



# *Expert Group and Workshop on Valuation of Forest Ecosystem Services*

Group of Expert (2012-2014) & Belgrade Workshop (Republic of Serbia), 24-25 September 2014

**Final report**

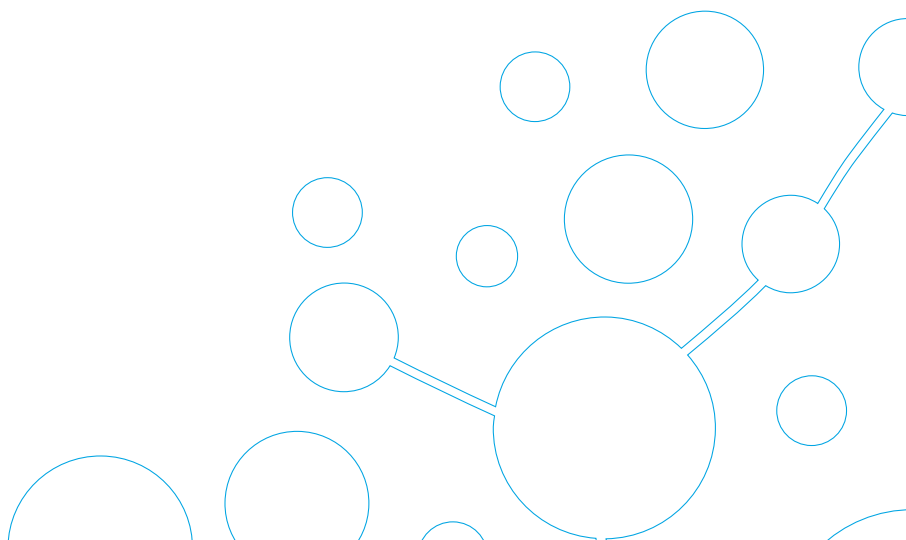




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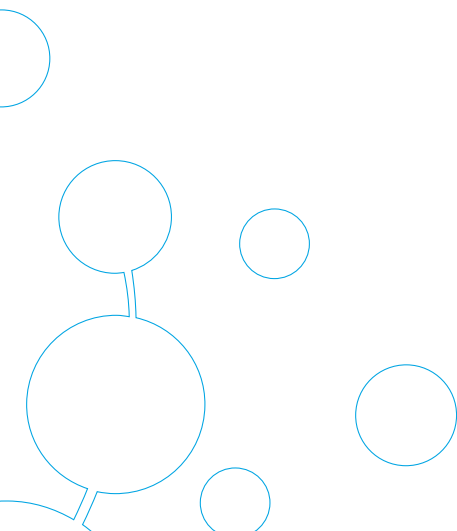




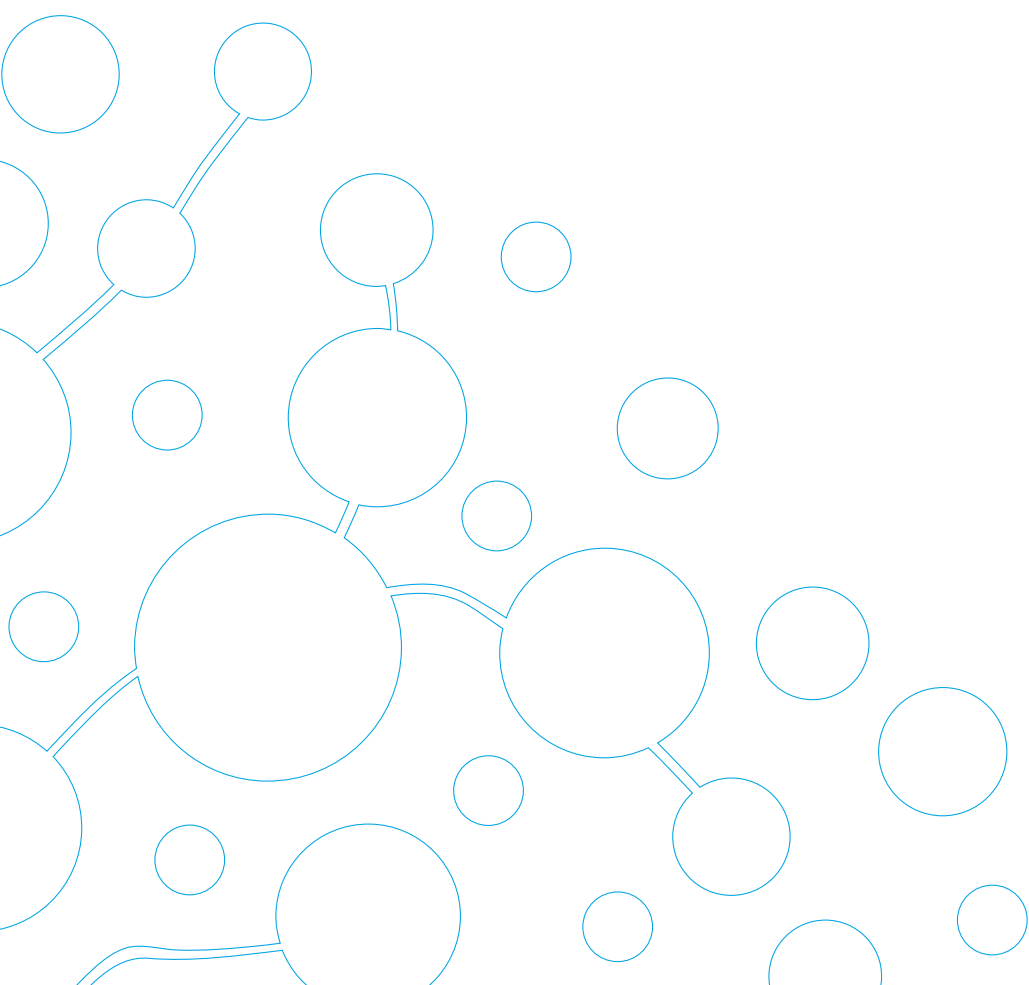
***FOREST EUROPE***  
***Expert Group and Workshop on a***  
***pan-European approach to valuation of***  
***forest ecosystem services***

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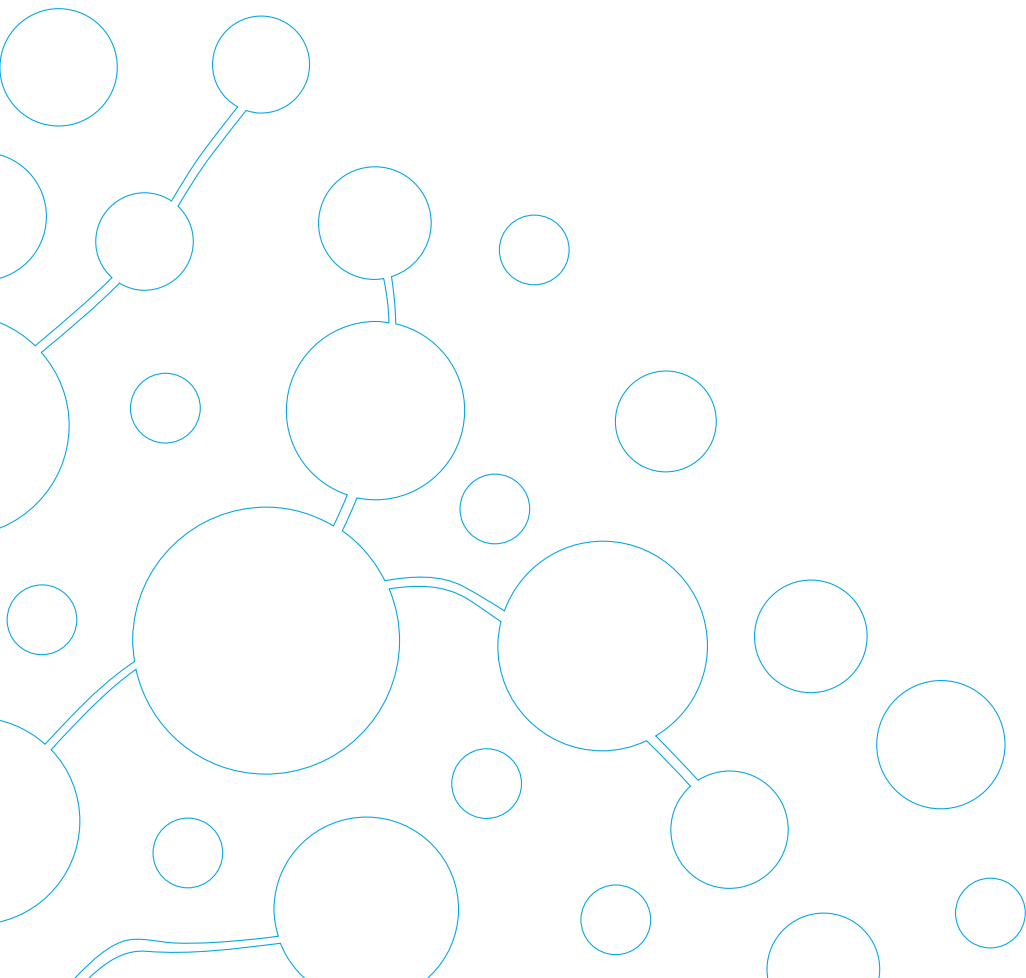




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# Foreword

Forests create multiple benefits for the society, providing renewable raw materials and play an important role in human wellbeing, biological diversity, the global carbon cycle, water balance, erosion control, combating desertification and the prevention of natural hazards, among others. Forests contribute to environmental stability, economic prosperity and offer social, ecosystem and recreational services.

The improve the knowledge about ecosystem services, its value and natural capital allow us to see the direct ways in which we depend on the natural environment and how local policy makers can address policy challenges in many different areas.

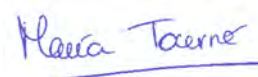
The main difficulty of the Forest Ecosystem Services is that most of the services provided lies on the goods and services that are not traded in markets, making difficult to directly observe their values without a market. Also these non-market goods and services are supplied to either the society or certain groups of users, for free or at a symbolic price which is far below the production costs. As forest owners are not compensated in monetary terms for their provision, they could be less inclined to contribute to generate them. This attitude can lead to the diminution of availability of these services in an adequate quality and quantity. One of the possible solutions in order to avoid this loss is to apply financing mechanisms which allows the owners to keep offering the valuable ecosystem services. That requires knowledge on the estimated value of these services.

Valuation of FES and the development of mechanisms to deliver these values are still being developed and introduced in many countries. Some countries have been active for some time, both in research and practice. The principle of establishing markets in less tangible, non-market ecosystem services has become a widely accepted principle in other countries like USA, but there have been signs in parts of the pan-European region of growing interest in this approach in recent years with some notable developments in practice.

Following the Oslo Mandate action on estimating the full value of forest ecosystem services across Europe with a view to using common valuation approaches, this document tries to display some the latest works performed within the pan-European Region. Also the request for values to be increasingly reflected in relevant national policies and market-based instruments such as payments for ecosystem services was an important point to be taken onboard. We are aware that literature is extensive and it is difficult to reach common and unique positions and so the contribution of the participants in both the scopes of the Working Group and the Workshop, created specifically to help us to fulfill FE Programme of Work, was very much appreciated.

Extraordinary recognition should be paid to Ms. Katerina Ventrubova, Mr. Jose Barredo and Mr. Pat Snowden, leaders of the three Subworking Groups in whose works this document is based. Their efforts and help deserve our highest appreciation.

Also, special thanks are owed to the Republic of Serbia, for hosting the Workshop and their endless support.

A handwritten signature in blue ink that reads "María Tourné Whyte". The signature is written in a cursive style and is underlined.

María Tourné Whyte  
Head of the FOREST EUROPE Liaison Unit Madrid

# Introduction

As part of the future FOREST EUROPE strategy, ministers agreed in Oslo Ministerial Conference 2011 on a common vision, strategic goals, and European 2020 Targets on forests. In follow up the part of the strategy that stresses the importance of the full range of forest goods and services, FOREST EUROPE is to consider a common approaches to valuation of forest ecosystem services and promote its use, with the aim of raising awareness of the contributions to societies of multiple forest functions, to serve informed decision making and to assess achievements against the 2020 targets. Within the framework of its Working Programme, FOREST EUROPE's ultimate objective is to offer pan-European policy makers and users a "menu" of options to implement the Valuation of Forest Ecosystem Services.

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To fulfil this activity an Expert Group was established and worked from 2012 to 2014 with the aim to give recommendations to policy makers on the pan-European approaches to valuation of forest ecosystem services and means to facilitate its implementation, bearing in mind that there can be a range of different possibilities. A Workshop was also planned to contribute to the same purpose.

At the kick-off meeting of the Expert Group three sub-working groups were foreseen to deal with the three identified tasks of the Expert Group. These three sub-working groups, who worked basically online, focused on:

- Identification of forest ecosystem services at the pan-European level

- Toolbox with valuation of FES approaches to the pan-European region
- Means to facilitate implementation

To consolidate the proposals and identify effective priorities and measures to promote the use of FES, a Workshop was established and held in Belgrade, Republic of Serbia, 24-25 September 2014.

Delegates from Albania, Finland, Italy, Norway, Republic of Serbia, Spain and United Kingdom shared with the workshop attendees a wide variety of projects on VFES carried out in their respective countries. Experiences developed at a regional level were also presented by representatives of the European Commission and the Joint Research Centre, the European Forest Institute, and the Economics of Ecosystems and Biodiversity (TEEB).

This report, oriented to a broader audience mainly consisting on decision makers and stakeholders in the field of forest resource assessment, takes onboard the work and expertise that was displayed and shared among the participants in both the scopes of the Working Group and the Workshop. And it benefits from the knowledge the experts provided voluntarily and free to Forest Europe. Their contribution is highly estimated.



# Background

**Ecosystem services have been defined as the direct and indirect contributions of ecosystems to human wellbeing<sup>1</sup>.** In order for an ecosystem to provide services to humans, some interaction with, or at least some appreciation by, humans is required. Ecosystem services are also bound up with the concept of natural capital which refers to the stock of natural assets from which they flow.

As stated by MEA 2005 <sup>2</sup>, the most common reasons for undertaking a valuation of ecosystems are to:

- (i) assess (and improve) the overall contribution of ecosystems to social and economic well-being,
- (ii) understand how and why economic actors use ecosystems as they do, and
- (iii) assess the relative impact of alternative actions, as a decision support tool.

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.

A major challenge facing the delivery of the Forest Ecosystem Services (FES) is that many of the services provided are not traded in markets, making it difficult to observe their values directly. Also, where these goods and services are supplied to either society or specific groups of users for free or at a price which is far below the production costs of equivalent goods and services, forest owners receive little or no monetary incentive to provide them. This can result in declines in both the quantity and quality of these services. Possible solutions include applying regulations to enforce their provision or developing incentive mechanisms (including market-based instruments) which encourage woodland owners to provide them. Therefore,

knowledge of **how to estimate the value of these services is often a crucial** step in providing evidence to support the introduction of such mechanisms. Nevertheless, valuation of FES is intrinsically uncertain, mostly for non-marked services or products.

Unfortunately, ecosystem services have different economic values depending not only on their quality but also on the interaction, or at least appreciation, by humans. In other words, when talking about Forest Ecosystem Services we have to take into account the 'value of use', for both direct and indirect use, and the 'value of non-use'. The 'value of non-use' could vary depending on the different stakeholders and their relationship and interests towards the forests; the scale of the service also makes a difference.

The concept of **Total Economic Value (TEV)** <sup>3</sup> has been developed in order to consider values, including non-use values, systematically and comprehensively. In recent years, the TEV has been widely used to quantify the full value of the different components of ecosystems.

Within the main aim of the FOREST EUROPE Expert Group (EG) on Valuation of Forest Ecosystem Services (VFES), a classification of forest ecosystem services<sup>4</sup> that can be identified in the pan-European region is needed. The classification will actuate as the basis for Toolbox with valuation of FES approaches to the pan-European region and Means to facilitate implementation.

There is a substantial body of literature related to the valuation of forest ecosystem services and to means of their implementation, but it remains quite disparate. In a pan-European context, the geographical distribution of non-market valuation studies has been uneven to date. As an example, most studies in the EU have been conducted in Western Europe and Scandinavian countries, while there have been relatively few studies in the Eastern EU Member States. This partly reflects different evidence and policy needs in different parts

1 MA (2005): Ecosystems and human well-being: biodiversity synthesis. Washington, D.C. (USA): World Resources Institute.

2 Millennium Ecosystem Assessment, 2005. Ecosystems and Human Well-being: Synthesis. Island Press, Washington, DC.

3 Total economic value (TEV) is a concept in cost benefit analysis that refers to the value derived by people from a natural resource, a man-made heritage resource or an infrastructure system, compared to not having it.

4 Within the scope of this report the definition of forest ecosystem services includes both services and products.

of Europe. It should be noted that some good work in this direction is being carried out in East European countries under the guidance of different international organizations. In general, valuation studies have focused on 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. where the relation between the valued good or service and the forest condition is easier to establish). Thus, forest recreation and tourism as well as the conservation of certain species or habitats (biodiversity protection) have received much attention, and the vast number of studies on these topics is evidence of this.

The terminology relating to ecosystem service valuations and mechanisms to implement FES is not widely understood or accepted. There seems to be a lack of general standards of implementation to guide newcomers in this issue in addition to the confusion around the terms used and lack of standard definitions. There is also a need for a more consistent and comparable set of research concepts and methodologies. However, it should be kept in mind that this area of study is still evolving, so it should be followed closely and it is FOREST EUROPE's duty to contribute to it.

# Group Of Experts: Outcomes

## Expert's sub-Group 1: Identification of forest ecosystem services

*Leader of the Sub-Group: Jose I. Barredo (Institute for Environment and Sustainability -JRC-IES EUROPEAN COMMISSION)*

### 1. Introduction

The aims of the work of this Subgroup are first to assess the state of art on Forest Ecosystem Services (FES) classifications from a literature review, and second to adopt a comprehensive, operational and widely accepted classification (and list) of FES applicable at the pan-European level.

The literature review will take into consideration key international and widely accepted initiatives on ecosystem services (ESS) and FES. The review is also useful for assessing advantages, disadvantages and characteristics of the FES classifications identified in the literature. This is also useful for setting the grounds for discussion and agreement within the work of the EG.

Also the chapter is oriented to guide the identification and synergies between FES and to provide an operational classification that eases its integration with the portfolio of options for valuation of the next chapters.

There are three interlinked concepts related to the provision of Ecosystem Services, i.e. ecosystem process, ecosystem function, and ecosystem service. Ecosystem process is “any change or reaction which occurs within ecosystems, physical, chemical or biological. Ecosystem processes include decomposition, production, nutrient cycling, and fluxes of nutrients and energy MA 2005. The second concept is ecosystem function that is a “subset of the interactions between biophysical structures, biodiversity and ecosystem processes that underpin the capacity of an ecosystem to provide ecosystem services TEEB 2010. And finally, ecosystem services are “the benefits that people obtain from ecosystems” MA 2005. “The direct and indirect contributions of ecosystems to human wellbeing” TEEB 2010. Thus the flow of ESS is seen as the link between socio-economic systems and ecosystems MAES 2013, and this is the aspect usually accounted for in assessment

and valuation of ESS. Processes and functions occur inside the ecosystem and are influenced by anthropic drivers that may have an impact (positive and negative) in the provision of services. The scope of this chapter is on ESS and specifically those provided by forest ecosystems.

### 2. Classifications of ecosystem services

Subsequently to the pioneer study of Costanza et al. 1997 on the valuation of ESS at the global level, three main international classification systems of ESS have been implemented: Millennium Ecosystem Assessment MA 2005, Economics of Ecosystems and Biodiversity TEEB 2010 and Common International Classification of Ecosystem Services – CICES HAINES-YOUNG & POTSCHIN 2013. These classifications show many similarities and have been built following an evolutionary process considering the findings of its predecessors.

The MA 2005 was the first global study on ecosystem services. The findings of MA provided a state-of-the-art scientific appraisal of the condition and trends in the world's ecosystems and the services they provide. The MA framework was further refined by TEEB and CICES MAES 2013. The MA classified ESS into four groups: provisioning, regulating, cultural and supporting.

TEEB (2010) is a global initiative aiming at highlighting the economic benefits of biodiversity including the growing cost of biodiversity loss and ecosystem degradation. TEEB uses a classification including 22 ESS grouped into four main categories: provisioning, regulating, habitat, and cultural and amenity. As suggested by MAES 2013 an important difference between MA and TEEB is that the second omitted supporting services, which are considered in TEEB as a subset of ecosystem processes. A second relevant difference is the inclusion in TEEB of the category habitat services.



CICES HAINES-YOUNG & POTSCHIN 2013 is the most recent of the three international initiatives. CICES has been originally implemented for supporting the work of the European Environment Agency (EEA) on environmental accounting. CICES supports EEA's contribution to the System of Environmental-Economic Accounting (SEEA<sup>5</sup>) which is currently being led by the United Nations Statistical Division (UNSD). Within the CICES initiative the idea of a common international standardised classification of ESS is a key factor, due to their use in ecosystem accounting methods and comparisons. From this perspective standardisation is seen as especially important for the CICES purpose of economic accounting. Recently the working group supporting Action 5 of the EU Biodiversity Strategy to 2020 on Mapping and Assessment of Ecosystems and their Services<sup>6</sup> (MAES) has adopted CICES for classifying ESS at pan-European level with the purpose of first, mapping and assessment, and second, economic valuation and prospective studies MAES 2013, 2014.

Despite the similarities of the three international classifications, MA, TEEB and CICES, each has its own

advantages and disadvantages MAES 2013 due to the specific context, view and scope for which they were developed.

From the original classification of ESS from MA, TEEB and CICES a comparison including only FES is shown in Table 1. A first look to the comparison of the three classifications suggests that there are important commonalities between them. The main categories of provision, regulation (and maintenance) and cultural (and amenity) are comparable and in many cases the subcategories are also coincident. It is noticeable that CICES is an extendable classification and that a further level of disaggregation (class) is not shown in Table 1 for the sake of readability, a point to which we shall return later in this chapter. It is worth mention that the last column of this table (FES in CICES) is in line with results of the MAES Forest Ecosystem Services Pilot MAES 2014 that provided an agreed classification of FES derived from CICES up to class level to be used at pan-European level.

5 <http://unstats.un.org/unsd/envaccounting/seea.asp>

6 [http://ec.europa.eu/environment/nature/knowledge/ecosystem\\_assessment/index\\_en.htm](http://ec.europa.eu/environment/nature/knowledge/ecosystem_assessment/index_en.htm)

**Table 1: Comparison of three main classifications of ecosystem services (only those services supplied by forest ecosystems are shown)**

MA <sup>7</sup>	TEEB <sup>8</sup>	CICES <sup>9</sup>
PROVISIONING	PROVISIONING	PROVISIONING
Industrial wood	Raw materials	Materials / Biomass, fibre
Fuelwood		Energy / Biomass-based energy
Non-wood forest products	Food / Raw materials	Nutrition / Biomass
		Materials / Biomass, fibre
Fresh water (water purification) (also Regulation service)	Water supply	Materials / Water
		Nutrition / Water
Genetic resources	Genetic resources	Materials / Biomass, fibre (genetic resources)
REGULATION	REGULATING	REGULATION AND MAINTENANCE
Pest regulation	Biological control	Maintenance of physical, chemical, biological conditions / Pest and disease control
Disease regulation		
Health protection		
Water regulation	Regulation of water flows	Mediation of flows / Liquid flows
	Disturbance prevention or moderation	Mediation of flows / Air flows (storms)
Water purification and waste treatment	Waste treatment (water purification)	Maintenance of physical, chemical, biological conditions / Water conditions
Air quality regulation	Air purification	Maintenance of physical, chemical, biological conditions / Atmospheric composition and climate regulation
Climate regulation (incl. C sequestration)	Climate regulation (incl. C sequestration)	Maintenance of physical, chemical, biological conditions / Atmospheric composition and climate regulation
Soil protection (erosion regulation)	Erosion prevention	Mediation of flows / Mass flow
Soil formation (supporting service)	Maintaining soil fertility	Maintenance of physical, chemical, biological conditions / Atmospheric composition and climate regulation
Pollination	Pollination	Maintenance of physical, chemical, biological conditions / Lifecycle maintenance, habitat and gene pool protection
	HABITAT	
Biodiversity repository	Maintenance of genetic diversity (especially in gene pool protection)	Maintenance of physical, chemical, biological conditions / Lifecycle maintenance, habitat and gene pool protection
	Lifecycle maintenance	
CULTURAL	CULTURAL & AMENITY	CULTURAL
Spiritual	Spiritual experience	Spiritual, symbolic and other interactions with ecosystems and landscapes / Spiritual and/or emblematic
Cultural	Inspiration for culture, art & design	Spiritual, symbolic and other interactions with ecosystems and landscapes / Intellectual and representative interactions
Historical		
Ecotourism	Recreation & Tourism	Physical and intellectual interactions with ecosystems and landscapes / Physical and experiential interactions
Recreation		
Sports: fishing/hunting		
Aesthetic values	Aesthetic information	Spiritual, symbolic and other interactions with ecosystems and landscapes / Other cultural outputs
Knowledge systems & Education	Information for cognitive development	Physical and intellectual interactions with ecosystems and landscapes / Intellectual and representative interactions
<b>SUPPORTING</b> (in MA services necessary for the production of all other ES)		
Nutrient cycling		
Primary production		

7 MA (2003) Ecosystems and Human Well-being: A Framework for Assessment, Ch. 2. <http://www.maweb.org/documents/document300.aspx.pdf> and MA (2005) Global & Multiscale Assessment Reports, Current State & Trends Assessment, Ch. 21 <http://www.maweb.org/documents/document290.aspx.pdf>

8 TEEB (2010) Integrating the ecological and economic dimensions in biodiversity and ecosystem service valuation, Ch 1. <http://www.teebweb.org/EcologicalandEconomicFoundation/tabid/1018/Default.aspx>

9 CICES V4.3; <http://cices.eu/>

## 2.1. Classifications of Forest Ecosystem Services

Forest ecosystems provide a multiplicity of services to humans. From this perspective FES are the direct and indirect contributions of forest ecosystems to human wellbeing (TEEB 2010). This conceptual view of forest ecosystems is in line with the multifunctional role of forest for delivering multiple goods and services in a balanced way and ensuring forest protection, as stated in the New EU Forest Strategy EC 2013. The multiplicity of FES provided by forest ecosystems and the new requirements for multiple delivery and accounting of FES necessitates a comprehensive methodological framework and systematic extensible classification of FES. To this end several approaches have been proposed pursuing different aims, however there is no consensus regarding a unique universal framework. On the contrary, each framework responds to specific requirements and scope for which it has been implemented. Therefore, the different classifications frameworks are hardly comparable because they have been elaborated for different purposes, and hence all present advantages and disadvantages depending of the application context (MAVSAR et al. 2008)

In this section we make a review of the most relevant frameworks for classifying FES and assess their advantages and limitations for the scope of this report. In addition to the three main international classification systems of ESS described in the previous section, five classification frameworks of FES are considered (in chronological order):

- Total Economic Value (TEV) classification (e.g. PEARCE & MORAN 1994; MERLO & CROITORU 2005)
- MA functional classification of FES MA 2005
- Holistic classification MANTAU et al. 2007
- FORVALUE study classification MAVSAR et al. 2008
- MAES classification MAES 2014

### Total Economic Value (TEV) classification

The study on the TEV of Mediterranean Forest MERLO & CROITORU 2005 is considered the first attempt to the comprehensive and systematic evaluation of FES in Europe (Mediterranean countries). This study filled a knowledge gap regarding the valuation of non-wood forest products (NWFPs) and provided a first estimate to the TEV including both NWFPs and wood forest products (WFPs) into a common framework. The TEV approach is founded in a classification that is based on the different benefits that humans may obtain from forest ecosystems. In this approach FES values are classified into direct and indirect use values, option

and non-use (bequest and existence) values. Table 2 shows the TEV classification and the services included on each category. The main aim of TEV classification used in Pearce and Moran 1994 and Merlo and Croitoru 2005 was to assess the overall contribution forest ecosystems to “social and economic well-being”. Therefore this approach focuses on measuring the current benefits provided by forest i.e. the flow of services, per unit of time, as forest ecosystems stand now and with current management practices.

