries (Figure 6). For the same period, the average annual increase of stored carbon was around 128 million tonnes, which could offset around one-tenth of the CO₂ equivalent emissions from these countries (MCPFE 2007). In this case, the increasing carbon stock is closely related to the increase of Europe's forest area (13 million hectares in the last 15 years). From 2000 to 2005, the data on changes in the area of protected forests for biodiversity, and is also somewhat on the increase (Figure 7).



Increase of carbon stock of woody biomass total

NA
0-20% increase
20-40% increase
40-50% increase



Area of forest protected to conserve biodiversity through "active management"

NA
decrease
constant
increase

Figure 6: Changes in total carbon stock in woody biomass (period 1990-2005) (source: MCPFE 2007)

Figure 7: Change in area of forests for biodiversity protection through active management (period 2000-2005) (source MCPFE 2007)

3.2.3 Importance and trends of social services

Grouped under the label of social services were tourism, recreation and sport activities. Recreation was ranked as the most important among these services. Somewhat lower importance throughout Europe was ascribed to sport activities in the forests (Figure 8).

The MCPFE report has very little information available that can be used for estimating the importance of social services. The only indicator is the number of forest visits per person per year. The estimated annual visits per person, in the reporting countries are as follow: Sweden (37.5), Germany (20.6), the Netherlands (16.6), Denmark (9.2), France (7.3), UK (5.0), Italy (2.6), Czech Republic (2.0), and Finland (0.2 only in public forests) (MCPFE 2007). Due to the use of different methodologies and reference years, data are not comparable among the countries and it is difficult to draw a general conclusion.

For the future we can expect that the importance of all three social services in the EU-27 countries is most likely going to increase further, since the majority of the countries predicted such trends for services related to recreation, tourism and sport events (Figure 8).

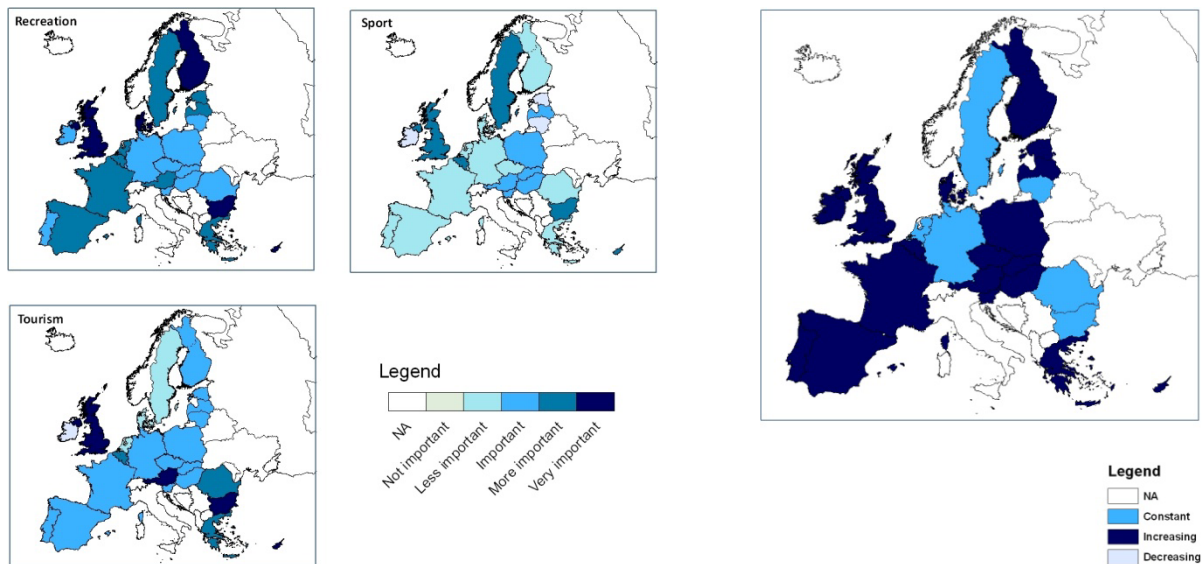


Figure 8: Relative importance of social services (left) and their trend of importance (right)

3.2.4 Importance and trends of amenity services

The last group of non-market goods and services inquired in the questionnaire were amenities, which include aesthetics, historical and educational, and spiritual and cultural services. The results of the questionnaire show that forests are considered of low importance for historical, educational, spiritual and cultural services, while the aesthetics were indicated to be important (Figure 9 and Annex 8, Table 8.13).

However, from what we deduce from the responses, it is expected that along with other non-market goods and services amenities will also play a more important role in the future, with increasing trends of importance (Figure 9).

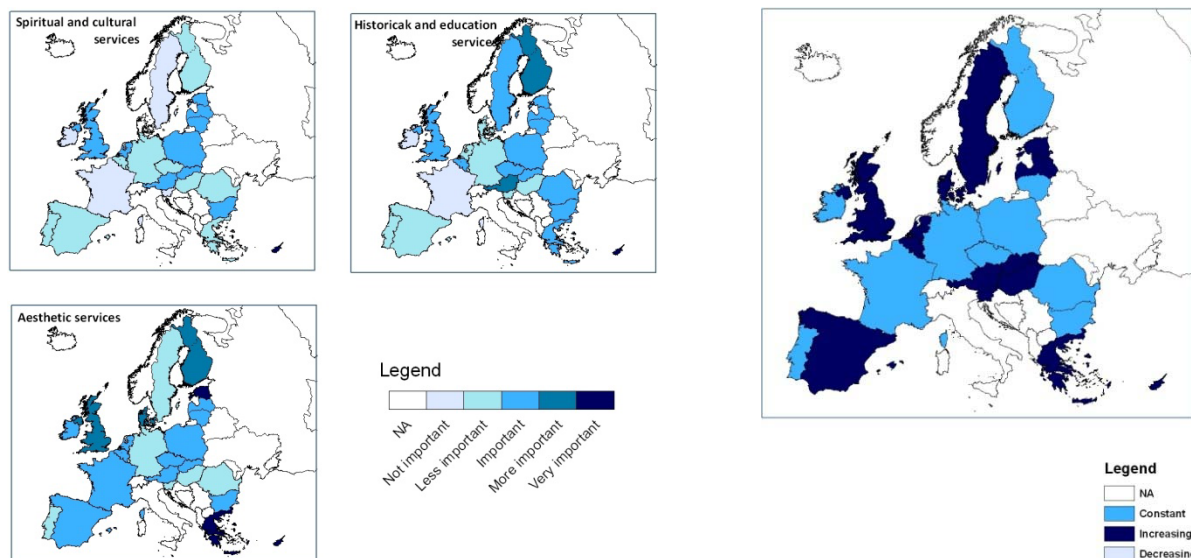


Figure 9: Relative importance of amenity services (left) and their trend of importance (right)

The MCPFE data provided the indicators on the importance of the amenities from forests, the number of sites designated as natural monuments, historical sites, and other sites with cultural and spiritual values (MCPFE 2007). Based on the available data, in 2005, there were 871059 nature monuments (13 reporting countries), 858 historical sites (6 reporting countries), and 527 other sites

with recognised cultural and spiritual values (in the latter, only 3 reporting countries). The countries reporting the largest number of natural monuments were Sweden, Latvia, Poland, France and Italy. However, the given numbers are only rough estimations of the importance of these services, since only few countries reported on these indicators. Nevertheless, according to the available data, the number of identified and protected sites, with spiritual and cultural values, is increasing. This can be associated with the intention of preserving these sites, as their accessibility and relevance is in danger due to the decline of rural population.

3.2.5 Other information on trends of forest goods and services

The COST Action E30⁷ launched a case study to evaluate the importance and the trends of different forest goods and services, in relation to forest entrepreneurship, in Europe. A total of fourteen of EU-27 countries were included⁸.

The collected data indicates that, according to their importance, forest goods and services can be divided into three main categories (Table 4):

- *traditionally important goods and services* - refers to those which were important in the past, but recently their importance and use are diminishing. The reasons for declining relevance of these (mostly agricultural and farming) products are closely related to the decline of rural population and modernisation of agricultural and farming practices. However, in some cases the traditional use of certain products was replaced by new uses (e.g. the importance of medical plants and herbs in traditional medicine have declined, but medical plants are increasingly important for pharmaceutical products).
- *traditionally and currently important goods and services*- as the previous group, mainly includes NWFPs, but with the in addition of nature tourism and recreation.
- *innovative goods and services* - includes environmental and recreational services, and so called “creative forest goods and services”. The growing importance of environmental services might be correlated to their increasing scarcity and growing public awareness. “Creative products” have recently been included in forest uses, intended for educational and specific recreational activities. They are particularly encouraged by private forest owners in Denmark, but are also fast spreading in some other countries (e.g. Austria, Finland).

It should be noted, that the above classification is not absolute and may vary considerably throughout Europe. For example, mushrooms and berries were historically and are still important in most of the countries (Finland, Austria, Bulgaria, Italy, and Romania). However, in Portugal they are not traditionally used, and their importance only recently arose. Similarly, nature tourism and recreational services, can be considered as “traditionally and currently important services” in Scandinavian countries, but are seen as “innovative” in other EU-27 countries.

⁷ COST Action E30 web page: <http://www.joensuu.fi/coste30/>

⁸ Includes national reports from the following countries: Austria, Bulgaria, Denmark, Finland, Germany, Hungary, Ireland, Italy, Lithuania, the Netherlands, Poland, Portugal, Romania and the United Kingdom.

Table 4: Trends in forest non-wood goods and service importance (adopted from COST Action E30 2007)

Traditionally important	Traditionally and currently important	“Newly” important	
		Environmental and recreational	“Innovative”
<ul style="list-style-type: none"> • resin • animal fodder (leaves, litter and grass) • foliage and branch for agricultural use, • lightwood, • medical plants and herbs (in traditional medicine), • fibrous materials (broom making) • bark. 	<ul style="list-style-type: none"> • mushrooms • berries • forest fruits • flowers • Christmas trees • medical plants (pharmaceutical products) • truffle • grazing • hunting • honey production • nature tourism and recreation (in Scandinavia) 	<ul style="list-style-type: none"> • drinking water • protection from natural hazards • erosion and watershed protect. • C-sequestration, • nature tourism, • amenities, • aesthetic values, • handcrafts, • greeneries for decoration, etc. 	<ul style="list-style-type: none"> • horseback riding • mountain biking • nature kindergartens • forest pedagogies • scouting and other youth activities

3.2.6 Overview and comparison of the trends and importance of non-market forest goods and services

The questionnaire results provide comparable information about the importance and trends of non-market forest goods and services. Comparing the average importance of different groups of non-market forest goods and services, in different EU regions, and at the EU-27 level, biospheric services are ranked as the most important, followed by ecological and social (Figure 10).

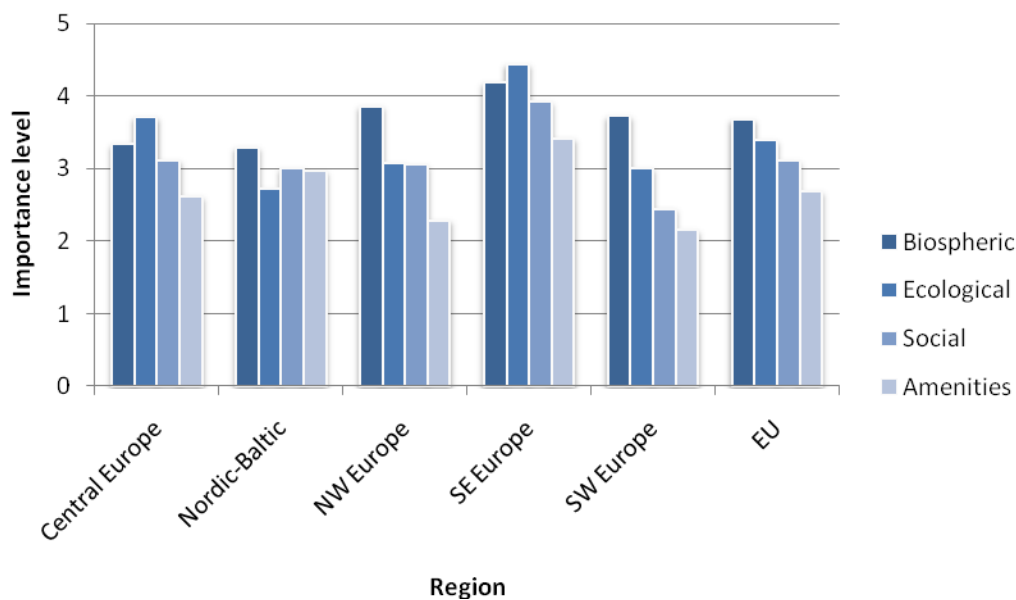


Figure 10: Importance of different groups of non-market forest goods and services (1-not important, 2-less important, 3-important, 4-quite important, 5-very important)

When comparing the importance of single forest goods and services, biodiversity protection and recreation are ranked as the most important. They are closely followed by carbon sequestration and

watershed services (soil protection, water regulation and purification). The lowest importance is ascribed to sport and spiritual and cultural services (Figure 11).

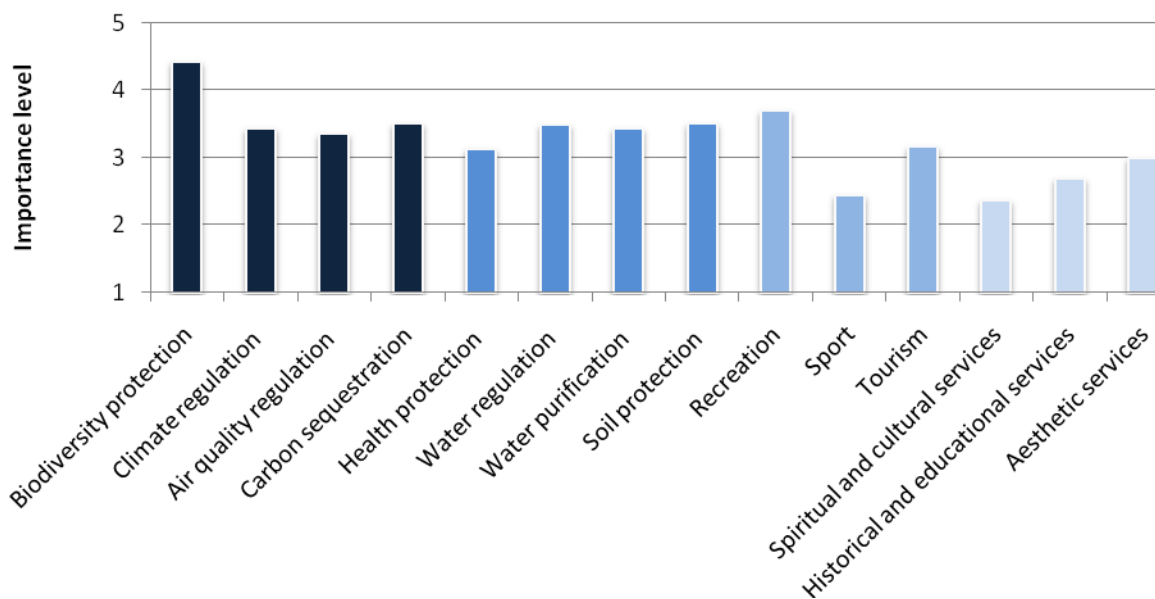


Figure 11: Importance of different non-market forest goods and services in the EU-27 (1-not important, 2-less important, 3-important, 4-quite important, 5-very important)

When analysing the trends of importance of the non-market forest goods and services, all of them show an increasing trend of importance, with some regional exceptions (Table 5).

Table 5: Trend of importance of different groups of non-market forest goods and services

	CE	NB	NW	SE	SW	EU
Biospheric	+	+	+	+	+	+
Ecological	+	+	+	+	0	+
Social	+	+	+	+	+	+
Amenities	+	+	+	0	0	+

Legend: 0=constant, + = increasing, - = decreasing

3.3 User groups, forest ownership structure and public access to non-market forest goods and services

The importance and trends of forest goods and services, discussed in the previous sections, are closely related to their demand and provision. The demand side is represented by the user groups, while the provision mainly depends on the forest owners and managers.

3.3.1 Forest user groups

A user is any individual or group of individuals that benefits from a forest good or service. Various categories of forest users can be identified. For example, based on the aim of the use of non-wood forest goods and services, FAO (1995) identifies the following groups:

- *rural population* - using non-wood forest products for household consumption;
- *urban population* - using and collecting non-wood forest products for recreation and
- *traders* - using NWFP for profit making.

MEA (2005) provides an estimation of the importance of certain forest goods and services for various user groups (Table 6).

Table 6: The importance of forest goods and services to different user groups (adopted from: MEA 2005)

User groups	Fuel	Timber	Water	NWFP	Biodiversity	Amenities	Carbon sequestration
Local communities	5	3	5	4	2	4	2
Loggers	4	5	2	2	1	2	2
Downstream users							
- cities	3	4	4	2	2	4	2
- agriculture	4	3	5	3	3	3	1
- industry	2	5	3	0	0	1	1
Timber traders	3	5	1	3	0	0	1
National	4	4	5	3	4	4	3
Global	4	3	3	4	5	3	3

The numbers stand for the level of importance: 0 – not used, 1 – sporadic use, 2 – moderately important, 3 – important, 4 – very important, 5 – crucial

According to this table the importance of non-market forest goods and services (e.g. water, biodiversity, amenities, and carbon sequestration) is equally distributed amongst the various user groups. However, it is difficult to say which of the goods and services are the most important. The ranking of importance depends on the criteria used to measure it. For example, water and amenities are the most important if measured by the number of direct users; biodiversity ranks first if measured by the number of indirect users; amenities and NWFP are crucial if measured by their contribution to rural communities.

Table 6 shows that different user groups might have similar or different and even competing priorities. Conflicts between different user groups can be related to the access and users rights to the wood and non-wood forest resources, and to property rights (Castro & Nielsen 2003, Hellström & Vehmasto 2001). Pearse (1990) identifies five main types of relationships between forest goods and services based on their uses:

- *mutually exclusive* are uses which are entirely incompatible (e.g. timber production and preservation of a virgin forest for scientific research)
- *highly conflicting uses* are those where successive increments in the output of one product requires progressively smaller sacrifices of the other (e.g. timber production and amenity)
- *constantly substitutable* are those uses for which the trade-off between the two products remains the same throughout the full range of production (e.g. fuelwood and industrial timber)
- *independent uses* have no effect on each other (e.g. watershed protection and recreation)
- *complementary uses* are those which have a mutually enhancing effect (e.g. watershed protection and biodiversity).

Annex 9 gives examples about the relation between timber production and the most important non-market services. However, the relation between two different forest goods can vary considerably and must be evaluated from case to case. In general it is assumed that commercial timber production is mutually exclusive with the ecological and biospheric services and highly conflicting with social services. But this is not always true. For example, timber production and biodiversity protection can

be mutually exclusive if we consider intensive timber production (short rotation periods, clear cutting, and planting of exotic tree species) and a very strict protection regime (no forest management allowed). On the contrary, they can be to a certain degree, complementary if close-to-nature forest management is applied (long rotation periods, dead wood accumulation, natural regeneration, native tree species, low intensity thinning) and a less strict protection regime is applied.

In the context of this study, it is also important to examine whether, considering only the interests of one stakeholder group might lead to a non-optimal production of forest goods and services, from the society's view point. In general, the main objective of each stakeholder group is to maximise its benefits. However, if the interests, regarding the provision of goods and services, are conflicting or even mutually exclusive, it is obvious that one group is not able to maximise its benefits without negatively affecting the benefits of other groups. There are different possible solutions (e.g. agreement about compensation payments for the foregone benefits) for these problems, which also depend on the distribution of the property rights (e.g. in general the owner of the resource decides about its use).

3.3.2 Forest ownership structure

The ownership structure and public access to forest are both tightly related to marketability of forest goods and services. The presented data provided in this report is based on existing literature and databases, from MCPFE, UNECE/FAO, COST E30 Action and some country specific studies. Forest ownership schemes vary across the EU-27 countries. According to the MCPFE report (2007) more than 60% of forests in the EU-27 countries are private (see Annex 10, Table 10.1). Portugal, Austria, France and Slovenia have the highest proportion of private forests; while in Malta, Bulgaria and Greece hold the highest shares of public owned forests.

Since the 1990s, there have been significant changes in the number of forest holdings and ownership structure, especially in Central European and Baltic countries. This is due to privatisation and restitution of forest land to former owners, whereby the share of private forest has significantly increased (MCPFE 2007). In addition Western European and Nordic countries have a generally decreasing share of public forest. These shifts have resulted in the creation of a large number of private forest owners. Many of them own relatively small areas of forest and often lack experience to properly manage their forest. Sustainable forest management can significantly influence the provision of many of the non-market forest goods and service. Thus, poorly managed forests might result in a suboptimal provision of these goods and services.

3.3.3 Public access to forest and forest goods and services

Public access to forest is another important issue in managing the environmental, social and economic aspects of forest and forestry (e.g. relationship between forest owners and users).

The access to forests varies substantially across the EU-27 countries. In many of them public access is a fundamental right, while in others this right may be limited. According to the UNECE/FAO (2004) the countries can be split into three main groups:

- Countries with “free public access to forest” are Finland and Sweden, where the public access rights are possibly the widest in Europe;
- Countries with “limited free access to forest”, which corresponds to the EU-27. However, in this group the countries can be further subdivided in (i) *Countries whose forest laws do not explicitly refer to public access to forest* (e.g. use of forest roads in Bulgaria, Cyprus and

Romania; no public access to regeneration areas, natural and scientific reserves in Romania). (ii) *Countries with significant difference in access between private and public forest* (e.g. In Poland and France private owners have the right to prohibit the access to their forest, while in the UK access is possible only when authorized by the owner) and (iii) *Countries where owners are entitled to restrict the access to forest only for specific reasons, and in specific areas* (e.g. Austria, Czech Republic, Estonia, Hungary, Slovakia, Slovenia, Germany, Lithuania); and

- Countries where “free access does not exist” are Italy and Denmark. Forest owners in these countries have the right to prohibit the access to their forests or can transfer the rights for specific uses, by establishing contracts with certain user groups.

The questionnaire survey conducted in the FORVALUE study also addresses the issue of accessibility to forest goods and services in the EU-27. According to the gathered information, the access to goods and services grouped under *resources* is mostly limited. Nevertheless, there are some exceptions with regards to food collecting (e.g. mushrooms, berries, seeds), which is free in many countries. However, South-Eastern European countries, with the exception of Greece, use permits to limit collecting for food. It should be noted that access to non-market forest goods and services is mostly unlimited and free. With regards to the exceptions for biospheric and ecological services, these are considered to be areas under strict protection regimes, such as water purification and biodiversity protection sites, where their access is limited in some countries. With regards to the accessibility to social services, there are large discrepancies between the differing countries and services. While access to recreation is mostly unlimited, access to tourism and sport sites is even more so (Figure 12). Finally, the access to amenity services is free in all European regions. Only in single countries, the access to some of the services is regulated by permits (see Annex 8 for more details). Figure 12 presents a summary of the amenity services to which the main groups of forest goods and services have access.

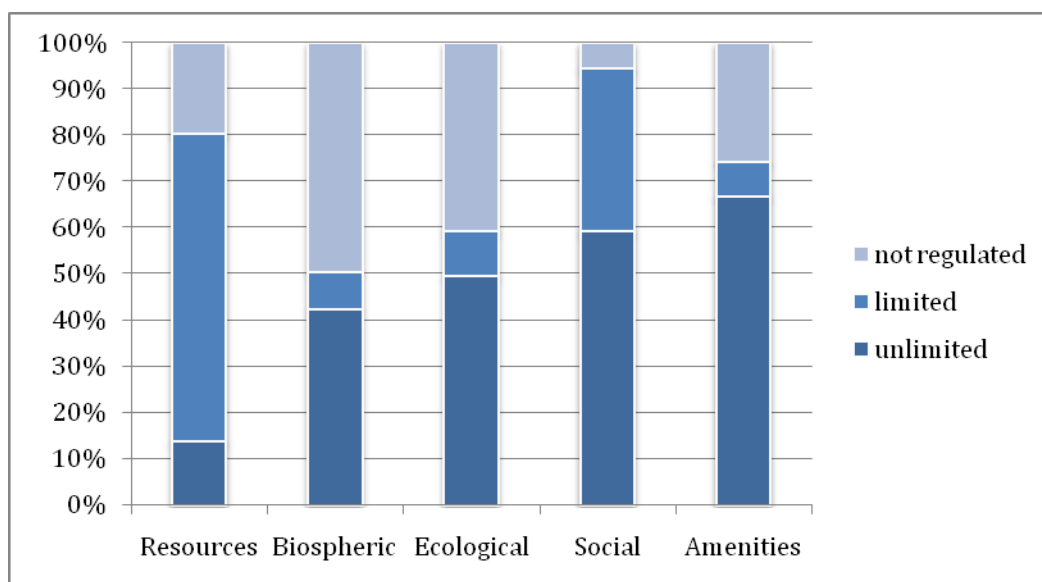


Figure 12: Accessibility of the main groups of forest goods and services in the EU 27.

The free accessibility and provision of non-market forest goods and services implies that the provider (e.g. forest owner) is not compensated for their provision, and is thus not motivated to manage the forest in a way that would optimise the quantity of these non-market goods and service. To correct this situation, compensation payments can be applied; however, before such payments can be established, an understanding of the value of these goods and services is necessary. This is

because, no market price exists that could indicate the value of this type of goods and services, and thus, other methods have to be applied for their valuation. These methods and the realm of possibilities for their application are presented in the chapter 4.

3.4 Concluding remarks on forest goods and services

Forests provide a multitude of different goods and services. There are different schemes available to classify these goods and service. For the purpose of this study, however, the most important is the division between market and non-market forest goods and services.

Market forest goods and services are traded on markets and their value is defined by the market price. However, non-market goods and services are not traded in markets, thus no value can be directly observed. They are supplied to either the society or certain groups of users, for free or at a symbolic price which is far below the production costs. Following this definition, a list of all forest goods and services was established, dividing them into market and non-market forest goods and services (Annex 6). Market goods include timber, fuel wood and non-wood forest products, while the group of non-market goods and services comprises water protection, soil protection, health protection, biodiversity protection, climate regulation, tourism, recreation, sport activities, spiritual services, cultural services and historical services.

It is of utmost importance to decision makers that they gain knowledge about the relative importance of these services for the society, in order to help them decide on the application of mechanisms for their preservation or improvement. According to the data gathered for our study (i.e. from the MCPFE report and the FORVALUE questionnaire) generally speaking, non-market goods and services are considered important. This is especially true for biospheric and ecological services. From the pool of non-market goods and services, biodiversity protection, recreation and tourism, carbon sequestration, and watershed services (water regulation and purification, and soil protection) were ranked as the most important. These non-market goods and services are also considered as to have the highest potential for the application of financing mechanisms in terms of compensation for their provision (see Chapter 5).

The access to non-market goods and services is in most cases unlimited and free. This means that the provider (e.g. forest owner) is not compensated, in monetary terms, for their provision, and thus also not motivated to manage the forest in such a way that an optimal quantity of these non-market goods and services would be supplied. To correct this situation, compensation payments can be applied, however, before such payments can be established, all knowledge on the value of these goods and services must be estimated. Since no market prices exist for these types of goods and services, which could indicate the value, other methods have to be applied for their valuation. These methods and the possibilities of their application are presented in Chapter 4 of this report

4. ECONOMIC VALUATION OF FOREST GOODS AND SERVICES

4.1 *The concept of economic value and valuation methods*

As discussed in the previous chapter, forests provide a great variety of goods and services that are certainly valuable to society. This section addresses how best their benefits can be valued and how to estimate their values.

The concept of value has been a subject of a wide debate among scientists for many years. This report identifies types of values that have been identified (see Annex 14 for a general value typology) and suggests various ways they can be measured (see e.g. Edwards-Jones et al. 2000). Economic valuation (based on the concept of economic value) is essentially anthropocentric – that is, it stresses values that bring benefits to human beings, either directly or indirectly – and is preference based. Many also consider that forests have intrinsic value independent of human preferences; consequently, the question of their impact on human well-being emerges. However, while the importance of other value notions should not be downplayed, their operationalisation is very difficult and in that respect the concept of economic value offers significant advantages.

Economic valuation of forest goods and services relies on the notion of *willingness to pay (WTP)*. Willingness to pay for a particular good is defined as the maximum amount of other goods (e.g. money) an individual is willing to give up in order to have that good (for further explanations of the concept, see Annex 12). WTP is determined by motivations which can vary considerably, ranging from personal interest, altruism, concern for future generations, environmental stewardship, etc. The economic value of the good to an individual is reflected in the willingness to pay of the individual for that good.

The most common reasons for undertaking a valuation of ecosystems are (i) to assess the overall contribution of ecosystems to social and economic well-being, (ii) to understand how and why economic actors use ecosystems as they do, and (iii) to assess the relative impact of alternative actions, as a decision support tool (MEA 2005). The latter can provide a way to justify and set priorities for programs, policies, or actions that protect or restore ecosystems and their services. This type of valuation can provide useful information to policy-makers by highlighting the economic consequences of an alternative course of action.

In addition, economic valuation has also been used to estimate the value of the totality of ecosystem services at a given time (e.g., Costanza *et al.* 1997). This approach has been strongly criticised by economists (e.g. Pearce 2001, Bockstael 2000). The removal of all forests, for example, would involve the loss of a major life support system. Economic values are only applicable to small changes in ecosystem services; therefore the question as to what is the 'value of everything' makes little economic sense.

The wide range of benefits that forests provide creates multiple challenges for analysis. A coherent analytical framework based on the concept of Total Economic Value (TEV) has been developed as a guarantee that the benefits are considered systematically and comprehensively, without any double counting. In recent years, the TEV has been widely used to quantify the full value of the different components of ecosystems.

In general, this framework disaggregates the value of ecosystems into use and non-use values (Pearce & Moran 1994).