**Table 2: Total Economic Value classification of forest ecosystem services (source: Pearce and Moran 1994 and Merlo and Croitoru 2005)**

Total Economic Value	Use value	Direct use value	Examples Timber Fuelwood Food Cork Recreation Landscape quality
		Indirect use value	Examples Watershed protection Water purification Carbon sequestration Flood control Nutrients Recycling
		Option value	Examples Recreation opportunities Biodiversity
	Non-use value	Bequest value	Examples Landscape Recreation Energy Raw material availability
		Existence value	Examples Biodiversity Habitats Species

Merlo and Croitoru 2005 identified the three main common “reasons” for the valuation of FES, something requiring first a systematic classification of FES. First, to assess the overall contribution forest ecosystems to social and economic well-being; second, to understand how and why (and where) the stakeholders use forests as they do; and finally, to assess the relative impact of alternative actions so as to help decision making. The classification approaches identified in this review have been implemented for at least one of these three reasons, but such approach of universal applicability is yet to be implemented.

## MA functional classification of FES MA 2005

In addition to the overall classification of ESS the MA 2005 proposed a functional classification of FES divided in five main groups (Table 3):

- 1) Resources, this category comprises products that can be obtained from forests, including wood and non-wood products.
- 2) Ecological services are those related to protection (and supply) of water, soil and health.
- 3) Biospheric are services such as climate regulation, repository of biodiversity and habitat protection.
- 4) Social services are considered those focusing on recreation, ecotourism and sport.
- 5) Amenities include spiritual, cultural and historical services.

The functional classification addresses the principle of the multifunctional and multiservice purpose of forests and of sustainable forest management. And this aim is properly achieved from a conceptual perspective with this classification. However, the practical implementation poses challenges derived from the many synergies, conflicts and mutual interactions between the services MA 2005 which creates difficult dilemmas to decision makers about the trade-off between the different services included.

**Table 3: Functional classification of forest ecosystem services (source: MA, 2005)**

Forest services	Resources	Industrial wood
		Fuelwood
		Non-wood forest products
	Ecological	Water protection
		Soil protection
		Health protection
	Biospheric	Biodiversity
		Climate regulation
	Social	Ecotourism
		Recreation
		Sports
		Fishing/hunting
	Amenities	Spiritual
		Cultural
		Historical

The Holistic classification from Mantau et al. 2007 addressed the issue of the need of an open and flexible classification of FES able to accommodate user-defined requirements such as new FES or FES categories. The proposed classification is built following the logical steps of resource, product and user, mimicking the productive processes occurring from forest ecosystems functions to end-products in the markets. The main conceptual background of this classification is that, in principle, any forest resource can be transformed into a marketable product and hence valued.

## FORVALUE

The main aim of FORVALUE was to provide a summary of the state-of-art in the field of valuation and compensation for non-market forest services MAVSAR et al. 2008. Nevertheless, FORVALUE reviewed and assessed several previous classifications for proposing a new classification for valuation purposes including both market and non-market FES.

FORVALUE proposed a classification of FES departing from the MA functional classification of FES. In a further step FORVALUE split the different FES into market and non-market forest services under the functional classification approach of MA. They provided a comprehensive list of some 200 FES. However, the list could be expanded on the basis of "continually changing uses and the importance society ascribes to different forest services" MAVSAR et al. 2008:12. In other words, the classification is adaptable to the inclusion of new FES or changes in the use of existing FES.

Results of FORVALUE indicate that different classification approaches have been elaborated for different specific purposes. Therefore none of the classification approaches is universal MAVSAR et al. 2008, all show advantages and disadvantages, and it is the context of application which make one approach more suitable than the others.



## Mapping and Assessment of Ecosystems and their Services (MAES)

Recently the working group MAES implemented four pilot studies at pan-European level on freshwater, marine, forest and agro-ecosystems MAES 2014. One of the aims of the forest pilot was to identify indicators and data available to map forest ecosystems and assess biodiversity, condition and their services. For fulfilling this objective in synergy with the other pilots, a widely-agreed, extensible and operative classification of ESS was needed. Within the MAES framework the CICES v4.3 classification was proposed to ensure a coherent approach across EU Member States and to support their integration into (ecosystem) accounting systems. Therefore the four ecosystem pilots have used this classification to organise the data collection and to compare outcomes. Starting from the original CICES classification the forest pilot implemented an extensible fourth-level (Section, Division, Group, Class) classification of FES. The last column of Table 1 shows the second and third levels of the CICES classification of FES. CICES v4.3 also includes a fifth level (Class type) that breaks the Class categories into further individual entities and

suggests ways of measuring the associated ecosystem service output. Nevertheless the fifth subdivision was not deemed necessary in the MAES pilots.

The list of FES and their classification in Provisioning, Regulation and Maintenance, and Cultural services resulting from the MAES forest pilot MAES 2014 is shown in Table 4, Table 5 and Table 6, respectively. This classification of FES was the departing point of the MAES forest pilot for identifying a list of more than 115 indicators and datasets potentially available for mapping, assessment and valuation of FES. The CICES classification is considered to provide a flexible and hierarchical classification that can be adapted to specific requirements and needs of users. The possibility of selecting between five hierarchical levels provides a flexible framework. The fifth level is considered more user-friendly because provides a clearer view of what ecosystem services are included within each class, hence being more in line with usually available indicators and data for valuation. Nevertheless the first four levels can be used for accounting without reducing the utility of the classification for different users MAES 2013.

**Table 4: Provisioning<sup>10</sup> forest ecosystem services according to CICES v4.3 MAES 2014**

Section	Division	Group	Class
Provisioning	Nutrition	Biomass	Reared animals and their outputs
			Wild plants, algae and their outputs
			Wild animals and their outputs
	Water		Surface water for drinking
			Ground water for drinking
	Materials	Biomass	Fibres and other materials from plants, algae and animals for direct use or processing
			Materials from plants, algae and animals for agricultural use
			Genetic materials from all biota
		Water	Surface water for non-drinking purposes
			Ground water for non-drinking purposes
	Energy	Biomass-based energy sources	Plant-based resources

**Table 6: Cultural<sup>12</sup> forest ecosystem services according to CICES v4.3 MAES 2014**

Section	Division	Group	Class
Cultural	Physical and intellectual interactions with biota, ecosystems, and landscapes	Physical and experiential interactions	Experiential use of plants, animals and landscapes in different environmental settings. And physical use of landscapes in different environmental settings
		Intellectual and representative interactions	Scientific, educational, heritage, cultural, entertainment and aesthetic
		Spiritual, symbolic and other interactions with biota, ecosystems, and landscapes	Symbolic and sacred and/or religious
	Spiritual, symbolic and other interactions with biota, ecosystems, and landscapes	Spiritual and/or emblematic	Symbolic and sacred and/or religious
		Other cultural outputs	Existence and bequest

**Table 5: Regulation and Maintenance<sup>11</sup> forest ecosystem services according to CICES v4.3 MAES 2014**

Section	Division	Group	Class
Regulation & Maintenance	Mediation of waste, toxics and other nuisances	Mediation by ecosystems	Filtration / sequestration / storage / accumulation by ecosystems
	Mediation of flows	Mass flows	Mass stabilisation and control of erosion rates
			Buffering and attenuation of mass flows
		Liquid flows	Hydrological cycle and water flow maintenance
			Flood protection
		Gaseous / air flows	Storm protection
			Ventilation and transpiration
	Maintenance of physical, chemical, biological conditions	Lifecycle maintenance, habitat and gene pool protection	Pollination and seed dispersal
			Maintaining nursery populations and habitats
		Pest and disease control	Pest control
			Disease control
		Soil formation and composition	Weathering processes
			Decomposition and fixing processes
		Water conditions	Chemical condition of freshwaters
		Liquid flows	Disease control
		Atmospheric composition and climate regulation	Global climate regulation by reduction of greenhouse gas concentrations
			Micro and regional climate regulation

10 Provisioning includes forest services related to (supply of) biomass, water and energy.

11 Regulation and maintenance services includes all the ways in which forest ecosystems can mediate or moderate the environment that affects human performance. It covers the degradation of wastes and toxic substances, the mediation of flows, as well as the ways in which ecosystems can regulate the physico-chemical and biological environment of people.

12 Cultural services include the non-material outputs of forest ecosystems. These services are seen as the physical settings, locations or situations that produce benefits in the physical, intellectual or spiritual state of people.

### 3. Conclusions

The review of the five FES classifications above helps for providing some first conclusions regarding options for classifying FES for valuation.

Despite the fact that the five approaches assessed have been implemented for different purposes they show a few similarities. First, wood products are usually included in a category facilitating accounting for market products. Second, non-market products are often classified in the regulation and maintenance category, including mediation of flows, waste, toxics

and maintenance of biophysical conditions. And finally, cultural services form a category that usually includes those services related with recreation, spiritual, cultural and intellectual interactions with forest ecosystems.

MA, TEEB and CICES classifications show more similitudes and have been built following an evolutionary process considering the findings (and limitations) of its predecessors.

Each has its own advantages and disadvantages due to the specific context, view and scope for which they were developed. There is no one-fits-all perfect classification of ESS, since it depends on the purpose.

#### DOUBLE-COUNTING

Forests provide a multiplicity of services underpinned by complex ecological processes and functions. Classifying forest services, which are at the border between the natural and social system, poses methodological challenges due to the anthropocentric view of the fluxes from ecosystems to humans: process, function, service. The challenge is even more evident when products and users are considered in this sequence. This difficulty is one of the reasons of the proliferation of classification systems over the last few years. All trying to propose a systematic analytical framework to ensure that the services are considered systematically and comprehensively, but without double counting MERLO & CROITORU 2005.

The issue of double counting is an aspect requiring close attention and it was carefully considered in the classifications systems assessed, and more specifically in CICES see: HAINES-YOUNG & POTSCHEIN 2013. Nevertheless this does not mean that there is a double counting-proof classification, because this is an aspect that should be considered both in the design of the classification system and in the further steps of valuation. In this respect an important difference between CICES and the overall MA classification is that the first excluded the so-called supporting services from the classification and focus only on the provisioning, regulating and cultural components. "The reason for this was that if ecosystem and economic accounts are to be linked, then an essential step is to identify and describe the 'final outputs' from ecosystems that people use and value, so as to avoid the problem of double counting" HAINES-YOUNG & POTSCHEIN 2013: 8. Nevertheless double counting is an issue present in the process of valuation that includes the classification used but also other aspects such as the selection of indicators and data representing the biophysical supply of FES and method adopted for valuation.

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# Group Of Experts: Outcomes

## Expert's sub-Group 2: Toolbox with valuation of FES approaches to the pan-European region

*Leader of the Sub-Group: Ms. Katerina Ventrubova (CZECH REPUBLIC)*

### 1. Introduction

One of the elementary conditions for a successful incorporation of forest ecosystems and their services into the socio-economic system, which also enables to determine the effectiveness of expenditure on environment conservation, is to estimate the full value of forest ecosystem services across Europe, with possible subsequent economic valuation. The issue closely relates to an assessment of forest services to humans with respect to the non-market-forest services and to their benefits they offer to humans.

The assessment based on a valuation of forest ecosystem services can be considered as a convincing method for the assessment of the significance of forest services to the public with respect to the fulfilment of non-market-forest services. It is however necessary to stress that a consistent distinction is made between the significance of the non-market-forest services for the society and the assessment of forest services to humans in the framework of management of these non-wood-producing forest functions (with the primary classification of the forest into two fundamental blocks – production and non-production ones – being left as natural and traditional classification).

The valuation of forest services can have many potential uses, at multiple time and space scales. The definition of the utility level of forest services will not do without the assessment of non-market forest services (non-wood-producing functions of the forest – sometimes also included in the so called social functions of the forest) and possible subsequent economic valuation. It is to note that the value and price are social categories that are rather complex in terms of their contents.

### 2. Toolbox with economic valuation of Forest Ecosystem Services approaches to the pan-European region

Monetary valuation techniques are often used for:

- understanding how much an ecosystem contributes to economic activity or society,
- understanding what are the benefits and costs of an intervention that alters the ecosystem (conservation investment, development project, regulation or incentive) and make ecosystem services comparable with other investments.
- identifying how to be costs and benefits of a change

in ecosystem distributed (by monetising changes in the flows of benefit from an underlying stock of natural capital, valuation could also support a fuller inclusion of the value of ecosystem services and natural capital)

- identifying how to make conservation financially sustainable.

For provisioning ecosystem services using market values could be an option. In general, approaches to valuation and assessment are possible to split into two groups depending on determining an economic value of environmental services:

#### Preference based valuation methods

This approach determines the value by means of willingness to pay for quality preservation or improvement of environment or to accept compensation for deterioration in quality. In a welfare theory framework, preference based valuation methods always focus at individual preferences (which may later be aggregated to preferences of society as a whole).

Measures of economic value are based on what people want – their preferences. Individuals/humans, not the government, are the best judges of what they want. Thus, the theory of economic valuation is based on individual preferences and choices. People express their preferences through the choices and trade-offs that they make, given certain constraints, such as those on income or available time.

#### Cost based methods

These methods, which include the damage cost avoided, replacement cost and substitute cost methods, are related methods that estimate values of ecosystem services based on either the costs of avoiding damages due to lost services, the cost of replacing ecosystem services, or the cost of providing substitute services. These methods do not provide strict measures of the economic value of ecosystem services, but rather provide rough indicators of the value by assuming that, if people incur costs to avoid damages caused by lost ecosystem services, or to replace the services of ecosystems, then those services must be worth at least what people paid to replace them. For example, the replacement cost method might identify a project for providing the same services and calculate the cost of construction for that project.

## TOOLBOX OF DIFFERENT EVALUATION APPROACHES

TYPE	APPROACH	SHORT DESCRIPTION	VALUE CONCEPT
PREFERENCE BASED VALUATION METHODS	Travel Cost Method (TCM)	The basic premise of the travel cost method is that the time and travel cost expenses that people incur to visit a site represent the “price” of access to the site. Thus, peoples’ willingness to pay to visit the site can be estimated by observing the reduction of the number of trips that they make when travel costs become higher, and constructing a demand curve from these data. This is analogous to estimating peoples’ demand curve for a marketed good based on the quantity demanded at different prices.	Consumer surplus
	Contingent Valuation Method (CVM)	Typically the survey derives an aggregated demand curve by asking people what would be their maximum willing to pay to maintain or improve the existence or the quality of an environmental feature, or what would be their minimum compensation demand for a respective loss	Consumer surplus (more precisely, an income variation measure)
	Choice experiments	By means of a survey, people make choices between bundles of goods which consist of several attributes, including a price attribute, all characterised by varying levels. Choices are then being analysed in order to find out the trade-offs between the attributes	Consumer surplus
	Hedonic pricing method	Based on the assumption that goods can be considered aggregates of different attributes, some of which, as they cannot be sold separately, do not have an individual price. On real estate markets for example, it is not possible to purchase separately the room, the preferred location, the panoramic qualities, quality of air or of surrounding landscape.	Consumer surplus
	Market observations	Demand curves can be created if quantity reactions to changes in prices are available	Prices (consumer surplus, if demand curves are known)
COST BASED METHODS	Preventive Expenditure (PE) = (averting costs)	Uses the cost of preventing damage or degradation of environmental benefits	Price surrogates
	Replacement Costs (RC)	Uses the costs of replacing the function of an environmental good	Price surrogates
	Damage Costs (DC)	Relies on the assumption that damage estimates are a measure of value	Price surrogates



SUITABILITY FOR SERVICE		
<ul style="list-style-type: none"> <li>• Changes in access costs for a recreational site</li> <li>• Elimination of an existing recreational site</li> <li>• Addition of a new recreational site</li> <li>• Changes in environmental quality at a recreational site</li> <li>• Forest recreation</li> </ul>	<ul style="list-style-type: none"> <li>• Closely mimics the more conventional empirical techniques used by economists to estimate economic values based on market prices.</li> <li>• Based on actual behaviour—what people actually do—rather than stated willingness to pay—what people say they would do in a hypothetical situation.</li> <li>• Relatively inexpensive to apply</li> <li>• On-site surveys provide opportunities for large sample sizes, as visitors tend to be interested in participating</li> <li>• Results are relatively easy to interpret and explain</li> </ul>	<ul style="list-style-type: none"> <li>• Value of time can be problematic. Because the time spent traveling could have been used in other ways, it has an “opportunity cost.”</li> <li>• Provides information about current conditions, but not about gains or losses from anticipated changes in resource conditions</li> <li>• Many bias sources possible due to inherent unobservability of travel costs (e.g. multiple purpose trips; truncation bias; value of time)</li> </ul>
All forest services	<ul style="list-style-type: none"> <li>• Measurement of non-use values possible (to provide a true measure of total economic value)</li> <li>• Valuation of future goods and services possible</li> </ul>	Results sensitive to numerous sources of bias in survey design and implementation
All forest services	<ul style="list-style-type: none"> <li>• Measurement of non-use values possible (to provide a true measure of total economic value)</li> <li>• Valuation of future goods and services possible</li> <li>• Valuation of several goods/services at the same time (including their trade-offs)</li> </ul>	<ul style="list-style-type: none"> <li>• High data requirements</li> <li>• Analysis mathematically complicated</li> <li>• Interpretation not straightforward for lay people</li> </ul>
Noise, air or water quality, landscape	May be conducted with already existing data (no separate data collection costs, e.g. for a survey)	<ul style="list-style-type: none"> <li>• It can be applied only in presence of a good number of market exchanges, as the model representing the market requires a certain number of good quality data;</li> <li>• The market must be sufficiently transparent;</li> <li>• The valuation might be biased if there are expectations with regards to changes in environmental qualities;</li> <li>• It is not possible to estimate the total economic value of the environmental good, but only the value connected to present and, with some caution, future uses.</li> </ul>
All goods sold in markets (e.g., wood)	Data availability	Prices may be biased value estimates if market distortions exist
<ul style="list-style-type: none"> <li>• Valuing improved water quality by measuring the cost of controlling effluent emissions.</li> <li>• Valuing erosion protection services of a forest or wetland by measuring the cost of removing eroded sediment from downstream areas.</li> <li>• Valuing the water purification services of a wetland by measuring the cost of filtering and chemically treating water.</li> <li>• Valuing storm protection services of coastal wetlands by measuring the cost of building retaining walls.</li> <li>• Valuing fish habitat and nursery services by measuring the cost of fish breeding and stocking programs.</li> </ul>	<ul style="list-style-type: none"> <li>• Useful in estimating indirect use benefits when prevention technologies are available</li> <li>• Costs incurred by individuals in order to avoid damages at already existing goods can be interpreted as a lower bound of the willingness to pay for this good</li> </ul>	<ul style="list-style-type: none"> <li>• Mis-matching the benefits of investment in prevention to the original level of benefits (if changes are too drastic, users of ecosystem goods and services may switch to other alternatives)</li> <li>• No measure of individual utility if only decision-maker's preferences count</li> </ul>
	Costs incurred by individuals in order to avoid damages at already existing goods can be interpreted as a lower bound of the willingness to pay for this good	No measure of individual utility if only decision-maker's preferences count
	To estimate damage costs are useful for comparison with cost-based approaches, which implicitly assume damage is worth avoiding	<ul style="list-style-type: none"> <li>• Estimated damages avoided remain hypothetical in most cases. Often difficult to relate damages to changes in ecosystems.</li> <li>• No measure of individual utility if only decision-maker's preferences count</li> </ul>

### 3. Caveats

There are some reflections to be taken into account in case of using common valuation approaches with regard to reflect the full value of forests in relevant national policies and market-based instruments:

- When ecosystem benefits are considered that relate to attributes such as human life, cultural or religious significance, economic valuation raises serious ethical questions. Moreover, results of ecosystem valuations may be conflict with the positions of specific interest groups (like forest owners or contra environmentalists); this is even more so since ecosystems may also generate negative externalities, not only positive ones, and since positive as well as negative externalities of ecosystems can also have distributive effects.
- In valuation of forests services of a non-market nature there is an enormous share of subjective factors, which cannot be easily controlled for.
- Many different concrete valuation systems are used for the expression of importance of non-production forest services for the society in different countries by their socio-economic, historical, natural conditions, and input data availability.
- Methods and their results are based on basic theoretical background, purpose of valuation, socio-economic conditions and input data availability.
- Estimating the value of the various services and benefits that ecosystems generate may be done with a variety of valuation approaches. All of these have their advantages and disadvantages. Hybridizing approaches may overcome disadvantages of particular valuation methods.
- Valuation techniques in general and preference methods specifically are affected by uncertainty, stemming from gaps in knowledge about ecosystem dynamics, human preferences and technical issues in the valuation process. There is a need to include uncertainty issues in valuation studies and to acknowledge the limitations of valuation techniques in situations of radical uncertainty or ignorance about regime shifts.
- Valuation results will be heavily dependent on social, cultural and economic contexts, the boundaries of which may not overlap with the delineation of the relevant ecological system. Better valuation can be achieved by identifying and involving relevant stakeholders.
- Valuation represents not only a professional issue but also a political issue of enforcement of respective political interests.
- Nevertheless, valuation approaches and results should consider rational relationships between economic, ecological and social aspects of forest services.

### 4. Other sources

1. <http://www.fao.org/docrep/005/AC625E/AC625E08.htm>
2. Methodology of experimental valuation of the socio-economic importance of forest services for the society
3. Principles of the method of Quantification and Evaluation of Forest Functions on the example of the Czech Republic.

# Group Of Experts: Outcomes

## Expert's sub-Group 3: Means to facilitate implementation

*Leader of the Sub-Group: Mr. Pat Snowdon (Forestry Commission – UK)*

### 1. Introduction

First of all, it is worth clarifying that, for this document, implementation has two components.

- a. First, it refers to work which could be done to enable methods to value Forest Ecosystem Services (FES) to be put into practice. This component focuses on best practice in the use of valuation and understanding the purposes to which valuation can be put.
- b. Second, it refers to ways in which these FES values could be captured in practical forest management terms. This component focuses on mechanisms to enable FES to be delivered 'on the ground'; for example, through market based instruments.

Valuation of FES and the development of mechanisms to deliver these values are still being developed and introduced in many countries. Some countries have been active for some time, both in research and practice. There have been signs in parts of Europe of growing interest in the principle of establishing markets in less tangible, non-market ecosystem services approach in recent years with some notable developments in practice.

### 2. Background

Different valuation methods exist, based either on observed market behaviour (revealed preference methods) or on hypothetical behaviour (stated preference methods). The second group of methods can be applied even to situations where no related markets exist at all, or to situations in which non-use values are of special importance. The choice of the valuation method depends on the context, including the type of service to be evaluated, the relevant population, geographical scope and availability of data, and also the time, budget and human resources available to the study.

The following points are important to note. First, values estimated in different contexts should not be compared directly. Second, estimates of non-market values cannot be used directly to define the price of the good or service. Third, the overall availability of values for non-market forest services across Europe remains relatively limited.

Finally, the estimation of non-market values has much potential to inform decision-making across Europe but more understanding and knowledge exchange is needed on how to carry out valuation studies, whether at local, regional, national or international levels.

### 3. Possible pan-European approaches to the valuation of forest ecosystem services

The following two sections contain existing ideas and new thoughts about the 'means of implementation' described above. Section 3 describes which elements of national policies might benefit from the use of economic valuations, and considers practical barriers and possible ways to overcome these. Section 4 examines how the value of FES might be incorporated through market based instruments.

#### 3.1 Incorporate into national policies

A wide variety of policy approaches can influence the conservation, or increase the production, of ecosystem services, and hence the values of these services:

- Liability laws - making citizens, enterprises etc. financially and legally responsible for something (e.g. damages to forest ecosystems which diminish their service supply).
- Property rights - determining how a resource is used and owned (as an example, forest owners may have more interest in protecting the quality of the water run-off from their property if the respective property right belongs to them, so that they can profit from selling it to water providers and prevent adjacent farmers from contaminating the water).
- Command-and-control approaches - such as standards, where political authorities set a level of performance to protect or improve environmental quality. (A few examples of these standards are the limits set on the volume of timber that can be harvested, bans on the cutting of trees, and maximum levels legally allowed for pollution emissions).
- Economic incentive approaches - such as subsidies, tax reductions or taxes and fees on sanctioned engagement in otherwise prohibited behaviours.

Various political institutions in Europe have explicitly formulated the demand for information about economic values of FES as a base for policy decisions; for example, the EU Forest Action Plan 2013 and the Biodiversity Strategy 2012 both call for the development of a coherent conceptual framework for valuing ecosystem services in order to integrate these services in Integrated Environmental and Economic Accounting systems in the coming years.

In the absence of markets for many FES, the values that people place on these services remains 'hidden' from economic transactions. This market failure is often used as justification for government action to take correcting

actions. If governments are to make informed decisions about how to support an appropriate level of FES, they require information about the economic values associated with these services. Hence, it is important to identify the values people attribute to different forest ecosystem services, and to define policies to establish potential implementation mechanisms. As noted above, different nations and regions may prioritise different ecosystem services, depending on how local populations appreciate these services. Good technical guidance can help to decide how to implement valuation studies (e.g. by DEFRA) and how to deliver such values, including the vital step of identifying the beneficiaries of FES and, therefore, potential demand for them.

However, several questions arise, the answers to which could contribute to a better establishment and implementation of procedures:

- How well does the policy stimulate the creation of or investment in ecosystem goods and services?
- In how far does it regard possible conflicts between different ecosystem services?
- Is the policy designed to replace lost ecosystem services?
- Is it designed to prevent future losses? How does the policy stimulate participation in the creation, restoration, and protection of ecosystem services on public and private lands?
- How does the policy generate new private-sector revenue sources for conservation, thereby enhancing market participation?

### 3.2 Practical barriers to a broader consideration of monetary valuation of FES

A number of barriers exist to the consideration of monetary valuations and the implementation of their results in policy decisions.

- A "cultural" barrier is that considering economic approaches for solving environmental problems is generally seen with some reservations in several European countries. Hence, there is less experience with economic valuations of environmental services in these countries (apparently there are fewer economic valuations of FES for example in the German speaking countries than in the UK or in Scandinavia).

- There are also some basic methodological barriers. As yet, there are no generally accepted procedural rules for monetary valuations of FES which would allow for a simple "cookbook approach". Rather, economic valuation uses a variety of approaches and methods, which have to be specified for each application. This diversity is an inevitable consequence of the diversity of FES and conditions under which they are provided, and also because of the academically contested nature of how valuations may best be carried out. Some methodological details remain open to debate, for example when non-use values are involved. The methodological complexities of valuation studies can result in widely varying estimates, even when valuation contexts are similar. Bias can often feature in this type of work.

- Political barriers are also relevant. It can be much easier to communicate political decisions based on 'real money' than on what some see as intangible and nebulous values based on the consumer surplus concept.

When interpreting the results of valuation studies, it is important to keep in mind:

- for what purpose the valuation is needed (liability, property rights distribution, command-and-control policy, incentive approaches – see above);
- what characterizes the services in question and which elements of total economic value have to be considered (e.g. do non-use values have to be considered?);
- what role the economic valuation has to play in the decision process;
- and finally, what alternatives to economic valuation exist in the decision-making process (including the any problems relating to these alternatives).

These factors mean that different studies may have very different requirements with respect to the accuracy of economic valuations. While a court having to decide about monetary compensation for an environmental damage is bound to specify the compensation amount exactly (which is far more common for American than for European courts), other cases may not require the same level of precision (e.g. decisions about whether to establish a protection area like a biosphere reserves or a national park, or about public infrastructure projects). In many cases, even a mere comparison of orders of magnitude might lead to unambiguous results.

The type of service to be valued and the function of economic valuation in the decision-making process are also important. Unresolved methodological issues may, for example, be especially important in relation to estimating non-use values, particularly where such non-use values are quantified separately (e.g. when determining the bequest value of a national protection area). But in many cases, such problems are relatively minor. A robust evidence base has developed in some countries, for example, on the (use) value of forest recreation. Moreover, the function of economic valuation in the decision process has to be taken in to account. Economic valuations provide information to inform decisions, but they do not determine such decisions.

The most important question, however, remains "What are the alternatives?" Criticising monetary valuation is easy as long as there is no requirement to present constructive alternatives which are subject to equal levels of accuracy. Relying simply on expert judgement or negotiations between the most influential communities of interest may not provide an adequate substitute for verifiable values which a population assigns to the environmental services of forests.

### 3.3 The need for quality criteria for economic valuations of FES

To achieve a broader consensus about the use of economic valuations of FES in Europe, it seems necessary to identify agreed and workable quality criteria. Otherwise, it may not be possible for the users of such valuations to spot inappropriate or poor quality studies, or to assess the influence of possible methodological deficiencies on the results. A catalogue of broadly accepted and useable criteria could provide the basis for carrying out quality assessments; for example, as presented by the Swedish Environmental Protection Agency<sup>13</sup> and by the European COST Action E45.<sup>14</sup> These criteria would not necessarily be intended to become norms for "ideal" valuations because costs could escalate accordingly. Rather, they would serve two purposes. First, they should ensure the transparency of results, and second, they should set minimum standards in order to prevent abuse of valuation techniques and misinterpretation of results. Transparency requirements include publicly accessible documentation of methods, data and results. For survey based valuations, for example, this covers:

- the wording of the questionnaire used (specifically, the valuation questions), possibly including visual aids (background information, maps etc.);
- a detailed description of the data gathering process (sampling procedures), including information about refusals and how they are incorporated into the analysis;
- relevant details of data manipulation (e.g. how protest votes were distinguished from genuine zero willingness-to-pay); and,
- stochastic reliability measures (random error, variation coefficients, coefficients of determination in regressions, etc.).

<sup>13</sup> Söderqvist, T., Soutukorva, Å., 2006. An instrument for assessing the quality of environmental valuation studies. Naturvårdsverket (The Swedish Environmental Protection Agency), Stockholm; Söderqvist, T., Soutukorva, Å., 2009. On how to assess the quality of environmental valuation studies. *Journal of Forest Economics* 15, 15-36.

<sup>14</sup> Riera, P., Signorello, G., 2012. Good practice guidelines for the Non-market valuation of forest goods and services. Cost Action E45 European Forest Externalities, Catania; Riera, P., Signorello, G., Thiene, M., Mahieu, P.-A., Navrud, S., Kaval, P., Rulleau, B., Mavsar, R., Madureira, L., Meyerhoff, J., Elsasser, P., Notaro, S., Dragoi, S., 2012. Non-market valuation of forest goods and services: Good practice guidelines. *Journal of Forest Economics* 18, 259-270.



### 3.4 Practical support for facilitating the use of economic valuations of FES in a European context

Experience and expertise in using of economic valuations of FES varies considerably across European countries. Several countries have a relatively long tradition in demand-based economic valuation of environmental goods (e.g. UK, Scandinavian countries). In other countries, valuation approaches are quite new. As a result, knowledge about methods as well as knowledge about the value of specific FES is distributed unevenly across Europe, and many knowledge and data gaps exist. The development of support tools to facilitate the use of economic valuations of FES could be a useful means to fill these gaps. These might include the following measures:

- Improving access to existing valuations. Publicly available meta-databases of valuation results can facilitate access. Such meta-databases do exist, but many of them are outdated, do not cover methodological details, and/or do not focus on forests or on countries within Europe. The most comprehensive valuation database (the Environmental Valuation Resource Inventory) suffers less from these problems, but is not generally accessible (most European countries except the UK and France do not have access to EVRI at present). As a possible solution, EVRI access could be opened generally to European countries. Alternatively, it might be sensible to extend other meta-databases in order to cover the needs of FES valuation (an example is a FES database which was initiated as part of the European COST action E45)<sup>15</sup>.
- Better use of existing data on FES values. Value Transfer approaches and the mapping of ecosystem values can help to make better use of data which are already available; for example, by transferring valuation results obtained at specific sites to other suitable sites where such values are still missing. A prerequisite for such Value Transfers is to develop commonly accepted transfer protocols, and to solve scaling or aggregation problems which become apparent e.g. when transferring local case study results to greater regions (or vice versa).
- Filling knowledge gaps. Even though Value Transfers can help to provide estimates of FES values to be made in cases where original valuations are not available, a sufficient base of original and up-to-date valuations remains a fundamental need. Such valuation studies can be costly and, therefore, require adequate resources.
- Enabling knowledge transfer: Methodological knowledge transfer and capacity-building might be necessary specifically for countries who have not yet

have gained much experience in the application of environmental valuations.

## 4. Means to facilitate implementation of valuation of Forest Ecosystem Services in the pan-European region

### 4.1 National Forest Programmes

At a strategic and policy level, National Forest Programmes (NFPs) can use FES valuation to create comparable and strategic frameworks that can be used to develop mechanisms to put such values in to practice, for example through market-based instruments. NFPs can use this valuation in several ways, including:

- identifying the geographical distribution of the main FES in order to assess resource allocation to ensure the protection (and possible compensation) of the ecosystem services in different regions;
- comparing their content among different European states or simply following the evolution over time in how countries value and implement the provision of FES.
- setting out frameworks and principles for developing mechanisms to implement FES values.
- providing data on FES values to feed into policy documents and accounting reports – thereby enabling, for example, comparisons with expenditure on forest conservation and management.

Using FES values in these ways reinforces the evidence base supporting the forest sector and offers the sector the opportunity to be compared with other sectors that routinely provide measures of their usefulness to society.

More accurate criteria and mapping of their FES within countries is also important. This provides evidence on the services provided at national, regional and local levels, and helps to underpin policy mechanisms designed to provide these services 'on the ground'.

### 4.2 Market based instruments<sup>16</sup>

In the past few years, Market-Based Instruments (MBIs) have been increasingly recognised as important policy mechanisms for achieving environmental protection goals. This is particularly so where regulatory approaches have failed to prevent ongoing degradation or where the cost of traditional policy tools is proving prohibitive to government or society in general. MBIs can be broadly defined as mechanisms that encourage behaviour (e.g. provision of ecosystem services) through market signals (i.e. prices) rather than through explicit directives, and in the process capture the value of environmental goods and services.

<sup>15</sup> Elsasser, P., Meyerhoff, J., Montagné, C., Stenger, A., 2009. A bibliography and database on forest benefit valuation studies from Austria, France, Germany, and Switzerland - A possible base for a concerted European approach. *Journal of Forest Economics* 15, 93-107.

<sup>16</sup> Study on the Development and Marketing of Non-Market Forest Products and Services (DG-AGRI, European Commission, 2008)

It is often argued that well-designed markets are an efficient means of allocating economic resources. MBIs have two potential cost advantages over more traditional instruments. First, they allow different private sector players to make different adjustments to reflect their particular business structures and opportunities. Second, incentives within markets to discover less expensive ways to achieve outcomes provide dynamic ways of reducing the future costs of achieving targets.

There is still limited experience of using MBIs to deliver FES. MBIs have limitations and their implementation can be costly and difficult. Effective standards may need to be applied in order to ensure that the incentive to cut costs does not undermine the quality of the services provided. However, as stated earlier, estimating FES values has an important role to play in developing MBIs and can provide vital evidence to ensure investment of the private sector in schemes to deliver FES. The following sections give a short summary of several possible ways to do this.

#### **4.2.1 Payment for Ecosystem Services (PES): a key MBI**

The term, PES, has been defined in various ways but in general it refers to situations where an agreement is made for the users, or beneficiaries, of an ecosystem service to pay the provider(s) of that service. Some studies exclude environmental taxes and subsidies from its scope but this paper adopts a broad definition which includes these instruments.

A review by IDDRI (Institut du Développement Durable des Relations Internationales) of academic literature about PES examined common characteristics of PES mechanisms, grouping them as follows.

- 'Coasean-type agreements'<sup>17</sup>, based ideally on spontaneous transactions (free of public intervention) involving exchanges of rights in response to a common interest of the beneficiaries and providers. These require clear allocation of property rights, are highly site-specific and are difficult to replicate on a large-scale. Usually they are of a case-specific contractual nature. Examples include:
  - o direct payment schemes (Wunder 2005)<sup>18</sup>- based on a willing buyer-willing seller model, where the

sellers deliver the desired outcome (environmental service) in exchange for a pre-negotiated cash or in-kind payment.

- o conservation easements - a power invested in a qualified private land conservation organisation (often called a 'land trust') or government (municipal, county, state or federal) to constrain the exercise of rights to a specified land area otherwise held by a landowner so as to achieve certain conservation purposes.
- o conservation concessions - management contracts between a government or community landowner and a conservation-minded buyer. They offer a novel way for conservation interests to compete directly with commercial interests. A concession reaps revenues, making it appealing to host governments. And unlike a park, or an easement, which can lock up land forever, a concession is temporary, albeit renewable.
- 'Regulatory price changes', based on regulatory measures that lead to higher or lower relative prices. Unlike coasean-type agreements, these are based on an existing market and might be part of a fiscal policy (including subsidies) with environmental objectives and under the control of public authorities. Typical examples are:
  - o 'Eco-taxes' - promoting ecologically sustainable activities through economic incentives based on tax exemption or tax deduction.
  - o 'Agri-environmental measures' - providing payments to farmers who subscribe, on a voluntary basis, to commitments to preserve the environment and maintain the countryside.

One of the main conclusions of the IDDRI study is the complex and multi-dimensional attributes of PES. Bearing this in mind, it would be worth considering establishing a common framework or a set of guidelines for setting up local, regional or national PES systems. In the UK, for example, the Department for Environment Food and Rural Affairs has produced guidance on setting up PES schemes. Wide-ranging issues need to be examined in drawing up such guidance, including the types of services and any co-benefits, geographical scope, stakeholder and expert involvement, legal and policy frameworks, tenure and property rights and monitoring, reporting and verification mechanisms.

<sup>17</sup> In law and economics, the Coase theorem describes the economic efficiency of an economic allocation or outcome in the presence of externalities. The theorem states that if trade in an externality is possible and there are no transaction costs, bargaining will lead to an efficient outcome regardless of the initial allocation of property. In practice, obstacles to bargaining or poorly defined property rights can prevent Coasian bargaining. This "theorem" is commonly attributed to The University of Chicago's Nobel Prize laureate Ronald Coase. (Coase Theorem, Wikipedia)

<sup>18</sup> Wunder's (2005) definition of payments for environmental services: "a voluntary transaction where a well-defined service (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: 3)

#### 4.2.2 Other marketed based instruments

IDDRI also identify other MBIs which have not been as regularly associated with the concept of PES. These cover 'commodity markets schemes', such as tradable permits and direct markets, and also 'competitive selection' instruments or 'voluntary price signals'. These instruments can be categorised as follows:

- Direct markets - These include market exchanges of genetic resources, non-timber forest products (NTFP) or eco-tourism, and are based on markets where environmental products can be directly traded between producers and consumers (or processors).
- Tradable permits - These rely on specially-designed markets where users of an environmental resource purchase 'permits to pollute' that can be further exchanged among resource users. Restrictions on the number of permits create 'artificial scarcity' which increases their price and incentivises actions to reduce pollution. In principle, this approach is designed to either serve a clear environmental objective (with bio-physical indicators) or be based on acceptable social costs (e.g. market price for carbon). A specific market is created for a given environmental objective and information is expected to be revealed. Significant examples of this tool are mitigation banking for biodiversity, emission quotas in the European Emissions Trading Scheme, Individual Transferable Quotas for fisheries, tradable development rights for land, and voluntary carbon markets.
- Reverse auctions - This is a mechanism whereby potential providers of a service propose prices for providing them in response to a call by public authorities to remunerate landholders. They create an auction-based market that favours competition among bidders for achieving cost-efficiency, as they are aimed at revealing prices and avoiding free-riding and rent seeking. Examples are the BushTender in Australia and the Conservation Reserve Program in the US.
- Eco-labelling and certification mechanisms - These are based on voluntary price signals and involve schemes whereby producers send signals to consumers that environmental impacts are positive (in relative terms) and consequently gain a premium on the market price. These tools use existing markets to identify and promote virtuous activities but are still limited as an incentive due to relatively low willingness to pay extra by consumers. Well-known instruments are forest certification and labels for organic agriculture.
- Green bonds - These are issued to finance sustainable development activities, ideally providing investors with independent assurance of environmental and

social benefits. There is a wide range of buyers of such bonds across the world. As the number of organisations seeking to issue green bonds increases over time, more standardised approaches to validating and verifying environmental and social performance will be required. The Climate Bonds Initiative is an example of green bonds in the climate change arena - it is an investor-focused not-for-profit initiative that aims to attract finance into investments that contribute to climate change mitigation.

The appeal of some of these instruments has been seen across the globe. There may be of value in examining any innovations in thinking and practice which they show, considering the potential to apply such ideas to ecosystem goods and services in Europe.

#### 4.2.3 Fostering demand for FES at market level

A number of questions have to be taken into account when examining the possible use or implementation of MBIs. For example, how can market demand be stimulated, how can the supply of ecosystem services be assured to meet demand?

Demand for FES conservation and restoration is constrained by an absence of specific regulatory standards and/or incentive programmes. Mechanisms to strengthen demand could potentially include, but are not limited to, the following:

- the creation or tighter standards, subjected to certain corporate reporting requirements
- the consistent enforcement of existing regulations.
- the alignment of taxation to favour the protection of ecosystem services.

On the other hand, some existing environmental programmes do not fully promote opportunities for the private sector to increase the supply of ecosystem services. Investments to mitigate climate change, for example, often occur on a project-by-project basis, limiting opportunities to direct investments more strategically. The supply of ecosystem services could potentially be enhanced in the following ways:

- Using existing programmes and environmental penalties to steer funds into a common pool for investment in the protection and restoration of priority ecosystem services.
- Developing credit registries to bring buyers and sellers together, and enhance market transparency.
- Facilitating the aggregation of ecosystem benefits.
- Providing clarity and/or rules for programme participation, for example in relation to measuring baselines and setting performance requirements.

Some ecosystem service markets have been constrained, in part, by an absence of metrics and accepted equivalencies. In other instances, regulators have required the use of specific technologies (e.g. stormwater pipes and tunnels, mechanical wastewater treatment, or specific wetland restoration techniques) rather than outcome performance goals to achieve environmental results. These technology prescriptions can increase the costs of participating in mitigation banks, water quality programmes, or other environmental initiatives and limit innovation. Mapping and identifying priority areas for investment is often also lacking. Options to enhance efficiency might include the following.

- Developing outcome-based performance measures where they do not currently exist and facilitating access through online tools.
- Developing monitoring protocols and tools to facilitate market implementation and the verification of ecosystem service outcomes.
- Creating 'reverse auctions' for ecosystem services payments to attract lowest-cost environmental outcomes.
- Direct payments for, or procurement of, ecosystem goods and services.
- Indirect incentives and disincentives such as fiscal measures, legislation and the provision of technical or social services.
- Allowing the use of offsets, i.e. transactions in which environmental restoration or pollution abatement in one place is used to compensate for negative environmental impacts elsewhere.
- Establishing group permits or 'permitting bubbles'; a US practice where policy enables emissions sources to meet emissions standards by aggregating multiple individual emissions points, treating them as a single emissions source and determining where and how to achieve emissions abatement within the overall bubble.
- Introducing cap-and-trade markets (a.k.a. emissions trading), a market-based approach used to control pollution by providing economic incentives for achieving reductions in the emission of pollutants.

A further consideration concerns recent work to develop ways to value natural capital and ecosystem services in national and corporate accounts. The United Nations has played a leading role in this area through the development of "The System of Environmental-Economic Accounting (SEEA)". This

contains internationally agreed standard concepts, definitions, classifications, accounting rules and tables for producing internationally comparable statistics on the environment and its relationship with the economy. SEEA has been extended to the development of experimental ecosystem accounting. Accounting for natural capital/ecosystem services could have major implications for how Governments and businesses view the role of ecosystems in supporting sustainable economies and companies. Through showing the costs and risks of ecosystem decline, it has significant potential to incentivise practices that protect and maintain ecosystems.

## 5. Financing mechanisms for non-market forest services

Numerous analyses have found that non-market forest goods and services value far above any value paid for them in markets and consequently that their supply may not meet social demand. Therefore, it is important to explore possible financing instruments which focus on supporting such goods and services.

Financing mechanisms can be *public mechanisms*, such as taxes, fees and charges or subsidies; *mixed public/private mechanisms*, such as public-private partnerships (PPP), public-private contracts, tradable permits and cap-and-trade schemes; or *private mechanisms*, such as the purchasing of goods and services (including licenses and entrance fees), land purchasing, eco-sponsoring, donations and gifts, and trade in certified goods.

Within the European Union, various funds have helped to support FES projects. In the period 2007-2013 programming period, these included the European Agricultural Fund for Rural Development (established by Council Regulation 1698/2005), the Life+ programme, the European Regional Development Fund and Cohesion Fund.

There has been considerable expansion in recent years in green investment markets, for example through green bonds and a growing number of investors who seek social and environmental returns from their portfolios.

In addition to creating new sources of funding for the conservation, restoration and valuation of FES, and enhancing efficiency in the allocation of natural, social and economic resources, financing mechanisms have further benefits. They can be used to raise awareness about the value of FES, they can help to resolve conflicts and achieve consensus between different stakeholders, and they can create indicators for the relative importance of natural resources by means of the valuation of environmental services.

## 6. Conclusions

- Economic and business accounting<sup>19</sup> and markets currently fail in large part to account for the value of nature. In the forest sector, for example, timber is valued but the role of woodlands in CO<sub>2</sub> emissions abatement (despite a limited carbon market), flood alleviation, water quality, biodiversity and others remains largely unvalued. This offers little incentive (financial reward) for forest owners, businesses or individuals to invest in these important services provided by woodlands. New practices are being advocated to address this problem; for example, through modified forms of accounting, and through payments for ecosystem services.
- Information about the values of environmental services of forests is needed for various national policies, including liability laws, the formulation and distribution of property rights, the adoption of command-and-control approaches as well as for the establishment of economic incentives.
- Economic valuation approaches offer a useful way of identifying the values people place on these services where they are not valued in markets.
- Various practical barriers exist against the wider use of monetary estimates of the values of FES. These are of cultural, methodological policy-related origin. A helpful step would be to establish a set of quality criteria for carrying out economic valuations, taking account of the different approaches which can be used.
- The use of economic valuations of FES in Europe can be facilitated in various ways: by supporting access to existing valuations (using or expanding respective meta-databases); by making better use of the existing information (resorting to Value Transfer approaches); by filling knowledge gaps (providing necessary resources for valuation studies where such primary studies do not exist), and by enabling knowledge transfer between countries.
- Various governments have placed increasing attention in policy to non-market forest goods and services and an increased use of market mechanisms in their financing. Such mechanisms are broad-ranging, including tax systems, subsidy allocations and the creation of markets through cap-and-trade regimes.
- There is scope to consider whether some market mechanisms which have been developed for certain goods or services could also be applied to others in future. In addition, as certain mechanisms are better developed in some countries but not well known in others, a cross-border exchange of experiences might give the impetus for the further development of existing instruments. Such knowledge exchange can also help to improve the application of different mechanisms, and enhance their efficiency. Of course, any introduction of new mechanisms would require the involvement of the relevant public and private stakeholders.
- Further potential exists to use market mechanisms to deliver FES, partly by improving their design and implementation. Involving relevant stakeholders and experts is key. There is a need for more pilot projects to test whether new market-based approaches can work in practice. Understanding is still relatively limited so there is also a need for more research and analysis to provide an evidence base for taking forward market approaches.
- Strategies for increasing the marketing of forest goods or recreational and environmental services are well developed in the literature but not extensively applied. There are unused market potentials without a need to change the institutional frameworks.
- Private financing mechanisms for FES are not regularly used by the land-owners, even where there are no institutional barriers to their use. This suggests that such services are generally not seen as relevant business fields for forest owners.
- Systematic knowledge on new private financing mechanisms is lacking. A number of successful examples for the application of new market-based instruments show potential for supporting non-market forest goods and services. Although such new financing mechanisms seem promising, they remain relatively rare and have not been extensively studied. Their real potential and limitations cannot, therefore, be assessed reliably. This lack of knowledge includes questions about the role of institutions in the development of market-based instruments and in the support of innovation processes.
- Integrating nature into accounting and markets offers opportunities for new revenue streams for woodland owners, and potential for forestry to play a mainstream role in services such as carbon sequestration, flood alleviation and water quality protection. It also recognises the multi-functional role of sustainable forest management, and the wide-ranging contribution of woodlands to rural and urban development.