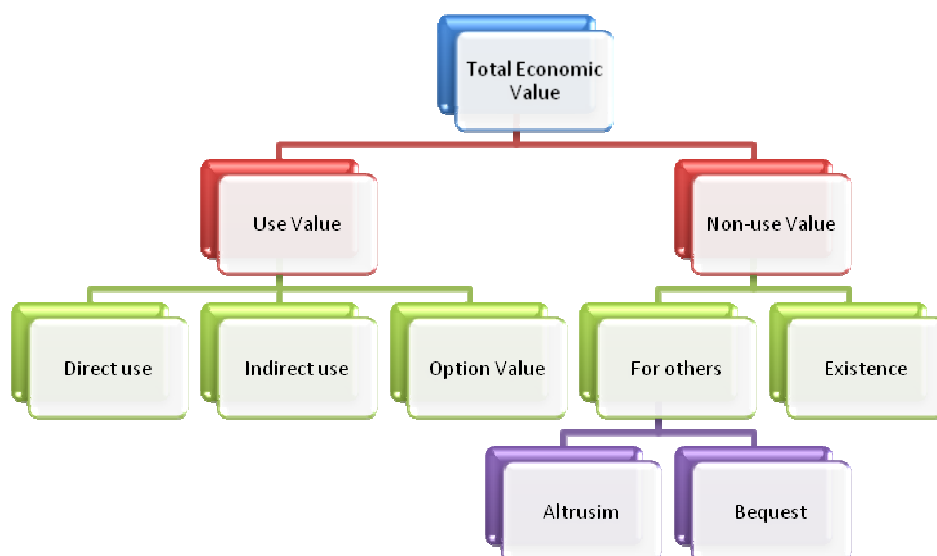


Figure 13: Total Economic Value framework

Use values are related to the direct, indirect or future use of a natural resource. *Direct use value* is defined as the value of actually using a good or service, (e.g. timber, hunting, bird watching, or hiking). Use values may also include *indirect uses*, where individuals benefit from ecosystem services supported by a resource (e.g. water regulation, carbon sequestration). *Option value* is the value that people assign to having the option of a good or a service (i.e. something to enjoy) in the future, even though they may not currently use it. These future uses may be either direct or indirect. For example, a person may hope to visit a natural area sometime in the future, and would thus be willing to pay something extra to preserve the area, as a way of securing that option.

On the other hand, **non-use values**, also referred to as “passive use” values, are values that are not associated to the actual use or even the option to use a good or service. These values are derived from the knowledge that the natural resource is preserved. Existence value is the non-use value that people place for simply knowing that something exists, even if they never see it or use it. Bequest value is the value that people place of simply knowing that future generations will have the option to enjoy something. Thus, it is measured by peoples’ willingness to pay to preserve the natural environment for future generations. Altruistic value is the value attached by an individual to another individual’s use or enjoyment of an ecosystem service in the current generation.

Another value, relevant in the context of ecosystem valuation, is the quasi-option value (Arrow & Fisher 1974). The quasi-option value refers to the value of information secured by delaying a decision, where outcomes are uncertain and where there is opportunity to learn by delay. This is to say that the information on value will only be revealed over time, mainly because there is uncertainty about the future value of a natural resource.

It is clear that a single person may benefit in more ways than one from the same ecosystem. Thus, the total economic value is the sum of all the relevant use and non-use values for a good or service.

Finally, it should be noted that the TEV framework and the classification of forest goods and service (MEA 2005) presented, in Chapter 3 of this report complement each other (DEFRA 2007) (Table 7). Combining both frameworks can give information on the types of values related to different types of goods and services. This can be helpful when selecting the appropriate valuation methods to estimate these values.

Table 7: Ecosystem services and the Total Economic Value (adopted from DEFRA 2007)

MEA classification		TEV framework			
Group	Goods & Services	Direct use	Indirect use	Option use	Non-use
Provisioning	wood, fuel, food, non-wood forest products, etc.	+		+	
Regulating	air quality regulation, climate regulation, water regulation, etc.		+	+	
Cultural	recreation and tourism, aesthetics, cultural heritage, etc.	+		+	+
Supporting	primary production, soil formation, nutrient cycling, etc.	Supporting services are valued through the other categories of ecosystem services			

The valuation methods can be broadly divided into two groups: *economic and non-economic valuation methods*. The *non-economic methods* are based on deliberative (participatory approaches), exploring opinions or preferences of different stakeholders and expressing them in non-monetary units. Since these methods are outside the scope of this study, they will not be explored any further. However, a review of some of these methods can be found in Stagl (2007).

Economic valuation methods attempt to elicit the monetary value of a certain change in the quantity and/or quality of the environmental goods and services. The main types for these methods are *Revealed Preference*⁹ (RP) and *Stated Preference*¹⁰ (SP) methods (see also Annex 15). These are based on the fundamental principles of welfare economics; whereby the changes in the well-being of individuals are reflected in their willingness to pay or willingness to accept compensation for changes in their level of use of a particular service or bundle of services (Hanley *et al.* 2001).

The RP methods are based on actual observed behaviour data, including some techniques that deduce values indirectly from behaviour in surrogate markets, which are assumed to have a direct relationship with the ecosystem service of interest. The main valuation techniques in this group of methods are:

- **Market Prices Method** is used when the actual market for the valued good or service exists. In this case, the valuation is done on the basis of observed market prices. The market valuation technique uses the standard economic methods for measuring the economic benefits from market impacts, based on the quantity demanded and supplied at different prices. Where market values exist, they should be preferred to any other valuation technique. However, it should be remembered that market prices represent only a lower range estimate of value; some people may in fact be prepared to pay much more than the market price.
- **Avoided Cost Method** is based on the idea that the cost of replacing the goods and services provided by an environmental resource can offer an estimate of the value for that resource. The main underlying assumptions for this approach refer to the predictability of the extent and nature of physical expected damage (there is an accurate damage function available) and that the costs to replace or restore damaged assets can be estimated within a reasonable degree of accuracy. It is further assumed that the replacement or restoration costs do not exceed the economic value of the service. The latter assumption, however, may not be valid in

⁹ More on revealed preference methods in Bockstael & McConnell (2007)

¹⁰ More on stated preference methods in Kanninen, B. J. (Ed.) (2007)

all cases. The value of the service may fall short of the replacement of restoration costs; either because there are few users or because their use of the service is in low-value activities.

- **Travel Cost Method** uses the costs of consuming the services of the environmental asset (e.g. outdoor recreation site) as a proxy for value the consumers place on it. These costs include travel costs, entrance fees, on-site expenditures and outlay on capital equipment necessary for consumption. This method requires that the visitor surveys provide information on travel expenditures (transportation mode, time and distance), socio-economic characteristics (age, gender, income, etc.) and purpose of visit. The travel cost method is mainly used to estimate economic use values associated with ecosystems or sites that are used for recreation (Hotelling, 1949; Freeman, 1992).
- **Hedonic Pricing Method** is used to estimate economic values for those goods and services that directly affect market prices of some other (related) goods or services. The basic premise of the hedonic pricing method is that the price of a market good is related to its characteristics, or the services it provides. It identifies value according to the idea that price is determined by both internal characteristics of the goods and external factors affecting it. For example, the price of a house reflects the characteristics of that house (size, age, comfort, location, air quality, etc), as well as the characteristics of the surrounding neighbourhood (accessibility to schools and shopping, level of water and air pollution, value of other homes, etc). Therefore, it is possible to value the individual characteristics of a house or some other good by looking at how its price changes when the characteristics change. The hedonic pricing method is most often used to value environmental amenities that affect the price of residential properties (Rosen, 1974), although it could also be used to estimate the value of the “green premium” on environmentally friendly consumer goods, or the value of environmental risk on human health through wage differentials.

The SP methods are based on hypothetical rather than actual data on behaviour; for the former the value is inferred from people’s responses to questions describing hypothetical markets or situations. They consist of the following main valuation techniques:

- **Contingent Valuation** – assigns monetary values to environmental goods and services that do not involve market purchases and may not involve direct participation. It is carried out by directly asking individuals about their willingness-to-pay to obtain an environmental good or service. A description of the service involved is given to the individual, along with details about how it will be provided. The WTP value can be obtained in a number of ways, such as asking respondents to name a figure, either from multiple choice questions, or by giving them specific amount (in which case, follow-up questions with higher or lower amounts are often used). Contingent Valuation can be used to estimate economic values for projects changing the supply of all kinds of ecosystem and environmental services (Mitchell and Carson, 1989).
- **Choice Modelling** - is a newer approach to obtaining stated preferences. It consists of asking respondents to choose their preferred option from a set of alternatives, which are defined by attributes (including the price or payment). These alternatives are designed so that the respondents’ answer reveals the marginal rate of substitution¹¹ between the attributes and money. These approaches are useful in cases when there is interest in the value of several

¹¹ Marginal Rate of Substitution is the rate at which a customer is ready to give up one good in exchange for another good while maintaining the same level of satisfaction.

attributes in a given situation or when the decision lends itself to respondents choosing from a set of alternatives described by attributes. Like Contingent Valuation it can be applied to estimate the value of most goods and services (Henscher *et al.* 2005).

Very often, time and resources are limited and new primary environmental valuation studies cannot be performed before making important decisions. When searching for the most cost-efficient techniques, decision makers try to transfer economic estimates from previous studies that have similar changes in environmental quality and thus, providing a value for the environmental changes in question. This procedure is often termed as **benefit transfer**. There are two approaches to value transfer: (i) Unit Value Transfer and (ii) Function Transfer (Navrud 2007). The former builds on the transfer of actual value estimates from other studies, appropriately adjusted for inflation, the differences in purchasing power of income across regions and, in some cases, the income variation. The latter approach is more ambitious and suggests transferring value functions from other studies. Benefit transfer has been the subject of considerable controversy, as it is often used inappropriately. The consensus seems to be that benefit transfer can provide valid and reliable estimates under certain conditions. These conditions include the requirement that the commodity or the service being valued must be very similar to the ones on which the estimates were made. The estimates – i.e. the site, the populations affected – must have very similar characteristics. Of course, the original estimates being transferred must themselves be reliable in order for any attempt at transfer to be meaningful (SEPA 2006).

Some of the valuation techniques are broadly applicable, some are applicable to specific issues, and some are tailored to particular data sources (see Annex 16). A number of factors and conditions determine the choice of specific measurement methods. In general, measures based on observed behaviour are preferred to measures based on hypothetical behaviour. However, the choice of valuation technique in any given instance is dictated by the objectives and characteristics of the case and data availability. In general, estimating the change in the value of an ecosystem good or service is only one step in the whole valuation process. First the baseline situation of an ecosystem needs to be identified, then the changes that may occur (e.g. due to improved management), in the next step this changes are quantified and the impact on human welfare is assessed and only in the last step the changes of ecosystem services are valued (see Annex 17).

A final remark should be made on the challenges related to ecosystem valuation. Even if, during the past three decades, the economic valuation approaches have improved considerably, some difficulties still exist (Turner *et al.* 2003, DEFRA 2007, TEEB 2008). These difficulties are related to:

- *interdependence of ecosystems and their services* – this includes interdependency within an ecosystem (i.e. various components of an ecosystem interact to provide a certain service) and between ecosystems (i.e. various ecosystems may interact to provide a certain service). For valuation this means that the value of an ecosystem service depends on its relation with other services. Therefore, when assessing the value of a change in a service, the valuation may not take into account how other services are being affected, by the change.
- *marginality* – the appropriate context for economic valuation is conditioned by the scale of the environmental changes. Economic valuation is only meaningful when considering small, or marginal, changes in the ecosystem services.
- *double counting* – many environmental services are not complementary, the provision of one is precluded by others. Therefore, to prevent double-counting, the full range of

complementary and competitive services must be distinguished before any aggregation of values is completed.

- *spatial issues* – (i) an ecosystem’s function and its ability to supply services to a particular human population are often best evaluated across its full extent, which may not coincide very well with the spatial scale that a valuation context might imply; (ii) the valuation should take into account the complete population affected, and whose values may be affected from the changes in ecosystem services. To apply appropriate values, there is a need to understand whether an ecosystem service is impacting at a local, regional, national or global level (see Annex 18).
- *temporal issues* - impacts on ecosystems and their services may extend well beyond a standard time period of a given policy (project) appraisal. It is therefore important to account for any temporal distribution of costs and benefits.
- *environmental limits* - if the state of an ecosystem deteriorates beyond a threshold, an irreversible change to the ecosystem may occur (e.g. total collapse), resulting in permanent loss of services. An economic valuation study typically estimates values only for a marginal change in a service or habitat at a few points along the demand curve. Applying these marginal values to non-marginal changes in ecosystems is, therefore not appropriate.
- *data transfer* – to transfer data from other studies is still considered to be difficult. Problems are related to the need for good quality studies of similar situations, to changing characteristics in different time periods and the inability to deal with the valuation of novel impacts.
- *uncertainty* – refers to the functioning and valuation of ecosystems. There is a general lack of understanding about certain aspects, for example, what services are provided by different ecosystems, how these may change over time and how changes to ecosystems may affect the quantity and quality of the services they provide. This is further complicated by the fact that ecosystems may not respond in a linear way; there may be thresholds beyond which an ecosystem responds in a previously unknown manner. Under such circumstances, consideration needs to be given to the uncertain future losses or gains that might be associated with potential change. One method of doing this is to conduct a sensitivity analysis by identifying areas of uncertainty and testing how sensitive the evaluation outcomes are to changes in values or assumptions used in valuing ecosystem services.
- *ambivalence* - Non-market goods are often related to tradeoffs among characteristics that cannot be easily compared. An individual may experience cognitive inability to make decisions that cannot be easily made while balancing the objectives. Two concepts serve as a background for ambivalence: bounded rationality and cognitive dissonance. (Opaluch & Segerson 1989, Ready *et al.* 1995)
- *ethical preferences* - A respondent in a SP valuation study may take the role of citizen instead of consumer. That means he/she evaluates the non-market good and its provision from the point of view of the whole society. An individual may not personally consider that a non-public good benefits him/her but feels it is their moral duty to support the provision of the good. Generally speaking, an individual is motivated by, on the one hand, self-interest and, on the other hand, the welfare of society or the state of the natural world. The interpretation of CV responses may differ considerably depending on whether responses are given in a role of

a consumer (self-interest) or a citizen (social interest). (Harsanyi 1955, Sen 1977, Margolis 1982, Edwards 1986, Blamey *et al.* 1995, Nyborg 2000)

4.2 Estimation of economic values of non-market forest goods and services

This section reviews the available data on the economic values associated with non-market forest goods and services. It should be noted, that the reported values are case specific, depending on the objectives and scenario of the study, and therefore direct comparisons of reported values should be avoided.

Based on the findings on the importance of non-market goods and services, only the estimated economic values for those non-market forest goods and services that were ranked as the most important were reported (see Chapter 3), namely: (i) biodiversity protection, (ii) watershed protection (grouping water regulation and purification and soil protection), (iii) carbon storage and sequestration, and (iv) recreation and tourism. In addition, values of amenities will be presented, since amenities services are often interrelated with recreation and tourism services.

4.2.1 Estimated values of biodiversity

One of the most difficult issues in placing an economic value on biodiversity is determining what exactly the object of value is. We may distinguish between two main concepts: biological resources and biological diversity. For example, the Convention on Biological Diversity (CBD 1993) defines

- biodiversity as “*the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part*”.
- biological resources to “*include genetic resources, organisms or parts thereof, populations, or any other biotic component of ecosystems with actual or potential use or value for humanity*”.

In short biological diversity refers to the variability of biological resources. However, when looking at the economic literature, it can be concluded, that in most cases the valuation studies are eliciting the value of biological resources. Consequently, valuation does not normally entail measuring the economic value of biodiversity as such. Instead, it typically focuses on the economic values of the goods and services generated by the biodiversity.

Pearce (2001) identifies five main groups of values related to biodiversity:

- *nature tourism*: it seems obvious that this service depends both on biological resources and diversity. It is a well known fact that wildlife viewing is more attractive the more species there are to view.
- *source of information for agriculture and pharmaceuticals*: biological diversity contains valuable information that can be used to develop goods and services for the benefit of humankind. Potentially, the information can be fed into plant breeding, into pharmaceutical 'blueprints' for drugs and so on.
- *ecosystem resilience (insurance value)*: if diversity is critical to ecosystem functioning, then reduced diversity reduces the probability of ecosystem survival. Therefore, the value of diversity can be approximated by the value of the ecosystem functions.
- *ecosystem services*: services that ecosystems provide include the protection of watersheds, climate regulation, waste assimilation, and nutrient cycling.
- *non-use value*: existence, bequest and altruism value of ecosystems.

It becomes apparent, that rich diversity generates benefits to the society. Therefore, the majority of the valuation studies, related to biodiversity, focus on the assessment of the value of species diversity (e.g. protection of one or several species) or the value of protecting the natural habitat or ecosystem (e.g. protecting or conserving a certain area). For examples see Table 8.

Table 8: Examples of biodiversity valuation studies

Authors	Country	Good	Valuation method	Value ¹ (WTP/year)
Olsen & Lundhede (2005)	Denmark	conversion from conifers to other species selective felling some old trees left	CE	101.1 to 126.0 112.5 14.8
Olsen et al. (2005)	Denmark	prevent loss of protected area	CV	182.4 to 197.6
Chuan-Zhong et al. (2004)	Finland	increased area of Natura 2000 sites	CM	138.1
Horne & Petäjistö (2003)	Finland	decrease moos population	CE	165.2
Horne et al. (2004)	Finland	increase conservation area	CM	17.9
Kniivilä (2004)	Finland	maintain conservation area	CV	50.4
Lehtonen et al.(2003)	Finland	Increased forest conservation	CV CM	227.5 133.1 to 239.3
Pouta & Rekola (2006)	Finland	increase of conservation area (1000 ha)	MA	1.4
Hampicke et al. (1991)	Germany	protection of endangered species		82.5 to 147.3
Küpker (2007)	Germany	enhance biodiversity in forests	CV	48.6
Meyerhoff, & Liebe (2006)	Germany	enhance biodiversity in forests	CV	22.3
Mill et al. (2007)	Ireland	increased area of conservation forest	CV	52.0 to 136.0
Travisi & Nijkamp (2004)	Italy	bird diversity	CV, CM	289.8 to 321.3
Van der Heide et al. (2005)	Netherlands	defragmentation of natural area	CV	18.2 to 19.7
Nunes (2000)	Portugal	protection of natural area	CV	49.0 to 62.5
Mavsar & Riera (2007)	Spain	plant species	CM	0.1 to 0.3
Riera et al. (2007)	Spain	increased plant cover	CV	0.9
Boman & Bosdedt (1995)	Sweden	wolf conservation	CV	90.8 to 116.7
Johnansson (1989)	Sweden	protection of endangered species	CV	188.9
White & Lovett (1999)	UK	conservation of natural area co financing natural parks	CV	5.4 199.0
Willis et al. (2003)	UK	biodiversity value of different forest types	CV, CM	1.3 to 1.8

¹ all reported values were recalculated to € (2007 prices); CE-choice modelling, CV-contingent valuation

Valuation of a single or a few species in general gives higher values per species than valuation of several species. For, example Boman and Bosdedt (1995) carried out the valuation of the conservation of wolves in Sweden. Their estimation results show that the mean WTP is about 100€ per year. Previously, Johnansson (1989) conducted a contingent valuation (CV) study that focus on the preservation of 300 endangered species in Sweden, and estimated the mean WTP to about 190€ per year. Even if the latter WTP is higher, it is not proportionally higher as one would expect. The WTP of the wolf alone corresponds to more than 70% of the WTP for 300 endangered species. Also a recent study, conducted by Jacobsen *et al.* (2008), concluded that by simply naming and somehow ‘iconising’ a few species, the obtained results might be dramatically higher than when using a quantitative description.

A problem with the interpretation of the value estimates of species preservation is the frequently missing link between the value assigned to a particular species and the area needed to protect its habitat. Instead, some studies link the value of biodiversity to the value of natural habitat conservation. The results indicate that the values of the habitat can be captured reasonably well and might be more stable (Jacobsen *et al.* 2008).

4.2.2 *Estimated values of watershed protection*

Watershed protection includes: soil conservation – including control of siltation and sedimentation, water flow regulation – including flood and storm protection, water supply, water quality regulation – including nutrient outflow.

The value of watershed services can be estimated in terms of (Willis *et al.* 2003):

- *opportunity cost*: e.g. the cost to society of forestry using the marginal quantity of water rather than some other economic activity;
- *replacement (avoided) costs*: e.g. the cost of having to develop alternative water sources where forests reduce supply; the reduced cost to society where forests regulate run-off and hence lower flood risks and the need for flood prevention; etc.
- *willingness-to-pay* by individuals in terms of use and non-use values for marginal increases in security of supply, enhanced water quality, reductions in interruptions to supply, etc. from changes in water supply and quality due to forests.

Table 9 gives some examples of watershed valuation studies conducted throughout Europe.

Table 9: Examples of watershed valuation studies

Authors	Country	Good	Valuation method	Value ¹ (WTP/person)
Hasler <i>et al.</i> (2005)	Denmark	naturally clean groundwater very good conditions for plant and animal life purified water	CV, CM	262.7 98.4 to 166.6 73.2 to 126.2
Thorsen (2008)	Denmark	clean groundwater	CM	17.4
Tervonen <i>et al.</i> (1994)	Finland	water quality improvement	CV	19.5 to 51.9
Stenger & Willinger (1998)	France	water quality improvement	CV	27.0 to 32.4
Löwenstein (1995)	Germany	avalanche protection	CV	53.1
Kazana & Kazaklis (2005)	Greece	watershed protection (total value)	AC	320.8 Million
Clinch (1999)	Ireland	water suply	-	-26.3
Croitoru <i>et al.</i> (2005)	Italy	watershed protection	AC	168.6/ha
Travisi & Nijkamp (2004)	Italy	soil and aquifer contamination reduction	CV	154.4 to 203.7
Mendes (2005)	Portugal	water management costs avoided	AC	0.7/ha
Brey <i>et al.</i> (2007)	Spain	erosion prevention	CM	1.2
Colombo <i>et al.</i> (2006)	Spain	water quality improvement erosion prevention	CM	15.2 to 26.4 14.2 to 26.4
Mavsar&Riera (2007)	Spain	increased availability of water in Spain by 1% decreased area eroded	CM	8.4 3.6
Willis <i>et al.</i> (2003)	UK	potable water lost		- 0.3 to -1.9/m ³

¹ all reported values were recalculated to € (2007 prices); CM-choice modelling, CV-contingent valuation; AC-avoided costs

The estimation of the benefits related to watershed protection has various problems. First of all the relationships (e.g. between forest and water) and impact of forests on water are not always clear (Whitman 2005). For example, forests are believed to improve water quality, but this is only true under certain circumstances. There are examples of how forestry activities can lead to a decline in water quality (e.g. through soil disturbance due to harvesting and afforestation). Forests may regulate the flow of water, resulting in a reduction in the negative effects of high rainfall (e.g. floods and soil erosion) but again, this is not always the case. Furthermore, with respect to water quantity, there is still no scientific consensus on how forests influence water quantity. Therefore, some of the valuation studies consider that forest provide positive benefits related to water quantity (e.g. Kazana & Kazaklis 2005, Mavsar & Riera 2007), while some other estimate negative values (Willis *et al.* 2003). This is believed to be limited to very small catchment areas and the effects of forests on large catchment areas are extremely difficult to assess.

The second issue is related to the estimation of the benefits. Estimating them by avoided costs method might, not entail the full value of the services, but only the part related to some specific group of the population (e.g. users).

4.2.3 Estimated values of carbon storage and sequestration

Climate change is an environmental issue that has been associated with increasing temperatures related to greenhouse gases. A significant portion of green house gases can be attributed to carbon dioxide emissions. With regard to carbon, forests have two main functions, carbon sequestration by growing forests and carbon storage in the standing timber.

Carbon sequestration is a global public good, since it has equal benefits for everyone. As a contribution to reducing global warming, one tonne of carbon sequestered in Sweden has the same value as one tonne sequestered in Spain.

Related to the valuation of carbon sequestration, there are two principal issues: (i) the calculation of net carbon sequestration and (ii) the social value per tonne of carbon sequestered¹². In accordance with the objectives of this report the rest of this section focuses on the social value of carbon.

The social value of carbon sequestration may be defined as the benefit in savings from damage avoidance. This benefit can be estimated by observation of compensatory costs to society, or “the shadow price”.

In 1996, the IPCC Working Group III published a review on the social dimensions of climate change (Pearce et al., 1996). The range of marginal damage cost estimates reported by the review was 3 – 91€ per tonne of carbon (in 1990 prices, or 7 – 185€/tC in 2007 prices). It was also estimated that this range was to increase to 5 – 112€/tC (in 1990 prices) for the period 2001-2010 because the marginal damage of carbon tends to increase with the level of atmospheric concentration of CO₂. In 2002, Clarkson and Deyes published a review based on 9 major studies. The recommended social cost of carbon was approximately 121€/tC in 2007 prices, with a range of 63 – 243€/tC. This estimate was mainly based on Eyre *et al.* (1999) and was suggested to rise by 1.6€/tC for each subsequent year.

A further review (Pearce 2003) including Clarkson and Deyes (2005) and five more peer-reviewed studies, concluded that 4.6 – 9.3€/tC (in 2007 prices) was the relevant range without equity weighting¹³, and 4.5 – 22.7€/tC with equity weighting. Employing time varying discount rates expanded the range to 6 – 41€/tC. This much lower estimate is mainly takes into account adaptive behaviour.

¹² The value of the stored carbon may also depend on future uses of harvested wood. Some of the carbon removed from the ecosystem rapidly emits itself into the atmosphere (e.g. from fuel wood) while some carbon is transferred to other stocks (e.g. durable products, like furniture) in which case the emissions are delayed for longer periods. (for further information see: http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_12_Ch12_HWP.pdf).

¹³ Equity weighting is a process that accounts for the diminishing marginal utility of income — the idea that a monetary unit is less valuable to a rich person than to a poor person. Equity weighting implies that a financial loss suffered by a poor person has more weight than an identical financial loss suffered by a rich person.

Table 10: Examples of studies on the value of carbon

Authors	Period	Discount rate	Valuation method	Value (€/tC in 2007 prices)
Nordhaus (1991)	-		MDC	3.8 to 243.8
Ayers & Walter (1991)	-		MDC	48.0 to 56.0
Maddison (1994)	2001-2010 2011-2020		MDC	14.1 19.4
Fankhauser (1994)	2001-2010	0 % 0.5 % 3 %	MDC	34.8 10.5 76.3
Eyre et al. (1999)	1995-2004	1% 3% 5 %	MDC	136.3 to 319.0 52.5 to 136.3 25.0 to 71.3
Tol & Dowing (2000)	2000-2009	0% 1% 3%	MDC	19.9 11.8 5.0
Tol (2005)	1995-2004	3% 1% 0%	MDC	8.8 41.3 48.8
Blok et al. (2001) (Belgium)	-		MCD	98.6
Davidson et al. (2002) (Netherlands)	-		MCD	54.8
Willingness to pay estimates				
Brey et al. (2007)		-	CM	11.79€/person
Mavsar & Riera (2007)			CM	0,0004 - 0,025€/tCO ₂

MDC-Marginal damage cost; CM-choice modelling

In a recent paper, Tol (2005) gathered 103 estimates from 28 published studies. He estimated a probability density function with a mean of 77€/tC, and the 95 percentile 290€/tC (in 2007 prices). He concludes that the marginal damage costs of carbon dioxide emissions are unlikely to exceed 41€/tC, under standard assumptions about discounting and aggregation, and should realistically be much lower.

A different approach to assess the social value of the carbon sequestered is by estimating the WTP of individuals to reduce the quantity of carbon in the atmosphere. Brey *et al.* (2007) conducted a choice modelling survey in Spain, to elicit the population's willingness to pay for the implementation of an afforestation programme. This programme would also contribute to CO₂ reduction in the atmosphere. The estimated value was 11.79 EUR/person and year for annual CO₂ reduction equivalent to the quantity of CO₂ produced annually by a city of 100.000 people¹⁴. In a similar study in 2007, the estimated annual willingness to pay per person ranged from 0.0004 to 0.025€/tCO₂ (Mavsar & Riera 2007).

The enormous range of estimates for the social costs of carbon reflects the uncertainties in the understanding future climate changes, socioeconomic variables and more specifically, the ethical parameters adopted in each model. Drivers of variability between model estimates can be grouped into the following categories (Guo *et al.* 2005):

¹⁴ It was assumed that the average amount of carbon emitted per person and year is 9.5t.

- *Scientific uncertainties*: uncertainties about present and future emissions and the impacts under different emission scenarios.
- *Economic and policy uncertainties*: the assumed rates of economic growth and emission scenarios have a significant impact on the outcome, as does the process by which monetary values are estimated for non-market goods and services.
- *Ethical value judgments*: the aggregation of values across time and regions depend on the choice of a discounting scheme and equity weighting scheme respectively. This choice is partly a matter of ethical judgment (IPCC 1996).

4.2.4 *Estimated values of recreation and tourism*

Forests offer numerous possibilities for recreation and tourism activities. The increased public demand for these activities has resulted in recreation being included among the management objectives of modern forestry.

Recreation and tourism fall under the category of direct use values, since the individual derives benefit from the actual use. Existing studies that valued forest recreation have used both revealed preference (RP) methods (e.g. the travel cost method) and stated preference (SP) methods (e.g. contingent valuation). The travel cost method takes the costs of practicing recreation as a proxy for the value of a recreational site. Contingent valuation and choice modelling estimated the value of the recreational service by asking for peoples' maximum willingness to pay to obtain or maintain a recreation level or form of recreation.

The reviewed studies based the valuation on certain scenarios:

- payments to have access to forests or specific areas (e.g. national parks) for recreation activities (e.g. Kosz 1995, Tyrvaïnen 2001);
- payment for specific recreation activities (e.g. Brey *et al.* 2007 - mushroom picking, picnicking);
- payment for improved or maintained forest management (e.g. Horne 2005, Scherrer 2002); and
- payment for improved recreation facilities (e.g. Christie *et al.* 2001).

Table 11: Examples of forest recreation valuation studies

Authors	Country	Good	Valuation method	Value ¹	Remarks
Kosz (1995)	Austria	recreation activities	CV	0.8/visit	in Elssasser & Meyerhoff (2007)
Moons et al. (2001)	Belgium	recreation	TCM	4.2 trip	
Melichar (2005)	Czech Republic	recreation improved site quality	TCM	11.8/visit 35.8/year	In Bartczak (2007)
Šišak et al. (1994-1996)	Czech Republic	recreation	CV	0.1-1.0 /visit	in Bartczak (2007)
Dubgaard (1998).	Denmark	recreation	CV	20.2/year	
Horne et al. (2005)	Finland	different management of recreation area	CM	-52.6 to 36.0€	
Huhtala (2004)	Finland	Recreation in national parks and state-owned forests	CV	20.0/visit/year (1998) 8.4/visit/year	questionnaire was conducted in 1998 and 2000
Tyrväinen (2001)	Finland	Recreation use of urban forests	CV	1.2 to 1.6 million /year	Aggregated value
Scherrer (2002)	France	Forest restoration for recreation	CV	2.2 to 2.9 €/visit	
Elsasser (1996)	Germany	Recreation activities	CV	43.0 to 96.2/year	
Nagypál & Szlávik (2002)	Hungary	recreation	CV	12.2/visit	In Bartczak (2007)
Scarpa et al. (2000)	Ireland	creating nature reserves for recreation	CV	25.9 to 94.0	
Bellu & Cistulli (1997)	Italy	recreation	CV TCM	9.4/visit 7.2/visit	Various sites
Cooper et al. (2002)	Italy	recreation	CV	5.7/visit	
Bartczak (2006)	Poland	recreation	TCM CV	23.2/visit 0.7 to 4.8/visit	In Bartczak (2007)
Brey et al. (2007)	Spain	mushroom picking picnicking 4-wheel drive allowed	CM	12.8/year 6.33/year -9.67/year	
Mavsar&Riera (2007)	Spain	accessibility of forests for recreation	CM	7.8 to 14.7/year	2 different forest types
Bostedt and Mattsson (1995)	Sweden	recreation activities	CV	276.1 to 355.9 /visit	
Hornsten & Fredman (2000)	Sweden	avoid a doubling of distance to nearest recreation area	CV	12.4	
Christie et al. (2001)	UK	path maintenance long paths and user facilities		7.5/year 2.8 to 3.0/year	
Scarpa (2003)	UK	recreation	CV	2.6 to 4.3	

¹ all reported values were recalculated to € (2007 prices); CM-choice modelling, CV-contingent valuation; TCM-travel cost method

Regardless of the great number of existing valuation studies, related to different aspects of recreation activities in forest, there are still some problems to resolve, such as:

- *framing the relevant population* – it is not always clear whose values should be included into the valuation study. Usually only users are considered, but some studies (Huhtala and Pouta 2008) indicate that also nonusers gain considerable benefits from public recreation services;
- *estimating the value of different recreation possibilities* – the major bulk of current research has either simply valued forest recreation in a generic sense or forest recreation as a single attribute of wider forest values. Very few studies explore the heterogeneity of forest recreation benefits obtained by alternative uses and different users; and
- *assessment techniques* - the valuation methods used to value recreation have their advantages and disadvantages. For example, RP approaches have the advantage that values are grounded on actual behaviour, but the approach is unable to value resource provision beyond current levels. SP approaches overcome these limitations, enabling valuations to go beyond existing levels of provision; however they strongly depend on the design of the valuation survey and may be subject to a wide range of potential biases (e.g. people are not used to place values on an environmental good or service, rather than expressing value for the good, the respondent might actually be expressing their feelings about the scenario or the valuation exercise itself). (Christie *et al.* 2007).

4.2.5 *Estimated values of amenity services*

To a variety of user groups forests can provide benefits, in terms of amenity. Perhaps the most obvious beneficiaries are those individuals who enjoy recreational activities in forest or in adjacent areas. These may be visitors to the area or local residents. In the latter case, benefits may also result from the aesthetic pleasure gained from regularly viewing the forest landscape (e.g. from home). Commuters and other travellers may also benefit from the forest landscapes encountered throughout their journey.

There were several studies conducted on this topic in Europe (Table 12). In general they can be divided into three groups:

- *estimating the value of woodland views from properties and on journeys*: Garrod (2003) estimated the annual willingness to pay per household associated with a view on generic forest landscape from home and during commuting.
- *estimating the value of forests aesthetic, with regards to forests' characteristics*: Aakerlund (2000) tested the populations' preferences and willingness to pay for increasing the share of different tree species in Danish forest. Mavsar & Riera (2007) estimated the value of an increased share of oaks and higher density of Mediterranean forest in Spain; and
- *estimating the value of forest amenities based on the differences in house prices*: In two Finnish studies (Tyrväinen 1998, Tyrväinen & Miettinen 2000) the hedonic pricing method has been applied to estimate the impact of a forest view and distance to forest area on the house prices. It should be noted, that the presence of a forest may also have negative influence on the value of property. For example, in a US study it was estimated that the proximity of a house to a forest, might decrease its value because of the risk of forest fires (Loomis 2004).

Table 12: Examples of forest amenities valuation studies

Authors	Country	Good	Valuation method	Value ¹
Aakerlund (2000)	Denmark	5-15% increase of beech and oak in forest	CM	28.3 to 152.4/household
Tyrväinen (1998)	Finland	house prices with regards to distance to forest	HP	-8.2/100 m
Tyrväinen & Miettinen (2000)	Finland	house prices: distance to forest with forest view	HP	-5.9%/km +4.9%
Mavsar & Riera (2007)	Spain	forest composition species mixture stand density	CM	0.11/person/% of oaks 0.02/person/trees/ha
Garrod (2003)	UK	forest landscape: view from home view while travelling	CM	310.1 to 775.3/household 240.3 to 511.7/household

¹all reported values were recalculated to € (2007 prices); CM-choice modelling, HP-hedonic pricing

4.2.6 Comparison of economic values of forest goods and services

Table 13 gives a summary of economic values of different forest goods and service. It contains the data from three different meta-studies. The first study collected the data for Mediterranean countries (Merlo & Croitoru 2005). According to this study the wood products still present the highest share of the total value. The most important non-market goods seem to be recreation and non-use values (for a more detailed presentation see Annex 19, Figure 19.1).

Willis *et al.* (2003) conducted a study on the value of social and environmental benefits of the British woodlands. The values reported in Table 13 are come in different units and are therefore difficult to compare. However, if we compare biodiversity and recreation in terms of their aggregated values they, account for 38% and 15% of the total aggregated value for amenity (see Annex 19, Figure 19.2).

The study of Pearce (2001) summarises data from various sources, on economic values of different forest goods in temperate forests. For this study, the comparison of values is even more challenging, because of the wide range between the estimated values and the different data sources. For example, the reported values for timber range from minus 4400€/ha (here the production costs exceed the value of the harvested timber), to a net gain of almost 800€ per ha. Also in this case, the highest values of non-market goods can be ascribed to carbon sequestration and recreation.

From the results of these studies one may conclude that recreation and carbon sequestration provide the greatest benefits. However, it must be noted, that a direct comparison of economic values between different non-market forest goods and services is generally difficult and can produce misleading results. The difficulty comes from the different valuation contexts (e.g. valuation objectives, valuation scenario); the different target population; the different methods applied (estimating different aspects of the Total Economic Value); the different units (e.g. value per visit, per year, per tC); the sum of values for goods which cannot be produced at the same time (double counting), etc. Thus direct comparison of values is possible only in certain cases, when the values were estimated in the same valuation context, for the same population and using the same or similar methods.

Table 13: Summary of economic values

Forest good and service	Merlo & Croitoru ¹⁵ 2005 (€/ha)	Willis 2003 (in €)	Pearce 2001 (in €/ha)
Timber	73	-	-4400 to 767
NWFP	17	-	Small
Recreation	35	2.6 to 4.3/visit	88
Watershed	20	-0.2 to -1.9 /m ³	-11 to 55
Carbon sequestration	9	10.3 / tC	99-440 (afforestation)
Biodiversity	-	0.5 to 1.8/year	?
Amenity	-	417.1/year	Small
Non-use values	27		13-49

4.3 Concluding remarks on the economic valuation of forest goods and services

Chapter 3 lists the non-market forest goods and services and identifies the most important ones. The methodological approaches for the estimation of the economic values of non-market forest goods and services in this chapter were explored and examples of their estimated values listed.

Several methods for the valuation of non-market forest goods and services were listed. Some of them (e.g. travel cost method, hedonic pricing) are relying on the revealed behaviour of the users for these goods, while others are using surveys and directly asking users about their willingness to pay for certain goods or services (e.g. contingent valuation method, choice modelling). The advantage of the first group of methods (revealed preference methods) is that they are based on actual market behaviour of users of the non-market goods and services (e.g. paying a higher price for a house because of a nice forest view); however, their applicability is limited only to a few non-market forest goods and services (recreation, tourism and amenities). The methods in the second group (stated preference methods can be applied to all types of non-market forest goods and services and enable non-use values to be estimated). However, their main disadvantages are that they are based on hypothetical situations (no real market transaction is performed and the received answer might not reflect the real situation) and their application is complex (specialists are needed for the development of the questionnaire and for data analysis) and time consuming. Nevertheless, in the last decade the methodology and knowledge on these methods have improved considerably, enabling sound estimation of economic values of non-market goods and services¹⁶.

Methods recommended for estimating the economic value of forest goods and services, which were found as most important, are listed in Table 14. The recommendations are very general, and are based on the idea that simple (less time and resource consuming) and market based methods are preferred. However, the final selection of the method depends on many factors, like: (i) type and number of objects to be valued; (ii) relevant population (e.g. users or non-users or both; geographical scope (local, regional, national, international); (iii) data availability (e.g. restricted data access – data on house values); (iv) available time and financial resources; (v) team (e.g. experience).

¹⁵ Values reported are the weighted (by forest area per country) average for the country group: Greece, Albania, Croatia, Slovenia, Italy, France, Spain and Portugal.

¹⁶ For further explanation on advantages and limitations of different methods see <http://www.ecosystemvaluation.org/index.html>.

In the context of limited time and financial resources, the benefit transfer method should be mentioned. This method (different variants) uses values estimated in other valuation studies, which are performed for similar goods or services, and for which correction factors or meta-data analysis are applied as estimates of the value for another good in another similar situation. However, the method is still relatively new and no widely accepted standards for its application have been adopted yet. Therefore, it should be used with care and precaution as a result of its limitations (e.g. accuracy of the estimated values depending on the accuracy of values used for transfer).

Table 14: Recommended methods for the estimation of economic value of the most important forest goods and services

Good/service	Value considered ¹⁷	Method
Biodiversity protection	non-use	CVM, CM
Watershed protection	indirect use	AC
	non-use	CVM, CM
Carbon sequestration	indirect use	MP (carbon credits)
Recreation and tourism	direct use	TCM
	non use	CVM, CM
Amenities	indirect use	HP, TCM
	non use	CVM, CM

Legend: AC-avoided costs; CM-choice modelling, CV-contingent valuation; HP-hedonic pricing; MP-market price; TCM-travel cost method

Values for the main forest goods and services in this chapter should not be seen as being representative or reflecting the ratio between values of different forest goods and services. Instead, they should be thought of as a demonstration of the different values estimated for similar goods under different valuation conditions (i.e. place, method, population). Furthermore, it is impossible to compare and rank the non-market forest goods solely on the premise of these values, as this can lead to false conclusions. Overall, the social value of a good does not only depend on the estimated unit value, but also on the size of the population holding this value. For example, in the case of carbon sequestration or biodiversity protection, the population on the countrywide or even global scale could be considered, while in most cases when estimating the value of recreation for a given site, the relevant population would be the residents of a neighbourhood (for more examples see also Annex 18).

Another important issue, related to the valuation of non-market goods and services is the way in which the estimated values are used or applied. In the context of the FORVALUE study, the objective would be the compensation measures for provision of non-market forest goods and services (e.g. establishment of a payment scheme). In this case, the objective of the valuation is to estimate the total benefits perceived by the society from a certain good. Once the value is estimated, it would then be used to raise public awareness for how it would contribute to the wellbeing of society, or to justify the extent of investment into the payment scheme. However, it would not be used to as compensation to the provider of this good (e.g. forest owner). The price is negotiable between provider and beneficiaries. More about this issue and how to proceed with compensation payment schemes is in Chapter 6 of this report.

¹⁷ For explanation of the categories see section 3.1.

5. FINANCING MECHANISMS FOR THE PROVISION OF NON-MARKET FOREST GOODS AND SERVICES

5.1 Introduction

Chapter 4 shows that non-market forest goods and services have higher actual value than their market value. As a consequence, it can be assumed that many of them are supplied under the social demand. It is therefore interesting to explore which public or private financing instruments are available for their compensation. Different mechanisms may be appropriate for different FG&S because of their differing characteristics, e.g. with regard to their marketability (see section 5.3 and the theoretical discussion in section 5.2). For some goods and services markets do not exist: for these it is to be assessed if markets can be created or to see whether other instruments exist to enhance their provision. Some goods and services do have markets but with lower market values than their real values: for these the task is to find mechanisms to correct this imbalance.

This part of the study relies on the following methods: literature reviews, web-search, expert interviews and questionnaire surveys. The main information was gathered by a questionnaire survey from government officials from the EU Member States (MS). Experts from land owners' organisations, environmental organisations and businesses from the demand side were in addition addressed by questionnaires and interviews. Two questionnaires have been used: one which was sent to all EU national governments as well as forestry and environmental interest groups (same questionnaire that collected information on the importance of FG&S), and one which collected detailed information on a selected number of cases to be also analysed by means of multi-criteria analysis (MCA, see next chapter).

At the beginning of this chapter a theoretical analysis of non-market FG&S as well as mechanisms for their financing is presented and a typology of financing mechanisms developed. The list of alternative mechanisms is reviewed including a theoretical description, their application in Europe and their strengths and weaknesses when applied to different FG&S. This is followed by an overview section which pictures the current use of the mechanisms in the EU MS and for different FG&S.

The chapter includes illustrative case examples for each type of mechanism; the cases have been collected in a publicly accessible database: The name of the database is "Innoforce Database of Innovation Cases in Forestry"; URL: <http://cases.boku.ac.at/> (description is given in Annex 23).

5.2 State-of-research on markets for forest goods and services

The many benefits that forests provide for the society have been discussed for some time. Early contributions refer to the "function" concept that had been presented by the Swiss forest policy professor Dieterich (1953). The use of the functions concept was later criticised by a number of authors as this technocratic approach takes into account neither the demand side of markets nor the societal side in valuing the forest benefits (Heeg 1973, Glück 1987, Glück and Pleschberger 1982, Krott 1985, Mantau 1995, Buttoud 2002). Instead of talking about forest functions it is recommendable to use concepts from policy or economic sciences as appropriate. When dealing with conflicts between different forest uses the interests and values of the concerned parties are analysed (policy issues). When referring to the production of forest benefits the notion of goods and services is appropriate, as this includes a demand side, be it public institutions or private demand on markets.

A growing political interest in new financing possibilities for ecosystem services such as the protection against natural hazards, soil protection against erosion, water provision, climate

regulation, and the conservation of biodiversity has resulted in a number of studies and reports that focus on the valuation of these ecosystem services and new mechanisms for their compensation (Totten 1999; Mantau et al. 2001; Landell-Mills and Porras 2002; Powell et al. 2002; Koteen 2004; Spergel and Moy 2004; Smith et al. 2006; Savcor Indufor 2006; Bräuer et al. 2006; Bracer et al. 2007; Holopainen and Witt 2008; TEEB 2008).

5.2.1 Marketability of forest goods and services

Many forest benefits have **public good** characteristics that make them difficult for being marketed and which justifies public policies to secure their production (Ostrom 1990, Carvalho Mendes 2002). Forest benefits, however, qualify as public goods partly as a result of their natural properties (that make them difficult to trade on markets) but also due to institutional frameworks and political regulations (e.g. regulations regarding the public access). There is a range of instruments that may be used by forest owners to market forest benefits that are often regarded as public goods.

In their study on economic strategies for making forest benefits “marketable”, Mantau et al. (2001) refer to the well-known concept of public and private goods (see also Chapter 3). Private goods are characterised by high degrees of excludability and rivalry in consumption. Mantau (1995) argues that there is a continuum between pure public and pure private goods and that institutions as well as economic measures can change the characteristics of a good – higher degree of rivalry or excludability – thus increasing the marketability (Figure 14).

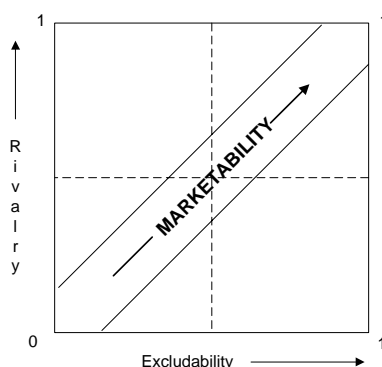


Figure 14: The marketability arrow: from public to private goods modified from Mantau (1995)

Shifting the characteristics of a good from public to private may include one or both dimensions: If rivalry increases, e.g. through a significant increase in demand, the public good becomes a common pool resource, where the users compete with each other (e.g. popular recreational sites, or the use of a forest road by hikers and mountain bikers). In such situations the exclusion also becomes easier because the transaction costs may be covered by the returns. The other strategy is to exclude users, e.g. through changes in the legal framework (right of access) or through the enforcement of property rights (fencing, or control of access together with entry fees or offering licenses). As long as customers do not compete the good is regarded a club good, but with increasing rivalry it becomes a pure private good (Figure 15).

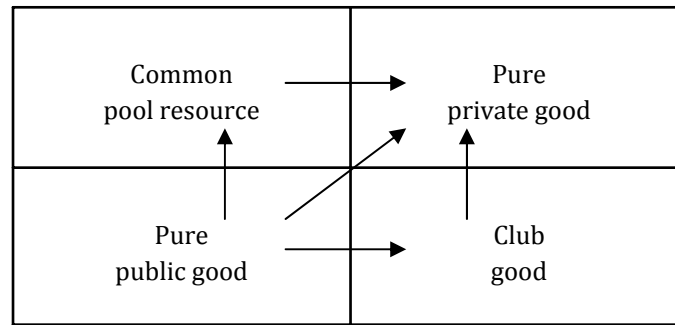


Figure 15: Different ways to move from public to private goods

A number of **preconditions** have to be fulfilled so that markets may develop. First of all, goods or services have to be scarce; otherwise nobody is ready to pay for it. Second, property rights on the good or service have to be defined. According to the Coase theorem, markets develop for the allocation of scarce goods without a need of government intervention as soon as the property rights are clearly defined and transaction costs are negligible (Coase, 1960). However, property rights need to be unambiguous, transferable, exclusive and enforced (Randall, 1987), a condition that is not found with many forest goods and services. Third, markets may not be impaired by high transaction costs or limited information, e.g. where a large number of persons benefit (landscape beauty) or own part of the resource (scattered forest property) or when the amount of the good or service is difficult to define (protection of soils or prevention of natural hazards). If transaction costs are too high, state intervention is needed for securing the efficient allocation of the desired good or service.

There are a number of **social and institutional factors** that influence the possibility to establish property rights and their enforcement: traditional use rights may stand against formal property rights, making them illegitimate (e.g. the traditional use of forest fruits by the local population). Ethical and political values need to be in line with the property rights definition (e.g. when it comes to the preservation of natural values). Furthermore, institutional capacities need to be sufficient to enforce property rights (e.g. regarding public access to forests or the use of forest fruits for private or commercial purposes)

Market exchange is **improved**, if the transactions are perceived as fair, if there are no negative external effects on third parties and if institutions exist that aid the exchange, such as customs, brokers or banks (Brown et al., 2006). Competitive markets are markets for rival goods or services with commodity characteristics (ample identical units), with many buyers and sellers, where market entry and exit is easy, that internalise all costs and benefits, and where market information is perfect on all sides. As this is typically not the case for ecosystem services and many forest goods, we observe market failure for many forest goods and services besides of timber and some other market goods (e.g. other wood products or minerals).

5.2.2 State intervention

Ecosystem services are often **externalities** of timber production or natural forests. As externalities generally have public good characteristics, no markets develop and the provision of positive externalities is often sub-optimal and also negative externalities are not regulated. For an externality to be regarded as positive or negative depends on the situation to which it is related to. For example, forest management can be regarded as having positive effects because of the provided ecosystem services that are connected to the existence of the forest if compared to a barren or agricultural land. However, if a forest is acknowledged to exist (as being the natural state or required by law), forest

management may be seen to be causing negative effects (i.e. monocultures replace natural mixed forests). In order to establish markets the state intervenes by clear definition of property rights or product liability rules. Other means are the regulation of land use (e.g. prohibiting the clearing of forests or prescribing the regeneration of forests after cutting); the provision of subsidies for desired management (e.g. establishing mixed forest stands); levying taxes on undesired management (e.g. resource extraction or dumping of waste in landfills); or government provision (e.g. establishing national parks or creating recreation forests or water reserves on state or municipal land). A tax levied to correct the negative externalities of a market activity is called Pigouvian tax and is often used or proposed for correcting environmental pollution. Positive externalities that are undersupplied may be corrected by Pigouvian subsidies. Besides the problem of defining the optimum levels for taxes or subsidies, there are often implementation problems. Taxes may encourage smuggling and black markets or powerful groups may hinder their establishment. Subsidies are often preferred over taxes because they are better accepted; however, they are a burden to the state budget. Furthermore, they are often applied for serving primarily the interests of stakeholder groups. In this case, public policy is captured by private interests. This rent-seeking behaviour of public and private organisations is one reason why subsidies often do not efficiently meet their targets.

Generally, a large part of forest legislation actually deals with regulating externalities. The full range of regulatory, financial and informational instruments may contribute to a better provision of forest benefits: **Regulatory policy means** have long been applied in order to secure basic provision of certain ecosystem functions of the forests such as the protection of water resources or the provision of natural hazards. Regulations, however, are also necessary as a framework for functioning markets, e.g. by clearly defining property rights (incl. e.g. hunting rights, or, emission rights and the related use of forests as carbon sinks). **Financial policy means** (interchangeably called economic or fiscal instruments) include negative incentives (taxes, fees and charges, e.g. for the use of water, gravel, etc.) as well as positive incentives (subsidies and payments on contractual basis, e.g. for close-to-nature forest management or the total protection of a forest area). **Informational policy means** have been used, for instance, for persuading forest owners to consider public benefits of their forests in management without compensation. At the same time, they have addressed forest visitors to respect the forest ecosystem and ownership rights. Alternatively, informational instruments could be used to promote market solutions, e.g. by making owners aware of marketing possibilities of forest goods and services and by informing users about property rights and market offers.

5.2.3 Market solutions

Mantau et al. (2001) point out two types of processes for increasing marketability: the “transformation” of the goods or services which changes their institutional properties (e.g. legal status, property rights, planning permissions, contractual agreements, etc.) and the “product development” (e.g. provision of complementary/additional goods and services, marketing promotion, changes of existing contracts, etc.) (Mantau et al. 2001: 12). From this follows that both public policy and private owners might take action to turn forest goods and services that are difficult to market into marketable products. In both public and private spheres theoretical studies exist but the practical applications are still rare. This fact has been reported repeatedly for both spheres, for new political instruments (Cubbage et al., Bräuer et al. 2006, Smith et al. 2006) and for marketing attempts of new products and services (Mantau et al. 2001, Rametsteiner et al. 2005).

Regarding the private sphere possibilities, two complementary approaches for marketing goods and services have been discussed, (i) a marketability approach (Merlo et al. 1996, Mantau et al. 2001) and (ii) an innovation and entrepreneurship approach (Rametsteiner et al. 2005, Slee 2006, Niskanen et al. 2007). The former has developed a specific approach for the transformation and development of recreational and environmental goods and services under real conditions of information and action. The work of Mantau et al. shows that an active marketing approach and strict orientation towards the customers' desires might overcome the widespread view of infrastructural services of forests as being (unmarketable) public goods (Mantau et al. 2001: 218f). Important product dimensions for the marketability of forest goods and services are their degree of immateriality of the product and the degree of customer integration in the production process as well as the question whether the provider is an individual or cooperation (Welcker 2001). Marketing instruments have to be developed specifically for every case as every company, product and market environment is different. It is typical, that recreational and environmental services are traded on unsaturated markets and that competition is of minor importance (Mantau et al. 2001: 220ff). **Recreational services** are often "additional" benefits added to the forested landscape, such as recreation or sport facilities, restaurants or guided tours, etc. Events or accommodation may successfully be turned into exclusive luxury products with special atmosphere. Large forest holdings have advantages in the marketing of environmental services because their provision often needs larger areas. The immaterial value is of particular significance with **environmental services**, but also with recreational services. Brands and labels are important for marketing immaterial values, a fact that has not yet been recognised by many forest companies (Mantau et al. 2001: 218). **Territorial marketing** is an instrument that is successfully used for forest goods and services in many cases (Merlo et al. 1996, Pettenella and Secco 2006). In this marketing approach a specific region is the common reference to create a consistent portfolio of products and services, and to bundle marketing efforts for their coordinated promotion (Pettenella et al. 2007).

Rametsteiner et al. (2005) focus on analysing the **innovation** processes and innovation systems that are involved in the development of new goods or services in Central European forestry. The institutional framework conditions, the public and private actors and their interrelations structure the economic and innovation activities of the firms. The authors report that hardly any novelties are new to the market and thus the innovations in the sector are mostly **diffusion**. Innovation **activities** in the field of non-timber goods and services are unexpectedly high when compared with technical and organisational changes (rationalisation). They make up for around 35% of all innovations in forest holdings. Their **income** shares, however, are still small: environmental services are almost negligible, and recreational services are also not significant in the overall picture. They are only significant locally and for specialized forest holdings, (Weiss and Rametsteiner 2005). A further alarming result is that the **innovation systems** that should support the innovation activities in the sector are rather weak. There is a lack of explicit innovation policies in the sector and there is a lack of interaction between forestry and other sectors that are relevant for the future development of forestry. This includes those sectors that are potential markets for non-wood goods and services. Cross-sectoral cooperation is seen as one of the most important factors in the development of new goods and services (Rametsteiner et al. 2005: 171f). The authors conclude that to **strengthen innovation activities** there is a need to establish cross-sectoral bridges, to better integrate research and education institutions into practice, to intensify the provision of information on new markets, and to provide innovation-oriented (risky) incentives. The results of COST Action E30 confirm these findings for the non-wood products sector by calling for a better support in information exchange, networking and marketing (Niskanen et al. 2007). Societal trends that increase the value of natural

environment and related services of forest ecosystems (e.g. climate protection, health, recreation, adventure, spirituality, etc.) are not as yet strongly utilised by forest owners for the development of new goods or services (see e.g. Weiss *et al.* 2007). Slee (2005) describes the trend that certain rural regions increasingly change from production to consumption landscapes and where the consumption value of territorial services such as recreation or housing take precedence over the production value of agricultural or forestry commodities. This value, however, is only partly tapped by land owners.

5.2.4 Challenges and limitations for new market-based instruments

Non-market goods and services of forests are often only provided as positive external effects of timber production and through regulatory provisions. It is generally assumed that the **societal demand** would often be higher than the actual supply. As conventional regulatory and financing instruments are not seen as effective and efficient (Cubbage *et al.* 2007), researchers and policy-makers have tried to develop **new ways of compensating** landowners for forest goods and services.

As mentioned earlier, authors report **difficulties** in the implementation of the new financing mechanisms that have been proposed or developed in the recent past. They can partly be explained for being in early stages of the innovation process and for the weak support provided by the institutional system. However, we should not forget that we still operate in a field where the marketability is and will stay restricted, at least to a certain extent. Difficulties in defining or enforcing property rights, restricted market information, high transaction costs, etc., remain even if mechanisms exist that might be able to overcome these difficulties. Authors have also pointed out various **risks** that may be connected with the new market-based instruments, for instance their often unclear efficacy and efficiency regarding ecological goals (Winkel 2007). There is also the **concern** that tapping new income sources is particularly difficult for poor people, small land owners and developing countries (e.g. Landell-Mills and Porras 2002, Karsenty 2004, Bracer *et al.* 2007). Wunder (2006), for instance, reports: that sceptics “fear that PES will bring back the fences by decoupling conservation from development, that asymmetric power distribution will enable powerful conservation consortia to deprive communities of their legitimate land-development aspirations, that hard-fought gains in forest management practices will be wasted, and that commercial conservation may erode culturally rooted not-for-profit conservation values”. This calls for special attention from governments, land owners and NGOs alike when attempting to apply market-based instruments.

5.3 Financing mechanisms

5.3.1 Definition of terms

New ways for compensating landowners for their forests’ goods and services have been coined by different terms, including: compensation and rewards, new economic instruments, market-based instruments or mechanisms, financing instruments or mechanisms, payments for environmental services or simply products, goods or services. They do not mean exactly the same. Which of these terms should be used in a study depends on its context and purpose.

The terms “compensation”, “financing” and “payment” are understood as general terms for paying for goods or services. At least for German language speakers the term “compensation” has a passive connotation. It tends to be particularly associated with outweighing a loss or a cost. An active marketing strategy would not focus on production costs but on customers’ needs and profits. The terms “financing” and “payments” specifically refer to market activities unlike the term

“compensation” and as such are preferred for the purpose of this study. Since “payment” would rather be associated with money transfer, we decided to use the term “financing” instead. In this study, “financing” uses the broad connotation that refers to all money transaction between the parties involved – the supplier and the beneficiary.

The term “instrument” is typically associated with policies. For financial/economic instruments, governments are the ones held responsible for applying such instruments. Market mechanisms, however, exist without specific official actors, but they might require regulatory instruments (e.g. when creating a cap-and-trade mechanism) and/or informational instruments (e.g. in order to promote the increased development of recreational offers by land owners). Since this study takes into account government and market activities, the broader term “financing mechanism” is used because it embraces public and private actors, public and private money, as well as policy and market mechanisms for financing forest goods and services.

5.3.2 Classification of financing mechanisms

A number of typologies have been used for classifying financing mechanisms. Public policy scholars have developed a plethora of different schemes, including a three-fold typology of regulatory, economic and policy means (Weiss 2000). For an overview of different classification schemes see Annex 20.

Within economic or financial policy instruments, a long list of specific instruments exists that include incentives and market approaches. Environmental policy scholars distinguish between centralised policies comprising of regulatory instruments and incentives that are imposed by the state, and decentralised policies where the state only sets the “rules of the game” but the mechanism works through private actors. Financial mechanisms of centralised policies apply a Pigouvian approach (see 5.2.2) and aim to correct externalities for which no market can be established. They include taxes, subsidies, deposit-refund-systems and liability bonds. Decentralised policies follow a Coasian approach (see 5.2.1) and create market solutions by defining property rights on the externalities. Voluntary agreements, certification systems and cap-and-trade schemes fall under this category.

For the purpose of this study a tri-fold typology of financial mechanisms is applied which follows the above distinction of centralised and decentralised instruments but further includes already existing market solutions for goods and services of the forest. It thus distinguishes public (state), mixed (public-private), and private (market) mechanisms:

- Public financing mechanisms: includes pure public instruments of Pigouvian type and comprises negative incentives (taxes, fees and charges) and positive incentives (subsidies/subventions).
- Mixed public-private mechanisms: state interventions that are voluntary (e.g. public-private contracts) or aim to create new markets for externalities of forest ecosystems (e.g. tradable permits) (Coasian type instruments).
- Private financing mechanisms: all market solutions developed without any specific public interventions. These mechanisms include the trade of goods and services, purchase or lease of land, sponsoring or labelling and may be used by public or private actors.