<sup>19</sup> e.g. Gross Domestic Product accounts and company financial accounts



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# WORKSHOP ON A PAN-EUROPEAN APPROACH TO VALUATION OF FOREST ECOSYSTEM SERVICES

The workshop was held in Belgrade, Republic of Serbia, on 24-25 September 2014. Looking forward to an efficient Workshop that would contribute to the mentioned pan-European vision, mission, goals and targets for 2020, it was considered appropriate to put the focus on experience sharing, mainstreaming of Valuation of Forest Ecosystem Services (VFES) within forest policies and overcoming technical (and other kind of related) difficulties.

In order to help increase the knowledge on ongoing initiatives and projects **the 3 sessions during the first day were planned to be a framework for sharing, learning and discussing pan-European experiences** in the field of Valuation of Forest Ecosystem Services and its implementation mechanisms, bearing in mind the policy makers as the final stakeholders.

*Session 1* was devoted to the Presentations of the work developed by the Expert Group of Valuation of Forest Ecosystem Services. Leaders of the three Subworking Groups of the EG presented the outcomes of the work to the audience of the Workshop. Their reports are the base of this conclusive document of FOREST EUROPE along with the outcomes and recommendations of the Workshop.

*Session 2 and Session 3* were conceived in a Round table format, focused each of them on sharing experiences and examples of VFES within the pan-European Scope and Regional level (Session 2) and at National level (Session 3).

On the second day of the workshop participants split into two working groups, focusing on different factors. *Working Group 1* worked on the “mainstreaming Valuation of Forest Ecosystem Services in National Forest Policies” while *Working Group 2* debated on “overcoming difficulties in Valuation of Forest Ecosystem Services and applying valuation results for financing FES”.

At the end of the morning there was a final session in which the outcomes and conclusions of both working groups were shared and discussed.

During the evening of the first day of the Workshop, participants were invited to boat trip through the Sava and Danube rivers around the fortress of Belgrade and a traditional Serbian dinner by the river kindly offered by the authorities of the Ministry of Agriculture and Environmental Protection.

## Work Sessions

Mr. **Atila Juhas**, Secretary of State of the Serbian Ministry of Agriculture and Environmental Protection opened the Workshop and welcomed the participants to a fruitful meeting over a challenging yet crucial thematic like the Valuation of Forest Ecosystem Services is.

Ms. **María Tourné**, Head of the Liaison Unit Madrid co-chaired the meeting with Mr. **Predrag Jovic**, Senior Adviser of the Serbian Ministry of Agriculture and Environmental Government. Ms. Tourné thanked the Serbian Government for hosting this Workshop which she saw substantiated, among other reasons, on the premise of the existence of scope to consider whether some market mechanisms, that have been developed for certain goods or services, could also be applied to others in the future. In addition, as certain mechanisms are better developed in some countries but not well known in others, a cross-border exchange of experiences might give the impetus for the further development of existing instruments. Such knowledge exchange can also help to improve the application of different mechanisms, and enhance their efficiency. She finalized remarking that any introduction of new mechanisms would require the involvement of the relevant public and private stakeholders. Ms. Tourné introduced each of the speakers in due course.

### SESSION 1: PRESENTATIONS OF THE WORK DEVELOPED BY THE EXPERT GROUP OF VALUATION OF FOREST ECOSYSTEM SERVICES

The first panellist was Mr. **José Ignacio Barredo**, from the Institute for Environment and Sustainability (JRC-IES) of the European Commission and leader of the Subworking Group 1, who presented the results of the Group that dealt with a **functional classification and list of forest ecosystem services** (see pages 44 to 47). In his presentation, he insisted that classifications of Ecosystem Services (ESS) show many similarities (MA, TEEB and CICES), **but none fits all perfect classification of ESS as it depends on the purpose**. He emphasized the challenging question of studying ecosystems from a human-centred perspective. On the classification of FES, it is crucial understanding the multifunctional role of forest for delivering multiple services (direct and indirectly). Also for the classification of FES, several approaches have been proposed pursuing different aims but, again, there is no consensus on a unique universal framework, as they have been elaborated for different reasons. The group he is now collaborating with, MAES<sup>20</sup> (EU Commission Working Group on Mapping and Assessment of Ecosystems and their

Services) uses the MAES- CICES classification based on 5 hierarchical levels and three main sections (provisioning, regulation and maintenance and cultural services). He finalized reflecting on **additional challenges, like the definition of the “true value of ecosystem services”**, and the opportunity that means that different valuation methods produces different results as a way to detect uncertainties (and the need communicate them).

The second panellist was Ms. **Katerina Ventrubova**, from the Czech Republic, that being the leader of the Subworking Group 2 introduced the audience into the outcome of the Group who worked on preparing a **Toolbox with valuation of FES approaches to the pan-European region** (see pages 48 to 49)<sup>21</sup>. Ms. Ventrubova explained that there are many several methods and different approaches and scopes, however, she recommended two types: **“Preference based valuation methods”** and **“Cost based methods”** conscious that **no method fit for all the valuations**. The toolbox includes the different approaches for the two types of methods, a short description of each of them, its suitability for the service to be valued and a list of *pros and cons* of its implementation. She acknowledged that estimating the value of the various services and benefits that ecosystems generate may be done with a variety of valuation approaches, as hybridizing approaches could help to overcome disadvantages of some particular valuation methods. Among the caveats she warned about, she highlighted the important share of subjective factors that surrounds the valuation of forests services of a non-market nature, which cannot be easily controlled. She recognized that valuation techniques, in general, and preference methods, specifically, are affected by uncertainty, stemming from gaps in knowledge about ecosystem dynamics, human preferences and technical issues in the valuation process, and agreed to the need to include uncertainty issues in valuation studies and to acknowledge the limitations of valuation techniques in situations of radical uncertainty or ignorance about regime shifts.

Some participants inquired about the specific election of the typology of methods, which is not the usual. There was agreement in the room that preferable methods are those which give a broader picture, and Ms. Ventrubova believes in such categorization as a contribution by the subworking group to the traditional VFES scope.

20 Further information about MAES project was delivered under the first two presentations of Session 2, both by Mr. Strahil Christov and Mr. Jose Barredo.

21 LUM strongly recommends to consult the documents of the outcomes of the 3 Subworking Groups (pages 23-44) as a support to the presentations by the leaders presentation.

The following speaker was **Mr. Pat Snowdon** from the Forestry Commission of the United Kingdom. As he was the leader of the 3rd Subworking Group he presented the outcome on the *Means to facilitate implementation of the Valuation of Forest Ecosystem Services*. He clarified the concept of the word “Implementation” as encompassing “Enabling the use of methods to value FES” and, “Capturing FES values on the ground”. He understands valuing ecosystem services as a mere decision tool, not a final purpose per se. In enabling the use of methods to value FES, Mr. Snowdon centred the attention in the potential contribution of the policy approaches and the existing barriers, stating that **“Pan-European approaches to valuation and implementation are really challenging”, proposing improvements in the quality of the criteria and data, access to existing valuations and technology transfer.** Regarding the payment for those FES, he informed about the requirements for the “creation of new markets” and reviewed the “existing market based instruments”, centring his attention on PES (Payment for Ecosystem Services).

Mr. Snowdon presented the practice guide on how to design and implement PES published by the UK Government (5 phase plan). He proposed the following roadmap for developing a woodland ecosystem market: *understand the opportunities* (as a stronger evidence base is needed, existing and new research and experiences should be reviewed and analysed), *build capacity* (based in the collaboration of different actors recommending an outward focus) and *apply* (which must rely in fiscal policies, standards that will give confidence to business, and the importance to report the benefits and practical examples). In addition to his conclusions on economic valuations and market based approaches, he highlighted that **National Forest Programmes have significant potential to support means to implement the valuation of forest ecosystem services.**

Responding to the questions from the floor, Mr. Snowdon declared he was optimistic over the growing engagement of the private sector on the payment for ecosystem services. In the UK, they started with the carbon market and are trying to expand it to water production.

## SESSION 2: ROUND TABLE ON SHARING OF EXPERIENCES AND EXAMPLES OF VFES WITHIN THE PAN-EUROPEAN SCOPE AND REGIONAL LEVEL

**Mr. Strahil Christov**, representing the DG Environment of the European Commission, opened the session 2 to inform about the “EU Action on Forests and Valuation of Ecosystems”, starting on the EU Biodiversity Strategy to 2020, a long-term vision for 2050, with an immediate headline target about halting the loss of ecosystems and restoring them by 2020. The Strategy enhances the contribution to forest services and financing

instruments like PES.

He explained that though there is no provision for a common forest policy in the Treaty, many EU policies affect forests and forest-based sectors. The EU Forest Strategy is not enforced by legislation or regulation; it is of a horizontal nature and tries to influence the different policies.

**One of the measures of the EU Biodiversity Strategy directly related to FES (action 5) requires improving knowledge of ecosystems and their services in the EU.** Member States are asked to map and assess state of ecosystems and their services by 2014, to assess their economic value and promote the integration of these values into accounting and reporting systems at EU and national level by 2020. So, as the first step, the **EU Commission launched a Working Group on Mapping and Assessment of Ecosystems and their Services (MAES)** to address a set of 6 pilots, one of them being focused on “forest ecosystems”.

Due to his expertise in the matter, **Mr. Jose Ignacio Barredo** continued on Mr. Christov’s presentation and explained the approach on the pilot on Forest Ecosystems of the MAES. The essential task is to identify available knowledge that can be used to map forest ecosystems and assess their condition and the services, and so countries receive “blanc matrixes” to fulfill describing the different services delivered. This is the base for creating the MAES “cards” summarizing table that includes a set of indicators. The outputs of the whole exercise include: a report **“Indicators for ecosystem assessments” (MAES, 2014), a list and assessment of available indicators for forest ecosystem services** (mapping and assessment, like datasets, maps, statistics, gaps, common framework...) as well as an agreement on a comprehensive, operational and widely accepted classification (CICES) and list of forest ecosystem services. Contemporaneously with the Belgrade’s Workshop on Valuation, more information about forest condition and forest biodiversity was being collected and treated and, together with the information related to FES, is to be linked with the socio-economic benefits provided by forests. Mr. Barredo explained a case study on the “multifunctional forest ecosystem”: how first MAES maps the main services, secondly an economic value is given to each of the map pixels, and finally the maps are integrated into a sole informative map.

The audience asked on MAES’ intention to look at trends, to which Mr. Barredo replied that though MAES is now a current picture, towards the deadline 2020 other values will be considered and they will be based on models (forest fragmentation, desertification, climate change etc.) and, on the other hand, since countries are obliged by the Habitat Directive to inform about the state of biodiversity every 5 years, information about trends will be easy to incorporate (and disseminate to policy makers)

The third panellist of the session was **Mr. Robert Mavsar**, Head of Programme of the European Forest Institute (EFI), who centred his presentation in the “Findings and Challenges of Valuing Forest Ecosystem Services”. He started by briefly presenting the EFI project NEWFOREX “New Ways of Valuing Forest Externalities”, as the continuation study of FORVALUE that deepens into the instruments and methods. One of the key issues is to be clear on who are the providers, and what are they willing to provide. The forest-owner face two different scenarios: the “win-loss scenario”, with different options to manage his land (intensively for maximum profit at the expense of losing different ES), and the “conservation incentive scenario” (less intensive or no management of the land) but less beneficiary for him unless he is compensated. The payment mechanisms need to be analyzed, and so it is also important to learn how ecosystems are functioning, what are they providing, how can this be quantified. In addition to this, it is advisable to have measurable goals, and to monitor the efficiency of the implementation of any policy targeting of ES, for progressing towards balanced policies that takes as much services into account.

He claimed that communication is essential in every respect, and **valuation is a very good tool to communicate the benefits provided by forests**. Society is one of the main targets (“raising awareness”) as its support it's important for backing up the policies that need to be developed. Also forest owners are another target, and he advocates for a two-way transfer of information with them, so they will not feel as losing their autonomy on deciding how to manage the ecosystems, and as a way to engage them in a transparent process with clear information.

He recommended assessing the value of small-scale changes (marginal changes) in ecosystem services as a way to capture the different cultural values and social schemes and take into account when drafting the payments in return. When talking about large scales, the scenario changes into “subsidies”. Also, as environmental policies have distributional effects some people win more than others – and others again may lose. These differences are not trivial but likely to have high policy relevance. He finalized regarding payment for ES as a complex matter since there are a lot of conditions that have to be taken into account: people can engage in this mechanisms for shorter or longer periods, for instance; or who should pay for the provision of the FES: society (Government), the direct beneficiary, etc.

To the floor question on how to address the “property right” concept (“trade” goods or services to people

that believe they already own), Mr. Mavsar responded that he definitely saw a role of the Government in the equitable distribution of those services. When he was asked specifically on a possibly decrease of role of the Government in favour of a more participative private sector he advocated for combining both forces currently, and for raising awareness (via cross-sectoral communication) towards capturing future private investments.

Finally, **Ms. Kavita Sharma**, representing The Economics of Ecosystems and Biodiversity Initiative (TEEB), made a presentation on “TEEB Implementation - Rooting valuation in policy”. Ms. Sharma introduced the TEEB and its work focused in country level engagements, and the inherent process. She insisted in rooting valuation to be consequential in policy, also at pan-European level, possibly at a more decentralized level of governance. She showed the TEEB's approach to valuation of Ecosystem services: 1) Recognition of value (at a basic level) 2) Demonstrating value – an economic value can make a case for economic instruments such as certification 3) Capturing value – where someone pays for the service (PES). Most of the countries she works with are still in the 1st phase.

Within the pan-European region, Georgia is considered a pilot country for TEEB and a coping study reviewing four economic sectors, including environment, was delivered in 2013, highlighting the importance of ecosystem services in economic sectors. There are facts related to forests (% forest cover, pressures on forests etc) on which TEEB could not act but are useful for elaborating accurate questions to be address within the process and hence, obtain better results. She finalized by pointing out **some issues specially inherent to the pan-European region and that may definitely facilitate the implementation of VFES, like the existence of forest management plans**.

In general, the subsequent debate after Ms. Sharma's presentation revolved about the **difficulty of the valuation of biodiversity and its benefits** (including ecosystem stability to hazards and contribution to resilience). It was noticed that in Europe the approach to the concept of biodiversity is multifunctional, while as TEEB is in principle more focused on the tropical areas, its point of view on biodiversity is much more related to the alternative “protection/conservation” vs. “the use of it”. On the other hand for MAES, biodiversity is not understood as a function but as a feature of the forests that provides more and better ecosystem services. It was generally acknowledged that working on the valuation of biodiversity at local level is definitely more advisable that at larger levels.



### SESSION 3 ROUND TABLE ON SHARING OF EXPERIENCES AND EXAMPLES OF VFES AT NATIONAL LEVEL

The order of intervention proposed for the seven speakers representing different pan-European countries follows the sun path route: from east to west.

The first speaker was **Mr. Artti Juutinen**, from the Forest Research Institute of Finland, who introduced attendants to “Valuing benefits of recreation-oriented forest management: state-owned commercial forests in Finland”. The audience learned that 35% of forestry land in Finland is owned by the State, and managed by “Metsähallitus”, who remits the profits from forestry to the government. This land, aside from commercial timber and other material production, it also provides environmental services and host over ten million close-to-home recreational visits annually (every man’s rights). Metsähallitus applies specific practices to enhance recreation, including buffer zones along lakes, rivers, and hiking trails to preserve the wooded scenery. The profits from timber sales are estimated to be reduced by over ten million Euros annually because of the recreation-enhancing practices, so due to the absence of market signals available to motivate and guide the managers to produce different services efficiently, a research was conducted trying to answer questions such as **“do the aggregate benefits from the recreation oriented management regime as a whole exceed the associated opportunity costs?”**. The concluding remarks showed that **benefits exceed the opportunity costs** (€13 million/year) but the study also noticed some difficulties by respondents to correctly considered FES (or forest management activities) and the risk of “double counting” (see page 17) when considering several FES at the same time.

**Mr. Peter Kampen**, from Connecting Natural Values & People Foundation (CNVP), showed the audience the use of ‘Sustainable Forest Management securing erosion leading to improved watershed management’ with an case example of Erosion Control in Ulza, Albania Watershed for Hydro Power, based on a study of World Bank PROFOR for Innovative Financing for Sustainable Forest Management in the Southwest Balkans. The key idea is that sustainable Managed Forests provide erosion control and soil stability, which reduces sedimentation in Hydropower reservoirs. This service can be quantified (his study produced an “erosion risk mapping” and quantified level of erosion under different land uses) and valued allowing others to contribute to retain this ecosystem service via establishing a private Payment for Environmental Service, with the Government playing a the facilitator role and sustained in a general policy on value of ecosystem services.

**Mr. Sasa Stamatovic**, from the Serbian Directorate of Forests, introduced the audience to **“The Serbian experience on Forest Ecosystem Services (FES), Valuation of FES, Implementation of the Valuation”**.

The Serbian forest sector valuation carried out in 2007 included an assessment of the **Total Economic Value (TEV)** based on annual flow of Serbian forest benefits but **also a Contingent Valuation (CV) of Serbian householders willingness to pay (WTP) for implementation of strategic decisions**. Mr. Stamatovic explained the methods used and surveys carried out, including the Serbian Households Survey (HHS) sampling that was set up. The result of the sample could be interpreted in a way that Serbian households support investment in forestry and forest on max 23,4 million € per year, but it also provided information about the preferences on forest functions (a concept not to be confused with forest ecosystem services). To finalize, Mr. Stamatovic shared some findings when implementing the Serbian Forest sector Valuation, like the importance of clarity on the purpose of the valuation (Why, who is the user of results, what is the object of valuation, what kind of value is needed...?) and the identification of the most appropriate techniques to apply depending on the context. He recognize the challenge of the uncertainties inherent to forestry that surrounds any kind of project like his (such as basic economic data, physical inputs, costs, physical production response, market structure and prices, technological change and the dynamic of the forest ecosystem)

**Ms. Benedetta Concetti**, from ERSAF Lombardia (Regional Body for the Service to Agriculture and Forest) presented the project “Making public Goods provision the core business of Natura 2000” circumscribe within the Life + Making Good Natura project. The main aim of the project is creating tools for qualitative and quantitative valuation of the ecosystem services in the study sites of the Natura 2000 network in order to develop innovative approaches of environmental governance to preserve agro-forest-ecosystems. This includes identifying and evaluating ES provided by Natura 2000 sites, creating and demonstrating innovative models for financing; but also, creating a web-based tool for Natura 2000 sites to evaluate ES qualitatively and quantitatively by processing spatial datasets and producing a handbook with self-financing instruments and strategies. The study is based in 27 pilot sites belonging to Natura 2000 network. It combines both GIS-based and Stakeholders-based analysis for establishing the priority of the ecosystem service. The project was still working on the PES implantation and dissemination of results.

**Mr. Stale Navrud**, from the Norwegian University of Life Sciences presented “Advances in Valuing Non-Timber Forest Ecosystem Services in Norway”. During his presentation, Mr. Navrud addressed the issue of generalizing values due to a lack of time and resources for new valuation studies, by Benefit Transfer - BT (defined as the transfer economic value of public good from *study* site (primary valuation study) to *policy* site). There are four basic requirements for valid benefit transfer:



- 1) Complete, searchable and accessible **database** of domestic and foreign valuation studies
- 2) Best practise criteria for **assessing quality** of primary valuation study
- 3) **Benefit transfer techniques**
- 4) **Best practise criteria for benefit transfer** of NTFES

The dimensions for the benefit transfer considered by Mr. Navrud was:

- i) Spatial (2 possibilities): simple transfer of unit values (reported high transfer error) and transfer of Meta-analysis (allegedly can increase precision in benefit transfer). Mr. Navrud concluded that simple unit value transfer from domestic studies performs no worse on average than Meta- analysis BT.
- ii) Temporal, he informed that very few test retest studies of Stated Preference (SP) studies over time; the findings in one of them concluded that **preferences for characteristics of the forest have changes significantly over this 20 year period and that the initial transfer error could be drastically reduced if WTP function is updated.**
- iii) Transfer in area (Adding up), out of a review of 28 stated preference surveys to value non-timber benefits in Scandinavian forests, Mr. Navrud concluded that **Willingness to Pay is insensitive to the size of the forest but suggested that to get national values from local studies it is more advisable to conduct national SP studies.**

He made a last warning on the skepticism with which the WTP surveys are received by experts, because what people declare they are willing to pay many times does not reflect reality accurately, and though the goodwill exist, sometimes is “overestimated”<sup>22</sup>.

**Mr. Jose Ramón Guzman Álvarez**, from the Regional Government of Andalusia informed about the “Application of ecosystem accounting in Mediterranean forests: the experience of Andalusia”. He made an introduction to the forest scope in Spain: area of distribution, type of forest landscape, forest related market and policy and economical terms that rule it. He paid special attention to the Andalusian forest scope as they delivered an assessment tool to communicate the real costs and benefits and to evaluate the ecosystems services provided by its forest (2002). Further, they worked in the **RECAMAN Project, a system of ecosystem national accounts for the Andalusian forests integrating both manufactured**

**and environmental (both priced and non-priced by the market) incomes.** RECAMAN is a pilot project model that may help to design common standards for green accounting in Europe. Its methodology has two components, a system of accounts, called the Agroforestry Accounting System (AAS) and a method to integrate commercial and non-commercial economic values, the Simulated Exchange Value (SEV) method. The RECAMAN framework offers relevant information to support sound policy decisions in order to balance economical and conservation approaches. However, Mr. Guzman recognized also some weaknesses of the work, including the cost-effectiveness of the project and the necessity to standardize the data collection processes for cost reduction.

The last speaker was **Mr. Pat Snowdon**, who finished the session presenting the “Practical experience from the Woodland Carbon CO<sub>2</sub>e” in the United Kingdom. The Code was set-up following industry demand for a **standard for forest carbon projects in the UK**, among other objectives (including clarity and transparency and rigorous scientific basis). It has been developed, and is managed, by the Woodland Carbon Code Executive Board (that includes the Forestry Commission). The Code pilot was based in ‘best practices’ from other carbon standards that fitted well within the UK context. **The projects under the Code are validated** (process undertaken by a certification body accredited by the UK Accreditation Service, that evaluates a project or group against the requirements of the Woodland Carbon Code) **and registered in a carbon unit hosted by Markit**<sup>23</sup>. Since 2011, over 200 projects across the UK have registered with the Code; they have to gone through an independent validation and the next step for 2016 will be the “verification”, an independent check of what a project has actually sequestered (additional cost). The last piece of the holistic carbon scheme is to ensure that the carbon units generated by a project can be tracked as they are created, transferred between owners, and used or ‘retired’.

Mr. Snowdon clarified that the WCC currently only covers new woodland creation, accounting for the carbon sequestration and emissions within a woodland site, but it does not cover the carbon gains to be made by changing the management of existing woodlands nor the carbon stored in forest projects or the substitution benefits of using wood in place of a more energy intense product or fuel. He announced that around 40% of carbon validated has been sold already (price fluctuates 3-15 pounds per tonne of carbon, depending on the additional social and environmental benefits that the project can ‘sell’ alongside the carbon). He also apprised that the projects need to be verified at year 5 and then every 10 years.

<sup>22</sup> In this sense, a reliability test was carried out when the people participating in a WP survey received a bill for the quantity declared. Not all of them paid the initially proposed amount but also many refused afterwards to be reimbursed once the “exercise” finished.

<sup>23</sup> Markit Ltd. is a global, financial information and services company founded in 2003 as independent source of credit derivative pricing. It provides environmental registries and supports the main carbon standards globally.

# Working Group 1: Mainstreaming VFES in National Forest Policies

*Facilitator: Mr. Robert Mavsar (European Forest Institute – EFI)*

*Rapporteur: Kavita Sharma (The Economics of Ecosystems and Biodiversity Initiative –TEEB)*

With the view that values of FES are increasingly reflected in relevant national and European policies and market-based instruments such as payments for ecosystem services, the aim is to include these considerations in the development of National Forest Policies, in general, and National Forest Programmes, in particular.

As it was established in the FOREST EUROPE approach to NFPs: “A national forest programme constitutes a participatory, holistic, inter-sectoral and iterative process of policy planning, implementation, monitoring and evaluation at the national and/or sub-national level in order to proceed towards the further improvement of sustainable forest management and to contribute to sustainable development.” (Vienna 2003)

With this in mind, at a strategic and policy level, **National Forest Programmes (NFPs) can take advantage of FES valuation to create comparable and strategic frameworks that can be used to develop mechanisms to put such values into practice**, for example through market-based instruments. NFPs can use this valuation in several ways, including:

- identifying the geographical distribution of the main FES in order to assess resource allocation to ensure the protection (and possible compensation) of the ecosystem services in different regions
- following the evolution over time in how countries value and implement the provision of FES.
- setting out frameworks and principles for developing mechanisms to implement FES values.
- gathering information on FES values to feed into forest policy documents and other sectoral reports – thereby enabling, for example, comparisons with expenditure on forest conservation and management.

Using FES values in these ways reinforces the evidence base supporting the forest sector and offers the sector the opportunity to be compared with other sectors that routinely provide measures of their usefulness to society.

More accurate criteria and mapping of their FES within countries is also important. This provides evidence on the services provided at national, regional and

local levels, and helps to underpin policy mechanisms designed to provide these services ‘on the ground’.

## Objective of the WG1:

The final objective of the Working Group is to **consider the necessity of support of national policies and planning tools, such as a National Forest Programme, to give VFES the prominence and boost needed for its development**. The discussion could be open to the consideration of other similar instruments.

In this context, participants in the Working Group 1 were asked to reflect on the following questions:

- Is VFES included in the NFPs at pan-European level? Did it contribute to the implementation of VFES or any implementation mechanism? How?
- Would it be considered of regional interest to propose its inclusion?
- What other kind of technical and political forest instrument would be in the interest of a country to framework and encourage VFES? What would be necessary to do so?