Public spending may fall under the first category (in the case of pure subsidies), under the second (in the case of voluntary contracts), or under the third (in the case government purchases goods,

services or land on the market). The difference between the voluntary contracts for certain services and the purchase of services on the market is the following contracts under the second category occur in course of specific public programmes (e.g. conservation banks, public financing programmes for biodiversity conservation) but the purchases, under the third category are done as single actions (e.g. purchase of land for establishing a national park).

The list of mechanisms that were used in the study is presented in Table 15 (see Annex 21 for further information).

Table 15: Classification of financing mechanisms used in the study

Type	Mechanism
PUBLIC MECHANISMS	Taxes, fees and charges
	Subsidies
MIXED PUBLIC-PRIVATE MECHANISMS	Public-private contracts
	Tradable permits
PRIVATE MECHANISMS	Purchase of goods and services
	Land purchase
	Land lease
	Eco-sponsoring
	Donations and gifts
	Certification

5.4 Financing mechanisms used in European forestry

The following descriptions are based on literature reviews, web-search, expert interviews, the questionnaire survey of the study, as well as the analysis of case examples. The questionnaire was sent to all governments of EU Member States as well as forestry and environmental groups. We received 26 answers from governments, and 13 further answers from stakeholder groups (six from state forest companies, four from private forestry interest groups and three from environmental NGOs). In the questionnaire respondents were asked to assess the use of the financing mechanisms for the different forest goods and services in their country (frequently used; rarely used; proposed to be used), and to name the three most innovative financing mechanisms in their country together with a short description.

In the following, we define the financing mechanisms, characterise them in theoretical terms, describe their application in forestry, and provide short examples from European countries. In a summary evaluation, we assess their strengths and weaknesses and their possible application for financing non-market forest goods and services.

5.4.1 Taxes, fees and charges

Public duties or taxes are financial charges imposed on individuals or legal entities by the state. Most generally, any contribution imposed by government is called tax, including taxes in the narrower sense such as income, property or value added taxes, but also fees and charges that are levied on certain public services. These terms are not used coherently. Tax differentiation or tax exemptions can be seen as a mixed form of tax and subsidy as some entities or behaviours are favoured.

Besides of the financing function for the state, taxes also have the function to control certain behaviours: one such measure is the use of **environmental taxes** (eco-taxes, ecological taxation) which promote ecologically sustainable activities. In order to maintain overall tax revenue, in course

of a green tax reform, other taxes such as on human labour and renewable resources are reduced. Examples in the broadest sense are: charges on the extraction of mineral, energy, water, or forestry products, licence fees for fishing and hunting, taxes or refundable fees on waste disposal, site value taxes on the unimproved value of land, taxes on technologies and products with negative externalities such as electricity, fossil fuels, automobiles, etc., carbon taxes on greenhouse gas emissions. Eco-taxes aim to correct negative market externalities by discouraging people from overusing resources. The higher consumption price of a product or service is an incentive to abate resource use or pollution. Environmental taxes may be levied on the use of resource, on collective services (e.g. waste treatment), emissions, or consumer products. There are two main aims for environmental taxes. The primary goal is to use taxes to increase the price of products which are considered to be undesired products, in favour of more environmentally friendly alternatives that become more competitive in comparison, as a result of the tax increase on other products. Renewable resources from forests are a good example of this. The second goal of environmental taxes is to finance the costs of collection and treatment systems or other compensation measures. This is a relevant measure in forestry because the collected funds may be invested back into forests in order to manage them for multiple / social benefits; thus, such charges, known as **earmarked charges** would finance specific purposes.

Earmarked charges can particularly be used for financing ecosystem services or other environmental improvements. There are many examples where taxes on the extraction of gravel, water, etc. are used for landscape or nature conservation funds. European examples for specific applications in forestry is the Croatian Green Tax (see Box 1) that is used for maintaining ecosystem services of forests, or the water charges in Lower Saxony, DE, that are used for the conversion of coniferous forests into mixed forests in water catchments.

Box 1: Green Tax (HR)

In Croatia, a special tax is used for financing a “Non-Wood Forest Functions Funds” which is managed by the Croatian State Forest Company and used for the improvement of deteriorated forests. The tax is 0.07% of the income of private companies which amounts to around € 45 mio/a. The money is used for the reclamation of degraded karst land to forest, the financing of fire communities, and research. Since 2008, also small-scale private forest owners may benefit from the funds through the extension service by forest road construction or reforestation.

Special forms are conservation banks where developers are legally obliged to compensate for environmental losses caused by their projects. The compensation is traded through a bank where land owners may offer compensation activities in exchange (see Box 7 under tradable permits). In the case of In-Lieu-Fee programmes the costs for compensation are directly paid by the obligor.

Tax exemptions differentiate according to environmental impacts and honour environmentally friendly behaviour. Exemptions from tax duties can also be regarded a subsidy. They are often used in forestry to compensate for legal restrictions on the use of forests, e.g. in protected areas (examples: all protection and special purpose forests are tax free in SK, see Box 2; Natura 2000 sites are exempted from tax in FR).

Box 2: Tax exemptions (SK)

According to the Slovakian forest act, forests may be declared protection forests or special purpose forests if they serve specific goals in the public benefit. To compensate for the restricted use for the owners, they are exempted from land tax.

Strengths:

- Simple forms of taxes are easy to administer.
- Tax exemptions work as incentives and are relatively cheap because not all of the cost has to be balanced out.
- Earmarked taxes may raise funds for forest management measures; they are often better accepted because the explicit purpose of the collected money.
- Eco-taxes on forest-related resources discourage forest use, but when imposed on non-forest resources they make forest resources more profitable in relation.
- Conservation banks use market mechanisms which allow for an efficient provision of forest related services and offer new market possibilities to land owners.

Weaknesses

- Simple taxes do not provide funds that are directly available for forest measures.
- Tax exemptions are relatively cheap but are not highly effective.
- Limited acceptance for new taxes.
- Low political weight of the forestry sector to lobby for eco-taxes or green tax reform.
- Costs for administration of conservation banks.

Basis for fixing the price

- The resource tax or tax exemption is an incentive for changing the behaviour (resource use); the height of the subsidy is thus directed towards the desired effect in changing behaviour.
- The Green Tax in Croatia compensates the cost of the projects it supports.
- Conservation banks set the price through a market mechanism.

Applicability to non-market forest goods and services

- Taxes are applicable for most forest benefits; however, as simple taxes on traded forest goods and services they are not feasible. They may be applied, however, in the form of tax exemptions or as earmarked taxes that fill funds being reinvested in forests through subsidies or public-private contracts.

5.4.2 Subsidies

Subsidies or subventions are government payments to individuals or legal entities without direct consideration. The payments are connected to certain requirements and aim to reward desirable behaviour. The difference with contracts is that, subsidies are paid to all subjects who fulfil the set requirements; the state cannot decide on single projects. The forms of subsidies are manifold, including direct payments, low interest rate credits, state guarantees or tax exemptions (indirect subsidies).

Subsidies may be justified to correct market failure, i.e. to encourage socially beneficial behaviour such as the trade of environmentally friendly products (Pigouvian subsidy). They may also be used to encourage economic activities in rural disadvantaged regions in order to balance out regional disparities. Furthermore, they may help business start-ups by supporting innovations in the development phase.

Besides of this, subsidies are often justified for social reasons, e.g. protecting domestic industries and jobs. However, the hidden reasons behind subsidies are often related to rent-seeking purposes of public and private actors. In fact, subsidies are often granted to powerful industries or voter groups and they are often not transparent. Thus subsidies are often inefficient and criticised by economists.

In **forestry**, subsidies are used in most European countries to support forest holdings economically (e.g. subsidising the construction of forest roads or other investments for rationalisation of forest production or innovation) or to guarantee the provision of the many benefits of forests, often termed forest functions. According to the survey performed for this study, subsidies are typically given for measures of “multi-functional” or “close-to-nature” forest management such as the establishment of mixed stands. Specific purposes also include the protection of biodiversity, soil, air, water and recreational uses of the forest (in many countries), as well as climate regulation (e.g. CZ), protection against natural hazards (e.g. AT), landscape amenities (e.g. FR), and historical and cultural sites (e.g. SW, see Box 3). Nature conservation budgets are most often invested through contractual agreements (see below under public-private contracts).

Subsidies may be granted by local, provincial, national governments or supranational/international levels. Relevant EU subsidies are granted under various funds and programmes, including the EAGF (European Agricultural Guarantee Fund), EAFRD (European Agricultural Fund for Rural Development), or ERDF (European Regional Development Fund). Projects may be funded through programmes such as LEADER, Agenda 21 or INTERREG. Funds for accession countries include the SAPARD programme which in some countries are dedicated also to forestry projects, in some others, forestry is excluded (e.g. SK).

Subsidies may be granted for concrete measures of forest management but also for forest extension services, support of networking, public relations, or special initiatives. Examples for the latter include Agenda 21 initiatives, marketing measures, setting up forest owners’ co-operations, and many more. Funding of economic activities of forest owners may be relevant for non-market goods or services of they encourage the development of business activities in these fields, e.g. under the title of innovation support. Subsidies are increasingly granted on project basis, thus falling under the category of public-private contracts, e.g. many LEADER projects (for an Austrian example of a canopy walkway see Box 4), LIFE project Walsertal (AT), INTERREG project Alpenenergywood, Agenda 21 Network project Monique Bio-Park, Model Forest (SWE), etc. (see section below).

Box 3: Subsidies for archaeological sites and nature monuments (SW)

Sweden offers subsidies for the conservation of biodiversity, landscape amenities and historical/archaeological sites. According to the forest act, a part of the costs to maintain cultural historical sites in the forests are covered.

Strengths

- Pure subsidies are simple to apply.
- Subsidies work as incentives and are therefore not expensive.

Weaknesses

- Subsidies are often not efficient in their practical implementation because of rent-seeking behaviour of public and private actors.

Basis for fixing the price

- The height of the subsidy is directed towards the desired effect in changing the behaviour (incentive for desired behaviour);

Applicability to non-market forest goods and services

- Subsidies are in principle applicable to all forest benefits. Subsidies are often granted for certain management forms instead of being geared for the provision of certain services. This is because the actual provision of these services is often difficult to assess. The supported forms of management seem to be connected to the provision of the desired social benefits. This practice makes the mechanism cheaper but assumingly less transparent. The efficiency then depends – among other aspects such as bandwagon effect – on how well the supported form of management actually increases the provision of the desired service.

5.4.3 Public-private contracts

When contracting specific services governments do not act as authorities but as private entities. The contracts are agreed voluntarily between the parties and for a certain time period. The content of contract in forestry may be to abandon harvesting activities (total conservation) or the maintenance or introduction of certain management forms. While total conservation may also be reached through regulations, contracts are particularly suitable for implementing specific management measures which, for instance, are of high recreational or historical value (e.g. historical land uses such as larch meadows in the Tyrol, AT), are in the interest of biodiversity conservation (e.g. traditional grazing practices) or for the protection of water resources, etc. In contrast to pure subsidies, contracts are voluntary for both, the taker and the granting government. The financing of nature conservation measures on private land is often performed through contracts between a public entity and the land owner (**contractual nature conservation**). Contracts are typically applied for compensating income losses in nature reserves or national parks, most often on private land, but there are also cases where public forest companies receive compensations from other state budgets like, for example, in Austrian national parks on state land. Payments for environmental services (PES) usually take the form of voluntary contracts. Apart from biodiversity conservation, other ecosystem services such as water protection, protection against natural hazards, improving landscape amenities or recreation services are funded on contractual basis.

In order to avoid the capturing of the public administration by private interests, it is necessary to **clearly define the service** that is paid for and its delivery. The concept of PES as presented by Wunder (2005) follows this notion and defines a PES as a voluntary transaction where a well-defined service (or a land-use likely to secure that service) is being 'bought' by a (minimum one) buyer from a (minimum one) provider if and only if the provider secures the service provision (conditionality). These criteria are often not fulfilled by the contracts thus making the mechanism inefficient in the implementation.

Contracts exist on all administrative levels. However, most examples are provinces, national states or the EU. In Austria, for instance, all federal provinces have a programme for contractual nature conservation as nature conservation is in their competence. There are big differences between the provinces, in how far measures in forests are supported or if the programme covers only agriculture. On national level, in turn, one programme exists that particularly focuses on forests, the Austrian Programme for Natural Forest Reserves. On the supranational level, the LIFE programme works through contracts that are co-financed by the EU. The sub-programme LIFE+ Nature & Biodiversity aims at the implementation of Natura 2000 and the EU biodiversity policy which makes it of

particular interest to forest owners. The former LIFE-Third Countries was dedicated for projects in candidate, acceding and neighbouring countries; these possibilities exist further.

Also LEADER funds are distributed on the basis of single projects. The LEADER programme follows a **bottom-up approach**. It developed a specific set of principles that include territorial orientation, local partnership, innovation and cross-sectoral co-operation. Under the LEADER framework, initiatives that support social benefits of forests have been co-funded, including business start-ups such as the economically highly successful Canopy Walkway in the Austrian Sauwald region (see Box 4). So far, LEADER has not been used strongly for projects that are connected with non-marketed forest goods and services. Furthermore, examples such as the Canopy Walkway where the investments are directly connected with the establishment of new and long-term businesses are still rare

Box 4: Forest canopy walkway (AT)

A farmer offers in his forest a canopy walkway with an entrance fee and a restaurant. The project with a total investment of about 1 Mio € was subsidised in course of the EU Leader+ programme. In the first year 2005 already more than 100.000 visitors were attracted.

An innovative approach to the distribution of public funds for certain projects is tendering. One example is the **competitive tendering scheme** that has been developed in the Finnish METSO programme that includes contracts for forest reserves. This scheme is known as Natural Values Trading (see Box 5).

Box 5: Natural Values Trading (FI)

Forest Biodiversity Programme for Southern Finland (METSO) proposed new policy instruments for nature conservation, including competitive tendering schemes for the trade or lease of land as well as contracts. Under the scheme "Natural Values Trading" landowners can establish protected areas based on their willingness to undertake conservation measures on a voluntary basis. The government calls for tenders and chooses the best offers. Forest owners are compensated for any economic losses they incur.

Strengths

- Voluntary basis on both sides makes it well accepted by stakeholders.
- Well suited when a certain management of a specific piece of land is required and the forest owner has the know-how.

Weaknesses

- Efficiency and equity is only guaranteed if clear selection criteria and procedures are used for the distribution.

Basis for fixing the price

- The costs for the agreed measures are compensated, including the costs of additional measures and foregone profit.

Applicability to non-market forest goods and services

- Applicable to ecosystem services of forests that are strongly connected with a specific piece of land.

5.4.4 Tradable permits and other forms of market creation

Market creation is one of the most important environmental policy instruments besides regulations and taxes. In comparison to regulations, markets are more efficient because the firms can optimize

their production system and emissions levels according to their specific capacities. There are many ways in which markets may be created by state intervention: Liability regulations can create incentives for firms to act more environmentally friendly and can create markets for alternative products such as renewable materials. The definition of minimum production quota creates a market for certain products such as green or renewable electricity including electricity from forest biomass.

One way to create markets for environmental externalities is to emit tradable emission permits or certificates. Tradable permits can have the form of emission reduction credit programmes or cap-and-trade systems. Credit programmes may be implemented as “bubble” scheme (a number of stationary emission sources are assigned a certain limit together), an “offset” scheme (firms buy pollution allowances from other firms that abate their emissions), or a “banking” scheme (where firms may store earned emission credits for future uses). Under a **cap-and-trade scheme** a cap is established for the use of a certain resource or the release of certain pollutants. The cap is the aggregate maximum amount of subtracted material or of pollution that can be released by participating entities. Tradable permits or credits are then allocated by dividing up the allowable overall total among those who participate in the established market. Industries or companies can sell permits that they do not need to other participants who need more than their allocation. This rewards companies which cut their pollutant discharge while it penalises those who pollute more heavily, and thus, creating an incentive for them to invest in pollution control. Trading increases the economic efficiency of resource management, by enabling companies or landholders to buy permits from those able to comply in a cheaper way (e.g. Smith et al. 2006).

A typical **forest-relevant** application is the trade with greenhouse gases/carbon trade. In the case of Transferable Development/Conservation Credits land owners waive their right for site development and receive credits that may be bought by interested developers. This scheme is used in peri-urban areas where green land is limited.

Emissions may be reduced by cleaner technologies or other abatement measures. In the case of carbon emissions compensation is possible through carbon sinks or carbon sequestration. Forests act as **carbon sinks** if they are established on bare land and the carbon is stored in the woody biomass (as long it is not burnt or rotten). The Kyoto Protocol (UNFCCC, 2006) has sanctioned offsets as a way for governments and private companies to earn carbon credits which can be traded on a marketplace (carbon offsets). According to the Kyoto Protocol Flexible Mechanisms industrialised countries may invest in emission reducing projects in developing countries in place of emission reductions in their own countries (UN Clean Development Mechanism) or implement projects with another industrialised country (Joint Implementation). One of the ways to create carbon credits is using the carbon sequestration function of forests.

The European Union Emissions Trading Scheme (EU ETS) is the largest carbon market today with a value of €19 billion in 2006. The total market worldwide is 23 billion EUR (Hamilton et al. 2007, World Bank 2007). EU ETS was launched in 2005 and allows investments in developing countries as well as in economies in transition, e.g. in Russia, Ukraine and Bulgaria (Joint Implementation), however it does not include carbon sinks. The agriculture and forestry sector is excluded from the scheme. Examples for the trade of carbon credits with carbon sinks that are located in Europe are therefore rare, but one was realised in Romania 2001 under initiation of the World Bank, where 6.000 ha are afforested (see Box 6).

Box 6: Carbon sequestration through the Prototype Carbon Fund (RO)

The World Bank initiated this pilot project for carbon credits through afforestation in 2001. The Romanian State Forest Company engaged in a contract with the Prototype Carbon Fund (which was erected by the Worldbank) over around 3 mio. US\$ on the sequestration of 855.000 t CO₂ through the afforestation of 6.000 ha degraded agricultural land. The total cost of the project is around 10 mio. US\$. Besides of future timber yields the forest is expected to protect against erosion and to provide forest fruits and honey. The additional benefit from the carbon contract will cover 1/3 of the cost and is paid yearly from the start according to the sequestration benefit.

Markets can also be created for other forest-related services such as water and mineral extraction or biodiversity. An example that works on the basis of legal obligations for compensation of adversarial impacts of development projects are **conservation banks**, in which projects with negative effects on the landscape or biodiversity pay into a bank for compensation. The bank holds/purchases land on which projects are realised to balance the adverse effects to the environment. Sites are chosen and managed for their natural resource values and special-status species or sensitive habitats. Sites may be natural (preservation) and/or include restoration, and/or creation of habitat (White n.d., Carroll et al. 2007). Similar constructions are In-Lieu-Fee programmes; in which charges are submitted to private or public funds which use the money for compensation activities and the compensation is done afterwards. Conservation Banks are often used in the U.S. and increasingly worldwide. Examples for conservation banks in a broader sense are the Wetland Mitigation Banking and the Endangered Species Credits (U.S.A.), BioBanking (Australia), the German Ecology Bank "Ökokonto" (earmarked duties if natural areas are destroyed, used for nature conservation projects), the French Biodiversity Compensation Bank (see Box 7) and the Dutch compensation principle which requires for any spatial interventions in forests, nature, landscape and recreational areas that the lost area is compensated somehow.

Box 7: Biodiversity Conservation Bank (FR)

CDC Biodiversité is a subsidiary of the French investor Caisse des Dépôts that buys or leases land and offers it to projects that need to compensate environmental losses due to environmental legislation. It buys or contracts with private owners and pays them for their management in favour of biodiversity. Therefore, when a project has to compensate its environmental losses, CDC biodiversité can sell or contract with the project to provide the required compensation.

Strengths

- Efficiency of the market mechanism.

Weaknesses

- Transaction cost for the installation of the market and the control of compliance.

Basis for fixing the price

- Market mechanism.

Applicability to non-market forest goods and services

- Applicable to climate conservation (carbon sequestration), biodiversity or habitat conservation, soil protection and extraction of natural resources such as water.

5.4.5 Purchase of/trade with goods or services

The simplest pure market mechanism for the financing of forest benefits is the direct acquisition of goods such as timber, fuel wood, forest fruits, mushrooms, greenery, etc. or services such as catering, accommodation, education services or adventure, the right of access to the land or sport facilities, hunting and fishing rights, etc.

The list of goods or services that can be traded on markets is long; however, the trade is not always well developed and the goods and services are partly defined as public goods by law or according to their nature. In particular, services are often prone to be regarded as public good, as, for instance, the protection function of forests can hardly be divided between different beneficiaries. The access to forests for recreational purposes and the collection of small amounts of forest products such as berries or mushrooms is in many European countries free by law (everyman's rights). In theory, the allocation of the full property rights to the land owners makes the establishment of markets easier (e.g. mushroom picking licenses in Italy). In practice, however, these property rights are often not utilised because they are sometimes difficult to enforce (e.g. in countries with vast forest resources) and because of a lack of interest by landowners (Mantau et al. 2001, Rametsteiner et al. 2005). Recreational services, for instance, are seldom developed although for many of such uses the property rights lie with the owner and no major obstacles for their marketing exist (biking, camping, sport events, etc.). Even if ownership rights are clear and transaction costs are low the marketing still depends on the willingness and the know-how of the owner to develop a marketable product. In order to develop markets for forest-related goods and services, the institutional level actors such as authorities, interest groups, extension services, etc. would have an important role through the provision of information, creating cross-sectoral contacts and providing seed-money for the development of the products and markets.

Goods: Non-wood forest goods may be collected and marketed either by the forest owners or through other persons – traders or consumers – with collection permits (licences). Mushroom and berry picking and chestnut collection are more developed in SW and SE European countries. Special products requested by firms rather than private people are more easily traded (e.g., resin collection in Greece, spruce wine and cosmetics in Finland). In the field of forest goods, marketing could be further developed through a better organisation of the whole value chains which would also allow for acknowledgements from organic labels. A future challenge is the fact that rising labour costs put the further exploitation of many forest fruits at risk. New products using non-wood forest goods in the chemical or cosmetics industry is still currently undercapitalised.

Services: Traditional forest services are hunting and fishing: In a number of countries the hunting right is allocated to the state, but in many countries hunting yields the second largest part of income from forest land. Still, the full market value of these services are often not utilised by the land owners even if these rights lie with them. There is a range of services that have gained importance today: many of them are connected with recreation in the wider sense including sports and adventure, but also other specific services are offered in forests, such as education (e.g. by guided tours), cultural events (e.g. arts and music), spirituality (e.g. green burials), etc. Recreational and tourism services are often offered as “added on” services to the often free access to the forest landscape in form of accommodation, catering, guided tours, wildlife parks, sports facilities or events, etc.

Combined marketing: In many cases the use and possible marketing of goods are closely related with services such as in the case of berry picking or hunting and fishing for recreation. In the concept of territorial marketing, bundles of goods and services are marketed under a flag-ship product that is typical for the area. A well-developed example is the “Mushroom of the Borgotaro Region” (Fungo di Borgotaro) which is marketed along the “Roads of Flavours” (vie dei sapori). Borgotaro has been officially acknowledged as a protected geographical region (Indicazione Geografica Protetta, IGP) by the European Union.

A number of examples for unusual products are included in the Innoforce case database which might trigger new marketing ideas like spruce wine, cosmetics, guided tours, bird watching, green burials, arts, etc. (examples in Box 8).

Box 8: Examples for the marketing of unusual goods and services of forests

Non-alcoholic sprucewine Kuohuva Kuusenkerkkä (FI): The private enterprise Korpihilla Ritva Kokko Ky in Lapland, Finland, developed a non-alcoholic sparkling sprucewine that the owner sells in small quantities around Finland.

Cosmetics products Lumene (FI): The Finnish company markets its products with the image of Nordic nature, and utilizes natural components such as cloudberry, blueberry, and birch sap and birch ash in the product development.

A Green Burial (UK): A British Funeral Director arranges green burials to a privately owned forest area in the county of Essex.

Art exhibitions in nature (IT): Arte Sella is an international art exhibition that takes place in a municipality owned forest in Italy. It is funded by entry fees, different venues and workshops and sponsors.

Tree hotel (DE): Visitors of the leisure park Kulturinsel are offered accommodation in 5 suites built in tree crowns 10 meters above ground. One house sleeps 4 and costs around € 200,- including breakfast.

Strengths

- Efficiency of the market mechanism.

Weaknesses

- Property rights for many goods and services are difficult to define and to enforce.
- Amount and quality of certain services are difficult to measure or assess.

Basis for fixing the price

- Market price.

Applicability to non-market forest goods and services

- Applicable to all goods such as forest fruits, game, fish and direct use services such as hunting, fishing, recreation, amenities. The trade requires clear property rights which are difficult to enforce for many forest goods and services. It is not well developed for such forest goods and services that are partly defined as public goods by law or by their nature. For services for which the amount or quality is not easily defined or for which special know-how is necessary other mechanisms such as the purchase or lease of land are better suited.

5.4.6 Land purchase

The purchase of land is maybe the most expensive way to secure the provision of desired products, but it is also the simplest. It is the most appropriate organisational solution if the production requires a specific way of management of the land and if the management know-how is on the side of the user.

The characteristic of this mechanism is that the property rights lie in the hand of one person. As the owner can freely and flexibly decide on the management of the land he/she may choose the management strategy, may change this strategy in future, may manage for multiple benefits, and may change the management goals at any point in time. Furthermore, the future provision of the goods and services from the land is not dependent on markets or the will of providers.

In many cases a certain piece of land is required for the provision of the desired service (e.g. recreation forest or water reserve) and only one party is interested (e.g. nearby municipality); in this case there is a double monopoly and no real market exists. The parties have then to agree on the basis of negotiations which strongly depend on the urge of need on both sides (wish to sell on the side of the land owner or political mandate to buy on the side of the interested user).

Typical examples are forest areas acquired by municipalities for recreation purposes or for the protection of drinking water sources (example: city of Vienna). For France it is reported that private companies buy land for the proper management of drinking water reserves (e.g. Vittel, see Box 9). Further examples are nature conservation areas that are most often put under a total conservation or a specific management regime (examples: purchase of riparian forests in Austria or the Rainforest of the Austrian in Costa Rica through private and public sponsors).

Box 9: Vittel pays for the protection of aquifers (FR)

Vittel, part of Nestlé Waters, France, acquired around 1500 ha of farm and forest land and manages the land for drinking water protection. The farmers are granted use rights and they receive payments for organic management.

Strengths

- Property rights lie in the hand of the person with the highest interest in the use of the land.
- The owner can freely and flexibly decide on the management, at any time.
- Suitable for multifunctional forestry.
- The provision of the goods and services is secure and not dependent on markets or the will of the provider.

Weaknesses

- Expensive because all property rights are acquired.
- In case of a one-sided or double monopoly no real market exists. This may cause high land prices.
- Desired land areas are not always available for purchase.

Basis for fixing the price

- Market price or negotiation between the interested parties in monopoly situations.

Applicability to non-market forest goods and services

- In principle, for all goods and services applicable, but particularly suited for complex services or when the know-how of the production/land management is on the side of the interested party, e.g. in the case of recreation, drinking water or nature conservation services.

5.4.7 Land lease

In a lease one person pays a rent for the right to possess a property that belongs to another person for a certain time period. The rent may be paid in one off but is typically given in yearly payments. The term of the lease may range from shorter periods up to often 99 years. It may be defined in fixed term or as periodic tenancy or it is of indefinite duration (tenancy at will). Lease of forests is not as common as lease of agricultural land. Examples from **forestry** refer to specific uses of the land such as, for instance, for recreational purposes, sports facilities, use of drinking water sources, nature conservation or burial sites (see Box 10).

Even if the lease term is up to 99 years, the lessor does not have to give up all property rights. The use rights are specifically defined in the lease contract and refer to forest management measures, clearing of forest, development rights, etc. The payment usually is made periodically, e.g. yearly, which is often preferred by both lessor and lessee. A **long-term lease** may be an option for an interested user of the land if the purpose of the use can be realised without full ownership. In contrast to contracts the lessee is responsible for the management of the land. The lease is advantageous if the know-how for the land management lies with the user.

Box 10: Forests of Peace (CH)

The company Friedwald offers the possibility of woodland burials. Around 60 sites exist in Switzerland, and around 25 in Germany. The ashes are given to the roots of a selected tree which is acquired by the client; the price range from around € 1.000 to € 6.000. The sites are leased on a long-term basis (99 years) from the owner and the maintenance is guaranteed to the clients. The use as a cemetery is further secured officially in the land register. The use of forests for a cemetery is not allowed by law in all countries, however, German federal states have changed their laws because of the new demand.

Strengths

- Clear mechanism similar to land purchase but the range of options/property rights is restricted.
- The payment is done periodically, e.g. yearly, and not the whole capital is needed at the time of the contract.
- Not all ownership rights are given up and not for all future.

Weaknesses

- Expensive because most property rights are acquired.
- In case of a monopoly the price may be high.
- Desired parcels are not always available for lease.

Basis for fixing the price

- Market price or negotiation between the interested parties in monopoly situations.

Applicability to non-market forest goods and services

- Similar to land purchase, leasing is particularly suited for complex services or when the know-how of the production/land management is on the side of the interested party.

5.4.8 Eco-sponsoring

In the typology used in this project, we distinguish between sponsoring as a business activity and donations for charity. The use of the term sponsorship does not distinguish clearly between these two situations but when it comes to the marketing strategy of land owners the distinction is important.

Sponsorship is a business relationship between a sponsor who provides financing, resources or services and a sponsored party which offers certain benefits in return. In contrast to donations, sponsorship is a contractual agreement with mutual benefit and the value of the provided financing can usually be deducted from the company's tax dues. Usually the commercial advantage is to establish an association between the sponsor's image, brands or products and the sponsorship investment. Typically the sponsor receives the right for advertisements or may also receive benefits for their staff. Sponsors may successfully be found for the support of events or projects that offer a high public visibility (e.g. large audience of an event or visitors of a site). The sponsored project, organisation or event should match with the type of the sponsoring company. Further, the audience should be the target group of the company in order to receive the intended advertising effect.

The sponsoring of cultural or ethical projects – such as in the case of *eco-sponsoring* – usually works in the way that the money is used for charity and for projects in the public interest – such as *biodiversity* conservation or the preservation of beautiful landscapes. National parks, zoos or ENGOS receive sponsor money easily because of their well-known names that are publicly recognised for their interests in preserving the environment. Forest holdings hardly achieve this publicity. In nature

conservation, however, the publicity factor is not always that important as in conventional sponsoring: the purposes for internal communication may be of greater importance. This makes nature conservation projects possible objects for sponsorship even if such projects are not aimed at large numbers of visitors. For example, the German eyeglasses company Fielmann sponsors tree planting but does not use this strongly in their advertising. In Austria, the owner of a daily newspaper finances the preservation of a primary forest but prefers to stay anonymous. They are allowed to gain information on the forest and to visit it, as part of their annual works outings.

Eco-sponsoring is usually done by enterprises in order to illustrate their care for the environment and for sustainable development. Typical projects are afforestations, maintenance of natural monuments, nature conservation or restoration projects, nature-related sports or cultural events, environmental education, etc. There should be a connection to public benefits and an appropriate audience. Projects with the aim to **attract visitors** – such as in the case of recreational facilities, public events in the forest, local products fairs, publications, etc. – are well suited for sponsorship (for an example with mountain biking see Box 11).

Box 11: Mountain bike routes offered by the Forestry Commission Wales (UK)

The Forestry Commission Wales offers advanced MTB routes that attract visitors from worldwide. The services comprise specifically constructed mountain bike routes and associated services both on and off site, for example, provision of food and drink, bike hire, bike cleaning facilities and accommodation. In 1999, one of the sites - Coed Y Brenin - injected around £1 million into the local economy which has supported established businesses and new enterprises. Funding was provided by the FC, European Union, and through sponsorship from high profile companies like Red Bull and Karrimor: two routes were named after the sponsors.

Strengths

- May be an additional income.
- Can give also the forest owner publicity.

Weaknesses

- Difficult market for forest owners because their public image is not very strongly connected to the public interest or charity. (forest holdings as “no-names”)
- Mostly relatively small sums are gained through single projects.

Basis for fixing the price

- Negotiation between the interested parties; for standard products, market prices exist e.g. in the case of the sponsoring of events, depending on the number of expected visitors.

Applicability to non-market forest goods and services

- Suited for services in the public interest and for charity such as historical and educational services, biodiversity conservation, amenities, sports, recreation and cultural services.

5.4.9 Donations

Donations are gifts given voluntarily and without return consideration. They are typically given for charitable purposes. Donations take various forms, including cash or other funds, goods and services including voluntary work. They may be given by organisations or private persons, including commercial organisations. In contrast to sponsoring, the firms donate without expecting direct benefits in return. Forest-related donations are often given for the preservation of rare or beautiful trees or sites, recreational facilities, environmental organisations, or projects in development cooperation. Donations are also known as sponsorships, donors also known as sponsors. Both, sponsoring as a business activity and donating without receiving benefits in return, are typically oriented at charity and social purposes. However, in marketing, there is an important distinction. In

the case of sponsoring the land owner would have to develop a well-defined product where the benefit for the sponsoring firm has to be visible. In the case of donations the charity purpose would be in focus.

Similar to sponsoring, it is not easy for forest holdings to attract donations. Projects that gain high importance on local level or are connected with specific purposes are still promising. A possible strategy may be to find partnership with influential local institutions or a well-established organisation that is interested in the project. Examples for donations for forestry projects are often found on local level (e.g. sponsorship of extraordinary trees or stands by private persons, or funding of educational activities by local companies) or in cooperation with environmental NGOs that raise funds for the purchase or lease of areas of specific interest for nature conservation (e.g. purchase of natural forests that are at risk to be developed for commercial purposes). The most commonly used is the symbolic sponsorship of one tree, one hectare, one species, etc. A certificate may be given as a symbolic reward for the donation, like in the example of oak sponsorships in Maienfeld (see Box 12).

Box 12: Donations for oak trees in Maienfeld (CH)

The manager of the municipal forest company Maienfeld has realised a number of eco-sponsoring and donation projects. One is the sponsorships of young oaks by private persons in a majestic old oak forest that is often visited by the city's inhabitants. The sponsors buy and care for the young trees that are planted for regenerating the forest. They are rewarded with a small engraved plate.

Volunteering in agriculture or forestry is increasingly gaining. The volunteering purposes are either focused on helping farmers in need or on the preservation of old land management practices, landscape beauty or ecologically valuable habitats. In forestry, the work in mountainous forests that are difficult to manage but serve important public interests such as the protection against natural hazards has attracted growing numbers of volunteers. The largest initiative that organises voluntary work in mountain forests is the Bergwaldprojekt in Switzerland, Germany and Austria (see Box 13).

Box 13: Volunteering in mountain forests in the Bergwaldprojekt (CH, DE, AT)

The Bergwaldprojekt organises voluntary work of laypersons together with forest owners in mountain forests that usually last one week. The work done may be planting or tending forests, building or maintaining forest trails or fences, etc. The Bergwaldprojekt was founded 1987 and is now organised as foundations or associations, nationally in Switzerland, Germany and Austria, in Austria organised through the Alpenverein. In the 20 years since its start around 16.000 volunteers have contributed.

An innovative financing tool for nature conservation and landscape preservation is also auctioning (Wensing and van Santen 2008). Elements of a certain landscape are offered by the land-owners and their maintenance can be secured by organisations or citizens for a certain time. The first auctions in Europe were carried out in the Netherlands (see Box 14) and it will be expanded to international scale.

Box 14: Landscape auctions (NL)

Landscape auctions, for three locations in The Netherlands in 2007, have raised more than 250,000 €. People or organisations “buy” the maintenance of certain landscape features which remain in the ownership of the land owner but their maintenance is guaranteed for ten years.

Strengths

- May be an additional income or may bring voluntary workforce.
- Can give also the forest owner publicity.

Weaknesses

- Similar to eco-sponsoring, a difficult market for forest owners because their public image is not very strongly connected to the public interest or charity.
- Often relatively small sums are collected.

Basis for fixing the price

- Open to the donator or a minimum may determined by the carrier of the project (e.g. days of volunteering or minimum amount in case of symbolic sponsorship).

Applicability to non-market forest goods and services

- Similar to eco-sponsoring, donations are suited for services in the public interest and for charity such as historical and educational services, biodiversity conservation, amenities, sports, recreation and cultural services.

5.4.10 Certification

Certification or labelling is defined as the confirmation of a certain property or quality of a person, organisation, product or process by an authority or an independent party. The basic idea of eco-labels or sustainability labels is that consumers support through their responsible choices environmentally friendly and sustainably produced products. The most important certification schemes in forestry refer to **timber from sustainable forest management**. The certification is an instrument for integrated nature conservation because ecological standards are requested by the certification systems. The certification should provide market benefits to the producer/trader in terms of higher prices or increased market shares. According to various studies (e.g. Baharuddin and Simula 1994 and 1997, Rametsteiner 2000) there is not much evidence on a strong price premium for certified timber. In some market segments, however, certified timber rewards benefits in price and market access. In Europe, two main certification schemes are particularly relevant: the FSC (Forest Stewardship Council, with around 100.000 ha certified forests worldwide) and the PEFC (Pan-European Forest Certification, since 2003: Programme for the Endorsement of Forest Certification Schemes, around 200.000 ha) standards.

For other forest goods, especially food, the certification of organic production may be considered. Organic standards do also exist for organic Christmas trees (label "Bio-Christbaum" or trees from certified organic farms; see Box 14).

Certificates of origin guarantee that a product has been produced in a defined region. A number of national timber labels existed but they did not gain recognition on the market. A tropical timber label was abolished for being discriminatory. A number of regional labels, however, exist that primarily confirm the local origin but often combine a number of quality properties, including multi-functional sustainable forest management, e.g. in the example of mountain timber from Grosses Walsertal (see Box 14). In the latter case the valley has been approved as a UNESCO Biosphere Reserve which can be regarded a landscape certificate. Labels such as Biosphere Reserves, Nature Parks or the IUCN category "National Park" are successfully used for the attraction of visitors and the marketing of regional products. In regional certification, often also certain quality standards are included, e.g. the sustainable management of the regional resources (Biosphere Reserve), or the use of particularly ecologically valuable tree species (fir in the case of the Styrian TANNO house, AT, or beech in the case of the marketing of red core beech wood, GE, see Box 15).

Box 15: Mountain timber from the biosphere reserve Grosses Walsertal (AT)

A local cooperation of companies from the timber value chain markets their products under a regional label “Bergholz aus dem Biosphärenpark Grosses Walsertal”. The certificate guarantees the origin from the valley, the processing by local firms and an ecological production. The initiation of the project was co-financed through the EU LIFE programme.

Strengths

- Preferences of consumers are directly translated into payments.

Weaknesses

- Relatively high transaction costs for the certification procedure.
- May exclude small forest owners.
- Depends on the willingness and ability of consumers to pay and on public awareness.

Basis for fixing the price

- Market price.

Applicability to non-market forest goods and services

- Applicable for the financing of ecosystem services of forests and related properties of forest products and the sustainable management of forests. The label is usually connected with traded goods or services, the benefit, however, is for multiple benefits of forests under the concepts of organic or integrated production or sustainable management.

5.5 Current use of financing mechanisms in EU Member States

5.5.1 Overview of the use of financing mechanisms

The questionnaire, developed in the framework of the FORVALUE study, addresses the application of financing mechanisms in EU countries for different forest goods and services. According to the responses from the government representatives, public mechanisms (taxes, subsidies and publicly financed contracts) are much more frequently used (and proposed to be used) than private mechanisms. Within the private mechanisms, the purchase of goods or services including certified products and entry fees are the most important ones. All types of financing mechanisms are known at least in some countries (Figure 16).

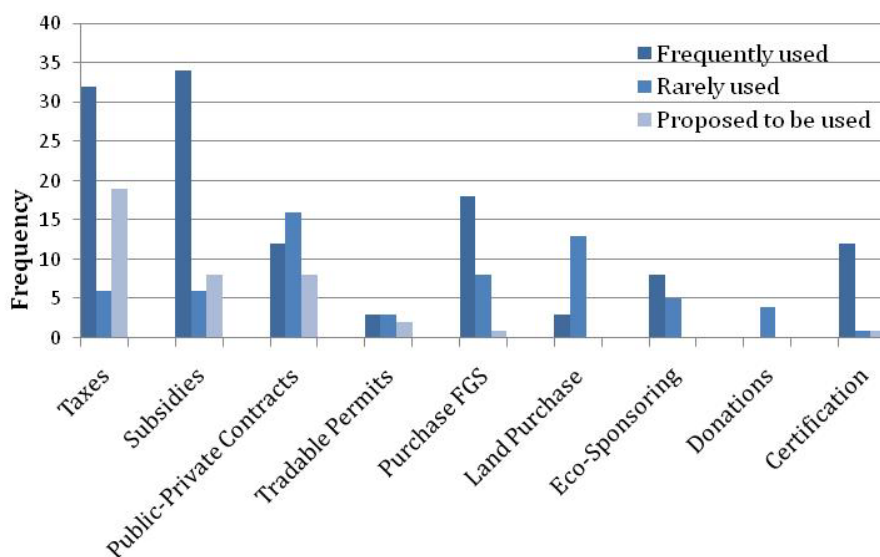


Figure 16: Use of different types of financing instruments for forest goods and services in European Union countries (government responses, 26 countries)

As the answers were given by ministry representatives this mirrors the experiences and views from the side of the public administration. In order to judge if other stakeholders have different views, the questionnaire was also sent to forest owners associations, state forest companies and environmental interest groups. Not many but still a few of these were returned (13 in total). When comparing the official answers with the other groups it can be seen that the general assessment of the use of mechanisms is fairly consistent across the groups, only the opinion on proposed instruments differs (detailed diagrams for each of the groups are provided in Annex 22). Governments strongly propose taxes and public payments, whereas environmental groups rather propose public-private contracts.

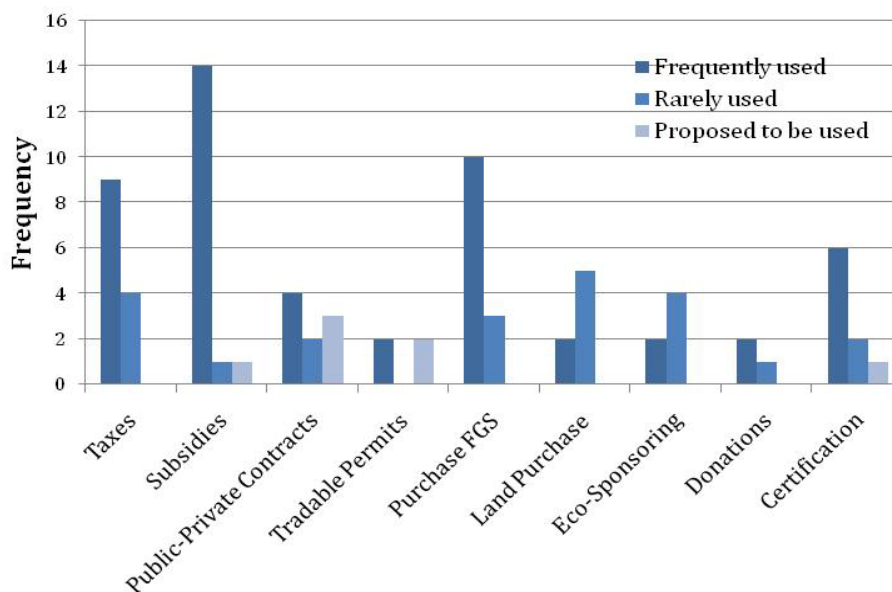


Figure 17: Use of financing mechanisms for forest goods and services in European Union countries (13 responses from forestry and environmental interest groups)

5.5.2 The use of financing mechanisms for forest goods and services

Some of the financing mechanisms are typically used for certain goods and services. According to the survey, tradable permits are apparently only used for biospheric goods and services (biodiversity conservation, carbon sequestration), and certification for resources (mainly timber). Purchases frequently occur for resources (wood and non-wood forest products) and social services (recreation). Taxes, subsidies, contracts, land purchase and lease and eco-sponsoring are frequently used for almost all forest products. Donations are only rarely used (see Figure 18; Annex 22).

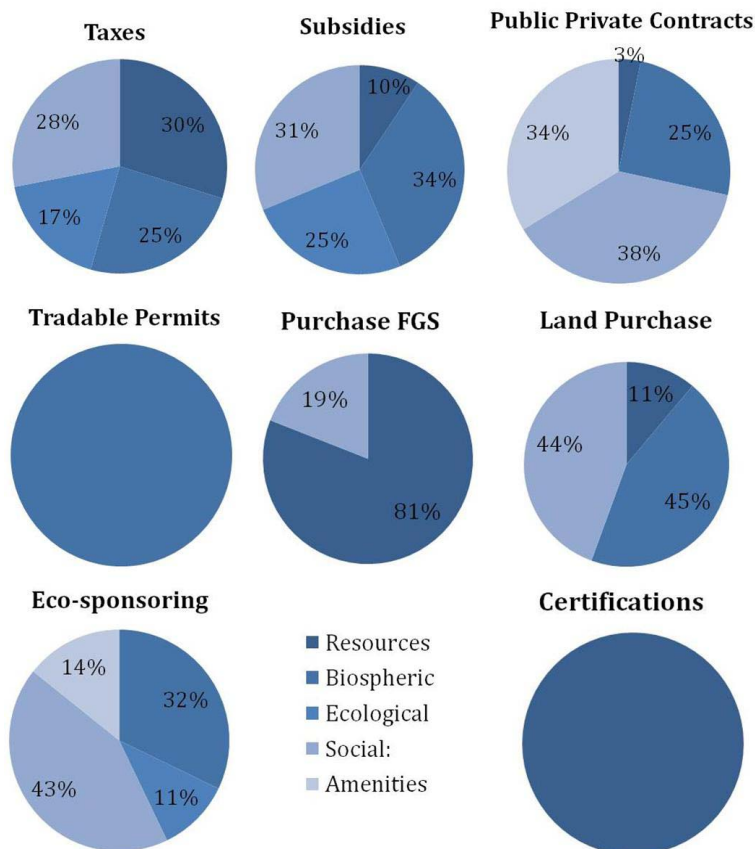


Figure 18: Use of financing instruments for different forest goods and services in the EU

In the following, the summary results of the survey are given for the five European regions (using the classification of the MCPFE). The detailed charts for the country groups are placed in Annex 22.

5.5.3 Northwest-European countries

In Northwest-Europe, all financing mechanisms seem to be of some importance, with a few variations among the seven countries. Taxes, public payments (subsidies or contracts) as well as trade of forest goods and services are relevant in all countries alike (charts for all country groups in Annex 22).

In **France**, for instance, tax exonerations and subsidies are granted for ecosystem services of forests, including biodiversity protection, landscape amenities or truffles and walnut production. For France, a number of cases with private funding are reported, including payments and purchase for water reserve management, mushroom picking licences, eco-sponsoring and timber certification.

In **Ireland**, subsidies for ecosystem services are connected with new afforestations; for recreation, subsidies are paid under the NeighbourWood scheme. For **Germany**, certification schemes are reported for different wood products and meat from game. Voluntary carbon offsets and carbon trade is proposed in a number of these countries, e.g. **UK** or the **Netherlands**. **Luxembourg** reports that there are no financing mechanisms for non-market forest goods and services, as at present, the view is that these should remain for free as long as there are no additional costs for sustainable forest management.

5.5.4 Nordic and Baltic countries

In the six Nordic and Baltic countries Denmark, Estonia, Finland, Latvia, Lithuania and Sweden, the dominating financing mechanisms are taxes, subsidies, public-private contracts, and market trade including certified timber. All other financing mechanisms are mentioned but rarely used.

Finland has, in the recent years, developed and piloted most innovative public and private instruments for environmental and recreational services of forests. The government uses tendering systems when giving grants for nature conservation projects (natural values trading) and when buying/exchanging land with high biodiversity value (competitive tendering). Models for trading recreation and landscape values have been launched in Finland in 2007 by landowner organizations. Further, a development payment fund has been suggested in which money is collected from the beneficiaries/users of landscape and recreational values based on turnovers of nature tourism services and from which forest owners are compensated including a wide range of forest management measures.

In **Denmark**, charges are collected from horseback riders and organised sport events in public forests. The state buys land for afforestations near urban areas for recreational purposes and groundwater protection. In **Sweden** public money is used to provide recreational infrastructure and to cover part of the costs to preserve biodiversity and cultural historical sites in forests. **Estonia** mentions hunting licences, **Latvia** reports on tax exemptions for land with young forest stands and subsidies on Natura 2000 sites. In **Lithuania**, forest land is exempted from land tax. Furthermore, payments for contracts on or purchase of land for ecosystem services exist as well as carbon trade, however, this is rare.

5.5.5 Central-European countries

Not too many financing mechanisms are found in the six CE countries. Tax exemptions, subsidies and publicly financed contracts are the dominating financing mechanisms. Aside from timber and biomass, the market plays a major role for hunting.

Land purchase plays a certain role in the **Czech Republic** for various ecosystem services, mushrooms and fruits in **Poland**. Timber certification was mentioned in Austria, Czech Republic and Poland. Other financing mechanisms (trade of Christmas trees and greenery, entry fees for wildlife parks, guided tours or educational services, purchase or lease of land for biodiversity/habitat protection, eco-sponsoring and donations for environmental or recreational purposes) are known from expert interviews and cases; however, these are of minor importance in the overall picture.

5.5.6 Southwest-European countries

From SWE countries we received answers from Spain (plus an additional answer from Catalunya), Portugal and Malta. **Malta** reports on sponsorships by companies and individuals for afforestations and restoration of habitats. In **Portugal**, subsidies, public-private contracts and sponsoring are applied for various ecosystem services such as biodiversity conservation and multipurpose forest management. Carbon sequestration is financed through subsidies, contracts as well as voluntary carbon markets (companies invest in afforestations to compensate their emissions). Private markets exist for hunting, tourism and other goods and services, besides those for the main markets of timber, biomass and cork. Similarly for **Spain**, but public money is also spent for projects concerned with spiritual/cultural and historical/educational values. Taxes and subsidies are proposed for a

broad range of ecosystem services. In **Italy**, good examples for combined marketing of goods and services of specific regions are known, often referred to under the term of “territorial marketing”

5.5.7 Southeast-European countries

In the four SEE Member States Bulgaria, Cyprus, Greece and Romania the answers to the questionnaire look very different. **Bulgaria** answered that taxes are used for all goods and services with limited access. **Romania** reported that tax exemptions are planned according to the Forest Code, in force since April 2008, for forests with special protection functions when designated in forest management plans. **Cyprus** only mentioned that public payments for ecosystem services on contractual basis are proposed in course of the Rural Development Programme. **Greece** mentions that taxes for all wood products exist. All other forest services are considered public goods, particularly in the dominating state forests.

The results suggest that no major innovations in financing mechanisms are currently reportable in SEE. The empty cells, however, do not mean that other financing mechanisms are never used. From expert interviews and case studies it is known that, for instance, carbon sequestration projects exist (Bulgaria and Romania) and forest fruits are traded. It is also known that forest owners often do not benefit from this trade.

A rare use of private mechanisms for forest goods and services in this region may be explained by a lack of knowledge and tradition of market mechanisms and private forestry as well as a lack of financial resources in the national economies of these countries.

5.5.8 Regional comparison

A comparison of the use of financing mechanisms in the different European region shows that the financing mechanisms are principally known in all regions. There is a number of regional “specialities” such as non-wood forest products markets and eco-sponsoring in Southern Europe, a specific interest in water resources in Western Europe, or a stronger existence of the everybody’s rights in Northern Europe. It seems that Eastern and South-Eastern European countries with economies/political systems in transition have a stronger emphasis on public policy instruments. This shows that political, institutional and social traditions have an influence in preferences of certain financing mechanisms but do not predefine the exclusive use of certain mechanisms or totally exclude others.

5.6 Concluding remarks on the financing mechanisms for forest goods and services

This chapter aimed at both, a theoretical review of financing mechanisms for non-market FG&S as well as at an empirical assessment of their use in Europe. The theoretical review employed two complementary research fields: marketability and innovation system approach. The former specifically explains the marketing difficulties and provides strategies for improving the marketability. The latter puts the focus on the complex process of developing and marketing new products – the innovation process, in which many public and private actors have important roles. It is therefore especially suitable for deriving recommendations for firms and political-institutional level organisations.

In the empirical assessment the chapter looked first, at what the current situation is and second, at the trends in the use of financing mechanisms. The collection of case examples therefore put a

particular emphasis on innovative applications. The value of these examples is twofold: to grasp the latest developments and to provide examples for possible further applications to learn from.

The comparison of the theoretical analysis and the empirical situation shows the marketing difficulties of many FG&S that lie often in their properties as externalities and their stronger or lesser public good characteristics. However, it also shows many examples that prove that these obstacles can often be overcome by a creation of markets and/or product development strategies. Public instruments are therefore justified to some extent but options for market-based instruments exist. Market-based instruments are still not applied to a wide extent, however their use is increasing.

Chapter 5 aimed at a comprehensive overview of the situation by applying a broad set of methods. The next chapter proves and illustrates this by applying a stringent evaluation method on a selected number of concrete case examples of different financing mechanisms.

6. COMPARISON OF ALTERNATIVE FINANCING MECHANISMS

6.1 Introduction

In former chapters the importance of non-market FG&S have been presented as well as a range of alternative financing mechanisms that can be applied for their improved provision. Next, we examine how best to select the adequate financing mechanisms. A rational choice of mechanisms requires a structured procedure as well as criteria and indicators for the decision. Multi-Criteria Analysis (MCA) provides a clear procedure for evaluating the strengths and weaknesses of alternatives.

This part of the report gives a short introduction of the main characteristics and steps of a MCA, and puts it into practice for the evaluation of selected cases of financing mechanisms in EU Member States. Furthermore, this chapter gives a structured description of a number of financing mechanisms applied in EU Member States.

The evaluation of strengths and weaknesses, and the selection of the most adequate financing mechanism are only the last steps of the process of designing financing mechanism; therefore a short introduction of this process is first given. In our opinion this additional explanation serves to complete the picture on the application of financing mechanisms and to connect the work between this task of the study, with the explanations and findings given in other parts (e.g. Chapter 4).

6.2 Application of financial mechanisms

The process of selecting the financing mechanism can be broken into several steps. There is no standard division of these steps, but following the procedures reported in other studies (e.g. Mayrand & Paquin 2004, Smith et al. 2006), the main steps are:

- identification of the need to act and the demand for the forest good/service;
- identification of the cause-effect relation between the forest and the good/service provided;
- identification of the provider and beneficiary;
- valuation of the environmental good/service; and
- selecting the financial mechanism.

6.2.1 Identification of the need to act and the demand for the forest good/service

Before starting to develop and apply a financing mechanism for compensating the provision of a non-market forest good or service, the need for such measures has to be identified. Thus answering the following questions is essential:

- whether the forest good/service is threatened or it might be in the future (quality and/or quantity)?
- whether a good/service is provided optimally in quality or quantity to meet the demand?

Different reasons for the introduction of financing mechanisms exist (see Box 16). In particular, they are applied to correct market failures in order to ensure the socially optimal provision of goods and services and to foster their efficient use. Thus in the case where there is a clear demand for a non-market forest good or service and this good/service is threatened or its provision is not adequate, the application of a financing mechanism can be considered as an option to improve the situation.

Box 16: Possible objectives of the application of financing mechanisms

1. Financing mechanisms can be applied to educate the population about the value of natural resources.

Setting a price for environmental services, which were previously available free of charge, causes users and providers to associate a market value to such services. This should lead to a more efficient use of the resource, and recognition of the benefits provided by a certain land use.

2. Financing mechanisms can facilitate the solution of conflicts and the reaching of consensus among different stakeholders.

Different user groups might have different and even competing priorities, with regard to the use of a natural resource. Financing mechanisms can contribute to solving conflicts about the alternative uses of natural resources by fostering the information flow between providers and users of the services and providing economic compensation.

3. Financing mechanisms can enhance efficiency in the allocation of natural, social and economic resources.

One of the basic assumptions is that the use of market mechanisms increases the efficiency in resources allocation. As in other markets, efficiency can be increased if the required institutional conditions are in place, including a sufficient degree of competition, information availability and the lack of externalities, among others. When designing the financing mechanism these conditions should be met to ensure that the mechanisms have a positive effect on the efficient allocation of resources.

4. Financing mechanisms can generate new sources of funding for the conservation, restoration and valuation of natural resources.

The appropriate implementation and execution of financing mechanisms requires an important number of preliminary studies to establish relations between the land use and the provision of goods and services, and to estimate the economic value of these goods and services. These studies may constitute a significant contribution to the knowledge of the ecosystems involved, as well as an important input for its conservation.

5. Financing mechanisms can create indicators for the relative importance of natural resources by means of the valuation of environmental services.

As previously stated, financing mechanisms can generate useful knowledge about human impacts on the condition of the natural resources and its ability to provide the desired goods and services, as well as the economic importance of these impacts.

6.2.2 Identification of the cause-effect relation between the forest and the good/service provided

Linking the condition of the natural resource (e.g. forest) and its capacity to provide goods and services is the basic concept for the application of financing mechanisms. It serves to relate the needs and welfare of the beneficiaries¹⁸ with the action of the land managers, responsible for the natural resources (e.g. forest owner).

To analyse this relation we have to know:

- What is the capacity of the natural resource in different condition (e.g. management type, stand structure, tree species mixture) in providing the demanded good or service. Since different types of forest may produce different amounts and combination of the goods and services.

¹⁸ The term beneficiary will be applied instead of user, since it includes also that part of the society, which benefits from the non-market forest goods and services indirectly (non-use values).

- What are the needs of the beneficiaries (how much of the good/service they demand)
- What is the amount of the good or service that can be used in a sustainable way
- Whether by applying different management measures it is possible to influence the quantity or quality of the available goods or services

It is fundamental, for the successful application and functioning of a financing mechanism, to answer all the above questions and avoid misunderstandings about the effects of forest management on the goods or services provided and needed.

6.2.3 Identification of the provider and beneficiary

The identification of providers and beneficiaries is another crucial issue in the design of financing mechanisms. It is not sufficient to only make a very general description of both groups (e.g. forest managers and recreationists), but it has to be more precise and detailed. The analysis of the beneficiaries is important for the identification of those stakeholders interested in paying for the provision of a forest good or service. Similarly, we identify the providers and the extent to which they are able to influence the management regimes on the area important for the provision of the goods (importance of scale).

6.2.4 Valuation of the environmental good/service

To justify the investment into the provision of a certain forest good or service, it is also important to estimate the value of the obtained benefits. This will enable taking decisions that are justifiable from an economic point of view. In the context of this study the main interest is placed on the social value of the considered goods/services, thus the valuation should be based on the Total Economic Value concept¹⁹.

The valuation is not only useful to justify the investment, but also to:

- show the contribution of certain ecosystem good or services to the economy on different scales (e.g. local, regional, national);
- increase public awareness on the existing benefits provided from the forest; and
- build support, for the application of financing mechanism among stakeholders.

However, the estimated values are not directly applicable and shouldn't be regarded as the price to be paid by the users. The prices are normally established by negotiations between the providers and beneficiaries of the forest goods/services. In principle financing mechanisms are efficient when beneficiaries pay less than the costs of alternatives and providers receive at least as much as the income forgone as a result of adopting the management to the optimal provision of a certain forest goods/services. It should be noted that in the past the forgone income was the main approach (e.g. value of the reduced timber harvest due to adopted management), while other components of additional cost or lost income were generally not considered. Consequently, no reliable data exists, what types of costs should be taken into account and what is their value.

Figure 19 illustrates the difference between the estimated social benefit, the use of a forest service, and the forgone income, which should be the basis for the negotiation of the payments for the provision of the considered forest service. In scenario A, the provider (e.g. forest owner) maximises his benefits, by cutting the forest. This influences the amount of non-market goods and services (e.g.

¹⁹ For more on this concept see Chapter 4.

lower quality of water) and result in a cost for the beneficiaries (e.g. need to buy water from other sources). In second scenario (B) the forest is preserved (e.g. lower intensity of cutting). There are no additional costs for the beneficiaries, but the forest owner losses one part of his income. Scenario C introduces a payment for the service. This payment compensates the provider for the foregone income, due to lower intensity cutting.