## DISCUSSIONS AND RECOMMENDATIONS

Following the facilitators guidance, the discussions were structured around the two main topics:

### Recognizing of Forest Ecosystem Services at policy level:

- In order to facilitate policies discussions, to support political decisions, introduce in the political will and taking into account a wide range of objectives, it is important to **institutionalize the recognition, valuation and implementation of the forest ecosystem services, as well as having the roles and responsibilities clear**. There is still the challenge to have an understanding of the importance of the services, their value and related market mechanisms at policy level.
- The **streaming and mainstreaming** of the benefits of services and their value (buy & power) have to be achieved.

- Clarity on the objective/s (What goal to) and to which policy/ies is related (Whether and to what policy). It is a cross-sectoral matter, as offers the forest sector the opportunity to be compared with other sectors and provide measures of its usefulness to society. It should be fostered to other sectors, making them inclusive in the development and its endorsement, support and implement the recognition of services, the valuation approach/es, its policy implementation and possible market mechanisms.
- There is a different application at different governance levels: pan-European (declarative), national (policies), subnational (piloting), and management level (implementation)
- Importance of communication: There is a need to looking within and beyond the forestry sector for both communications and internalizing policies.

### **Addressing FES at policy level:**

#### *At pan-European / Regional level*

- Declarative level – the aim is that **the recognition and promotion of the provision of goods and services, the concept and benefit of the services, their value, is politically endorsed**, acknowledged in the forest sector and highlighted its relations to other ones, empowering the forest sector.
- Further improvement of SFM tools at pan-European level taking into account FES and their valuation, e.g. SFM guidelines can refer to FES and through them encourage countries in developing tools and concepts. The concept of services is a new dimension not broadly accepted and not fully incorporated in the SFM concept. (The experts clearly state that there cannot be a common pan-European approach to the valuation of FES).
- Sharing experiences, knowledge, policies, approaches, data repository, etc. on recognition, classification, valuation, market mechanisms including PES schemes, etc.
- **Agree/Declare to take into account services considerations at national level, as part of National Forest Programmes and in different level planning, including mapping, classification, valuation, possible developments, regulations, etc.**
- Leverage existing institutions to act as intermediaries

in PES schemes.

#### *At National level:*

- **Institutionalization:** Introduce VFES considerations in forest policies and strategic documents/instruments is the best way to institutionalize its recognition, make the concept clearer at all levels, make recommendations on valuation (social and economic), implementation and on payment schemes. There is a **need for official policy processes and documents to include this subject at national, sub-national and management levels (including forest management plans), in order to establish and control the valuation approach.** And note that forest owners and other actors should be always included in the process to develop such policies.
- National level is optimum to understand the needs and preferences/priorities of the society and also of the ecosystems, that the forest range of services change through time and depending on the areas and through the different context of the country, peculiarities that determine the scale of the valuation and of the policy approach – and national policies have to secure forest products and services taking into account these particularities through time and space.
- More accurate classification, criteria and mapping of their FES within countries is important to provide evidence on the services provided at national, regional and local levels, and helping to underpin policy mechanisms designed to provide these services 'on the ground' and helping extension.
- Foster FES valuation, its possible certification, and PES schemes at individuals and governments level.
- Pilot projects for the development of services classifications, valuation approaches and market mechanisms. Share, exchange, make available the techniques, evidences, and existing tools, and develop further ones as guiding principles.
- Establish relation with other sectoral policies, making the best use of their developments, and fostering them. E.g. Leverage the inclusion of FES in river basin plans.
- Use extension services to raise awareness and allow forest owners to tap into this to raise awareness.

### Through Market Mechanisms:

- Encourage/ institutionalize inclusion of natural capital in the System of National Accounts (SNA) – either done through pan-European declarations or national policies.
- Include national capital into national accounts (“natural capital finance” )
- The product to provide is innovation to develop market policies, relating forest ecosystem services to market instruments, including consider and promoting payment schemes. However, **be careful not to restrict the talk to subsidies or compensations, it can narrow the aspects of ES, and also when relating the FES only to monetary aspects, usually related to imposing restrictions, is difficult to understand/ accept by forest owners** (mainly when the e.g taxes do not come back directly to the ones who provide the services).
- The communication of the advantages of each mechanism is crucial, e.g. green taxes in place can show the goodness for finance and for the wellbeing of the country.

### Through enhance relevance/ raise awareness/ garner support FES to other sectors:

- **Communication, raise awareness and implementation** (2 levels institutional and to users/owners) **through: workshops, seminars, brochures, extension services, brochures, expert meetings with other sectors, consultations, media, dialogue, etc.**
- Empower the position of the forest sector – proactivity.
- Leveraging existing institutions to facilitate knowledge exchange, raising institutional awareness.
- Consult other sectors and push the FES agenda through dialogue in the expert meetings with other sectors.
- **Research strengthening of VFES on science and foster linkages with policy level.**
- **Take advantage of the idea that VFES mechanisms are already tools to communicate to other sectors and to the public in general.**

# Working Group 2: Overcoming difficulties in Valuation of Forest Ecosystem Services and applying valuation results for financing FES

*Facilitator: Mr. Robert Mavsar (European Forest Institute – EFI)*

*Rapporteur: Kavita Sharma (The Economics of Ecosystems and Biodiversity Initiative – TEEB)*

Experts pointed out a variable set of difficulties when trying to applying VFES at policy, market, owners, stakeholders' level. Some examples of difficulties that have been identified are:

- Economic and business accounting and markets currently fail in large part to account for the value of nature. This offers little incentive (financial reward) for forest owners, businesses or individuals to invest in these important services provided by woodlands.
- Information about the values of environmental services of forests is needed for various national policies, including liability laws, the formulation and distribution of property rights, the adoption of command-and-control approaches as well as for the establishment of economic incentives.
- Various practical barriers exist against the wider use of monetary estimates of the values of FES. These are of cultural, methodological and policy-related origin.
- There is a need for more pilot projects to test whether new market-based approaches can work in practice. Understanding is still relatively limited so there is also a need for more research and analysis to provide an evidence base for taking forward market approaches.
- Strategies for increasing the marketing of forest goods or recreational and environmental services are not extensively applied.
- Private financing mechanisms for FES are not regularly used by the land-owners, even where there are no institutional barriers to their use. This suggests that such services are generally not seen as relevant business fields for forest owners.
- Systematic knowledge on new private financing mechanisms is lacking. New financing mechanisms remain relatively rare and have not been extensively studied. Their real potential and limitations cannot, therefore, be assessed reliably. This lack of knowledge includes questions about the role of institutions in the development of market-based instruments and in the support of innovation processes.

## Objective of the WG2

To contribute to a better implementation of VFES within the Paneuropean region the object of this Working Group is **to jointly evaluate and prepare a list of solutions and recommendations for policy makers on how to overcome them.**

In this context, participants in the Working Group 2 were asked to reflect on the following questions:

- Which are the key challenges to the implementation of VFES nationally? And at the regional level?
- Could they be easily solved? What kind of solutions could be proposed? Could they be proposed at different temporary levels: short, medium and long term?

## DISCUSSIONS AND RECOMMENDATIONS

The facilitator started identifying the problematic as three dimensional:

### 1) Lack of information:

Under this heading, the Working Group discussed and identified several areas where more information regarding VFES is needed, such as:

- Science (specially on biophysical interactions and functions)
- Capacity (and experts)
- Appraisals (evaluation)
- Information on trade-offs between FES
- Costs of data collection and evaluation
- Available funding for studies (and further valuation)
- Differences between public goods (values) and private goods (values)
- High hopes by stakeholders produce disappointment when facing real markets and payments
- Benefit transfer, and how to apply it

The facilitator stated that reducing the problem means to make a selection of those FES which seems very important at regional or national level.

He proposed that economically sound estimates of (marginal changes of) FES values are needed, as well as:

- Primary valuation studies:
  - Know-how --> capacity building
  - Quality criteria
  - Funding
- Value transfer approach and mapping:
  - Access to (good) primary studies
  - Know-how and quality criteria
- Remaining problems:
  - Substitution effects? additionality of values? ...

## 2) Lack of institutions:

An establishment that could capture those values and market failures, and try to bring to the ground these marketing approaches is needed.

The Working Group discussed and identified several areas where the institutional part of the matter should be reinforced, such as:

- Co-ordination and transaction (and costs related)
- Communication between actors and stakeholders
- Infrastructure to support the work (physical or digital)
- Legal restrictions for owners
- Unclear property rights
- Interference with other political instruments

## 3) Lack of interest:

The facilitator noted specially the lack of interest in the valuation of forest ecosystem services at political level, because of different reasons. He insisted, however, that actually it is a social problem, as the principal idea would be that FES are related to welfare improvement for society.

Some of the experts did not agree exactly with this suggestion, but recognize there is interest among the stakeholders and population over the matters while the problems mentioned above are the ones that block possible solutions.

It was also noticed the existence of various conflicts with possible individual interests behind among forest owners, nature conservationists, policy makers, ...

## SOLUTIONS:

After examining the problematic affecting both to the Valuation of Forest Ecosystem but also to the implementation of PES, the solutions that the Working

Group discussed and proposed for overcoming difficulties were structured around the two main topics:

### *Valuation of Forest Ecosystem Services*

- Agree on a clear definition of Forest Ecosystem Service within the Pan-European region, as well as some guidance on valuation, including quality criteria and Valuation transfer.

- **Impulse the Governmental role as facilitator in performing the valuation of forest ecosystem services, but also as coordinator of the transaction costs as well as a distributor of funds devoted to appraisals and evaluations on VFES.**

- Improve the data collection through the latest technological innovations, like smartphone apps. Reinforce the role of the "citizen science" as informers contributing to the studies.

- **Increase the information provision**, including database and case studies, as well useful tools, such as mapping.

- Call on the importance on relying on **sound scientific studies before addressing valuation** per se.

- **Promote the development of innovative studies, like benefit transfer and temporal changes.**

### *Applying valuation results for financing FES and on Payment for Ecosystem Services:*

- Review the **definitions for PES.**

- **Promote the PES related infrastructure, like creating registries.**

- **Encourage the implementation of innovative finance instruments**, like crow funding, the Global Forest Fund (GFF) established by the Foundation for Environmental Education (FEE), green levies, etc.

- **Call on Governments to support forest owners to provide FES, including as a task on the Rural Development Plans.**

- **Promote case studies and elaboration of business cases to help decision-makers** ensure of the value and priority of the initiatives.

- Recognize and encourage the communication of the benefits of FES approach actively, in order to avoid possible mistrust created by contradictions with particular interests.



## Final Remarks

After the presentations made by the Rapporteurs of the two Working Groups, the participants exchange some views and made some final remarks to finalized the wrap up session.

It was stressed that **the Government had an important role to play in:**

- Reviewing the definition of PES
- The distribution of public money to public goods.
- Resuming the transactions costs and bringing together the suppliers and demanders
- Facilitating markets
- Fostering the developing of systematic approaches.

This last recommendation emerged as **participants recognized the absence of systematic approaches to valuation methods** as they directly depend on how the

work is financed. Though there are a lot of studies, and despite their dissimilarities, experts are still struggling with different methodologies, making the challenge of going all in the same direction difficult to reach (although copying the approaches proposed by other countries facilitate it). This does not imply to agree on a unique approach to the valuation of **forest ecosystem services (VFES) in the pan-European region, which is neither practicable nor advisable.**

Following on the Government role, it was singled out a difference of objectives with the experts, as the former is looking for evidence based for funding research studies and the latest would like to focus its work on recent developments. **Aligning together the objectives of both the Academia and Governments is necessary for achieving further progress.**

## ANNEX 1: WORKSHOP PRESENTATIONS

### Results of Subworking Group 1: A functional classification and list of forest ecosystem services

Mr. Jose I. Barredo

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EUROPEAN COMMISSION

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#### FOREST EUROPE – Expert Group on Valuation of Forest Ecosystem Services

##### Sub-working group 1: A functional classification and list of forest ecosystem services

José I. Barredo

European Commission – Joint Research Centre  
Institute for Environment and Sustainability

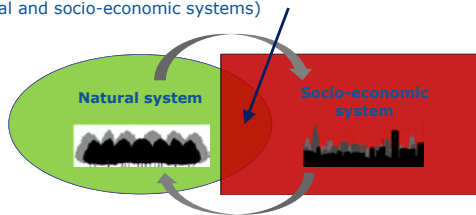
FOREST EUROPE Workshop on Valuation of Forest Ecosystem Services  
Belgrade, Serbia, 24-25 September 2014

#### Expert Group on Valuation of Forest Ecosystem Services Sub-working group 1: A functional classification and list of forest ecosystem services

- The **aim** of sub-working group 1 was to elucidate a classification of forest ecosystem services (FES) that can be applied in the pan-European region
- The classification will actuate as the **basis for valuation** steps identified in SWG 2 and SWG 3
- **Assessing** the state of art of FES classifications from literature review
- **Adoption** of a comprehensive, operational and widely accepted classification of FES applicable at the pan-European level

#### Forest ecosystems - Introduction

- Forests are very complex biological laboratories (ecosystems)
- Therefore, their analysis from a human-centred perspective is challenging
- Even more challenging when studying forests and their services from an economic perspective (monetary interphase between natural and socio-economic systems)



#### Forest ecosystems and their services

Three interlinked concepts...

- 1) Ecosystem process:** is any change or reaction which occurs within ecosystems, physical, chemical or biological. Ecosystem processes include decomposition, production, nutrient cycling, and fluxes of nutrients and energy
- 2) Ecosystem function:** is a subset of the interactions between biophysical structures, biodiversity and ecosystem processes that underpin the capacity of an ecosystem to provide ecosystem services
- 3) Ecosystem services:** are the benefits that people obtain from ecosystems

#### Forest ecosystems and their services

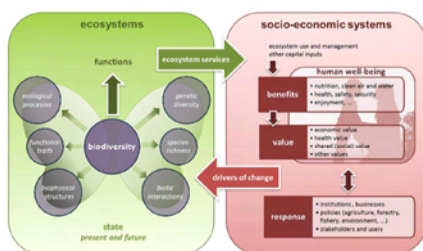


Figure 2. Conceptual framework for EU wide ecosystem assessments.

Source: [http://ec.europa.eu/environment/nature/knowledge/ecosystem\\_assessment/pdf/MAESWorkingPaper2013.pdf](http://ec.europa.eu/environment/nature/knowledge/ecosystem_assessment/pdf/MAESWorkingPaper2013.pdf)

#### Classification of ecosystem services

Subsequently to the pioneer work of Costanza et al. (1997) on the valuation of ESS at the global level, three main international classification systems have been implemented:

- **Millennium Ecosystem Assessment (MA, 2005)**
- **Economics of Ecosystems and Biodiversity (TEEB, 2010)**
- **Common International Classification of Ecosystem Services (CICES, 2013)**

## Classification of ecosystem services Main groups of ESS

MA (2005)	TEEB (2010)	CICES (2013)
PROVISIONING	PROVISIONING	PROVISIONING
REGULATION	REGULATING	REGULATION AND MAINTENANCE
--	HABITAT**	--
CULTURAL	CULTURAL & AMENITY	CULTURAL
SUPPORTING*	--	--

\* Supporting services necessary for the production of all other ESS, in TEEB are considered as a subset of ecosystem processes

\*\* Habitat services were included in CICES in Regulation and Maintenance

## Classification of ecosystem services Example: Provisioning ESS

MA	TEEB	CICES (Division / Group)
PROVISIONING	PROVISIONING	PROVISIONING
Industrial wood Fuelwood	Raw materials	Materials / Biomass, fibre Energy / Biomass-based energy
Non-wood forest products	Food / Raw materials	Nutrition / Biomass
Fresh water (water purification) (also Regulation service)	Water supply	Materials / Biomass, fibre Materials / Water
Genetic resources	Genetic resources	Nutrition / Water Materials / Biomass, fibre (genetic resources)

## Classification of ecosystem services MA, TEEB and CICES

- MA, TEEB and CICES classifications show many similarities and have been built following an evolutionary process considering the findings (and limitations) of its predecessors
- Each has its own advantages and disadvantages due to the specific context, view and scope for which they were developed
- We are studying ecosystems from a human-centred perspective and this is **challenging !!!**
- There is **no one-fits-all** perfect classification of ESS:
  - It depends on the purpose

## Classification of ecosystem services CICES

- CICES has been implemented for supporting the work of the European Environment Agency (EEA) on environmental accounting
- CICES supports EEA's contribution to the System of Environmental-Economic Accounting (SEEA) which is currently being led by the United Nations Statistical Division (UNSD)
- CICES is a common international standardised classification of ESS. Useful for ecosystem accounting methods and comparisons
- CICES was adopted in the MAES process at EU level

[http://cices.eu/wp-content/uploads/2012/07/CICES-V43\\_Revised-Final\\_Report\\_29012013.pdf](http://cices.eu/wp-content/uploads/2012/07/CICES-V43_Revised-Final_Report_29012013.pdf)

## Classifications of forest ecosystem services

- The aim was to identify, characterise and assess FES classifications from literature review
- Forest ecosystems provide a multiplicity of services to humans. FES are the direct and indirect contributions of forest ecosystems to human wellbeing
- This conceptual view of forest ecosystems is in line with the **multifunctional role of forest** for delivering multiple services in a balanced way and ensuring forest protection (New EU Forest Strategy)

## Classifications of forest ecosystem services

- Total Economic Value (TEV)** classification (e.g. Pearce & Moran, 1994; Merlo & Croitoru, 2005)
- Millennium Assessment** functional classification of FES (MA, 2005)
- Holistic** classification (Mantau et al., 2007)
- FORVALUE** study classification (Mavsar et al., 2008)
- MAES-CICES** classification (MAES, 2014)

## Classifications of forest ecosystem services

- Several approaches have been proposed pursuing **different aims**, however there is no consensus on a unique universal framework
- Each framework responds to specific requirements and scope
- The classifications are hardly comparable because they have been elaborated for different purposes
- All classifications present **advantages** and **disadvantages** depending of the application context and scope
- Examples:

## Forest ecosystem services:

- Millennium Assessment (MA, 2005)
- Merlo & Croitoru (2005). Modified from Pearce & Moran (1994)



Figure 3.1. The total economic value of forests. Modified from Pearce and Moran (1994).

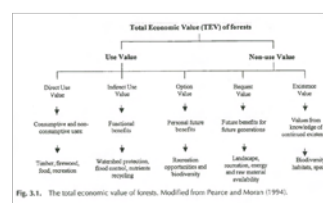


Figure 3.1. The total economic value of forests. Modified from Pearce and Moran (1994).

## Forest ecosystem services MAES-CICES (MAES, 2014)

- **Provisioning** includes forest services related to (supply of) biomass, water and energy
- **Regulation and maintenance** services includes all the ways in which forest ecosystems can mediate or moderate the environment that affects human performance.

It covers the degradation of wastes and toxic substances, the mediation of flows, as well as the ways in which ecosystems can regulate the physico-chemical and biological environment of people

- **Cultural services** include the non-material outputs of forest ecosystems. These services are seen as the physical settings, locations or situations that produce benefits in the physical, intellectual or spiritual state of people

## Forest ecosystem services MAES-CICES (MAES, 2014)

Figure 1: illustration of proposed hierarchical structure of CICES V4.3



**MAES-CICES** is a flexible and hierarchical classification that can be adapted to specific requirements and needs

Five hierarchical levels provide a flexible framework

Source: [http://cices.eu/wp-content/uploads/2012/07/CICES-V43\\_Revised-Final\\_Report\\_29012013.pdf](http://cices.eu/wp-content/uploads/2012/07/CICES-V43_Revised-Final_Report_29012013.pdf)

## Forest ecosystem services MAES-CICES (MAES, 2014) – Provisioning

Section	Division	Group	Class
Provisioning	Nutrition	Biomass	Rared animals and their outputs Wild plants, algae and their outputs Wild animals and their outputs
		Water	Surface water for drinking Ground water for drinking Fibres and other materials from plants, algae and animals for direct use or processing
	Materials	Biomass	Materials from plants, algae and animals for agricultural use Genetic materials from all biota Surface water for non-drinking purposes
		Water	Ground water for non-drinking purposes
	Energy	Biomass-based energy sources	Plant-based resources

Source: [http://ec.europa.eu/environment/nature/knowledge/ecosystem\\_assessment/pdf/MAESWorkingPaper2013.pdf](http://ec.europa.eu/environment/nature/knowledge/ecosystem_assessment/pdf/MAESWorkingPaper2013.pdf)

## Forest ecosystem services MAES-CICES (MAES, 2014) – Regulation and Maintenance

Section	Division	Group	Class
Regulation & Maintenance	Mediation of waste, toxics and other nuisances	Mediation by ecosystems	Filtration / sequestration / storage / accumulation by ecosystems Mass stabilisation and control of erosion rates
		Mass flows	Buffering and attenuation of mass flows
	Mediation of flows	Liquid flows	Hydrological cycle and water flow maintenance Flood protection
		Gaseous / air flows	Storm protection
	Lifestyle maintenance, habitat and gene pool protection	Lifecycle maintenance, habitat and gene pool protection	Pollination and seed dispersal Maintaining nursery populations and habitats
		Pest and disease control	Pest control Disease control
	Maintenance of physical, chemical, biological conditions	Soil formation and composition	Weathering processes Decomposition and fixing processes
		Water conditions	Chemical condition of freshwaters
	Atmospheric composition and climate regulation	Atmospheric composition and climate regulation	Global climate regulation by reduction of greenhouse gas concentrations Micro and regional climate regulation

Source: [http://ec.europa.eu/environment/nature/knowledge/ecosystem\\_assessment/pdf/MAESWorkingPaper2013.pdf](http://ec.europa.eu/environment/nature/knowledge/ecosystem_assessment/pdf/MAESWorkingPaper2013.pdf)

## Forest ecosystem services MAES-CICES (MAES, 2014) – Cultural

Section	Division	Group	Class
Cultural	Physical and intellectual interactions with biota, ecosystems, and landscapes	Physical and experiential interactions	Experiential use of plants, animals and landscapes in different environmental settings. And physical use of landscapes in different environmental settings
		Intellectual and representative interactions	Scientific, educational, heritage, cultural, entertainment and aesthetic
	Spiritual, symbolic and other interactions with biota, ecosystems, and landscapes	Spiritual and/or emblematic	Symbolic and sacred and/or religious
		Other cultural outputs	Existence and bequest

Source: [http://ec.europa.eu/environment/nature/knowledge/ecosystem\\_assessment/pdf/MAESWorkingPaper2013.pdf](http://ec.europa.eu/environment/nature/knowledge/ecosystem_assessment/pdf/MAESWorkingPaper2013.pdf)

## Challenges of forest ecosystem services valuation studies

Applying valuation results

Overcoming difficulties in Valuation of FES

## Challenges of forest ecosystem services valuation studies

### Dimensions of uncertainty:

- **Baseline datasets** (stats/georeferenced): observed vs. modelled data
- **Modelling tools** (assumptions, validation, ground data, etc...)
- **Valuation method** (environmental economics !!!)
- **Communicating** uncertainty to final users (policy makers)

## Challenges of forest ecosystem services valuation studies

### Uncertainty:

- : the quality or state of being uncertain
- : something that is doubtful or unknown: something that is uncertain

### Uncertain:

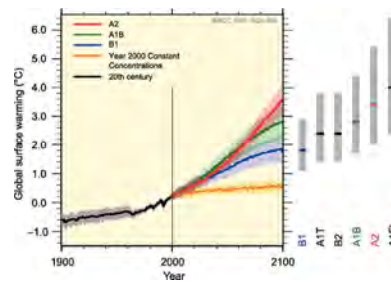
- : not exactly known or decided: not definite or fixed
- : not sure: having some doubt about something

## Challenges of forest ecosystem services valuation studies

- The monetary value of ecosystems depends on the potential payers as well as several other factors, including the long-term sustainability of the service
- (...) defining the 'true' value of ecosystem services is a **major challenge**. There is no accepted universal method but instead a range of approaches (FAO, 2014)
- Different valuation methods might produce different results !!!
- The same applies to different baseline indicators/datasets

FAO (2014): <http://www.unecce.org/fileadmin/DAM/timber/publications/SP-34Xsmall.pdf>

Joint Research



The assessment of the best estimate and likely ranges in the grey bars includes the AOGCMs in the left part of the figure, as well as results from a hierarchy of independent models and observational constraints

Source: [http://www.ipcc.ch/publications\\_and\\_data/ar4/wg1/en/figure-spm-5.html](http://www.ipcc.ch/publications_and_data/ar4/wg1/en/figure-spm-5.html)

Joint Research

## Challenges of forest ecosystem services valuation studies

- Different valuation methods producing different results should be seen as an **opportunity**
- Important methodological resource
- Different outputs from different valuation methods are useful for **informing uncertainty** to users/policy makers
- Ensemble approach for valuation, range of values: min/max, SD, etc.
- In some cases **spatially explicit uncertainty** measures: e.g. territorial decision making

Joint Research

# Thank you

### Contact:

José I. Barredo: [\[jose.barredo@jrc.ec.europa.eu\]](mailto:jose.barredo@jrc.ec.europa.eu)

Joint Research

## Results of Subworking Group 2: Toolbox with valuation of FES approaches to the pan-European region

Ms. Katerina Ventrubova  
CZECH REPUBLIC

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### Toolbox with valuation of FES approaches to the pan-European region

Expert group 2

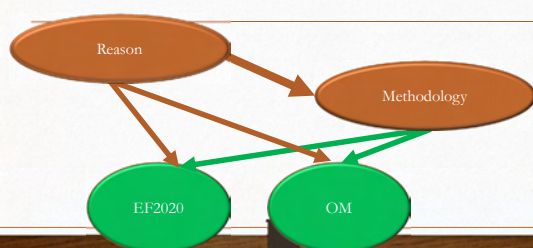


### Concept of work

- Collaboration with wide different target groups (forest owners, government etc...)
- Choosing the best appropriate approach for the defined reason



### General description



### Scope of the part 2

- Introduction
  - Why the toolbox
- Description of monetary valuation techniques
  - Why valuation (different kind of use)
  - Determining an economic value
    - Preference based valuation methods
    - Cost based methods
- Toolbox
- Caveats

### Toolbox

- | Type  | Type  |
|---|---|
| <ul style="list-style-type: none"> <li>• Preference based valuation methods               <ul style="list-style-type: none"> <li>• Approach                   <ul style="list-style-type: none"> <li>• Travel cost method (TCM)</li> <li>• Contingent valuation method (CVM)</li> <li>• Choice experiments</li> <li>• Hedonic pricing method</li> <li>• Market observation</li> </ul> </li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Cost based methods               <ul style="list-style-type: none"> <li>• Approach                   <ul style="list-style-type: none"> <li>• Preventing expenditure</li> <li>• Replacement costs</li> <li>• Damage costs</li> </ul> </li> </ul> </li> </ul> |

### Toolbox types





## Caveats

- In valuation of forests services of a non-market nature there is an enormous share of subjective factors, which cannot be easily controlled for.
- Many different concrete valuation systems are used for the expression of importance of non-production forest services for ...
- Methods and their results are based on basic theoretical background, purpose of valuation...
- Estimating the value of the various services and benefits that ecosystems generate may be done with a variety of valuation approaches...
- Valuation techniques in general and preference methods specifically are affected by uncertainty, stemming from gaps in knowledge about ecosystem dynamics...
- Valuation results will be heavily dependent on social, cultural and economic contexts, the boundaries ...
- Valuation represents not only a professional issue but also a political issue of enforcement of respective political interests.