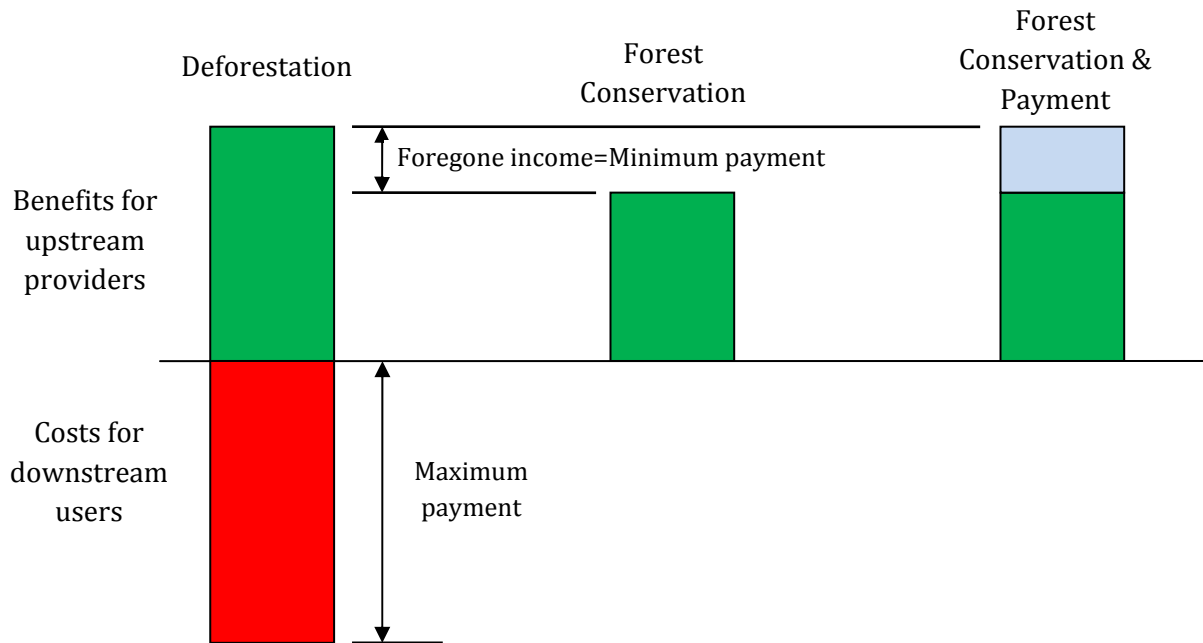


Figure 19: Payments for non-market forest goods and service, based on the assessment of cost for the beneficiaries and benefits for the provider (adopted from Pagiola *et al.*, 2004)

It should be also considered, that compensation payments are justifiable only in those cases where the beneficiary would like to prevent a deterioration or achieve improvement in the quality or/and quantity of the desired good or service.

6.2.5 Selecting a financing mechanism

When developing new financing mechanisms to address specific problems of forest goods and services, case by case assessment should be done to determine which financing mechanism, in which circumstances and in which form would be the most appropriate. This assessment can provide a valuable insight into the strengths and the weaknesses of alternative financing mechanisms. To evaluate the suitability of the financing mechanisms different methods can be used. Following the EFTEC project (EFTEC, 2006) they can be categorized as:

- *Economic Valuation Methods* (e.g. Market Price Approach, Travel Cost Method, Benefits Transfer)
- *Deliberative and Participatory Valuation Methods* (e.g. Questionnaires, Focus groups, Delphi Surveys)
- *Decision Support Methods* (e.g. Cost- Benefit Analysis, Multi Criteria Analysis, Lyfe Cycle Analysis)
- *Alternative Measures of Prosperity* (e.g. Index of Sustainable Economic Welfare, Green National Product and genuine Savings)

For the purpose of this project, the main interest is in decision support methods. In practice the most commonly used decision support tools, to evaluate alternatives for achieving a certain objective, are

the Cost-Effectiveness Analysis (CEA) and the Cost-Benefit Analysis (CBA). In cases where the value of the desired output cannot be estimated, the CEA is used to assess the least cost alternative that can be applied to achieve the objective. The CBA compares the costs and the benefits of each alternative by using different indicators (e.g. net present value, internal rate of return, benefit-cost ratio). Both of the above methods require quantitative data in monetary terms. However, in practice, very often only qualitative or a mix of quantitative and qualitative data is available. In these cases other decision support methods have to be applied, like the Multi Criteria Analysis (MCA). This method enables the comparison of alternatives, based on different types of data (qualitative and quantitative).

The MCA can be used in *ex ante* evaluations (e.g. for the selection of alternative financing mechanisms) and also in *ex post* evaluations (e.g. evaluation of the performance of an already applied financing mechanism).

Other benefits of the MCA are (EFTEC, 2006):

- simple application (a few working steps and no data demanding models);
- requires descriptive (qualitative) information that in many cases is more easy to collect than quantitative;
- supports interaction and involvement of stakeholders into the evaluation process; and
- the output is simple and clear.

The main weakness of some versions of MCA is the lack of transparency due to the weighting process. To overcome this problem versions of the MCA exist that use score tables, which make the weighting of the used criteria visible and transparent (Wielen et. al. 2004).

Since the FORVALUE study puts the MCA into application, some general information about the method and the evaluation procedure are given in the next sections, followed by an empirical example of its application.

6.3 Multi-criteria analysis as an evaluation method

Multi-criteria analysis (MCA) is a decision support method that can be used to evaluate different alternatives. These alternatives may be very broad (e.g. different policy options) or concrete cases of applied instruments. Applying MCA helps to compare alternatives according to their performance with regard to a selected set of evaluation criteria. These performances are presented in a so called performance matrix, or consequence table. In this matrix each column represents an alternative (case) and each row describes the performance of the alternative against each criterion. In a basic form of MCA this performance matrix may be the final product and each user can use this matrix to make his own judgement (for details see: DTLR multi-criteria analysis manual²⁰).

More sophisticated MCA techniques convert the information given by the performance matrix into consistent numerical values. Usually this conversion is done by the process of scoring and weighting, and the application of mathematical routines where the estimated scores and weights are combined into overall scores for each alternative.

The main steps of a MCA are the following:

- establish the aims, identify the decision maker and other stakeholders;
- identify alternatives;

²⁰ Available at: <http://www.communities.gov.uk/documents/corporate/pdf/146868.pdf>

- describe the performance of each alternative against the criteria (scoring);
- assign weights to each of the criteria;
- calculate the overall performance of alternatives; and
- analyse the results.

Step 1. Establish the aims of the MCA, the decision makers and other key players

Before starting the MCA, it is crucial to clearly define the objective of the MCA (why is it done?) and to define who should be involved in the MCA process (e.g. decision makers and other stakeholders).

Step 2 Identify alternatives

After the objectives and the “key players” are identified, the alternatives (e.g. alternative policies, alternative financing mechanisms) to be evaluated should be listed (e.g. which types of financing mechanisms could be applied).

Step 3 Define the criteria (and the corresponding objectives) that reflect the relevant consequences of each option.

In this step the evaluation criteria are defined. The criteria are measures of performance applied to evaluate the alternatives. In general the design and the choice of the financing mechanisms can be made against six main sets of criteria (OECD, 1991, OECD, 1994, Bohm and Russell, 1985):

- (i) **Effectiveness** refers to the success of a financing mechanism in achieving certain policy objectives (i.e. improved provision of non-market forest service). The effectiveness of a financing mechanism must be judged against these predefined policy objectives. Effectiveness of the mechanism can be assessed *ex ante*, if the mechanism in question allows the possibility to predict the post-policy situation with a reasonable accuracy (e.g. in case of tradable permits the total amount of emission reduction that the financing mechanism is expected to achieve can be estimated quite well).
- (ii) **Economic efficiency.** Ideally, a financing mechanism should be designed so as to be able to achieve the optimal allocation of resources, which in practice often means the ability to achieve a chosen policy objective at the lowest cost. Attention should be paid both to the direct costs imposed by the mechanism (e.g. pollution abatement cost) and the indirect cost in terms of opportunities forgone.
- (iii) **Implementation complexity** refers to the ease of designing and implementing the mechanism, and it can be broken into two components:
 - a. **Information intensity** represents how much information (e.g. data, predictive modelling skills) is necessary to design a certain financing mechanism.
 - b. **Administrative feasibility** refers to the ease and cost of monitoring and enforcement.

Implementation complexity is closely related to the criterion on economic efficiency, because a high administrative cost increases the total cost associated with the financing mechanism. It is important to differentiate between the costs of establishing from the cost of implementing the financing mechanism. The implementation of some financing mechanism requires continuous data collection by the corresponding authorities (e.g. taxes, fees, charges), while for some other mechanisms (e.g. tradable permits, certification schemes, market creation) the authorities just need to establish an adequate

operational framework (“rules of the game”), which, if well designed, will not require continuous monitoring and will be self-enforcing. On the other hand, price-based mechanisms (e.g. taxes, charges, fees, subsidies) are usually preferred over quantity-based mechanisms (e.g. marketable permits) because the latter require the establishment of new administrative and institutional apparatus.

- (iv) **Dynamic efficiency** refers to the actions encouraged by the mechanism in the long run, e.g. incentives for continuous research and development, adoption of new environmental-friendly technologies, etc. The mechanisms that are closely linked to the profits of the regulated agents (e.g. taxes) tend to create stronger incentives than the ones where the link is more subtle (e.g. tradable permits²¹).
- (v) **Flexibility** refers to the easiness to adapt to external changes in markets, technology, knowledge, and social, political and environmental conditions. **Internal flexibility** is understood as the ability of the financing mechanism itself to adjust to changes that occur in tastes, technologies, resource use or other features of economic activity. **External flexibility** is the ability of the agents affected by the mechanism to adapt to external changes. In this respect, for example, tradable permits are more flexible than taxes, fees and charges, as the price of the former automatically adjusts to changing conditions insofar as these affect the decisions of participating actors, whereas the latter usually require some additional intervention by the policy maker.
- (vi) **Political considerations** affect the choice of policy instruments at least as much as any other arguments about their relative merits on the abovementioned dimensions. This criterion encompasses several dimensions, such as:
 - a. **Acceptability.** It is important for the target groups to accept the financing mechanism imposed onto them; otherwise the whole functionality of the mechanism is in danger. Acceptability increases by taking into account the following elements:
 - (1) **Adequate information** of target groups about any aspect of the new mechanism they might be interested in (e.g. the purpose and the technicalities of the mechanism, financial consequences, time of introduction, possible future adjustments, etc.). This element is also often called **transparency**.
 - (2) **Consultation** with target groups which should be involved as far as possible in the execution of the mechanism.
 - (3) **Progressive implementation** of new mechanisms preceded by an appropriate anticipation period and a timely announcement.
 - b. **Equity.** Different financing mechanisms have different distributive consequences for different interest groups, both within and across generation. For example, in

²¹ In case of tradable permits for pollution control, for example, the firms can pollute as much as before the introduction of pollution permits as long as the pollution they generate stays within the allowable limits. Therefore, there is incentive to reduce pollution control costs but no direct incentive to reduce pollution. This happens because the firm’s profits are not tied as directly to pollution reduction as with pollution taxes, as the permit system is based on a fixed amount of permissible pollution.

situations where common property or open-access resources become less accessible, attention should be paid to those whose traditional rights will be affected. Equity requires that cost burden imposed by a financing mechanism is carefully considered, both for the actors directly affected by the mechanism (e.g. firms) and for the remaining interested parties (e.g. consumers, employees, etc.). In theory, if the environmental objectives are consistent across mechanisms, the equity consequences should also be consistent across mechanisms. Intergenerational equity involves fairness across generations and is important in resource management. For example, a subsidy that encourages depletion of a resource is likely to reduce the amount of resources available for future generation in ways that can be viewed as inequitable. It is important to understand and be explicit about possible intergenerational consequences of policy instruments and the tradeoffs involved.

- c. **Concordance with institutional frameworks** requires that the mechanisms are concordant with the main policy principles, such as Polluter Pays Principle, and to major institutional constructions, such as fiscal policy framework. For example, incentive schemes designed to reduce the amount of negative externalities (e.g. pollution) can be implemented either by taxing or subsidising polluters. Under the Polluter-Pays Principle, polluters should pay the costs of cleanup via taxes, while with the subsidies it is the public that pays polluters to change their behaviour.

Defining the criteria is a crucial part of the MCA. The selected criteria should reflect all the important characteristics of the evaluated alternatives (e.g. which characteristics would distinguish a good alternative from a bad one) and they have to be operational (e.g. is it possible to judge, in practice, how well an option performs on the selected criteria). The criteria should also facilitate the evaluation of the performance of alternatives (e.g. the needed efforts to implement and operate the financial mechanism in a specific country, the effects the financing mechanism has or will have). When selecting the criteria a balance must be found between the completeness of the applied criteria (considering all the important evaluation aspects) and keeping the evaluation task manageable and transparent (the complexity of the evaluation increases with the number of applied criteria). Thus not all the criteria presented in the above list have to be applied.

Once the criteria are selected and tested for completeness, redundancy, operationally, independence, double counting, number, etc., they can be grouped. The main reasons for grouping criteria are: (a) to facilitate the checking whether the selected set of criteria is appropriate, with regard to the evaluation objective; (b) to ease the process of calculating criteria weights in large applications, where it can be helpful to assess weights within groups of related criteria, but also between groups of criteria.

Step 4 Describe the performance of each alternative against the criteria in the performance matrix and determine the score matrix (scoring),

After the criteria were selected, the next step is to identify how the alternatives perform with regard to the established criteria. This process is also known as scoring. However, before the scoring can be performed, all evaluated alternatives should be described, with regards to the selected criteria. These descriptions should be done in a neutral and objective way, not to influence the evaluation process.

Once this description is available, in the next sequence, the score for the performance of each of the alternatives is ascribed. Scoring is the process of judging the performance of an alternative with

regards to the defined criteria. The scoring is done on a selected interval scale. For example from 0 to 100, where 0 represents the lowest level of performance, while 100 the highest. However, very often also simpler and more robust scales are applied.

In principle the scoring reflects the subjective judgment of each user (or group of users) of the MCA. Thus it is recommendable that the MCA includes several users, representing different stakeholder groups, where in the analysis scores from several users (stakeholders) can be combined or compared, in order to come to more robust results.

Step 5 Assign weights to each of the criteria to reflect their relative importance (weighting).

The next step of the evaluation process is the weighting of criteria. This step introduces the relative importance of the criteria, and thus adds another dimension in the evaluation process.

The users involved in a MCA may not only differ in their judgement of the performance on criteria, but also in the relative importance they attach to different criterion. Therefore weights are attached to each criterion. Since the score of an alternative (e.g. financing mechanism) is calculated as the weighted average of its criteria scores (see next step), the weights are crucial in the aggregation of scores (i.e. for assess the performance of single financing mechanisms as whole).

Step 6 Combine the weights and scores for each of the options to derive overall values.

This step involves the calculation procedure, where the performance scores for each criterion are combined with the respective importance weights. The general equation is:

$$S_i = w_1 s_{i1} + w_2 s_{i2} + \dots + w_n s_{in} = \sum_{j=1}^n w_j s_{ij}$$

where s_{ij} is the performance score for alternative i on criterion j , w_j is the weight for criterion j and S_i is the overall score for alternative i (see example in Box 16).

The example in Box 17 illustrates how the weights of the criteria are transformed into relative weights, which sum up to 1. Therefore the user can apply any set of indicators/numbers that represents the relative importance he attaches to the criteria.

Box 17: Example of calculating a total score for a financing mechanism

Assume that for the evaluation of alternative financing mechanisms three evaluation criteria are used. The performance of each criterion can be scored with -1, 0 and +1, while the weights ascribed to the criterion can range between 0 and 2. Further we assume that three users were performing the scoring, ascribing the following scores and weights:

Alternative 1	Person 1		Person 2		Person 3	
	Score	Weight	Score	Weight	Score	Weight
Criterion A	+1	1	0	1	+1	1
Criterion B	0	1	+1	1	-1	0
Criterion C	-1	1	0	2	+1	1
Total score	0		0.25		1	

To calculate the total score per user, the procedure is to multiply the score of a criterion by the weight of that criterion. Then the products for all criteria are summed and divided by the sum of the weights to obtain the total score for that criterion.

For person 1 all criteria are equally important, so all weights are equal to 1 and so the score of the criterion is equal to $1 \times 1 + 0 \times 1 + (-1) \times 1 = 0 / 3 = 0$.

For person 2 criterion C is twice as important as the other criteria. The score of the total score equals $0 \times 1 + 1 \times 1 + (0) \times 2 = 1 / 4 = 0.25$.

Person 3, judges criterion 3 to be three times as important as both other sub-criteria, the score of the criterion equals $1 \times 1 + 0 \times (-1) + 1 \times 1 = -2 / 2 = 1$

Step 7 Analyse the results.

The analysis of the results and comparison between alternatives can be done by comparing the overall scores or by comparing scores on single criterion. Finally, based on the obtained results, recommendations can be made which alternative would be the best (overall) or which performs best on single criterion.

6.4 Empirical example of evaluating selected financing mechanisms in EU Member States

The aim of this part of the study is to give an illustrative example of the use of MCA, by evaluating selected financing mechanisms for forest goods and services applied in the EU Member States, and to provide a structured description of a number of financing mechanisms applied in the field of forestry in the EU Member States.

The evaluation of the mechanisms focuses on their usefulness and problems that might influence the success of their application. However, the possibilities of application and the success of the application of financing mechanisms for non-market forest goods and services will differ between EU Member States, because of differences in their legal, institutional as well as in cultural and social context. For this reason the generalisation of the evaluation results, presented in this section, is not possible.

To accomplish the aims of this task the following steps were conducted:

- collecting information on financing mechanisms applied for forest goods and services in the EU Member States;
- selecting of financing mechanisms for evaluation and selection of evaluation criteria;
- preparing descriptions of the selected financing mechanisms; and
- evaluating of the selected financing mechanisms by the mean of Multi Criteria Analysis.

6.4.1 Collecting information on financing mechanisms applied for forest goods and services in the EU Member States

The study focused on the evaluation of innovative financing mechanisms in the EU Member States. In the frame of the FORVALUE study, an innovative mechanism was defined as a new financing mechanism that has not yet been extensively used for a specific good or service in a certain EU Member State.

The information on cases of innovative financing mechanisms was collected through a questionnaire (for detailed description see chapter 2 and Annex 11). The questionnaire respondents were asked to give examples of innovative mechanisms in their countries, regardless if the mechanism was in the planning stage or already being implemented. The judgment whether a financing mechanism is 'innovative' was based on the respondents' opinion, and thus, what was considered as innovative in one country, may not be considered as such in another.

In total 26 EU Member States replied to the questionnaire, however only 13 Member States sent information about innovative mechanisms. This resulted in a list of 35 innovative mechanisms. The mechanisms covered a wide range of objectives, from compensation for logging operations to compensation for aesthetic enhancement through compensation for personal liability and illustrate the wide variety in forestry practices in Europe (the complete list is presented in Annex 25).

Most cases came from Central (e.g. Austria, Hungary and the Czech Republic) and Western Europe (e.g. Ireland, the United Kingdom and France), while less cases were given from Northern (Finland), Eastern (Poland) and Southern Europe (Cyprus, Spain, Italy Greece) (for further details see Annex 25).

All the reported cases could be classified according to the mechanism type and the non-market forest good or service for which they are applied.

Table 16 presents only mechanisms that are applied for non-market forest goods and services. They are grouped according to the mechanism type and the forest services for which they are applied. It also shows that a balanced number of cases were reported for all 3 categories of mechanisms: private (13 cases), mixed (16 cases) and public (15 cases). However, the number of cases differs significantly according to the forest goods and service for which the mechanisms are applied. There are 27 cases of financing mechanisms applied for biospheric and ecological services, while only 17 for social services and amenities.

Table 16: Categories of reported financing mechanisms and their relation to forest goods and services

Forest goods and services	Financing mechanism		
	Private	Mixed	Public
Biospheric/ecological	Donations (8)	Public-private contract (6, 11, 19, 21, 22, 26, 30, 31)	Taxes, fees, charges (28)
	Land purchase/ lease (7, 27, 35)	Tradable permits none	Subsidies (1, 2, 4, 13, 25, 29, 30, 31, 33)
	Eco-sponsoring (10, 15, 16, 21, 23)	Cap- and-trade schemes none	
	Certification none		
Total	9	8	10
Social/amenity	Donations (5, 23)	Public- private contracts (11, 18, 20, 22, 24, 26, 30, 34)	Taxes , fees , charges (28)

	Land purchase/lease (17)	Tradable permits none	Subsidies (3, 9, 25, 30)
	Eco-sponsoring (32)	Cap- and trade schemes none	
	Certification none		
Total	4	8	5

6.4.2 Selection of the financing mechanisms for the evaluation

After the information on the innovative financing mechanisms was collected and reviewed, a number of cases were selected for the evaluation²². The selection of the financing mechanisms was done by using the following criteria:

- Innovativeness;
- geographical distribution; and
- completeness and availability of information.

The selection included the three main financing mechanism groups (private, mixed and public) considered in this study equally. Even if some types of mechanisms are applied more frequently, the aim of this task is to present the innovative cases of financing mechanisms, which can be considered as alternatives to the well established ones.

Applying these criteria and considerations, 22 cases were selected for the evaluation (all cases marked with * in Annex 25).

6.4.3 Defining criteria and collecting data

To perform the evaluation of the selected cases of financing mechanisms, by means of the Multi Criteria Analysis, the evaluation criteria had to be specified and additional information for the cases had to be collected.

The first step in the evaluation process concerned the definition of criteria to describe the selected cases. The criteria must facilitate the evaluation of the performance of different cases of financing mechanisms. As explained in section 6.2.5, the selection of criteria is an essential step of the evaluation process that should result in a set of criteria, which describe the evaluated financing mechanisms, but also facilitate the evaluation task. Considering the main groups of criteria presented in section 6.2.5 and their relative importance for the purpose of this case study, the following main evaluation aspects and criteria were selected:

- *feasibility* - including criteria on: legal, institutional and social context;
- *applicability* - including criteria on: preparation, technical applicability, transaction costs; and
- *effects of the application* - including criteria on: effectiveness, side effects.

The first evaluation aspect was **feasibility**. Feasibility assesses whether the application of an economic mechanism is possible under the existing legislation and if it is in accordance with the existing political and administrative rules and societal norms. When the application of a certain instrument is not feasible, it has to be determined whether it would be possible to adopt regulations

²² The decision, to limit the evaluation to a number of selected cases, was taken because of time constraints in the study.

and/or to create political and societal support, in order to make the application possible from the legal, political and societal point of view. Another subject concerns the existence of infrastructure to facilitate the economic mechanism, such as the availability of market structures, when the mechanism includes selling of goods or services. Thus, this aspect includes the following criteria (see also Table 17):

- *Legal context*: this criterion concerns the question if application of the financing mechanism is possible in the existing legal context? If not, what legislative modifications have to be made and whether there is willingness to make them? It further enquires what efforts have to be taken to make these modifications and how long does it take to realize them?
- *Institutional context*: assesses the question if a market infrastructure already exists for the application of the financial mechanism? Are there institutions functioning on this (new) market?; Is there an effective organization or private sector to promote the financial mechanism? In the case if it is not, does willingness exists to make the needed modifications in institutional context? What efforts have to be made to make these modifications? How long does it take to realize them?
- *Social context*: looks at whether the application of the instrument is socially acceptable? The main question here concerns the acceptance of a mechanism by the target groups, the implementing body and by the society.

The second aspect, **applicability**, concerns the efforts and/or costs that are related to the practical application of the mechanism. When the efforts and/or the cost of implementation of the mechanism and/or the transaction costs exceed the expected benefits, the concerning mechanism will be considered as having lower potential. This aspect groups the following criteria:

- *Preparation*: before a mechanism can be applied in practice, preparations have to be taken. For the evaluation it should be known what preparations/investments have to be made, what time it takes to make them and what costs are connected with the preparations.
- *Technical applicability*: not all financing mechanisms can be applied in all situations. To evaluate the cases we need to know if the financial mechanisms are technically applicable. For example: when applying an admission fee for forest visits it must be technically possible to collect this fee. When a forest has only one entrance it is rather easy to collect them. When a forest has several entrances it becomes more difficult, or sometimes even impossible.
- *Transaction costs*: are another important criterion for the application of a financing mechanism. The interest is twofold: first, insight is needed on which activities produce transaction costs, and second, the amount of transaction costs. Note that the amount of transaction costs has to be evaluated in the context of the expected profits.

The last aspect deals with the **effects** of the application of a specific mechanism. The application of a mechanism aims at inducing some intended effects, but it may also produce some unintended effects, the so-called side effects, which can be desirable or not. Since these might be significant, they should be included in the evaluation. The selected criteria for this aspect are:

- *Effectiveness*: the question here is does the mechanism do what it is expected to do? This is described by the extent to which the goals are realized and time needed for their realisation.
- *Side effects*: The main question is, are there any (expected or unexpected) side effects from implementation of the economic mechanism and how are these effects judged? How much time does it take before the side effects are noticeable? When side effects are negative; what (extra) measures can be carried out to reduce the negative effects?

In total 8 criterions were used and 34 sub-criteria; an overview is given in Table 17.

After defining the main aspects and criteria, the next step was to collect this detailed information on the performance of the selected financing mechanisms with regard to the evaluation criteria. To collect this information a second questionnaire was developed (see Annex 24) and sent to the corresponding persons, involved in a specific mechanism and its application. In some cases also web search was performed to obtain additional information for the selected cases.

In total, the detailed information for 22 cases of financing mechanism was collected and the description of the main characteristics as well as an assessment of the strengths and weaknesses of these cases is provided in the next section.

Table 17: Hierarchy of sub-criteria, criteria and aspects

Aspect	Criteria	Sub-criteria
Feasibility	Legal context	- is application allowed in the existing legal context?
		- is it feasible to adjust the legal context?
		- which modifications in the context are required?
		- how long does it take to realise the modifications?
	Institutional context	- is there a market structure to facilitate the mechanism?
		- are there institutions functioning in the market?
		- are organisations for promotion available?
		- is there willingness to set up a market infrastructure?
		- are the costs for setting up a market infrastructure?
	Social context	- how long does it take to setup such a market?
		-is it accepted by target groups (beneficiaries and payers)?
		- is it accepted by executor and/or intermediary organisations?
		- is it accepted by society?
- what efforts have to be made to make the instrument accepted?		
Applicability	Preparation	- any preparations/investments that have to be made?
		- any required investments/costs?
		- any required time for preparations?
	Technical applicability	- is the mechanism technical applicable?
		- any technical constraints connected with applying the instrument?
		- possibility to solve technical constraints?
		- what time is necessary for solving technical constraints?
	Transaction cost	- what are the costs for solving technical constraints?
		- which activities have transaction cost?
		- what is the amount of operation costs (related to profits)?
Effects	Effectiveness	- which goals have to be realised?
		- are the intended goals realised?
		- what time was required to realise intended goals?
		- has a market analyses been carried out?
		- potential supply of the good or service?
	Side effects	- potential demand of the good or service?
		- any intended side effects?
		- any unintended side effects?
		- in what period are side effects noticeable?
		- were any measures taken to reduce them?

6.4.4 Description of selected mechanisms

The selection includes 22 cases of financing mechanisms, from 11 EU Member States and covering all main groups of financing mechanisms (private, mixed and public) (for details see Table 18).

Table 18: Selected cases of financing mechanisms- overview by country and mechanism type

Mechanism type	Private	Mixed	Public
Country (number of cases)	Finland (2), Austria (1), UK (1), Spain(1)	Finland (1), Austria (1), UK (1), Spain(1), Hungary (1), Netherland (3), Belgium (1), France (1)	Austria (1), Spain (1), France (1), Cyprus (1), Czech Republic (2), Ireland (1)

Total number	5	10	7
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Private mechanisms

Lease of recreational services (Finland; case 5²³)

1. Type of mechanism, aims and stakeholders

In Finland, 80 % of the land is covered by forests, which are mainly private owned. The mechanism is intended to lead the landowners and other users in trading of recreational values. Within the mechanism, the landowner commits himself to manage the selected forests, for an agreed period of time, so that they would meet the needs of recreation activities.

The Central Union of Agricultural Producers and Forest Owners (MTK) has prepared an operating model for the mechanism, also known as Recreational Value Trading. This operating model can be used by all parties interested in buying or selling of recreational values. The recompense will be determined according to the market and its amount will be agreed by the landowner and the purchaser of the recreational value.

For example, the trade may deal with:

- delaying the final felling of a forest stand for a number of years;
- maintaining a certain species or mixed forest in an particular area;
- keeping a certain area open;
- maintaining the view from a hill;
- maintaining the forest around a hiking or horse-riding routes; and
- establishing beaches and picnic places and maintaining their immediate environment.

2. Information on the aspects

Feasibility: the mechanism fits within the existing legal and institutional context, but it is still in the initial stage and it is still uncertain whether it will be accepted by all involved parties.

Applicability: There were no technical constraints concerning the application of the mechanism. The preparations took one year and the costs were low. There are no transaction costs.

Effects: The primary goal has been achieved in one year and it is expected that the effectiveness will improve with time.

Competitive tendering (Finland; case 7)

1 Type of mechanism, aims and stakeholders

The mechanism was developed to increase biodiversity in privately owned forests by acquiring rare forest habitats for long time conservation. It foresees establishing privately owned nature conservation areas or fixed term conservation. An additional goal is to build a cost- effective conservation network. Environmental authorities invite land owners to submit a tender on structural features and rare forest habitats that need protection. Valuable areas were then purchased by the state (the Finnish Forest and Park Service) or hired for conservation for 20 years.

2 Information on the aspects: strengths and weaknesses

²³ Case numbers coincide with the numbers in Annex 25.

Feasibility: The mechanism was tested in 3 selected areas in 2005. The institutions which play a role in this mechanism already exist. All stakeholders accepted the mechanism, although the fixed term contracts were criticized for not being permanent. Land owners and other involved stakeholders were informed.

Applicability: No technical constraints existed and preparation costs (discussions with stakeholders, a brochure and information to personal of the environmental centers) were not specified. The budget of the whole pilot project was 1million Euro and the staff spent 60-110 days working on the project (different for the 3 areas).

Effect: The results from the pilot project were encouraging; however the mechanism is currently not in use.