Thank you for your attention

Kateřina Ventrubová  
Faculty of Forestry and Wood Sciences in Prague  
email: [ventrubova@fd.cvz.cz](mailto:ventrubova@fd.cvz.cz)  
GSM: +420 722 004 209

## Results of Subworking Group 3: Means to facilitate implementation

Mr. Pat Snowden

Forestry Commission – UK

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Forestry Commission

### Pan-European Approach to valuation of ecosystem services

#### *Expert sub-group 3: means to facilitate implementation*

Forest Europe workshop,  
Belgrade, Serbia  
24-25 September 2014

Dr. Pat Snowden MICFor  
Forestry Commission

Forestry Commission

**“Instead of measuring the destruction of nature as a economic gain, we need to address its stewardship as an economic opportunity”**

(Aldersgate Group 2011)

Forestry Commission

### Expert sub-group 3

Objective of the sub-group:  
“develop broad recommendations to facilitate **implementation** of the valuation approach”

examining:  
strategies, policies and actions to promote incentives that can turn **forest ecosystem service (FES) values** into concrete actions or initiatives (incorporate into NFPs, market-based instruments schemes, etc).

Implementation means both:

- Enabling the use of methods to value FES; and,
- Capturing FES values ‘on the ground’


Forestry Commission

### The challenge

To maintain natural capital & the ecosystem services that flow from it

But, economic and business accounting and markets fail in large part to account for the value of natural capital or ecosystem services

- difficult to observe their values directly
- forest owners given little financial incentive to provide them




Forestry Commission

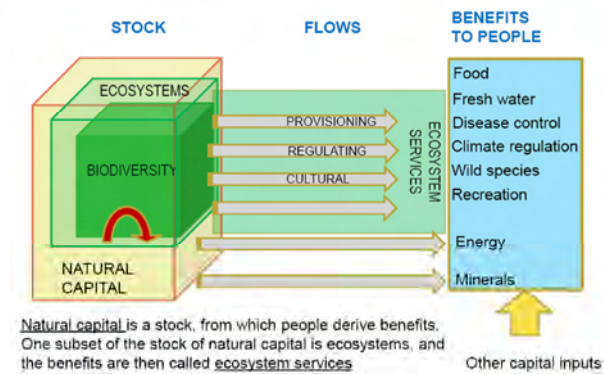
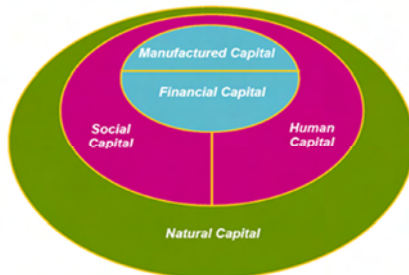
### Valuing ecosystem services

- Decision support - to assess relative impacts of alternative actions
- Better understanding of their contribution to social and economic well-being
- valuation methods have been unevenly distributed
  - geographically
  - across different services
- Further points to note:
  - comparing values estimated in different contexts?
  - different uses may require different degrees of accuracy
  - Values versus price
  - Availability of values remains limited
  - More understanding and knowledge needed
  - A lack of standards and some confusion over definitions

## What is natural capital

One type of capital on which people ultimately depend:

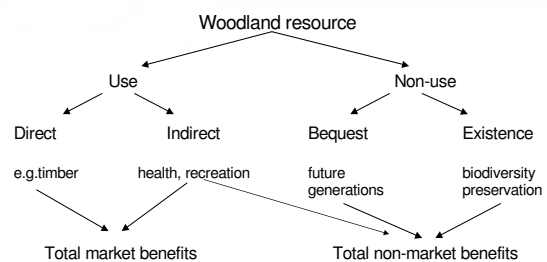
- (i) *produced or manufactured capital* (money, buildings, machines)
- (ii) *human capital* (health, knowledge, culture and institutions)
- (iii) *natural capital* (available from nature)



## Concept of economic value

- measuring wellbeing – trade-offs & marginal changes
- market goods – prices (often) reflect value
- non-market goods – unpriced but concept of trade-offs & opportunity costs remain
- ⇒ methods to estimate monetary value of non-market goods
  - incl. revealed preference, stated preference, value transfer
- evolution of valuation approaches and models

## Total economic value



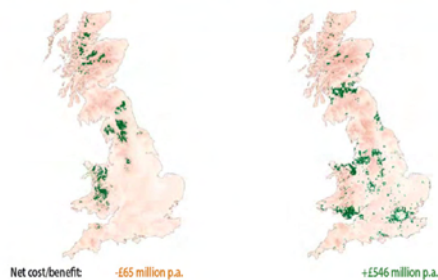
## Determinants of value

biophysical quantity & quality + human interactions ⇒ large spatial variations

Where should we plant Britain's new forests?

We could...  
maximise market value...

...and now consider...  
green house gases and recreation



UKNEA Follow-on study (2014)

Enabling the use of  
methods to value FES

## Policy approaches

Market failure used to justify policy interventions

Options include:

- Liability laws
- Property rights
- Command-and-control
- Economic incentives

But questions arise about policy interventions:

- actual impact on ecosystem service provision?
- possible conflicts between services?
- replacing lost services or generating new services?

## Barriers

- Data requirements are demanding – gaps remain, access limited
- Lack of standards on implementation
- Different purposes of valuation
- ES values depend on human interactions & vary spatially
- Valuation methods are contested & studies are 'patchy'
- Confusion over terms and definitions
- Estimated values do not define price



- Political and cultural objections

⇒ pan-European approaches to valuation and implementation are challenging

**Forestry Commission** **Guidance - valuation**

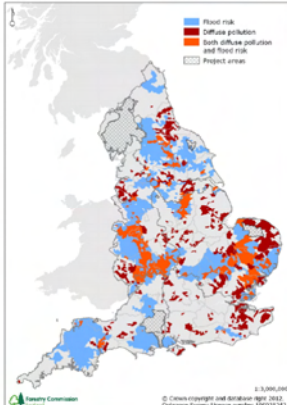
www.defra.gov.uk

An introductory guide to valuing ecosystem services

Forestry Commission

**Forestry Commission** **Mapping**



Woodland for water

National EWGS Targeting Map 2012-13

Forestry Commission

**Forestry Commission** **'Slowing the Flow'**



**THE INDEPENDENT**

**A 21st century catastrophe**

Forestry can affect flood flows :

- Reducing the volume of run-off
- Slowing down run-off
- Holding back flood waters in floodplains

**2007 floods in England and Wales**

⇒ Review: called for greater working with natural processes

⇒ 'Slowing the Flow' – to demonstrate how integrated application of land management practices can reduce flood risk at catchment scale, while providing multiple benefits for local communities

**Forestry Commission** **Slowing the Flow**

- Evaluation
  - Some constraints: landscape and biodiversity, finance (landowners)
- Modelling underway: flood storage bunds predicted to protect c50 properties in Pickering affected by low level flood events (1 in 25 yrs)
- Key ecosystem services: flood regulation, erosion regulation, habitat provision, social relations, education and knowledge, climate regulation
- Mean annual gain of £0.2m; central NPV of £4.3m
- Lessons include: secure full implementation & take opportunities to extend, continue monitoring, communicate and promote success
- Recommendations: develop & trial a PES to secure wider implementation

**Forestry Commission** **Valuation - ways forward?**

- Workable quality criteria
- Improve access to existing valuations
- Better use of existing data (mapping, VT)
- Filling knowledge gaps
- Enabling knowledge transfer

**Forestry Commission**

Capturing FES values

**Forestry Commission** **Unlocking values from land assets**

- Ecosystem services support our economy & society



- New opportunities – emerging markets?

- Cost-effective solutions
- Green growth in rural areas

**Forestry Commission** **Creating new markets**

- Incorporating ES externalities & public goods into markets brings risks
  - poor design & implementation
  - 'green wash' reputation
  - lack of confidence
  - cynicism
- Requirements for success?
  - Evidence (science, economic/financial)
  - Appropriate knowledge & expertise
  - Appropriate infrastructure
    - clear property rights, information, standards, liquidity
  - Practical examples - demonstration initiatives

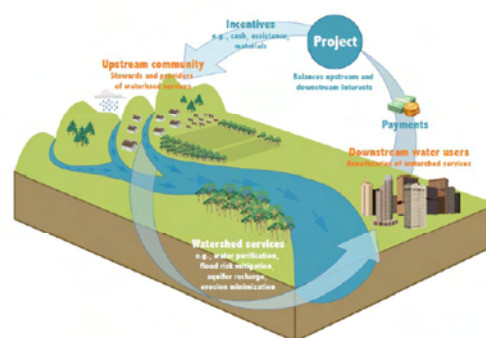


## Encouraging behaviour through market signals

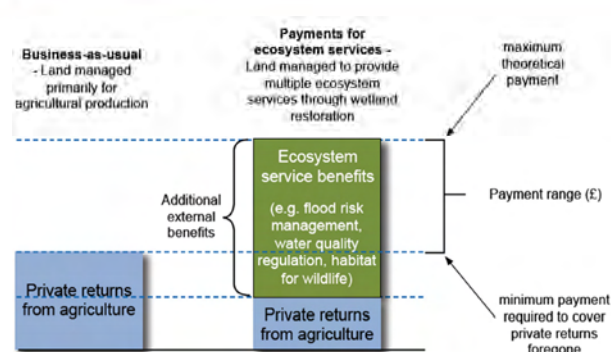
Examples include:

- Payments for ecosystem services (PES)
  - direct payments, easements, concessions, regulatory
- Direct markets
- Tradable permits
- Reverse auctions
- Eco-labelling & certification
- Green bonds

Where users (or beneficiaries) of ecosystem service pay the stewards (or providers) of ecosystem services



- a *voluntary* transaction where
- a *well-defined* ES (or a land-use likely to secure that service)
- is being 'bought' by an (minimum one) ES *buyer*
- from a (minimum one) ES *seller*
- if and only if the ES provider secures ES provision (*conditionality*)
- Also, *additionality*, *permanence*, *avoiding leakage*



## how to design & implement PES

- Phase 1: identify a saleable ecosystem service & prospective buyers & sellers
- Phase 2: establish PES scheme principles & resolve technical issues
- Phase 3: negotiate & implement agreement
- Phase 4: Monitor, evaluate & review implementation
- Phase 5: Consider opportunities for multiple-benefit PES
- [www.gov.uk/government/publications/payments-for-ecosystem-services-pes-best-practice-guide](http://www.gov.uk/government/publications/payments-for-ecosystem-services-pes-best-practice-guide)



- Fostering demand & supply
- Improved metrics
- Monitoring and evaluation
- Financing mechanisms
- Pilot projects
- Business cases
- Natural capital accounting

**"Develop a woodland ecosystem market roadmap ... to bring together actions by Government and our partners" (UK Govt 2013)**

## UNDERSTAND THE OPPORTUNITIES

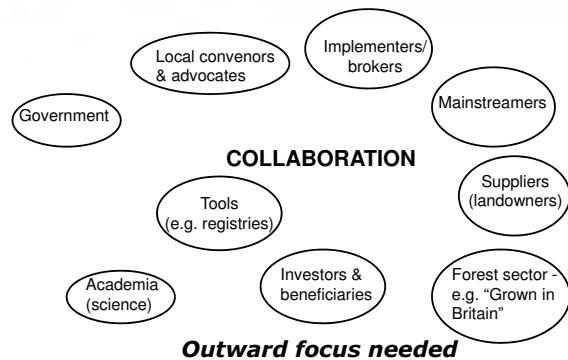
## BUILD CAPACITY

## APPLY

- Review research & experience to date
- New research & analysis
  - Forest ES market analysis
- Costs and benefits, and investment returns
  - Marginal abatement costs (CO<sub>2</sub> emissions)
  - Water regulation
- Metrics for natural capital accounting
  - reporting and impact assessment/ rating

**Stronger evidence base needed**

## (b) Develop capacity



## (c) Apply

### Incentives

Fiscal policies  
Market-based instruments

### Standards



### Information



*Practical examples needed*

## Conclusions

### Economic valuation

- A powerful tool but one approach among others
- Its purposes need careful communication
- Major advances but major challenges remain
- Guidance and standards needed

### Market-based approaches

- At an early stage
- Guidance and standards needed
- Evidence essential
- Lack of systematic knowledge on new finance mechanisms
- Knowledge exchange
- Pilot projects

National Forest Programmes have significant potential to support means to implement the valuation of forest ecosystem services

Forestry has an important contribution to make

- major provider of natural capital & ecosystem services
- wide-ranging data and expertise
- capacity, in partnership, to apply in practice



Forest sector has potential gains

- revenue streams
- mainstreaming

**Thank you**

Contact: [pat.snowdon@forestry.gsi.gov.uk](mailto:pat.snowdon@forestry.gsi.gov.uk)



## EU Action on Forests and Valuation of Ecosystems

Mr. Strahil Christov

Directorate General for the Environment

EUROPEAN COMMISSION




### EU Action on Forests and Valuation of Ecosystems

Workshop on a Pan-European Approach to Valuation of Forest Ecosystem Services

Belgrade, 25/09/2014

Strahil Christov,  
European Commission




### Content

- EU Biodiversity Strategy to 2020
- EU Forest Strategy
- Links between Biodiversity Strategy and valuation of forests
- Study on Ecosystem Services valuation and accounting



### EU Biodiversity Strategy to 2020



### The mandate

**Long term vision**

*By 2050, European Union biodiversity and the ecosystem services it provides – its natural capital – are protected, valued and appropriately restored for biodiversity's intrinsic value and for their essential contribution to human well-being and economic prosperity, and so that catastrophic changes caused by the loss of biodiversity are avoided*

**Mid term headline target**

*Halting the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restoring them in so far as feasible, while stepping up the EU contribution to averting global biodiversity loss*



### Forest actions

**Action 11: Encourage forest holders to protect and enhance forest biodiversity**

11a) Member States and Commission will encourage the adoption of **Management Plans**, inter alia through the use of rural development measures and the LIFE+ programme

11b) Member States and the Commission will foster innovative mechanisms (e.g. **Payments for Ecosystem Services**) to finance the maintenance and restoration of ecosystem services provided by multifunctional forests.

**Action 12: Integrate biodiversity measures in forest management plans**



### EU Forest Strategy

## EU Forest Strategy

No provision for a common forest policy in the Treaty

But many EU policies affect forests and forest-based sectors

EU-wide coordination through Standing Forestry Committee, and some other committees

Actions are voluntary and based on 'strategic orientations'



## Relevant parts

### Objectives

*'To ensure and demonstrate that all forests in the EU are managed according to **sustainable forest management** principles [...] contributing to **balancing various forest functions**, meeting demands, and **delivering vital ecosystem services**'*

### Strategic orientations

*'Member States will, with the Commission's assistance, develop a **conceptual framework for valuing ecosystem services**, promoting their integration into accounting system at EU and national levels by 2020. They will build on the Mapping and Assessment of the state of Ecosystems and of their Services.'*

## Links between Biodiversity Strategy and valuation of forests

## Target 2 (TEEB) in EU Biodiversity Strategy

*By 2020, ecosystem services are maintained and enhanced through the establishment of Green Infrastructure and the restoration of at least 15% of degraded ecosystems*

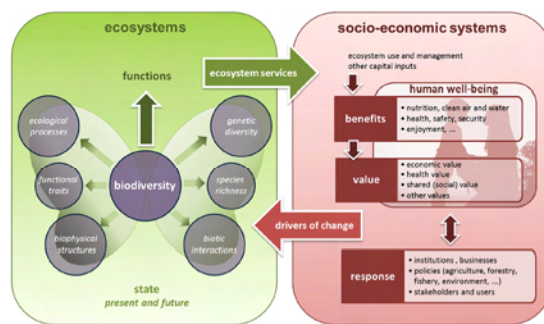
- Action 5: Improve **knowledge** about ecosystems and their services in the EU
- Action 6: Set priorities to **restore** and promote the use of **Green Infrastructure**
- Action 7: Ensure **no net loss** of biodiversity and ecosystem services

## Action 5, T2 (TEEB) in EU Biodiversity Strategy

**Action 5:**  
*Improve knowledge of ecosystems and their services in the EU*

*Member States, with the assistance of the Commission, will map and assess the state of ecosystems and their services in their national territory by 2014, assess the economic value of such services, and promote the integration of these values into accounting and reporting systems at EU and national level by 2020.*

## MAES Conceptual Framework



## MAES Working Group (WG)

- Create an analytical framework for ecosystem assessment following CICES (the Common Classification of Ecosystem Services).
- Create Indicators for ecosystem assessments
- WG on Mapping and Assessment on Ecosystems and their Services (MAES) four pilots focused on Europe's main ecosystem types:
  - **agro-ecosystems**
  - **forest ecosystems**
  - **freshwater ecosystems**
  - **marine ecosystems**
- Two further pilots were also implemented:
  - **use of conservation status data for assessing the state of ecosystems**
  - **natural capital accounts**

## Study on Ecosystem Services valuation and accounting

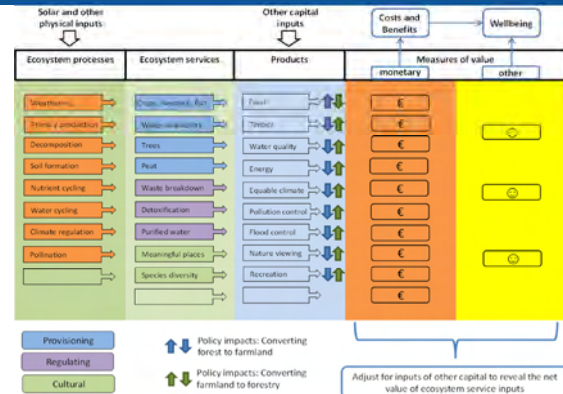


## A synthesis of approaches to assess and value ecosystem services in the EU in the context of TEEB

- Task 1 - Review of Initiatives using standard format
- Task 2 - Analysis and synthesis of approaches
- Task 3 - Develop common framework
- Task 4 – Conclusions and Recommendations
- **NOT ONE SINGLE STANDARD APPROACH !**

## Conceptual framework

Consistent with MAES framework and CICES classification



## Applying the Conceptual Framework: Choices

**Choice level 1: what do you want to achieve?**

**Choice level 2: what are the relevant ecosystem services?**

- Classification of ecosystem services
- Final and/or intermediary services
- Role of biodiversity
- Actual or potential ecosystem services

**Choice level 3: what are the relevant valuation principles?**

- Monetary or nonmonetary quantification of ecosystem services
- Definition of economic value
- Marginal or total values
- Spatial and temporal scales

**Choice level 4: what are the appropriate valuation methods?**

- Market valuation
- Non-market valuation
- Value transfer



**Thank you**

For more information visit:

**Forest Strategy** - <http://ec.europa.eu/agriculture/forest>

**MAES documents** - <http://biodiversity.europa.eu/maes>

**TEEB in the EU** - <http://ec.europa.eu/environment/nature/biodiversity/economics/>

## MAES Pilot on forest ecosystems and their service

Mr. Jose I. Barredo

Institute for Environment and Sustainability (JRC-IES)  
EUROPEAN COMMISSION

### MAES Pilot on forest ecosystems and their services - Outlook

Co-leaders of the pilot:

José I. Barredo (EC-JRC, Institute for Environment and Sustainability)

Cristina Marta-Pedroso (CIMU - Polytechnic Institute of Bragança, PT)  
Henrique Pereira (German Centre for Integrative Biodiversity Research)  
Jan Bengtsson (Swedish University of Agricultural Sciences)  
Tord Snäll (Swedish University of Agricultural Sciences)  
Jon Moen (Umeå University, Sweden)  
Hannah Östergård (Swedish Environmental Protection Agency)

FOREST EUROPE Workshop on Valuation of Forest Ecosystem Services  
Belgrade, Serbia, 24-25 September 2014

### European forests

- Cover around **40%** of terrestrial ecosystems
- Home to much of the continent's **biodiversity**
- High **socio-economic** importance
- And **environmental** !!!