BIOSA (Austria; case 15)

1 Type of mechanism, aims and stakeholders

BIOSA is an association of private forest owners, which implements projects aiming at the biodiversity protection. The activities (projects) carried out by the association are supported by companies, as well as public authorities (federal and provincial), and also members who pay membership fees. All involved parties promote the idea of voluntary nature conservation contracts, and the achievement of fair financial compensations for nature conservation services brought by private forest owners. Additional goals of the association are awareness rising, forest education, support of scientific projects, related to biodiversity and close to nature forest management.

The mechanism has a public-private nature and is applied mainly in Styria, Lower Austria and Carinthia.

3 Information on the aspects: strengths and weaknesses

Feasibility: The scheme fits within existing legal, institutional and social context.

Applicability: It took approximately 1 to 1,5 years to set up the association, but afterwards the application of the mechanism went well.

Effect: The effects are positive, especially in terms of awareness rising. No negative side effects are expected.

Scottish Forest Alliance (UK; case 23)

1 Type of mechanism, aims and stakeholders

Scottish Forest Alliance (SFA) is a woodland conservation project that unites British Petroleum (BP), Forestry Commission Scotland, the Woodland Trust Scotland and the Royal Society for the protection of Birds (RSPB) Scotland. Established in 2000 this project is designed for 10 years and aims to create around 10,000 ha of new native woodland at 14 sites across Scotland. These new woodlands will be established through a combination of regeneration and plantation of 7 million trees. This work is being supported by a BP pledge of £10 million over ten years.

An important activity ensuring that each SFA project is successful and can be sustained well into the future is the involvement of local communities and visitors. It is considered even more important

that the individual needs and ideas of people living close to the SFA sites are taken into consideration at the earliest stage.

2 Information on the aspects: strengths and weaknesses

Feasibility: The scheme fits within the Scottish legal framework, for the institutional structure. However, some new structures were required and set up, and the mechanism was accepted by all actors.

Applicability: There were no problems as to the applicability of the mechanism.

Effect: The mechanism generates the intended effect.

Association (Spain; case 32)

1 Type of mechanism, aims and stakeholders

The mechanism is developed to support the forest management. Its additional goal is production of forest goods.

The owner of the forest product is paid by the (private) company that collects the forest product. Supervision and regulation come from the Forest Administration.

2 Information on the aspects: strengths and weaknesses

Feasibility: The changes of existing regulation did not require a lot of time. The regional Forest Administration has been restructured, in order to execute, supervise and regulate the mechanism. All stakeholders accepted the mechanism.

Applicability: technical constraints were solved from case to case. A contract model and a systematic controlling process had to be prepared. This did not take much time.

All costs are low compared to the social benefits.

Effect: The effectiveness is expected to increase, and the mechanism is also extended to preserve the wild life. Positive side effects are the preservation of soil and other environmental values. Negative side effects are unknown, however some negative impacts might occur at the local level, and will be handled case by case.

Mixed mechanisms

Natural values trading (Finland; case 6)

1 Type of mechanism, aims and stakeholders

The mechanism was developed as a pilot project to increase biodiversity in Finnish forests by protecting valuable plots, specified in a fixed term agreement. National government will pay land owners who offer a tender to the regional Forest or Environmental Centre to decide whether the forest area qualifies as a natural conservation area. If the area qualifies and the land owner accepts the compensation offered, a fixed- time agreement (10-20 years) is drawn where the land owner is committed to maintain or improve the specified natural values on the site.

2 Information on the aspects: strengths and weaknesses

Feasibility: This pilot project runs from 2003 to 2007 and the results were encouraging. Small modifications of existing law would be necessary. The regional Forest and Environmental Centres already exist. All stakeholders accepted the mechanism but its fixed term was criticised by conservationist organisations. Land owners and intermediary organisations had to be informed.

Applicability: No technical constraints were discerned. Preparation concerning the staff expertise was required. One expert was involved full-time in the project. The total budget of the pilot project was 400,000 Euros/year. Benefits, in terms of the value of added biodiversity, have not been evaluated.

Effect: The results were encouraging because forest owners offered many plots for trading. The pilot study showed that forest owners are interested, and willing to voluntarily protect and enhance biodiversity. However, the mechanism is currently not in use.

One percent tax donation (Hungary; case 11)

1 Type of mechanism, aims and stakeholders

This mechanism has been developed to increase the quality of forest services. The additional goal is to improve public awareness on forestry and forest public services. Money comes from the tax payers and is distributed by the Forest Authority, acting as an executor of the instrument awarding appropriate applicants.

2 Information on the aspects: strengths and weaknesses

Feasibility: Public services of forests had to be added to the annual national budget act (this took half a year). Afterwards the mechanism fitted well in the national forestry subsidy system. Only additional procedures were required to disseminate and control the use of the funds (it took 1 year to accomplish).

Applicability: As the state administration runs the mechanism parallel with other subsidies, no special efforts are required. Moreover the operation costs are low compared to the revenues.

Effect: Both effects and side effects cannot be assessed, because forest public services were not on the list of tax donations in 2006 and 2007. Revenues can be expected much later.

Compensation (the Netherlands; case 19)

1 Type of mechanism, aims and stakeholders

The mechanism was developed to protect areas and their ecological quality belonging to the National Ecological Network. The initiator of a project or plan has to pay for damaging nature if that project or plan has significant negative effects on the ecological goals of a protected site belonging to the network, and has to be allowed because of having an overriding interest even when no alternatives exist. It is society that benefits from realizing the Ecological Network as a project of national importance. The mechanism is based on the Spatial Planning Law.

2 Information on the aspects: strengths and weaknesses

Feasibility: No law or regulation has to be changed. Intermediary organisations and structure already exist. A controlling system does not exist and information from the field indicates that the mechanism is not always executed in the right way. So the mechanism seems not to be fully accepted.

Applicability: A controlling system is missing and in some cases compensation by land is very expensive. No information on preparation and transaction costs exist.

Effect: In many cases the mechanism is not executed or not in the right way the effectiveness seems to be low.

Extra value of housing prices (the Netherlands; case 20)

1 Type of mechanism, aims and stakeholders

The mechanism was developed to create a green (nature) or blue (water) housing/living area. The additional goal is a contribution to the governmental task to develop nature areas in the national Ecological Main Structure.

The buyers of the houses near the created sites and the planning bureau initiating the housing project will compensate the investor of the nature development project and other involved stakeholders for their costs. The beneficiaries (project initiators) can be private companies as well as public organizations (government, NGOs). The buyers of the houses also benefit from the natural/green environment.

2 Information on the aspects: strengths and weaknesses

Feasibility: A feasibility study was carried out on the expected environmental effects and positive results of the project are expected. There were no legal constraints.

Few years of planning, consultancy and discussion were needed to implement the mechanism using the experiences from a previous successful project. The various groups of stakeholders accepted the housing project.

An Environmental Impact Assessment was necessary and a public relations campaign was carried out.

The project was only feasible by compensating farmers for the land they had to sell.

Applicability: The main technical constraint was the regulation of groundwater table that was solved by creating a lake (600 ha) in a former agricultural area. The costs of this “solution” (expected to be a several million EUR) and those related to the creation of “new nature” (500 ha) will be covered by the benefits of higher values of houses.

It took several years to promote the project and to create awareness of the benefits. Consulting, planning and discussion also created costs. However, net positive benefits are expected.

Effect: A full realisation of the project is expected within 25 years.

A side effect is the disappearance of farmland area.

Include Drinking water supply companies (the Netherlands; case 21)

1 Type of mechanism, aims and stakeholders

This financing mechanism has been developed to improve the water quality of a small river system, by limiting agricultural activities in a buffer zone along the river. The additional goal was to collect information about the effects of using of such buffer zones on the cleaning costs of the drinking water supply (e.g. buffer zones lower the cleaning costs). If it could be proved that the established buffer zones increase the quality of water and thereby lowering the cleaning costs of water, this could attract water supply companies to finance the project.

The government should then establish Water boards to charge for the service to water companies and to pay the costs of the project.

2 Information on the aspects: strengths and weaknesses

Feasibility: A feasibility study has been carried out and it was concluded that the mechanism was not feasible.

Applicability: not relevant

Effect: not relevant

Rural Development Contracts Rural Priorities (Scotland/UK; case 22)

1 Type of mechanism, aims and stakeholders

This mechanism has been developed to stimulate a broad range of rural development activities which would bring economic, environmental and social benefits to the people of Scotland. The additional goal is to distribute Pillar 2 rural Development Plan funding according to the requirements of EC law. Money comes from EU and the national government. It is the landowner/occupier who applies for competitive funding. After a regional selection process for the applications of the highest quality, the owner/occupier delivers outputs in return for a contribution to costs. All actions funded by this grant scheme require compliance with domestic and international law, for example the protection of endangered species.

2 Information on the aspects: strengths and weaknesses

Feasibility: A feasibility study was not carried out in advance; however the scheme is based on experience in running comparable grant schemes which have now been integrated.

Applicability: The main technical constraints are related to fitting technical detail of activities into the specific requirements of the Rural Development Regulation. Preparation costs are related to the development of a new IT system, staff and applicant trainings, guidance and the setting up of a new registration system. These costs are not quantified but could be at least 4 million GBP for the IT system. All costs are estimated to be small compared to the potential 150 million GBP in grant aid to deliver to forest owners.

Acceptance has been easier to achieve in the more senior staff roles compared with customer facing staff in local offices who faced with some radical changes. Indications are that external stakeholders view the new integrated and competitive approach to rural development funding as a positive initiative resulting in a better use of public funds. For implementation of the scheme training material, seminars and press briefings were delivered.

Effect: It is too early to conclude on the effects, but indications suggest that applications from forestry business are starting to appear in sufficient numbers and across a range of rural development activities. Large improvements in effectiveness are expected in the course of next 12 months.

Main intended side effect is that applicants take responsibility for describing their proposals in terms of contribution to Scottish Governments priority outcomes for rural development instead of in terms of outputs. A negative side effect, which however is monitored, would be a decrease of the number of applications because of the complexity of the grant scheme application process and the relative

unattractiveness of payment rates. To reduce this side effect, program modifications will be submitted to EC to address issues such as standard costs which do not reflect recent input cost increase.

Main transaction costs are related to staff salaries (case officers, advisors, and regional committees), the IT system and communications.

Insurance for personal liability (Belgium; case 24)

1 Type of mechanism, aims and stakeholders

This (mixed) mechanism has been developed for encouraging forest owners giving access to their forests. When a material damage or physical injury occurs in the forest, the owner contacts the Forest Office that will contact the insurance company. The Regional Government of Wallonia pays the insurance company.

2 Information on the aspects: strengths and weaknesses

Feasibility: Before implementing the mechanism the forest damages were analysed. The mechanism was based on the already existing Forest Code. The needed institutions were already in place. The most important stakeholders (regional government, insurance company and forest owners) accepted the mechanism, after the owners were informed by their Forest Society. The public was informed by press.

Applicability: The main technical constraints were fences, paths and signals.

Transaction costs are zero because the mechanism works only in forests with free access.

Effect: Effects are expected to be good, however the mechanism has not yet been implemented, so the effectiveness depends on the original prognosis.

Private contract for water (France; case 26)

1 Type of mechanism, aims and stakeholders

This mixed mechanism has been developed to protect drinking water resources.

Recreation has been seen as an additional goal.

The National Forest Office will be paid by the Saint-Etienne municipality of and drinking water company for regular surveillance of harvesting activities nearby water pipes and of recreation. Furthermore, they program the maintenance work of the pipes and clean (deforest) the area above the water pipes.

2 Information on the aspects: strengths and weaknesses

Feasibility: The formal rule of fencing of protected area just above water catchment points had to be changed for this case. This change lasted about 2 years. The institutional context existed before the payments started.

A feasibility study has not been carried out. This was not necessary because the municipality of Saint Etienne was both the owner of the forest and of the water supply system.

Applicability: The only technical constraint is that crossings for harvesting above the drainage pipes are forbidden. Possible costs were not estimated. Preparations were necessary in terms of exchanges between foresters and water supply managers, which take several years. Transaction costs were calculated about 22,000,- euro/year for surveillance of harvesting activities and of recreation nearby drainage points, for deforesting just above the water pipes and programming the maintenance work.

Effect: Effects are positive because the primary goals are reached (good drinking water quality, no accidents since the beginning of the contract).

A positive side effect is that the good forest practices are also applied by private forest owners nearby.

Patronage (Spain; case 30)

1 Type of mechanism, aims and stakeholders

This mechanism was developed to support forest management. Its additional goal is to guarantee forest goods productions.

A private foundation, government or person (e.g. ecologist) pays the executor of the mechanism (private company, ecologist organizations or foundations) and they in turn pay the beneficiary (land owner, community association).

The mechanism can be applied in all protected forests (e.g. in National and Natural Parks)

2 Information on the aspects: strengths and weaknesses

Feasibility: It has to be implemented by changing the Forest law which will take about 10 months. Supervision and regulation come from the Forest Administration.

Applicability: Technical constraints were solved case by case. A contract model and a systematic controlling process had to be prepared. This did not take much time.

All costs are low compared to the social benefits.

Effect: The effectiveness is assumed to increase, and the mechanism is now extended to preserve wildlife.

Positive side effects are the preservation of soil and other environmental values.

Negative side effects are unknown, however are assumed to occur at the local level and will be handled case by case.

Mountain biking (Austria; case 34)

1 Type of mechanism, aims and stakeholders

In this public-private mechanism land owners benefit from the development of mountain biking trails by the province of Tyrol which, together with local tourist boards remunerates the land owner. The goal of the mechanism is to reach a consensus on mountain biking between land owners and tourist boards in Austria, where biking on forest roads in principle is not allowed but where the law has been modified so that land owners may open up their forest roads for biking. The local

government provides signs that show the directions and the degree of difficulty of the trail. The mechanism also reduces the risk of liability for land owners and has positive effects on tourism.

The land owner and the local tourist board or local community sign a contract, which allow mountain biking on specific roads, which are then subsidized. A feasibility study in 1995 has shown that there was an urgent need for mountain bike roads in Tyrol and e that 3000 – 5000 km are suitable for mountain biking.

2 Information on the aspects: strengths and weaknesses

Feasibility: The scheme fits within the legal, the institutional and the social context.

Applicability: The preparation and the cost of the mechanism takes some time and cost but in general the application is positive.

Effect: The mechanism is effective but a small number of bikers still use illegal routes.

Public mechanisms

Forest Environment and Natura2000 Payments measures of the rural development program (Cyprus; case 1)

1 Type of mechanism, aims and stakeholders

This public mechanism has been developed to protect biodiversity and has the additional goals to protect soil and water resources. It can be used in protected forests either Natura2000 or not. National government pays forest owners or their associations protecting high value habitat types. The payments are under the responsibility of the Department of Forests.

2 Information on the aspects: strengths and weaknesses

Feasibility: This public mechanism is based on existing law and regulations (Rural Development Programme) that had to be adapted to the mechanism.

No studies have been carried out on the possible effects of the mechanism.

Information and publication were used to inform the forest owners.

Applicability: The most important preparation measure was the internal training of staff. The main operation costs were staff salaries related to actions such as execution of the payments, approval, checks and management of applications. The transaction costs are expected to be lower than possible benefits.

Effect: Effects are expected to be good; however, the mechanism has not yet been implemented, so the effectiveness concerns a prognosis.

Financial compensations for forest management restrictions (Czech Republic; case 2)

1 Type of mechanism, aims and stakeholders

This public mechanism has been developed to compensate forest owners and leaseholders on the forest management restrictions to their land. It has the additional goal of changing the characteristics

of the forest, from commercial forests to 'closer-to- nature forests. Examples of management measures are: leaving certain parts of the forest to spontaneous growth and changing the tree species composition. A condition is that the forest (land) has to be protected. The money comes from state budget and the Ministry of Environment decides on applications of the owners/leaseholders. The amount of compensation depends on the kind of restriction, the value of the forest stand and productivity of the site.

2 Information on the aspects: strengths and weaknesses

Feasibility: A feasibility study has not been executed in advance. Some modifications of existing formal regulations were required.

Applicability: **no information**

Effect: Not many subsidies were paid, but there is no information about the success or failure of the assigned subsidies.

Forest Environmenty: Non productive Investments in forests (Czech Republic; case 3)

1 Type of mechanism, aims and stakeholders

This public mechanism (subsidies) has been developed to increase the social value of forests by protection of biodiversity and stimulating recreation, tourism and aesthetic services.

By building a suitable infrastructure for forest visitors the additional goal is their regulation and the decrease of possible negative effects on the forest ecosystem.

Forest visitors have indirectly benefited from the protected values, however the financial benefits go to forest owners or forest associations. Single payments are for them and they are based on a project proposal that has to be approved by the State Agricultural Intervention Fund. A project will last for at least 5 years and the payment conditions have to be fulfilled by the owner.

Regional offices of the State Agricultural Intervention Fund carry out the payments that are based on the Rural Development Programme (2007- 2013) that is EU co-financed.

2 Information on the aspects: strengths and weaknesses

Feasibility: A new regulation has to be established making the mechanism possible. Further institutional changes were not necessary. The executing State Agricultural Intervention Fund already existed.

Based on an information campaign the mechanism was accepted by the beneficiaries. Proposals were sent since the regulations were accepted, although, not at the expected level and it seems that an additional information campaign is necessary.

A feasibility study has been carried out on the absorption capacity of the forests during the preparation of the Rural Development Plan.

Applicability: Main preparation costs were related to the training of staff of the State Agricultural Intervention Fund.

Other transaction costs are difficult to estimate because administration of the measure is executed by the same staff and part of the overall package of forestry measures within the Rural Development programme.

Effect: The mechanism is at the beginning of its implementation. The first call for proposals has been finished. However, it is expected that the mechanism will have positive effects in the future.

NeighbourWood Scheme (Ireland; case 9).

1 Type of mechanism, aims and stakeholders

It concerns subsidies by the national government in order to stimulate recreation by the enhancement of existing woodland, the establishment of new woodland, and the installation of appropriate recreational facilities. This *public mechanism* is under the responsibility of the Forest Service (the Forest Authority), who published grant conditions and a grant manual explaining the scheme's criteria, terms & conditions, procedures, standards, etc. Under the scheme, the funds are paid to the landowner. This is normally a Local Authority (local government), who develops the project in partnership with the local community, community groups, eNGOs, etc. Private landowners can also apply, subject to conditions regarding access.

The primary goal is to develop existing and new amenity woodlands close to where people live, for daily use in general recreational activities (e.g. strolls, dog-walking, family visits, picnics, fitness training, school visits). Additional goals are the promotion of public health and well-being, the encouragement of local community engagement and participation in local projects and the promotion of the use of woodlands as outdoor classrooms by local schools.

2 Information on the aspects: strengths and weaknesses

Feasibility: The scheme fits within the existing legal, constitutional and social context.

Applicability: The development of the initial version of the scheme launched in 2001 took approximately 1.5 years to complete. The recent revision of the scheme took place over a 1-year period. But, the corresponding costs were not significant. The operational costs can be deemed to be minimal compared to the benefits of the mechanism. It is true that the cost per unit area tends to be high due to the complexity of the projects, the level of consultation required, and the nature of the practical work involved; but, non-timber benefits from these projects are arguably higher.

Effect: A wide network of projects involving 'close-to-home' woodland amenities have received funding under the NeighbourWood Scheme. Each represents a woodland amenity designed and managed for local recreational use, realizing the intended benefits. However, some Local Authorities have not been highly motivated in applying the scheme, leading to a lower number of projects in some areas of the country. Reasons for this are varied, e.g. the lack of in-house professional experience regarding woodland development. One positive side-effect that has emerged is the positive publicity generated by "Neighbourwoods" regarding general forest activity in the area. Neighbourwoods often becomes a "flagship" for forest activity in the area, encouraging a positive local perception and support, and raising the profile of those foresters and forestry companies involved. One negative side-effect is the occurrence of abuse within the woodland, following the opening-up of access, e.g. illegal dumping in newly-created car parks.

Water Agencies (France; case 28)

1 *Type of mechanism, aims and stakeholders*

This public mechanism (taxes) has been developed to give a financial incentive to all economic sectors abstracting water and/or discharging waste waters. It follows from the 'Polluters and Users Pay Principle'. It has the additional goal of collecting money earmarked to subsidy water protection projects.

Municipalities, industrial units, farmers, owners associations or other forms of collective action can become a beneficiary of the mechanism and are paid by Water agencies which are financed by taxes on water use. The water agencies collect fees through a system based on measure or assessment of waste water discharge.

2 *Information on the aspects: strengths and weaknesses*

Feasibility: a study was carried out on waste water discharge. It took a long time (40 years) before existing and new law provided the legal status to the fees collected by the water agencies.

The mechanism fits into the existing institutional context of water agencies boarded by a Basin Committee (state service, local authorities and users).

Applicability: no information

Effect: no information

Co-property (Spain; case 31)

1 *Type of mechanism, aims and stakeholders*

By sharing the forest ownership with others, the owner will be able to keep, support and improve the forest. Co-owners may be citizens, private organizations or the Government. The mechanism is implemented by the Government of the Castilla-La Mancha Region.

2 *Information on the aspects: strengths and weaknesses*

Feasibility: Although the legal context did not exist, this was not a problem. Although the institutional context was basically present, additional personal had to be hired.

Applicability: In principle the mechanism is applicable.

Effect: Effects are to be expected in the long term.

ISDW- Initiative Protection by Forests (Austria; case 33)

1 *Type of mechanism, aims and stakeholders*

The mechanism has been developed to optimize the object-protective effects of forests, and has started in 2008. The additional goals are: enhanced motivation for the management of forests with an object-protective function by means of a fair and performance-based compensation, in terms of the Mountain Forest Protocol of the Alpine Convention. Further goals include: subsidies for improve their protective function; information tool for the protection forest policy (own homepage www.isdw.at with database); database for research in the field of forest protection.

The executor of the mechanism is the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management and the administrations of the 9 federal provinces. The

executors have developed the mechanism in cooperation with experts of the Forest Engineering Service in Torrent and Avalanche Control and the Federal Research and Training Centre for Forests, Natural Hazards and Landscapes. The mechanism works by means of District Framework Plans that are prepared by the Provincial Forest Services; such plans have to be updated annually and to be approved by the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management. The plans are developed by authorized forest managers or foresters, commissioned by applicants for a subsidy and have to be submitted to the competent institutions as provided by the Austrian Rural Development Plan (2007- 2013). So, land owners and the community are the beneficiaries, while EC and the government pay for the mechanism.

2 Information on the aspects: strengths and weaknesses

Feasibility: A feasibility study has been carried out, focusing on the evaluation of subsidies. As a result, the protective functions of forests can be calculated and displayed. The mechanism is based on the Austrian Program for the Rural Development.

Special regulations were implemented. A new institutional structure was not necessary to implement the mechanism. Since ISDW is strongly linked to the Austrian Forest Dialog the evaluation will be part of this process. The mechanism is accepted by all stakeholders and the first estimations predict that annual demand will achieve 6 million EUR. Meetings with landowners were organized. Information on the implementation of the mechanism was distributed through brochures, the homepage and handbooks.

Applicability: technical constraints consisted of data- processing, coordination of the ISDW program with conveying prerequisites and the design of the homepage

It took 3 years and about 50,000 Euros to solve the technical problems. Staff costs are estimated to be about 250,000 Euro. All costs are low compared to the annual subsidy budget of 6 million Euro per year.

Instructions and a brochure for forest managers and foresters have to be prepared. These preparations took 3 days, with 51 people currently especially trained for planning detailed projects. Extern costs are low (less than 1000 EUR). Since ISDW is part of the daily work of the administrative body, so there are no extra calculated costs for administration. Approval of the District Framework Plans is estimated about 100,000 Euro per year. All costs are very low to low compared to the benefits.

Effect: All District Framework Plans are approved and ISDW is now running for its first year. The total number of detailed projects is not known yet. The effectiveness differs between the provinces and is on a high level, but could be raised.

A pilot year and 3 years of development are expected. The effectiveness could be improved, although this depends on the interest of the land owners and the cooperation between all partners and the Provincial Forests' Services.

The analysis will show concrete results. Any unintended side effects that went noticed in this first year, but may eventually show up after the first two years. It is expected to reduce possible side effects by evaluation and information. Side effects are due to the continuous improvement of the database for forest policy and research and the development of modern inventory methods.

6.4.5 Evaluation of the selected cases

The evaluation procedure consists of three steps:

- scoring the performance of financing mechanisms;
- weighting of the criteria; and
- analysis of the results.

In total, only 11 cases were included into the evaluation procedure. Information for the reminding didn't provide enough details to be included. For the purpose of the scoring and weighting, the descriptions of the cases had to be put into a uniform format (see Annex 26).

As already explained in step 4, section 6.3, scoring is a procedure of evaluates the performance of a financing mechanism for the defined criteria. The scoring is done on a selected interval scale. In this case the provided information about the financing mechanisms was rather general; therefore a simple three level scale was used. The scale distinguished between the following scores: positive judgement (+1), indifferent (0) and negative judgement (-1). The scoring reflects a subjective (personal) judgment of each of the evaluators.

The weighting refers to the relative importance of each of the evaluation aspects and criteria (for a complete list of aspects and criteria see Table 17). These weights are crucial in the aggregation of criteria and aspects scores into the score for the case as whole (see also the explanation of step 6 in section 6.3).

In the FORVALUE study the weights that could have been applied ranged from 0 to 2. Where 0 indicates that a criterion is not important at all, 1 expresses an equal importance and 2 that a criterion is twice as important.

The weighting was done separately for the criterion and aspect levels. When ascribing the respective weights to the criteria, their importance was only evaluated within the frame of the aspect, while the criteria in other aspects were not taken into account. The latter are considered when weighting the importance of the aspects level.

The scoring and the weighting were done by members of the Standing Forestry Committee Working Group on Valuation and Compensation Methods of Non-Wood Forest Goods and Services and by members of the project consortia (for a more detailed list see Annex 26).

6.4.6 Evaluation results

The results of the MCA evaluation provide information about two issues; (i) the importance of evaluation aspects and criteria; and (ii) the performance of the cases with respect to the given criteria. The first reflects which evaluation aspects and criteria are most likely to influence the selection of the mechanism; while the second reflects on the actual performances of the mechanisms concerning the given evaluation criteria/aspects.

The importance of evaluation aspects and criteria

The importance of evaluation aspects and criteria is based on the weighting exercise. The average weight of evaluation aspects and criteria, reflecting their importance, are presented in the (Table 19).

Table 19 indicates that, at the aspect level, applicability of the mechanisms is thought to be the most important, followed by feasibility, while effects was ascribed the lowest importance.

Table 19: Relative importance of the evaluation aspects and criteria

aspect	criterion	relative weights	
		aspect	criterion
Feasibility		0.322	
	Legal context		0.281
	Institutional context		0.322
	Social context		0.397
Applicability		0.364	
	Technical applicability		0.389
	Preparation		0.264
	Transaction cost		0.347
Effect		0.314	
	Effectiveness		0.556
	Side effects		0.444

Comparing the importance of single criterion should be done within different evaluation aspects. Social context (reflecting the social acceptability of the mechanism) is considered to be the most important within the aspect of feasibility, followed by the institutional and legal contexts. Within the aspect of applicability, the technical applicability was scored as the most important, followed by the transaction costs and preparation. Finally, with regards to the effects, the effectiveness of the mechanisms is considered to be more important than the possible side effects.

Following these results, it can be concluded that financing mechanisms that have high social acceptance and are technically applicable are particularly favoured by the members of the evaluation group.

The evaluation of the cases of financing mechanisms

Figure 20 summarises the performance of different cases in respect to different evaluation aspects as assigned by the members of the evaluation group.

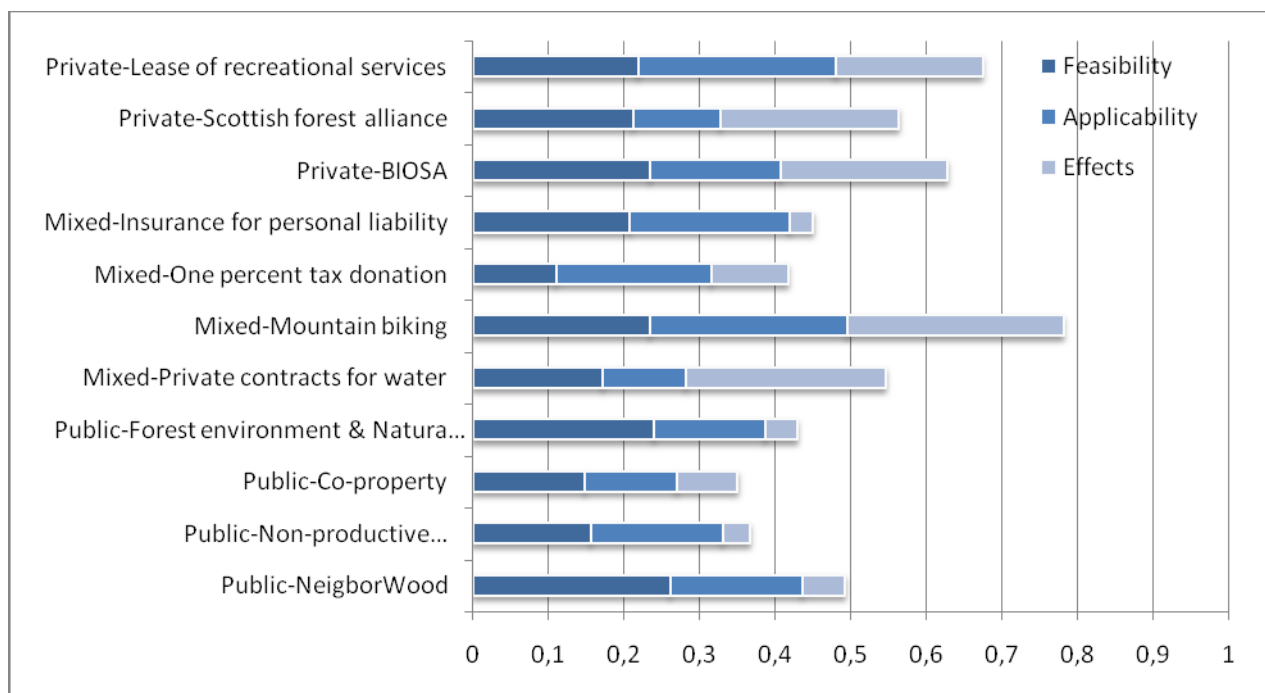


Figure 20: Comparison of cases by the scores for the aspects

The total length of the bars indicates how well a financing mechanism is performing with respect to the evaluation scores. The segments of the bars indicate the contribution of the evaluated aspects (feasibility, applicability and effects) to the total score.