### MAES Pilot on Forest Ecosystems: scope

- The essential task of the pilot was to **identify available knowledge** useful for mapping forest ecosystems and assess their condition and the services they provide
- Using a common framework for all MAES pilots
- An analytical framework for ecosystem assessment (2013) to be applied by the EU and its Member States in order to ensure a consistent approach



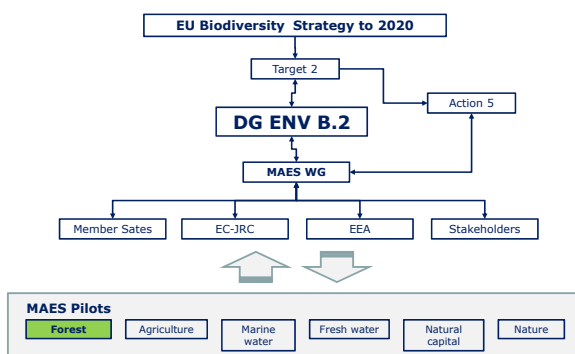
### MAES Pilot on Forest Ecosystems: participation

Table 1. Contributions of Member States, stakeholders and EU services to the pilots

	1 Nature	2 Agriculture	3 Forest	4 Fresh water	5 Marine	6 Natural Capital Accounting
MS Leads	LT, BE	SE, PT	FR, FR	FR, FR	EE, BG	EEA
EU Lead	ENV, JRC	JRC, JRC	JRC, JRC	ENV, ENV	ENV, ENV	ENV, ENV
EU members	EEA, JRC	EEA, ENV, AGR	EEA, ENV, AGR, ESTAT	EEA, ENV, ENV	EEA, ENV, ENV	ENV, ENV, ENV
MS co-leads	LT, HU, BG	AT, BE, DE, ES, SE, SK	BG, FI, ES, SE, PT	AT, ES, FR	PT, FR	DE, EE, FR, PT, SK, UK, BG
Stakeholders	CEB, WWF	ELO, FACE	WWF, BG, ELO, FACE, FOREST EUROPE	WWF	CONAN, LAGOONS, ABCP	WWF

1. "Integrated water resources and coastal zone management" (IPF grant agreement n° 201517, <https://ec.europa.eu/ipf/>)  
2. "Institutions and leadership to manage multiple pressures on lagoons" (IPF grant agreement n° 202146, <https://ec.europa.eu/ipf/>)

### Structure of MAES pilots

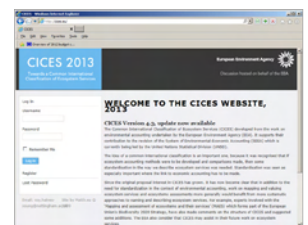


### CICES: The Common International Classification of Ecosystem Services

- CICES was developed from the work on environmental accounting undertaken by the European Environment Agency
- CICES was adopted by the MAES WG
- <http://cices.eu>

#### CICES main sections:

- Provisioning services
- Regulating/maintenance services
- Cultural services



## MAES Pilot on Forest Ecosystems: approach

Table 7. Cultural services delivered by forest ecosystems

Division	Group	Class	Indicators
Physical and intellectual interactions with biota, ecosystems, and land-landscapes	Physical and experiential interactions	Experiential use of plants, animals and land-landscapes in different environmental settings. And physical use of land-landscapes in different environmental settings.	<ul style="list-style-type: none"> <li>Distribution of wildlife/embellished species associated with forest</li> <li>Important bird areas associated with forest</li> <li>Area of forest accessible for recreation</li> <li>Number of visitors</li> <li>Number of hunters</li> <li>Ecosystem operators</li> <li>Area of forests accessible for hunting</li> </ul>
Spiritual, symbolic and other interactions with biota, ecosystems, and land-landscapes	Intellectual and representative interactions	Scientific, educational, heritage, cultural, entertainment and aesthetic	<ul style="list-style-type: none"> <li>Creations, distribution of research projects, educational projects, number of historic records</li> <li>Number/value of publications sold</li> </ul>
	Spiritual and/or emblematic	Symbolic and sacred and/or religious	<ul style="list-style-type: none"> <li>Distribution of sites of emblematic plant/forest</li> <li>Number of sites with recognised cultural &amp; spiritual value</li> <li>Number of visitors</li> </ul>
	Other cultural outputs	Existence and bequest	<ul style="list-style-type: none"> <li>Distribution of important areas for forest biodiversity and their conservation status</li> <li>Condition of forest-associated priority species on habitat and birds directives</li> <li>Distribution of sites with forest designated as having cultural value</li> <li>Number of visitors</li> </ul>

## MAES Pilot on Forest Ecosystems: output

- Report: Indicators for ecosystem assessments under Action 5 of the Biodiversity Strategy (MAES, 2014)
- List and assessment of available indicators for forest ecosystem services (mapping and assessment): datasets, maps, statistics, gaps, common framework...
- Agreement on a comprehensive, operational and widely accepted classification (CICES) and list of forest ecosystem services



## MAES Pilot on Forest Ecosystems: output

- List of forest ecosystem services and indicators for mapping and assessment
- e.g. Forest cultural services:

Table 7. Cultural services delivered by forest ecosystems

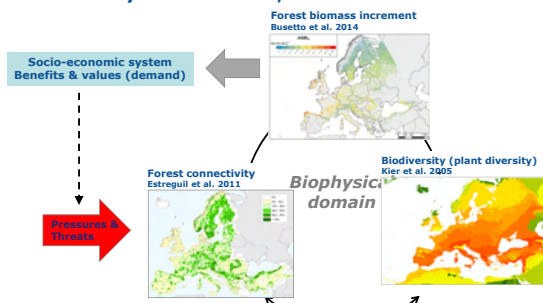
Division	Group	Class	Indicators
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## Next steps of MAES and Pilot on Forest Ecosystems

Within Action 5 of the **Biodiversity Strategy to 2020**: Improve knowledge of ecosystems and their services in the EU:

- MS, with the assistance of the Commission, will **map and assess** the state of ecosystems and their services in their national territory by **2014**, (...)
- (...) **assess the economic value** of such services, and promote the integration of these values into accounting and reporting systems at EU and national level by **2020**

## Forest ecosystem services, condition and biodiversity



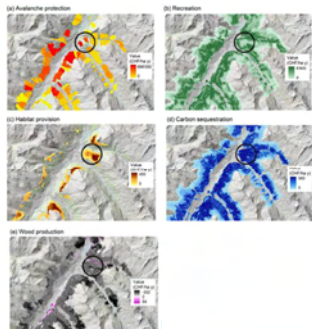
Source: EFDAC -> FISE

## Case study: Multifunctional forest ecosystems

- Fostering multifunctional forest ecosystems supporting different services
- Identification of key ecosystem services and synergies for designing management strategies

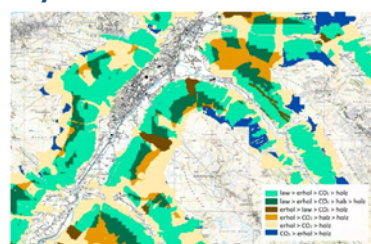


## Case study: Multifunctional forest ecosystems



Source: Grêt-Regamey et al. 2013

## Case study: Multifunctional forest ecosystems



Simultaneous provision of different forest services: avalanche protection (law), recreation (erhol), carbon sequestration (CO<sub>2</sub>), habitat provision (hab), and timber production (holz) indicating priority ecosystem services and ecosystem services trade-offs (Bebi et al., 2012)



# Thank you

**Contact:**

José I. Barredo: [jose.barredo@jrc.ec.europa.eu]


Joint  
Research  
Centre



# Valuing Forest Ecosystem Services: Findings and Challenges

Mr. Robert Mavsar

European Forest Institute - EFI



EUROPEAN FOREST INSTITUTE

## Valuing Forest Ecosystem Services

### Findings and Challenges

Robert Mavsar


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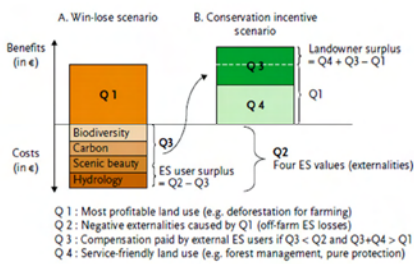


NEWFOREX  
NEW WAYS TO VALUE AND MARKET  
FOREST EXTERNALITIES

## Background

- NEWFOREX "New Ways of Valuing Forest Externalities" - FP7 funded research project
  - Methods for valuing forest externalities that enable to handle jointly produced externalities in an integrated way.
  - methodology for assessing the cost of provision of externalities..
  - assess several market-based methods for enhancing the provision of forest externalities, like payment schemes, certification or (re-)definition of property rights.
  - disseminate and communicate the improvements and gains in knowledge about the methods for valuation and marketing of forest externalities.





A. Win-lose scenario

B. Conservation incentive scenario

Benefits (in €)

Costs (in €)

Q1: Most profitable land use (e.g. deforestation for farming)

Q2: Negative externalities caused by Q1 (off-farm ES losses)

Q3: Compensation paid by external ES users if  $Q3 < Q2$  and  $Q3 + Q4 > Q1$


Q4: Service-friendly land use (e.g. forest management, pure protection)

ES user surplus =  $Q2 - Q3$

Landowner surplus =  $Q4 + Q3 - Q1$


Four ES values (externalities)

Source: Pagiola and Platais (2007)




## Quantification of and goal setting for non-marketed forest ecosystem services (ES)

- Any policy targeting ES should have clear and measurable goals for ES quantities at least for two reasons:
  - to ensure that what is being delivered is what has value and
  - to allow society to monitor the efficiency of policies
- In goal setting, it should be remembered that any policy will likely affect several ES and therefore multiple policies may be needed for balance
- Still remains a challenge to understand functioning of ecosystems and provision of ES (interrelations, role of species, climate change,...)



## The valuation of non-marketed forest ecosystem services (ES)

- based on the concept of **economic value** – it stresses values that bring benefits to human beings, either directly or indirectly (preference based).
- relies on the notion of **willingness to pay (WTP)** - the maximum amount of other goods (e.g. money) an individual is willing to give up in order to have a particular good.
- economic value** of a good to an individual is reflected in the willingness to pay of the individual for that good.
- focuses on assessing the value of **small-scale changes** (marginal changes) in ecosystem services resulting from management decisions or other human actions



## The valuation of non-marketed forest ecosystem services (ES)

- raise awareness by demonstrating the importance of forest conservation and sustainable use.
- determine damages of forests loss
- land use decisions
- maximize the environmental benefits per monetary unit spent
- encourage innovative forest goods and services (e.g. certification)
- justify and decide how to allocate public spending on conservation, preservation, or restoration initiatives.
- consider public's values, and encourage public participation and support for environmental initiatives.
- compare the benefits and costs of different projects or programs.

## The valuation of non-marketed forest ecosystem services (ES)

- Using improved methods we add documentation for the impressive value of non-marketed forest ecosystem services – yet we argue that to make valuation studies policy relevant, focus should turn away from total economic values to value distributions
- Environmental policies have distributional effects: Some people win more than others – and others again may lose. We demonstrate with case studies that these differences are not trivial and likely to be highly policy relevant
- Identifying who values ES how much can inform policy instrument design in order to gain legitimacy and direct costs to where values are harvested.

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## The cost of provision for non-marketed forest ecosystem services (ES)

- the benefits of applying multiple methods for assessing the cost of provision – capital budgeting techniques widely used can be further informed by methods taking forest owner perceptions into account
- European private forest owners are generally positive towards the provision of ES from their forests
- differences in forest owner objectives spill over to major heterogeneity their perceived cost of providing further ecosystem services.
- options for improved cost efficient policy designs

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## Economic Instruments non-marketed forest ecosystem services (ES)

- many formal aspects of contract matter and that loss of decision right is costly, thus instruments should be designed to limit these where possible and carefully consider aspects like exit options, time frame etc
- participation rates in voluntary economic instruments increase when transactions costs can be controlled, e.g. larger forest properties, higher educated and forest owners with experience from other instruments are more likely to enter a new instrument
- forest extension companies can be instrumental in reducing transactions costs and stimulate participation from owners who face steep transaction costs

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## Economic Instruments non-marketed forest ecosystem services (ES)

- ES targeted instruments are more likely to attract forest owners if the are aligned with forest owner values – for example instruments requiring action (infrastructure, establishing new nature, restoration) are seen more positive than instruments requiring inaction (passive conservation) – policy instruments can be designed to benefit from this
- the majority of citizens of several European countries support the view that cost of ES provision should in general be carried by society or identified users directly – and not the forest owners. This shows widespread public support for economic instruments.

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**Thank you!**

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## TEEB implementation – Rooting Valuation in Policy

Ms. Kavita Sharma

The Economics of Ecosystems and Biodiversity - TEEB  
UNITED NATIONS ENVIRONMENT PROGRAMME

**The Economics of Ecosystems & Biodiversity**

### TEEB implementation – Rooting Valuation in Policy

Belgrade  
24/09/2014

Kavita Sharma  
UNEP TEEB Office

**The Economics of Ecosystems & Biodiversity**

### Agenda

- I. Introduction - valuation and policy
- II. TEEB
  - A. Background
  - B. Country Implementation – process and methods for valuation
  - C. Examples
- III. Concluding remarks

**The Economics of Ecosystems & Biodiversity**

### I. VFES and public services

**Catskills and Delaware Watershed**

- 90% NYC's water supply
- Saving the city 10 billion USD in CAPEX
- Other services include –recreation, Carbon, etc.
- City has set aside USD 300 million to improve watershed health – reduce nutrient loading, turbidity, implement BMPs.

**Biosphärenreservat Mittlere Elbe**

- After floods in 2002, BMU agreed on a law to increase floodplains
- Cost-benefit scenario 2.5:1 to 4.2:1 (Meyerhoff, Dehnhardt, 2004)

**TEEB NL**

- Green spaces up-scaling to 10 million people shows that benefits could be as high as 400 million Euros.

**The Economics of Ecosystems & Biodiversity**

### II.A. TEEB Introduction (Phase I & II (2008-2012))

The flowchart illustrates the TEEB introduction process. It begins with the 'GB 2007 Environment Ministers Meeting' in Potsdam (15-17 March 2007), which led to the 'Potsdam Initiative – Biological Diversity 2010'. This initiative focused on the economic significance of the global loss of biological diversity. The process then moves through several key milestones: the 'Interim Report' and 'Climate Issues Update' (leading to 'CBD COP 9 Bonn 2008' and 'Input to UNFCCC 2009'), followed by 'TEEB End User Reports' (Brussels 2009, London 2010), 'TEEB Synthesis', and 'TEEB Books'. The final stage is 'BD COP 10 Nagoya, Oct 2010'. The process is supported by 'Ecol./Env. Economics literature' and 'The Economics of Climate Change'. On the right, a vertical list identifies 'Country TEEB Programs' (including India), 'Sectoral TEEB Programs', 'Business Externalities Work', and 'Rio+20 Brazil'.

**The Economics of Ecosystems & Biodiversity**

### TEEB Phase III: 2012-2017

1. Country-level studies
  - TEEB Country Guidance Manual
  - TEEB “EC-funded” Studies
2. Regional studies
  - TEEB for Arctic
3. Natural Capital Accounting
  - SEEA - EEA at national level
  - Advancing Natural Capital Accounting
4. Biome & Sector-specific studies
  - TEEB for Water & Wetlands
  - TEEB for Agriculture and Food
  - TEEB for Oceans and Coasts

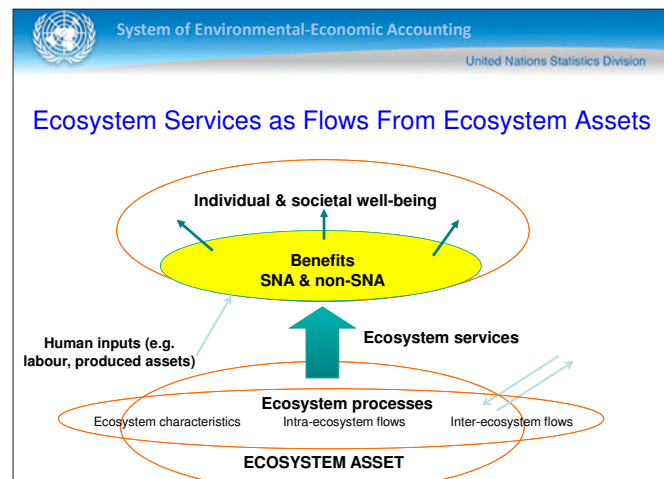
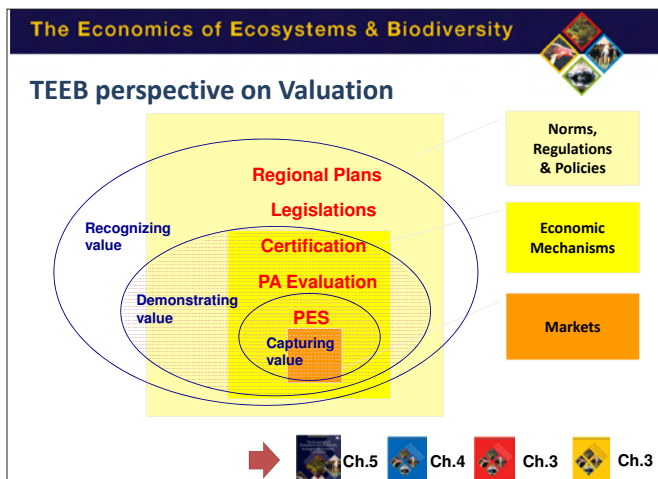
**The Economics of Ecosystems & Biodiversity**

### II.B TEEB Country Studies - Approach and methods

#### TEEB Six-step Approach

1. Refine the objectives of a TEEB country study by specifying and agreeing on the key policy issues with stakeholders
2. Identify the most relevant ecosystem services
3. Define information needs and select appropriate methods
4. Assess and value ecosystem services
5. Identify and outline the pros and cons of policy options, including distributional impacts
6. Review, refine, and report

**Note:** This approach is not a fixed recipe. It is intended to guide policy makers in designing their own processes.

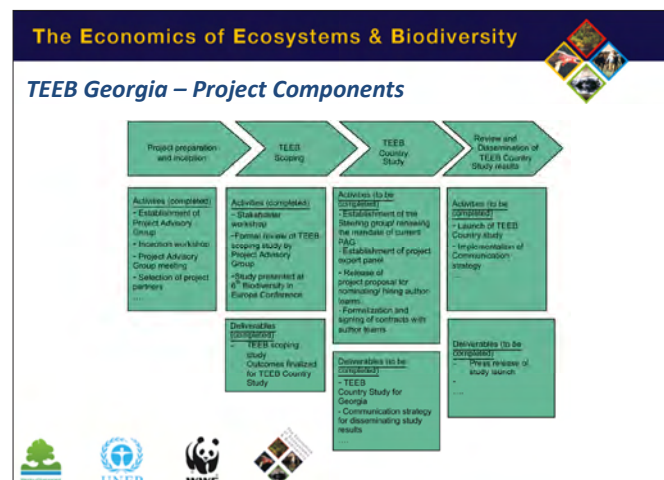


### The Economics of Ecosystems & Biodiversity

#### II. C. Examples: TEEB Georgia

- Became a pilot TEEB country in late 2011
- Coordinated by UNEP, WWF-Caucasus, the Ministry, and UNEP-TEEB Office (and PAG)
- The Scoping study (released October, 2013) reviews four economic sectors-
  - Highlights importance of ESS in economic sectors
  - Identifies policy relevant questions that may be addressed by a TEEB study for Georgia

UNEP WWF



### The Economics of Ecosystems & Biodiversity

#### Forests in Georgia

- 40% forest cover
- Pressures on forests due to illegal hunting and logging
- Grazing in protected areas
- Land fragmentation
- Poor forest inventory
- Hydropower/ mining pressures
- Leases offered for 49 years
- Policy context
  - Programme of government
  - NBSAP -2
  - 2020 Strategy for biodiversity

UNEP WWF

### The Economics of Ecosystems & Biodiversity

#### TEEB Georgia – Questions to address

- Examine and quantify, wherever applicable, the biodiversity and ecosystem services impacts and dependencies
- Suggest ways to internalize this information in policies for protected area management, leasing, and creation of corridors

- Identify policy instruments
- Do a distributional analysis of policy instruments.

UNEP WWF

### The Economics of Ecosystems & Biodiversity

#### Keynote address by Hon. Khatuna Gogaladze – Cabinet Minister for Environment and Natural Resources at the 1<sup>st</sup> Globe Natural Capital Summit

"This study highlights the critical relationship to biodiversity and ecosystem services, formulates important questions that may be answered by a full TEEB study ..."

"Considering the transitional phase and rapid development in Georgia's economy, TEEB initiative is exactly one of those effective instruments, which could successfully be applied for preserving ecosystems, and at the same time promoting sustainable growth of the economic sector."

UNEP WWF

### The Economics of Ecosystems & Biodiversity

#### TEEB National Implementation (Contd.) – EC funded project

- Project preparation and scoping Phase**
  - Establishing the Project governance structure
  - Scoping the project
  - ....
- Study Phase**
  - Compilation of biophysical data and modeling in the countries
  - Valuation of Ecosystem services and biodiversity
  - Identify pros and cons of policy options, including distributional impacts
- Review and dissemination of results**
  - Development of a final Implementation Plan for TEEB
  - ....

**Pilot countries:** Liberia and Tanzania (Africa), Bhutan and the Philippines (Asia), Ecuador (Latin America)





## TEEB Bhutan – Hydropower development

Inform the Sustainable Hydropower Development Policy of 2008, and the Alternative Renewable Energy Policy of 2013

- TEEB would assess changes in ecosystem services provisioning (with a focus on watershed services from forests) under different hydropower diversification scenarios, assuming that each scenario would seek to meet the 2020 energy goals set by the Royal Government of Bhutan.
- Diversification includes large, medium and small hydropower plants
- The study would recommend instruments, including PES, or royalty fee changes to ensure benefits sharing with communities



## TEEB Bhutan – informing policy through VFES

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>▪ Costs                     <ul style="list-style-type: none"> <li>▪ CAPEX</li> <li>▪ OPEX ~ f (forest management)</li> <li>▪ Emissions</li> <li>▪ Displacement of people</li> <li>▪ Biodiversity loss</li> <li>▪ Cultural values</li> <li>▪ Tourism</li> <li>▪ Glacial bursts risks</li> <li>▪ Fuelwood + NTFP loss</li> <li>▪ ---</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>▪ Benefits                     <ul style="list-style-type: none"> <li>▪ Revenue generation (5000 MW deal with India)</li> <li>▪ Job creation (double counting)</li> <li>▪ Tourism</li> <li>▪ Clean air</li> <li>▪ ...</li> </ul> </li> </ul> |
|---|---|



## TEEB Philippines – Land Reclamation

Inform land reclamation policy with ecosystem services and biodiversity impacts (3-4 sites)

- Southern Palawan
  - Port development and “Ocean park”
  - Relatively pristine, mangrove forests, indigenous people
  - Risk of deforestation; compounding impacts (mining and oil palm development also occurring)
- Manila Bay
  - High population pressure
  - Lappchea zone (high migratory bird species; coral reef)
  - Risk of sedimentation and nutrient loading



## III. Concluding remarks

1. Biophysical inventories and assessments are important
2. Research in topics such as –
  - Contribution of biodiversity to resilience
  - Linking climate change to changes in ESS provisioning (Carbon, Species composition)
  - Impacts of Nitrogen deposition
3. Flood protection increasingly becoming important
4. Externalities accounting for wood sourcing in tropical countries – impact on pricing
5. Linking with SEEA – EEA
6. Marginal analysis as opposed to TEV

Enablers –

- Policy imperatives exist – WFD, EIA Directive, Pan European Biodiversity strategy, Aichi targets, NBSAPs
- Decentralized forms of governance
- Management plans



THANK YOU!



[www.teebweb.org](http://www.teebweb.org)

Contact: [teeb@unep.org](mailto:teeb@unep.org)

[Kavita.sharma@unep.org](mailto:Kavita.sharma@unep.org)

## Valuing benefits of recreation-oriented forest management: state-owned commercial forests in Finland

Mr. Artti Juutinen  
Forest Research Institute  
FINLAND

Forest Knowledge Know-how Well-being

METLA

Valuing benefits of recreation-oriented forest management: state-owned commercial forests in Finland

Artti Juutinen  
Finnish Forest Research Institute (Metla)  
(Anna-Kaisa Kosenius, Ville Ovaskainen)

Workshop on a Pan-European Approach to Valuation of Forest Ecosystem Services (Belgrade 24-25 September 2014)

### Background I


- Forests provide multiple benefits to people, including timber, other material products, and **environmental services** such as recreation and biodiversity
- Increasing public concern
- There are **no market** signals available to motivate and guide the managers to produce different services efficiently
- Valuation of forest ecosystem services (VFES)

### Background II

- Finland's land area 86% is covered by forests
- State owned forest: 35% of forestry land
  - Commercial **timber production forests** (50%)
  - Host over ten million close-to-home **recreational** visits annually (every man's rights)
  - Managed by Metsähallitus (remits the profits from forestry to the government)

### Background III

- Metsähallitus applies **specific practices** to enhance recreation (legislation)
- For example, buffer zones are left along lakes, rivers, and hiking trails to preserve the wooded scenery
- The profits from timber sales are estimated to be reduced by over **ten million Euros annually** due to the recreation-enhancing practices



### Research questions

- Do the aggregate benefits from the recreation-oriented management regime as a whole exceed the associated opportunity costs?
- What is the importance of the considered management practices in the light of their marginal valuations?
- What levels of the management attributes would maximize the benefits to the public?

### Method I

- Choice experiment
  - Detailed information about public preferences for many potential states of the environment

Attribute	Current situation	Alternative 1	Alternative 2
Width of buffer zones along lakes and rivers	20 m	40 m	20 m
Number of managed courting grounds for capercaillie	2000	1000	3000
Clear-cut areas visible along hiking trails	quite rarely	not at all	quite frequently
Tax increase per household	0 €/year	60 €/year	30 €/year

Please choose the best alternative by putting a tick to **one** circle above.



## Method II

- Data
  - Combination of mail and web surveys (a mixed mode)
  - 4200 randomly selected inhabitants living in selected municipalities in three regions: Lapland, Kainuu, and Tavastia Proper
  - Response rate 29.5%



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## Method III

- Models
  - Random parameter logit model
    - Importance of attributes and welfare effects
    - WTP space
    - Qualitative non-cost attributes (effects coding)
  - Conditional logit model
    - Optimal management levels
    - Preference space
    - Continuous non-cost attributes
    - Quadratic sub-utility functions

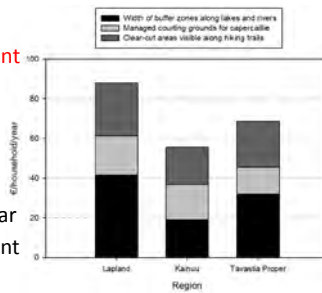
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## Results I

- Values of the **current management regime** (figure):
  - Lapland €88.1
  - Kainuu €55.6
  - Tavastia Proper €68.7
- Aggregate value €49 million/year
- Welfare effect (CV) of the current management regime is -€149 million/year



→ **Benefits exceed the opportunity costs (€13 million/year)**

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## Results II

The most preferred levels of management attributes compared to the current management levels.