It should be noted that the total score is the average of the three aspect scores (feasibility, applicability and effects) so the length of the ‘coloured’ bar is equal to the aspect score multiplied by its relative weight (for weights see Table 19).

Figure 20 shows that all cases have a good, positive score for the aspect of **feasibility**, although there are differences between the cases, in terms of the efforts required for realising the adequate legal context and institutional context. However, differences between the cases are too small to make any conclusions about the preferences for a type of financing mechanisms.

The importance of the social context is indicated by the relative weights and the evaluation (scoring) of this criterion. The base for scoring and weighting was information about the acceptance of the mechanism by different groups of stakeholders (e.g. beneficiaries, payers, executor and/or intermediary organisations and the society). However, the collected information shows that in some cases, although the mechanism is accepted, not all stakeholders have applied it.

Possible reasons for this could be insufficient information and inadequate communication between different stakeholders, as both affect the effectiveness of the financing mechanisms in a negative way. This illustrates the importance of stakeholders’ involvement and participation.

The differences in the **applicability** between different groups of mechanisms are too small to draw any conclusions. However, the applicability of the mixed mechanisms seems to be a bit higher, when compared to the public mechanisms. Collected information indicate that all types of preparatory actions, such as training (education), development of procedures and format of requests, have a negative effect on this aspect.

Finally, regarding the aspect **effect**, Figure 20 shows that there are no negative effects. However, effects of the public mechanisms are assumed to be low. This is caused by the fact that three of these financing mechanisms were implemented not long enough to estimate or know their effects.

Comparing the eleven cases it can be concluded that cases that are implemented for long enough show positive effects, while no conclusion can be made on which type of mechanisms is more effective.

A more detailed presentation of the results is given in Annex 26.

6.5 Concluding remarks on the evaluation criteria for financing mechanisms

The main purpose of this chapter was to present a rational procedure and a possible set of criteria for the evaluation of financing mechanisms, and to give structured, brief descriptions of a number of financing mechanisms applied for non-market forest goods and services in the EU Member States.

The selection of the most adequate financing mechanism is just the last step in the whole procedure of the design of a compensation scheme. Before the actual evaluation and selection can be done, the needs and objectives of the implementation of a financing mechanism must be defined, as well identifying the main beneficiaries and providers, and estimating the social benefits of the implementation of the mechanism.

It is important to note, that the estimated value of the societies' benefits, is not equivalent to the compensation payment that would be paid to the provider of non-market forest goods/services (e.g. forest owner). The estimated value should instead be taken as an indicator of the generated social welfare, due to the availability of certain forest goods/services. On the contrary, the compensation payment should be negotiated between the providers and beneficiaries, and would be based on the foregone income or additional costs for the provider, as a result of the provision of the non-market forest goods and services.

The rest of the chapter was dedicated to the evaluation of financing mechanisms. The Multi Criteria Analysis (MCA) was presented and applied to evaluate strengths and weaknesses of a number of selected financing mechanisms. MCA was chosen because it is based on a clear procedure and well-defined criteria, which enables the evaluation of the strengths and weaknesses of the financing mechanisms, and takes into account different types of information (qualitative and quantitative) and the opinion of different stakeholder groups (e.g. forest owners, decision makers, users).

The main objectives of the application of the MCA, on a number of selected financing mechanisms used in the EU Member States, were: (i) to give detailed information on a number of applications of different financing mechanisms in the EU, and (ii) to illustrate which aspects may be relevant for the successful application of financing mechanisms. Although, the results from the MCA shall not be misinterpreted as a comprehensive evaluation of abstract alternatives – any political decision would have to be based on their own definition of criteria, weights and values. It could, however, follow the same procedure.

The case analysis showed that feasibility is an important aspect, which is illustrated by the need for an adequate legal context (existing regulations) and an established institutional structure. In addition, social acceptance, which can be enhanced by good communication based on adequate information, plays a key role in improving the feasibility of the payment mechanisms. It is important

to note that the conditions related to social acceptance differ strongly between the EU Member States, which affects the successful application of the analyzed mechanisms.

In addition, applicability (preparation, technical applicability, and transaction costs) influences the potential success of applying the mechanisms. Collected information shows that all types of preparatory actions, such as training (education), development of procedures and design of the application procedures, could be improved.

In terms of the effectiveness of the mechanisms, it can be concluded that there is a remarkable variation. Although the three categories of mechanisms show positive scores, the detailed information demonstrates the importance of stakeholder involvement. For public mechanisms the stakeholders' motivation and involvement is often weak or missing, while it is higher in the case of private mechanisms.

Another important result of the Multi Criteria Analysis is that there are no simple recipes or no superior financing mechanisms – in principle, different mechanisms may be chosen alternatively and the success of its implementation strongly depends on the concrete political-institutional setting as well as their correct application. This implies that a successful application of mechanisms in other countries could hardly be taken for granted but would have to follow a mutual learning process among all stakeholders (public and private).

7. CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

7.1.1 Forest goods and services

Different schemes exist to classify forest goods and services, which one is applied depends on the objectives of the classification

There are many possible ways to classify forest goods and services, depending on the goals and needs of the user of the classification scheme. With regards to the implementation of financing mechanisms it seems adequate to use schemes that provide information about the economic nature of the forest goods and services (e.g. market/non-market, public/private). Classification schemes are compatible, and thus combining them could be a good solution for the purposes of policy and decision making.

Non-market forest goods and services are considered as important and their importance is expected to further increase

According to the expert opinion, non-market forest goods and services have a high level of importance in all parts of the EU. The relative importance of these goods and services was highlighted in some of the southern EU Member States.

The experts also expect that the importance of the majority of non-market forest goods and services is going to further increase in the future.

Biodiversity protection, recreation and tourism, carbon sequestration, watershed services are considered as the most important non-market forest goods and services at the EU level

From the pool of non-market goods, *biodiversity protection, recreation and tourism, carbon sequestration, and watershed services (water regulation and purification, and soil protection)* are especially important.

The importance of forest goods and services might vary between different stakeholder groups and with scale

Different stakeholder groups are likely to differ in their opinion, as to which forest goods and services are the most important. For example, forest owners might ascribe higher importance to income generating market goods and services (e.g. timber, fuel-wood, hunting), while the general public might rank higher non-market forest goods and services (e.g. recreation, watershed management).

Population groups at different scales might also have different preferences. At the local level those goods and services that can be directly or indirectly enjoyed (e.g. recreation, watershed services, aesthetics) yield more importance, while at the countrywide or international (EU) level forest goods and services with a “global character” might be more important (e.g. carbon sequestration, biodiversity protection).

Access to non-market forest goods and services is mainly unrestricted and free

Even though, more than 60% of forests in the EU Member States are privately owned, the access and use of the majority of goods and services is unrestricted and free for the public. The only exception

are market forest goods and services (i.e. timber, fuel wood, hunting), where the access is in general granted only to the forest owner or the permit holder.

7.1.2 Valuation and values of non-market goods and services

The Total Economic Value framework is widely used for the valuation of forest goods and services

The wide range of benefits that forests provide to society requires a coherent analytical framework. In recent years, the concept of the Total Economic Value has been widely used to quantify the full value of the different forest goods and services.

Valuation of non-market goods always looks at the value of a small (marginal) change

Economic valuation methods always attempt to elicit the monetary value of a certain change in the quantity and/or quality of the environmental goods and services (e.g. having access to a forest for recreation activities or not having it). The changes are always considered as being small (marginal), since big changes in the quantity or quality of a certain forest good or service might provoke other impacts, which would not be included in the valuation of the respective good.

Revealed preference methods are based on actual market behaviour, but limited in application

The advantage of revealed preference methods is that they are based on actual market behaviour; however, their applicability is limited only to a few forest goods and services (market goods and services, recreation, tourism and amenities).

Stated preference methods are complex, but applicable to all types of goods and services

The stated preference methods are applicable to all types of market forest goods and services and also enable the estimation of non-use values. Their main disadvantages are that they are based on hypothetical situations, their application is complex, requiring expert knowledge, and time consuming.

When time and resources are limited, benefit transfer techniques can be applied to derive values

The benefit transfer method estimates economic values for forest goods and services by transferring available information from studies already completed in another location and/or context. The use of this method is less costly than other valuation methods; however it is still relatively new, and thus no widely accepted standards for its application have been adopted yet.

Valuation methods give reliable results when applied properly

The methodology and knowledge on non-market valuation methods have improved considerably, enabling sound estimation of economic values of all types of forest goods and services. However they should be applied taking into consideration the good practice standards and their strengths and limitations.

Economic values of non-market forest goods and services, estimated in different contexts should not be directly compared

One of the limitations of these methods is that, in general, they do not allow direct comparison of economic values estimated in different studies, or the use of the estimated values to express the relative economic importance of different forest goods and services. The limitation results from differences in valuation objectives, methods applied, data accuracy, considered target populations, value units (e.g. value per visit, value per year, value per tonne of carbon).

It should be noted, that this could be improved by the application of wide scale valuation studies on the EU level, applying the same valuation context and methodology.

The estimated values should not be used for defining the price of the valued good or service

The estimated values for a certain non-market forest good or service reflect the benefits perceived by the society. However, the estimated value cannot be directly used to determine the amount of compensation that should be paid to the provider of a non-market forest good or service. The amount of compensation is subject to negotiation between the provider and the beneficiaries. In general it should be based on the forgone income or additional costs that the provider has to bear due to the provision of the non-market good/service. In this respect, there is a considerable lack of information about the costs of the provision of non-market forest goods and services, which in the past were only based upon income lost due to, for example, decreased timber harvest.

There is considerable lack of standards and data on the estimation of costs of the provision of non-market goods and services

There is considerable lack of information about the real costs for the provision of non-market forest goods and services. In the past those were only based upon the lost income because of limitations in timber harvesting, while other aspects were neglected.

Values are available for a limited number non-market forest goods and services and only in some EU Member States

In general, non-market forest goods and services that have attracted wider public and/or political attention or those which have been easier to value (e.g the relation between the valued good or service and the forest condition is easier to establish) have been subject to more valuation studies. In this context, forest recreation and tourism as well as the conservation of certain species or habitats (biodiversity protection) have received much attention, and a vast number of studies on these topics are evidence of this.

Also the geographical distribution of valuation studies is uneven. Most data is available for the western and Nordic countries, while there is lack of data in the eastern EU Member States.

7.1.3 Financing mechanisms

Taxes and subsidies are the most popular financing mechanisms used in the EU

Taxes and subsidies are the most frequently used financing instruments for non-market forest goods and services in EU Member States. Public-private contracts, trade of forest goods and services, eco-sponsoring and certification are also in use. The other financing mechanisms, i.e. tradable permits, land purchase, land lease and donations, are found only in some countries.

- ***Taxes, fees and charges:*** Taxes on natural resources are often used in European countries but not always re-invested in forest management. They occur in two forms, i) as eco-taxes which feed into funds for forest management, and ii) as land tax exemptions that are connected with land use restrictions, e.g. in protected areas. Both are interesting options for many social benefits of forests, if the conditions for tax exemptions and the use of funds are clearly specified. (Conservation banks are a specific form of a tax which employs market mechanisms; see under: tradable permits).
- ***Subsidies:*** This policy instrument is the most important financing mechanism in all countries, particularly for services. Subsidies are typically provided for multifunctional or close to nature forest management. The efficiency of subsidies may vary considerably: Pure subsidies are simple

to apply and they are not expensive because when working as incentives they do not need to cover the whole cost of the desired service. The practical efficiency, however, is often compromised because of a rent-seeking behaviour of public and private actors. The efficient distribution strongly depends on clear requirements and procedures.

- **Public-private contracts:** This form of distributing public funds steadily gains importance for various forest ecosystem services including biodiversity conservation, prevention of natural hazards, drinking water protection, recreational benefits, etc. Particularly interesting forms are: i) project-based bottom-up approaches such as under the LIFE and LEADER programmes; and ii) the use of tendering systems for the distribution of the public funds. A tendering scheme which includes tendering mechanisms for land purchase and conservation contracts was recently developed in course of the Finnish METSO programme. A limit for the application of this mechanism is set by limited public funds but it shows that available funds from the EU Rural Development Programmes are relatively rarely used for non-marketed forest goods and services.
- **Tradable permits:** This financing mechanism is a very recent development and promises efficient resource allocation. A growing number of cases are documented and authors expect a strong rise in importance. It is mostly connected with emissions trading (carbon offsets) but is in a few cases also used for other applications. Conservation banks are specific structures for biodiversity conservation that are found in a number of countries: they follow the polluter-pays principle and use market mechanisms for flexible and efficient investments.
- **Purchase of goods and services:** This mechanism is an important category that depends strongly on the innovation and marketing activities of land owners. In the field of forest goods, marketing could be further developed with better organisation of the whole value chains. A future challenge is the fact that rising labour costs may make the further exploitation of many forest fruits unprofitable. Experts see considerable opportunities in the field of bio-refineries: new specialty chemicals such as for the chemical or cosmetics industry may be extracted from different parts of trees or other forest plants; however, they are yet to be developed. With regard to the marketing of services many possibilities exist – in particular in the field of recreation – but these opportunities are rarely utilised by land owners. Territorial marketing is an innovative approach of marketing bundles of goods and services of a particular region.
- **Land purchase and land lease:** These mechanisms are of importance in cases when the users have a high interest in a specific type of land management, e.g. in recreational forests, water reserves, or nature reserves under total protection.
- **Eco-sponsoring and donations:** They are relevant mechanisms that could be further developed; however, so far, they are of relevance at rather local scales. A novelty is the financing of nature and landscape conservation through auctions.
- **Certification:** A number of different certification schemes exist for different forest products. Market impacts are particularly observed with smaller certification approaches such as for specific products, organic production or regional schemes. Labels are also frequently used in the connection with territorial marketing.

A broad variety of policy instruments is relevant for non-market forest goods and services, including regulations and financing instruments

A broad variety of policy instruments is relevant and feasible for securing the sustainable provision of non-market forest goods and services. These include regulatory and economic instruments and within economic instruments they encompass public, mixed public-private, and private financing mechanisms.

There are regional differences in the use of financial mechanisms

Most of the financing mechanisms are known throughout the EU; however, their application varies between regions:

- In ***Southern Europe***, forests are often rare and privately owned. Markets for a broad range of forest goods have a long tradition, including cork, forest fruits, or mushrooms. More recently, eco-sponsoring for forest-related ecosystem services have been used more frequently and voluntary carbon markets (afforestation for carbon sequestration) are emerging. The concept of “territorial marketing” seems to be an Italian “speciality”.
- In ***Western Europe***, a number of examples for the specific management of drinking water resources are known, using land lease or purchase as mechanisms and public or private sources for financing.
- In ***Northern Europe***, the “everybody’s right” of access to the vast forest resources is typical. In Finland, a number of innovative approaches for the efficient management of public activities and efficient distribution of public funds have been developed.
- For ***Eastern Europe***, tax exemption of special purpose forests is typical. In East and South-East European countries with economies in transition, a lack of financial resources and institutional capacities seem to be hampering factors for the development of private financing mechanisms.

The success of financing mechanisms depends on their proper design but also on the involvement of stakeholders

The successful application of financing mechanisms depends on the nature of the goods or services, the institutional framework, the proper design and implementation, but also on social and political factors such as the acceptance by the target groups and by the public administration. Any introduction of new mechanisms would therefore require the involvement of the relevant public and private stakeholders.

Potentials of existing mechanisms are not fully utilised yet

All existing financing mechanisms seem relevant and feasible for the support of forest goods and services but their potentials are still not fully utilised. It seems that improvements not so much depend on the development of new mechanisms but more on an increased use of established mechanisms and their proper implementation.

Mechanisms that have been developed for certain goods or services might also be applied for others. As certain mechanisms are better developed in some countries but not well known in others, a cross-border exchange of experiences might give impulses for the further development of existing instruments. Through this knowledge exchange, the efficiency of public financing mechanisms may be improved in many cases.

There are unused market potentials without a need to change the institutional frameworks

Private financing mechanisms such as the trade with goods and the offer of services are not regularly used by the land-owners. This is the case even if the institutional framework does not stand against their marketing. Strategies for the increased marketing of forest goods or recreational and environmental services are well developed in the literature but not extensively applied. This indicates that non-wood goods and services are generally not seen as relevant business fields for forest owners.

There is a trend to an increased use of market mechanisms

There seems to be a double trend of growing government interest in non-market forest goods and services and an increased use of market mechanisms in their financing. On the one hand, governments increasingly engage in the provision of forest ecosystems services; on the other hand, they increasingly aim to better ensure efficiency of public funds. There is thus a trend for a stronger utilisation of market mechanisms in various categories, including tax systems, subsidy allocation and the creation of markets through cap-and-trade regimes.

Systematic knowledge on new private financing mechanisms is lacking

A number of successful examples for the application of new private financing mechanisms (or market-based instruments) show a potential in the support of non-market forest goods and services. In view of these growing but still rare examples, these new financing mechanisms seem promising but still not extensively studied. Their real potentials and limitations can therefore not be assessed reliably. The lack of knowledge includes questions regarding the role of institutional actors in the development of market-based instruments and in the support of innovation processes.

7.2 Recommendations

More efforts should be put into obtaining reliable information on the preferences of different stakeholder groups

The application of financing mechanisms for compensation could only be based on reliable data on the preferences of different stakeholder group. Only then efficient forest policy and management measures could be developed. In the present no such data exist.

Methods based on observed market behaviour should be preferred

When deciding which method to apply, the general recommendation is to use methods that are market based and simpler (less time and resource consuming). However, the final choice of the method depends on many factors, like: (i) type and number of objects to be valued; (ii) relevant population (e.g. users or non-users or both; geographical scope (local, regional, national, international)); (iii) data availability (e.g. restricted data access – data on house values); (iv) available time and financial resources; (v) team (e.g. experience).

The quality and availability of valuation data could be improved by application of international valuation studies

Due to the limited geographical distribution of valuation results for non-market forest goods and services joint EU wide valuation studies would be welcomed. By applying a common methodology and standards, they would also improve the quality of the available data and the range of goods with

estimated values (not limited only to recreation activities).

European database on valuation studies for benefit transfer is needed

In addition to new studies, also an effort on collection of existing studies should be made. This would enable to recognize what type of studies (data) is available and create a sound base for the application of Benefit Transfer methods.

There are already some existing databases (e.g. EVRI, Envalue); however they are not specifically addressing non-market forest goods and services and are containing rather general information about the valuation studies, which may not be sufficient for the application of benefit transfer methods.

More efforts should be made to obtain reliable estimates of the costs for the provision of non-market forest goods and services

Efficient payment mechanisms should be based on reliable information of costs occurring to the provider of non-market forest goods and services. They are needed to help define what cost categories should be included and valued. In addition reliable data about good practice forest management for the provision of different non-market goods and services are needed (e.g. what additional measures or what prohibitions).

Equally further develop all financing mechanisms

The overview of the use of financing mechanisms in Europe shows that all mechanisms need further development. Mechanisms that have been developed for certain goods or services might also be applied to others. There are good practice examples in certain EU Member States that are not known in others, for instance, tax exemptions (SK, FR), tendering schemes (FI), conservation banks (DE, FR), water protection (FR, DK), territorial marketing (IT), eco-sponsoring (Southern Europe), volunteering (UK, Alps), landscape auctions (NL), or various local labels for forest products. This calls for increased exchange of experiences among the EU Member States. Further, international examples on payments for ecosystem services might be taken up in EU countries.

Develop a knowledge base on the financing of non-wood forest goods and services

An indication that non-wood forest goods and services (NWFGS) are not yet seen as a serious business field within forestry is the fact that a systematic knowledge base on the trade with and the compensation of these products is lacking. In order to establish such a business area, one measure would be the regular monitoring and publication of the related economic indicators. Further measures would be the well-funded support of research on NWFGS markets, new financing mechanisms, related innovation systems and innovation processes, the roles of enterprises, non-governmental organisations and institutional actors in the provision of these benefits, etc.

Engage land owners in the marketing of goods and services

There remains a vast potential, which is not yet utilised, in the trade of forest goods and services. Examples show that there are many opportunities in this field even within the existing institutional frameworks. They include new forms of marketing traditional products such as mushrooms, game, wood, etc. as well as examples for the successful marketing of new goods such as cosmetics or food and of forest-related services such as sports, adventure, spiritual, recreational and educational services and biodiversity conservation. A further development depends on the engagement of land owners, their interest groups and extension services.

Develop further public and mixed public-private financing mechanisms

Important ecosystem services such biodiversity conservation or the protection against natural hazards will most likely remain largely dependent on public funds. As demands seem to increase but funds are limited, the efficient distribution gains in importance. This implies the need for a further development of public and mixed public-private mechanisms, e.g. taxes and subsidies, the efficient application of contracts or the creation of markets (e.g. through tradable permits). The application of innovative and promising mechanisms such as conservation banks, carbon credit schemes or tendering systems is only at the beginning stage.

Support forest owners in the development of private financing mechanisms

Political-institutional actors also have an important role with regards to private mechanisms, as land owners need support in their attempts to develop new products. Such innovation support measures would comprise the provision of information, coordination of actors as well as financial support to buffer risks in the early stages of product development. The EU Rural Development Policy allows for many of these measures under the Axes 1-4. Measures for a systematic support of innovations are particularly foreseen by means of the LEADER instrument.

Support cross-border exchange of experiences

The exchange of knowledge and experiences across national borders seems to be of highest importance for an improved application of financing mechanisms because they are developed at very different degrees in the EU countries. Seminars, workshops, excursions, training programmes as well as joint research and development projects may be organised on European or bilateral levels. Cooperation should include public and private actors as well as representatives from a range of sectors.

Support cross-sectoral cooperation

The further development of financing mechanisms can be strengthened by supporting cooperation across sectors. This should be considered on political-institutional level on different scales (EU, national, provincial, local) as well as on enterprise level. By this, the forest sector should be stronger connected to those sectors from which new demands are expected, i.e. the wood and chemical industries, energy production, tourism, environmental protection and nature conservation.

Provide seed-money for the development of new market opportunities

Only small shares of forestry funds are dedicated to the development of new market offers in the field of NWFGS. The provision of seed-money for the development of new business activities could help in tapping new private financing sources for forest goods and services.

Improving awareness of existing policy measures

The EU Rural Development Policy offers a range of measures under which the development of non-marketed forest goods and services may take place. However, so far, these measures were not used to the full extent. This may be due to poor awareness about the importance of non-market forest good and services and about the existing policy measures for their development, within the forestry sector. The situation could be improved by capacity building, education, training, information measures and awareness raising on EU and national levels.

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Websites related to alternative financing mechanisms

Biosa: www.biosa.at

Lease of recreational services:

www.MTK.fi/MTK_briefly/forestry/en_GB/recreational_value_tracking

Mountain Biking: www.tirol.gv.at/mountainbike

NeighbourWood Scheme: www.agriculture.gov.ie/forests-service

Scottish Forest Alliance: www.scottishforestalliance.org.uk

9. GLOSSARY

Bequest Value: the value that people place on knowing that future generation will have the option to enjoy something.

Cap-and-trade: In cap-and-trade scheme in the context of emission trading the state establishes a defined maximum level of total emissions of a certain pollutant (cap) which is divided among the polluters as emission rights. As the rights may be traded among the polluters, they may decide if they prefer to take measures to reduce their emissions or to buy additional rights from other participants of the trading scheme. This allows those companies who can reduce their emissions in a cheapest way to trade their rights, which makes emission trading particularly efficient. Cap-and-trade schemes may also be established for the extraction of natural resources.

Carbon offset: A carbon offset is an emission reduction credit from another organization's project that results in less carbon dioxide or other greenhouse gases in the atmosphere than would otherwise occur. (David Suzuki Foundation; http://www.davidsuzuki.org/Climate_Change/What_You_Can_Do/carbon_offsets.asp, on 26. 7. 2008)

Certification: Certification is the verification of conformity with some given and documented benchmarks – whether they are called standards, norms or other – and conducted by independent bodies, which are also called “third parties”. (Rametsteiner 2000) (see also sustainable forest management certification, timber certification, eco-label)

Compensating variation: the amount of additional money an individual would need to reach its initial utility after a change in prices, or a change in product quality, or the introduction of new products. Compensating variation can be used to find the effect of a change in the quantity of an environmental good on an individual's net welfare.

Conservation bank: A land account that is drawn on to compensate for adverse environmental impacts elsewhere (White, n.d.)

Consumer surplus: the difference between the price actually paid, and the maximum amount that an individual is willing to pay for a good. This measure approximates, and is bounded by, the more technically precise measures of economic benefit: compensating variation or equivalent variation.

Contractual nature conservation, nature conservation contracts: Satisfaction of needs for nature conservation, based on contracts (Rosenberg, n.d.); payments for nature conservation or environmental services are provided on voluntary basis and for clearly defined measures or ceased management.

Demand curve: the graphical representation of the demand function.

Demand function: the mathematical function that relates price and quantity demanded for goods or services. It tells how many units of a good will be purchased at different prices. The market demand function is calculated by adding together all of the individual consumers' demand functions.

Discount rate: the rate used to reduce future benefits and costs to their present time equivalent.

Eco-label: An eco-label is a voluntary trademark that is awarded to products deemed to be less harmful to the environment than other products within the same category. (Rametsteiner 2000) For the assessment of eco-labels a life-cycle approach or a single-issue approach may be used. (see also certification, sustainable forest management certification, timber certification)

Eco-sponsoring: Eco-sponsoring is a business relationship between a sponsor who provides financing, resources or services for environment-related activities and a sponsored party which offers benefits for the company in return.

Ecosystem function: can be defined as “the capacity of natural processes and components to provide goods and services to satisfy human needs, directly or indirectly. (de Groot *et al.* 2002).

Ecosystem functions – the physical, chemical, and biological processes or attributes that contribute to the self-maintenance of the ecosystem; in other words, what the ecosystem does. Some examples of ecosystem functions are wildlife habitat, carbon cycling, or trapping nutrients.

Ecosystem goods and services: represent the benefits human population derived directly or indirectly from ecosystem functions (Constanza *et al.* 1997)

Ecosystem services: the beneficial outcomes, for the natural environment, or for people, that result from ecosystem functions. Some examples of ecosystem services are support of the food chain, harvesting of animals or plants, clean water, or scenic views. In order for an ecosystem to provide services to humans, some interaction with, or at least some appreciation by, humans is required.

Existence value: the value that people place on knowing that something exists, even if they will never see or use it on site.

Externality is defined as an unintended action caused by an economic agent that influences the utility of another agent (external) without being fully or directly reflected by market prices (Merlo & Croitoru 2005).

Forest products or goods are commodities of tangible materials, often perishable goods, removed from the forest to supply existing or potential customers/markets. (Jäger 2005).

Forest services are components of forest, directly or indirectly enjoyed, consumed or used to yield human well-being (Boyd *et al.* 2007).

Forest is land with tree crown cover of more than 10 percent and an area of more than 0.5 ha (FAO 2001)

Market forest goods: are physical objects for which a demand exists, over which ownership rights can be established and whose ownership can be transferred from one institutional unit to another by engaging in transactions on markets; they are in demand because they may be used to satisfy the needs or wants of households or the community or used to produce other goods or services (OECD 2000).

Net economic benefit: the net economic benefit is the total economic benefit received from a change in the state of a good or service, measured by the sum of consumer and producer surpluses, less any costs associated with the change.

Net present value: the current value of net benefits (benefits minus costs) that occur over time. A discount rate is used to reduce future benefits and costs to their present time equivalent.

Non-market forest goods and services: cover those goods and services provided to the community as a whole free of charge, or to individual consumers either free of charge or at a fee which is well below 50 per cent of production costs (OECD 2000)

Non-use values: values that are not associated with the actual use, or even the option to use a good or service.

Non-wood forest products (NWFP): are goods of biological origin other than wood derived from forest, other wooded land and trees outside the forest. The term NWFP excludes all woody raw

materials. Consequently, timber, chips, charcoal and fuel wood, as well as small woods such as tools, household equipment and carvings are excluded (FAO 1999).

Opportunity Cost: The value of the best alternative to a given choice, or the value of resources in their next best use.

Option value: the value that people place on having the option to enjoy something in the future, although they may not currently use it.

Payments for environmental services: Payments for environmental services is a method of internalizing the positive externalities associated with a given ecosystem or a specific resource use. (Pagiola 2004)

A payment for environmental services is a voluntary transaction where a well-defined environmental service (ES) (or a land-use likely to secure that service) is being 'bought' by a (minimum one) ES buyer from a (minimum one) ES provider if and only if the ES provider secures ES provision (conditionality). (Wunder 2005)

Seed money: Seed money, seed funding or seed capital is the initial capital needed to pursue a business idea or to develop an innovation before they yield profit.

Shadow price: estimates of the marginal social costs or benefits when market prices are distorted in some way, either through market failure (presence of externalities), or due government intervention in the market.

Sponsorship: any commercial agreement by which a sponsor, for the mutual benefit of the sponsor and sponsored party, contractually provides financing or other support in order to establish an association between the sponsor's image, brands or products and a sponsorship property in return for rights to promote this association and/or for the granting of certain agreed direct or indirect benefits. (European Sponsorship Association, on the basis of ICC Code of Sponsorship Definition; <http://www.sponsorship.org/faq.asp> on 23. 7. 2008) see also eco-sponsoring

Subsidy: A grant paid by a government to a private person or company to assist an enterprise deemed advantageous to the public. (following Merriam-Webster Online Dictionary)

Sustainable forest management certification: Sustainable forest management certification is the certification of conformity with standards of sustainable forest management. (Rametsteiner 2000) (see also certification, timber certification, eco-label)

Tax: A pecuniary burden laid upon individuals or property to support the government. (Bryan A. Garner, ed., Black's Law Dictionary, 8th ed., West Group, 2004)

Territorial marketing: In territorial marketing the territory is the common reference to create a consistent portfolio of products and services, and to bundle marketing efforts for their coordinated promotion, (Pettenella et al. 2007)

Timber certification: Timber certification or wood certification denote the certification of timber that originates from a forest which is managed in conformity with sustainable forest management standards. (Rametsteiner 2000) (see also certification, sustainable forest management certification, eco-label)

Total economic value: the sum of all types of use and non-use values for a good or service.

Use value: value derived from actual direct or indirect use of a good or service.

Willingness to Pay: the amount—measured in goods, services, or monetary units—that a person is willing to give up to get a particular good or service.