Attributes	Preferred attribute levels			Current level
	Lapland	Kainuu	Tavastia Proper	
Width of buffer zones along lakes and rivers (meters)	28.7	39.3	31.0	20.0
Number of managed courting grounds for capercaillie	2432.7	2480.1	2648.9	2000.0
Clear-cut areas visible along hiking trails (on % of trails)	6.0	5.6	6.6	10.0

- People would like to increase the management activities from the current level to some extent
- Citizens in Kainuu prefer wider buffer zones along lakes and rivers and less frequent clear cuts along hiking trails than citizens in Lapland and Tavastia Proper
- Citizens in Tavastia Proper prefer the largest number of managed courting grounds for capercaillie (habitats for game birds)

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## Concluding remarks

- National level
- Cost-benefit analysis
- Regional differences
- Guidelines for forest management
- Respondents may not know very well the considered FES (or forest management activities)
  - Difficulties to describe attributes and their levels
  - Considering several FES at the same time
- How to take into account spatial preferences?
- Every man's right (right to public access on land)
  - How to define the cost attribute in a survey (protest answers)

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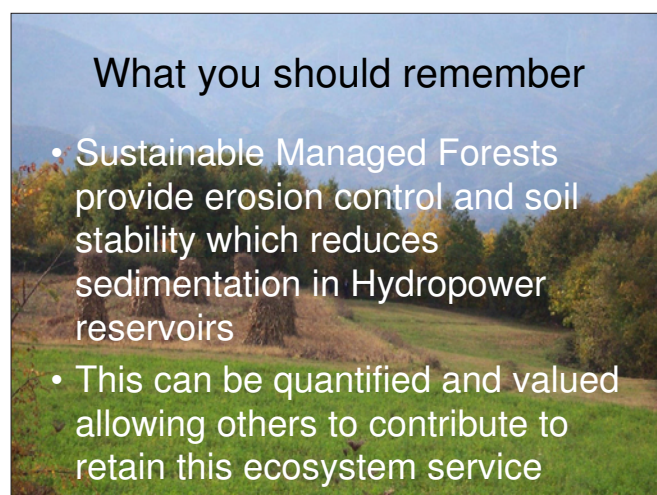
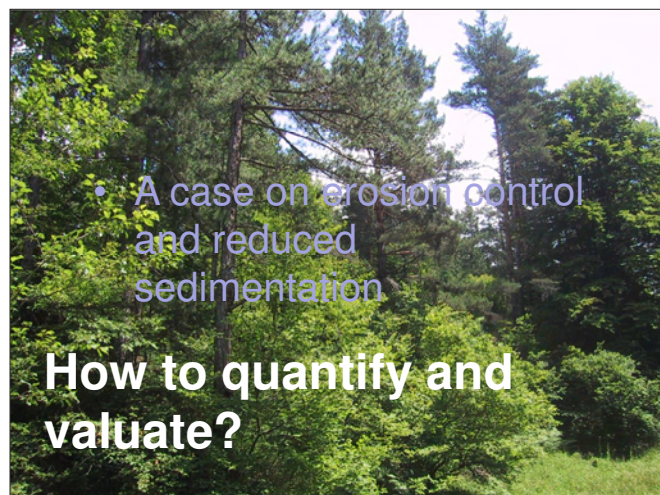
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Sustainable Forest Management securing erosion leading to improved watershed management - Study of World Bank PROFOR for Innovative Financing for SFM in the Southwest Balkans

Mr. Peter Kampen

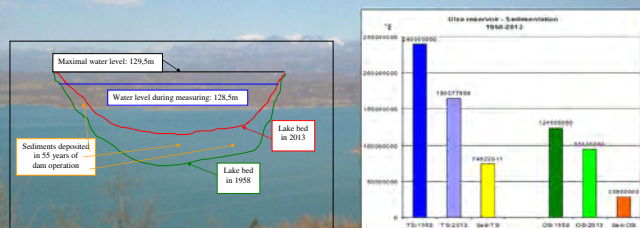
Connecting Natural Values & People Foundation (CNVP)  
MACEDONIA

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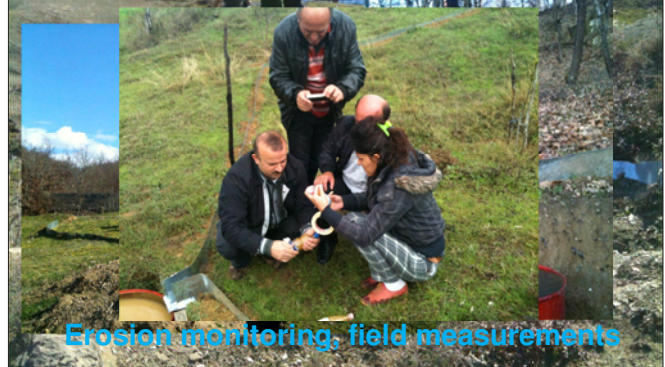


## The Effect of Erosion on the Hydro Power Reservoir



Sedimentation leads to loss of reservoir capacity and operational storage

## The influence of Land use on erosion

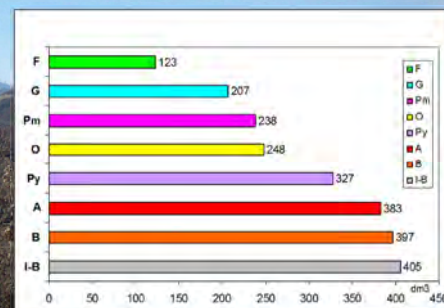


Erosion monitoring, field measurements

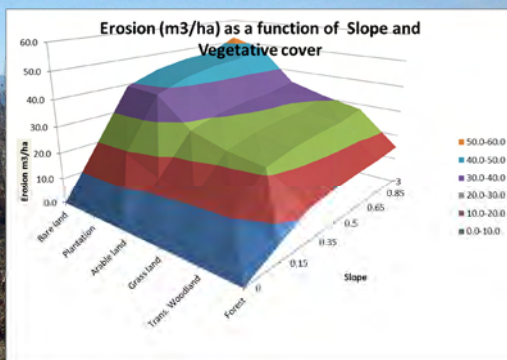
## Land use and land cover

- Erosion monitoring shows a high relation of the land cover and the level of erosion and run off
- Bare land and arable land have the highest values especially with increased slopes
- Forests and Plantations with ground cover have the lowest values. Increased slopes have hardly any influence on erosion under well managed forests.
- Gullies are having a high impact on erosion

## Quantified level of erosion under different land uses



## Quantified level of erosion under different land uses

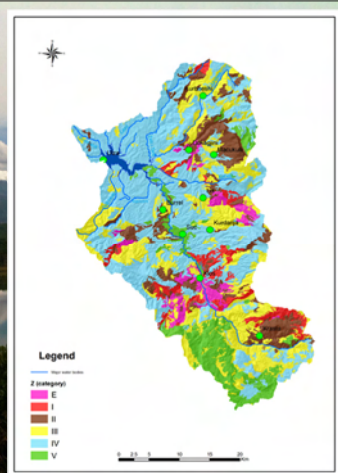


## Sustainable Forest Management

- Sustainable Forest Management and good grassland use with sustainable practices can be used to reduce erosion
- Opportunity to support this with a Payment for Environmental Service Scheme: Hydro Power contributes towards farmers upland applying SFM

## Erosion risk mapping

Where occurs the erosion in the watershed?



## There is a needs for a PES system

- Policy give general value to ecosystem services
- Quantified values give options to make concrete measures
- These can be developed in a Payment for Ecosystem Services, clarity for who pays for what?

## What you should remember

- Sustainable Managed Forests provide erosion control, soil stability which reduces sedimentation in Hydropower reservoirs
- This can be quantified and valued allowing others to contribute to retain this ecosystem service

## Thank you for your attention

Peter Kampen, MSc Forestry, Executive Director CNVP

For further information:

[www.cnvp-wbprofor.org](http://www.cnvp-wbprofor.org)



Financed by:





## Forest Ecosystem Services (FES), Valuation of FES, Implementation of the Valuation : Serbian experience

Mr. Sasa Stamatovic  
Directorate for Forest  
REPUBLIC OF SERBIA

### Forest Ecosystem Services (FES), Valuation of FES, Implementation of the Valuation: Serbian experience

Stamatović Saša

Belgrade, September 2014

## Content of presentation

- Introduction
  - Few words on the importance of value and valuation
  - Serbian forest sector valuation (2007) - basic info
- Methodologies and results
  - TEV
  - WTP
  - Preferences
- Discussion
  - Forest Ecosystem Services (FES) vs. Forest functions
  - Post hoc analyses and results
  - Purpose of valuation
- Instead of conclusion

## Introduction

### -something on the importance of value and valuation-

- Value is the worth of a product or service to an individual or a like-minded group in a given **context** (*Brown, 1984*);
- Monetary valuation - "Making apples and oranges comparable" (*Pagiola, Ritter, & Bishop, 2004*);
- Debates and controversies exist as long as attempts of valuation (e.g Kant);
- Valuation is not a panacea (*Kengen, 1997*) and there is no magic formula;
- Concerning object of valuation there are 2 approaches of valuation: flow and asset;

## Introduction

### -Serbian forest sector valuation (2007) - basic info's-

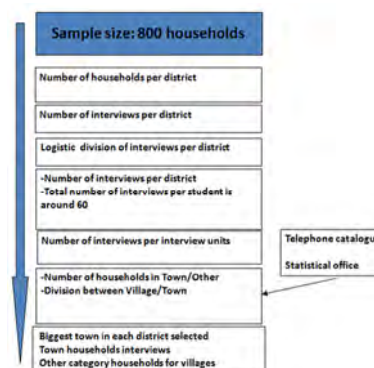
- Realized under the project "Study on forest valuation and financing in Serbia: Forest sector valuation sub study" (Helsinki University- Department for Forest Economics: Rekola M., Stamatović S., Petrović N. 2007) as part of wider project "Forest Sector Development in Serbia" GCP/FRY/003/FIN implemented by FAO, financed by Finland;
- During 2006 and 2007;
- Momentum
  - Forest development strategy adopted in 2006 (public financing WFBT),
  - Action plan (part of nfp document) and Legislation- needed
- In general, purpose was to provide appropriate information-inputs for further development of **nfp**- process;
- What has been done?
  - First assessment of **TEV** on annual flow of Serbian forest benefits,
  - Contingent valuation (**CV**) of Serbian householders willingness to pay (WTP) for implementation of strategic decisions;
  - Many useful information (preferences...) .
- Sources of Data
  - Review statistics
  - Households Survey
  - Literature

## First assessment of Serbian Forest TEV- main phases

- Preparation of list of goods and services (functions) for evaluation;
- Review of available data (national statistics) relevant for valuation;
- Select methods for valuation;
- Collection- survey of missing information;
  1. Identification of non-market goods to be valued
  2. Select a data collection method (interview/mail survey)
  3. Select the population and sample
  4. Select valuation methods
  5. Prepare valuation questionnaire
  6. Pilot Survey Implementation
  7. Finalize data collection instruments
  8. Interviews
  9. Data entry
  10. Data analysis
- Reporting

## Serbian Households Survey (HHS) sampling procedure

- during "face to face" questionnaire survey 800 of householders (from total population of 2.521.190 Serbian households) has been sampled. In the purpose of providing realistic representation of households in the context of their regional distribution and type of settlement, sample was correspondingly stratified;
- afterwards, within stratum, householders were randomly selected.



## Methods used for TEV

Product or service	Valuation methodology or source of data
Product and Service Category	Sub-category
<b>USE VALUES</b>	
<b>Direct use values</b>	
<b>Products</b>	
1. Wood	by species and categories
Wood increment in stock	MARKET PRICE
Actual used wood (solid)	Forest Directorate MARKET PRICE
	Statistical office, Reports from PE, national parks, RRS
2. Non-wood forest products	by species
	MARKET PRICE PE and National Parks RRS
<b>Services</b>	
Non-sustainable Hunting	1) in house association and 2) out of house association
	INDIRECT MARKET PRICE reports from hunting land users
Recreation (non-commercial)	by activities
	RRS INDIRECT MARKET PRICE
<b>Indirect use values</b>	
<b>4. Watershed / floods protection / erosion control</b>	
	HEDONIC PRICING COST AVOIDED LITERATURE LULUCF
<b>Carbon sequestration</b>	
<b>NON-USE VALUES</b>	
5. Forest conservation	COST-BASED METHOD RENT CAPTURE LITERATURE
Pharmaceutical option value	

Table 3. Summary of Forest Values, Methodologies, and data of this study.

## TEV results

Product or Service Category	Sub-category	Volume	unit	Unit price (EUR)	Minimum estimate (EUR)	Maximum estimate (EUR)	%
<b>USE VALUES</b>							
<b>Direct use values</b>							
<b>Products</b>							
1. Wood							
1.1	Wood increment in stock	4,050,486	m <sup>3</sup>	25	101,037,889	15,759,827	
1.2	Actual used wood	2,419,480	m <sup>3</sup>	25	59,781,938	145,000,000	
		9,670,000	m <sup>3</sup>	10			
<b>Total wood</b>					<b>166,819,827</b>	<b>40.8</b>	<b>166,819,827</b>
2. Non-wood forest products					1,070,000	6,057,094	
2.1	Wild berries and plants				1,070,000	5,470,000	
2.2	Wild Mushrooms				0	503,221	
2.3	Wild animal				0	83,372	
2.1.2	recorded (for market)				4,447,062	4,447,062	
2.1.2	Wild berries and plants				987,234	987,234	
2.2.2	Wild Mushrooms				2,536,827	2,536,827	
2.3.2	Wild animal				923,000	923,000	
<b>Total NWFP</b>					<b>5,517,062</b>	<b>1.4</b>	<b>16,364,155</b>
2.4	Honey	4,000,000	kg	1.66	7,400,000	1.9	7,400,000
<b>3. Services</b>							
Hunting					14,434,410	31.9	186,000,000
Recreation (non-commercial)					79,973,859	20.3	79,973,859
<b>Indirect use values</b>							
4.1	Watershed / floods protection / erosion control	2,400,000	ha	28	67,200,000	17.1	67,200,000
4.2	Carbon sequestration	2,037,548	tons	20	40,750,958	10.3	40,750,958
<b>NON-USE VALUES</b>							
5.1	Forest conservation	2,400,000	ha	2	4,800,000	1.2	4,800,000
5.2	Pharmaceutical option value	2,400,000	ha	5.3	12,720,000	3.2	12,720,000
<b>GRAND TOTAL (EUR)</b>					<b>393,805,815</b>	<b>100</b>	<b>564,168,799</b>
					<b>156</b>		<b>233</b>

Table 4. Total Economic Value (TEV) Matrix of Serbian Forest in 2006

## TEV BY CATEGORIES

Product or Service Category	Value (rational) (EUR)	% of Total
Total wood	160,819.827	40,84
Total NWFP	12,917.062	3,28
Total Hunting	14,624.110	3,71
Recreation	79,973.859	20,31
Watershed / flood protection / erosion control	67,200.000	17,06
Carbon sequestration	40,750.958	10,35
Biodiversity conservation	4,800.000	1,22
Pharmaceutical opt.	12,720.000	3,23
<b>Total</b>	<b>393.805.815</b>	<b>100,00</b>



## Contingent Valuation-Willingness to pay

- >Stated preference technique
- >Willingness to pay/accept (WTP/WTa) employs CV survey to create virtual market or referendum (Transaction) for an environmental goods being examined.
- Revealing values of non-market goods ;
- Assessment of value on changing in environmental goods;
- Public participation in policy creation, calibration and decision making process;
- >Any transaction includes three elements:
  - a) a good,
  - b) payment,
  - c) social context.
- >In Stated preferences studies it is important to ensure that the survey is **understandable, acceptable and meaningful** to respondents (Mitchell & Carson 1989)
- >Scientific debate

## WTP-Serbian Households Survey

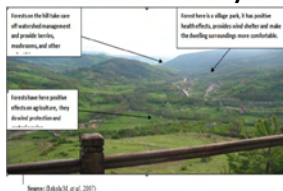
- In this study, **good** has been the object of transaction is scenario which describes the main strategic goals and measures defined by the Forestry Development Strategy of the Republic of Serbia and the presumed effects on forest and forestry sector that will arise from its implementation.
- Virtual **payment** on WTP question is formulated according to the method of payment card and to half of the respondents in the "consumer" and the other half in the "citizen" format. (The difference between these two formats is made in the formulation of WTP questions "Citizens" were asked to express willingness to pay in relation to the proposed scenario considering its importance for society in Serbia, while "Consumer" should take into account the importance for their household.
- An important part of the CV is a **social context** that includes socio-economic characteristics of respondents and the different aspects and dimensions of their impact on WTP.

## WTP-Serbian main components of the scenario

- Introduction (...state of Ser. Forest and forestry)
- Strategic decisions and need for action
- NFP-action plan and Legislation
- Presumed Effects of welfare measure
- Need for extra payment

<b>New Forestry development strategy of Serbia and National forestry program</b>	
Forests, except for the forest owners, provide numerous benefits for the whole society without compensation. These benefits have positive effects on erosion protection, water and global climate, recreation, human health, nature conservation, and other numerous benefits which are presented in the table (forest functions). In order to maintain and increase forest benefits, advisable and externally management of forest resources is necessary.	
National Forestry Program identifies forest status and forest owner of Serbia as a unacknowledged, but also creates new goals in forest management which can be presented through long-term strategic goal: Sustainable forest development through the improvement of quality of forest and increasing of forest area in Serbia.	
Strategically goal for improvement of sustainable forest management in Serbia will be realized through the following activities:	
1. Increasing rate of afforestation activities and other related activities like seed and seedlings production	
2. Improving conditions of existing forests through increasing silvicultural activities.	
3. Improving health conditions of forests through improvement of forest protection measures and development of forest prevention and protection systems (fire, insects and fungi)	
4. Improving existence and support for private forest owners	
5. Increasing and maintenance of forest stock	
6. Development of accurate forest planning, monitoring and information systems	
These activities will improve the level of all forest benefits, as well as economical, ecological and social functions, such as watershed protection, flood control, land slide, timber production, nature conservation, berries, mushrooms, health effects, insect and genetic climate positive effect	
<b>Most important effects of new strategy could be:</b>	
Annual level of afforestation	Current state ~2000 ha New Forest strategy 10 000
Share of high forests	Current state 44% New Forest strategy 76%
Average standing volume	Current state 107 m3 New Forest strategy >200m3
Forestry cover of Serbia	Current state 27% New Forest strategy 42%
<b>COMPENSATION FOR THE UTILIZATION OF WELFARE BENEFIT OF FORESTS</b>	
In evaluating the recreation of forest strategy it is important to know Serbian households' opinions on the proposed described above. This survey study may help policymakers to decide about the Programme and to legitimate amount of state financing to forest owners.	
The National Forestry Programme creates evidently some money. According to the draft forest law enterprises on the territory of the Republic of Serbia, performing economic activities, pay the compensation for the utilization of multiple-use forest functions.	
Compensation is paid by companies at the certain percentage of the social income earned in Serbia. Revenues for forest protection and enhancement are paid into the special account of the budget of the Republic, so called Forest Fund. These revenues shall not be used for other purposes. The exact economic effect is not yet known. Basic payment will be obligatory for enterprises related with their economic capacity.	

## Survey subsidiary tools



Source: (Jabala M. et al. 2017)

Most important effects of new strategy could be:

	Current state	New Forest strategy
Annual level of afforestation	<2000 ha	10 000
Share of high forests	44%	76%
Average standing volume	107 m3	>200m3
Forestry cover of Serbia	27%	42%

<b>WATER</b>	Water quality, The amount of water, Flood protection
<b>LAND</b>	Quality and soil fertility, Erosion, Landslides, Protection against rockfall
<b>AIR/CLIMATE</b>	Local and regional air, Global climate, Protection against noise, Protection against dust, Absorption of harmful substances (contaminants), Cooling of villages, Absorption of CO2
<b>CULTURE/SOCIETY</b>	Elements of nature, Historical forms of forest use, Direct/indirect: physical/mental, Indirect: health, accessibility (roads, trails, etc.), Tourism, Aesthetics, landscape
<b>NATURE CONSERVATION</b>	Protection of species, protection of habitats, Protection of the process of exchange of matter, Protection regulation functions of ecological systems
<b>ECONOMY/SOCIETY</b>	Wood, Other forest products (fruits, mushrooms, game, etc.), Income from work, Income from hunting/forest, Social structure (age, Positions), Spatial structure (ag. Structures settlements / local area), Security of people (economic resources)

## WTP Payment Card

26. Because of the extra payments, for companies some changes in prices may indirectly influence on households as basic socioeconomic unit in national economy. Please, carefully consider what is a best for benefits to the WHOLE SERBIAN SOCIETY. Choose one of the following options, which represents maximum sum that your household could accept as a potential payment for the implementation of Forest development strategy of Serbia.

300 RSD	500 RSD	1 000 RSD	1 500 RSD	2 000 RSD	2 500 RSD	3 000 RSD
3 500 RSD	4 000 RSD	4 500 RSD	5 000 RSD	5 500 RSD	6 000 RSD	More than _____ RSD

CITIZEN=Whole Serbian society  
CONSUMER=Your Household point of view



## Serbian WTP -Result

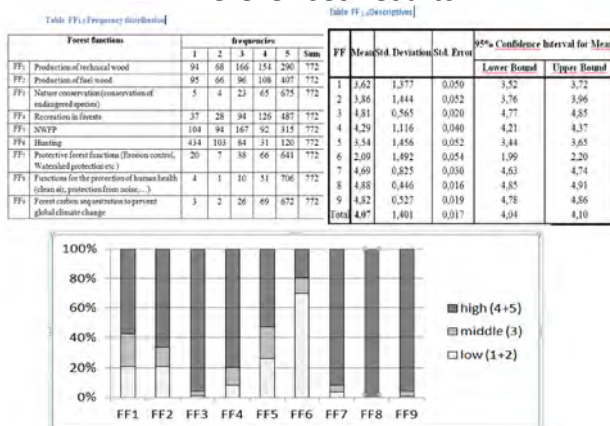
- The average annual WTP for new Serbian Forest Strategy per household was at 2007. 752 RSD≈ 9,3 €. With 2 521 190 households in Serbia this produces WTP total of **23,4** millions EUR annually.
- Could be understand in a way that Serbian households support investment in forestry and forest on max 23,4 million € per year.

## Preferences on Forest Functions

- For the purpose to get information about household's preferences on forest functions respondent were asked "Evaluate the following forest values from the point of view of you and your household. We use five categories for evaluation, so that if you think the function (value) is very important give the number 5, and if it is very marginal (unimportant) give the number 1". In this sense it was given 9 groups of forest functions (FF<sub>1-9</sub>) to be evaluated :

  1. Production of technical wood,
  2. Production of fuel wood ,
  3. Nature conservation (conservation of endangered species) ,
  4. Recreation in forests ,
  5. Production of Non Wood Forest Products,
  6. Hunting,
  7. Protective forest functions (Erosion control, Watershed protection and etc. ),
  8. Functions for the protection of human health (clean air, protection from noise,...)
  9. Forest carbon sequestration to prevent global climate change.

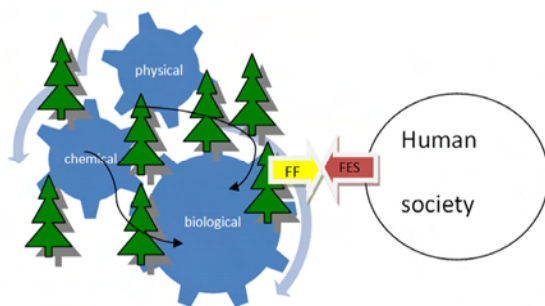
## Preferences results



## Discussion- Forest Ecosystem Services (FES)vs. Forest functions

- "The **capacities** of natural processes and components to provide goods and services that contributes **directly** and **indirectly** to Human welfare" (*De Grot, 1987*), while "Ecosystem goods (such as food) and services (such as waste assimilation) represent the benefits of human populations derive, **directly** or **indirectly**, from ecosystem functions" (*Robert Costanza et al, 1997*).
- (Forest)ecosystem process "any change or reaction which occurs within ecosystems, physical, chemical or biological. Ecosystem processes include decomposition, production, nutrient cycling, and fluxes of nutrients and energy" [MA 2005](#)
- (Forest)ecosystem function "subset of the interactions between biophysical structures, biodiversity and ecosystem processes that underpin the capacity of an ecosystem to **provide** ecosystem services" [TEEB 2010](#).
- (Forest) ecosystem service "the benefits that people obtain from ecosystems" [MA 2005](#). "The direct and indirect contributions of ecosystems to human wellbeing" [TEEB 2010](#).

## Forest Ecosystem processes, functions and/or services



Directly or indirectly  
Value and awareness of worth  
Understandability requirement  
Forest service-providing functions (*Martín-López et al., 2009*)  
Time-Momentum (context)

## Discussion- TEV results

Total Economic Value (TEV) = Use Value + Non-Use Value

Use Value = Direct Use Value + Indirect Use Value

Non-Use Value =Existence value + Option Value

### Serbian first TEV (some examples)

- Wood (No secondary value)
  - Registered exploitation 60 mil €
  - Consumption 145 mil €
  - Total increment 161 mil € (used + optional, no indirect)
- Hunting
  - 14,6 mil. € (licenses, game products) –Used value
  - Direct cost 23 mil.€ ≈ 230 € per hunters yearly
  - 180 mil.€ (total cost) TEV of hunting
- .....

## Post hoc analyses and results on preferences -examples

- Overall mean score of all functions is 4.07.
- The mean score higher than the overall mean score is registered for following functions: protection of human health, the absorption of CO<sub>2</sub>, environmental protection, protective functions of forests and recreational functions.
- Lower mean than average grade and at the same time greater than 3, are for: NWFP, technical and fuel wood production.
- The lowest mean rating value (significantly lower than the others) is for hunting function, in amounts 2.09.
- "Forest rate"
  - Statistically significant at the 1 % level for the " hunting ", "production of firewood ", "recreation" and "production of technical wood", while the " absorption of CO<sub>2</sub> " level of significance of 5%, and the protective functions of forests 10 % ;
  - The largest negative standard regression coefficient for variable that established statistical significance registered with the " hunting tool ", and -0.017, while its largest positive value recorded at 0,011 + " fuelwood production ";
- " Household income "
  - Is statistically significant at the 1 % level for "recreation ", and " the production of technical wood ", " hunting " and " CO<sub>2</sub> absorption " at 10 % ;
  - Negative standard regression coefficient for the variable that determined the statistical significance is not registered, while most positive of 0.54 was founded for " recreation ";
- " Settlement type "
  - Statistically significant at the 1 % level for manufacturing " technology tree ", "firewood production ", " recreation " and " hunting ", while " collecting MTFPs " at the 5 % significance
  - The largest negative value of the standard regression coefficients of the variables for which statistical significance was established at "The production of fuel wood and is -1.082 while the only positive value observed in "recreational functions " + 0.464 .

## WTP

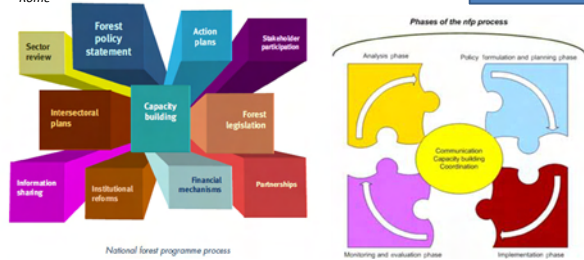
- HH income is most significant variable for WTP.
- Recreational Factor (representing preferences on recreational, hunting and NWFP functions of Serbian forest is significant for WTP +), contrary, Woody and Environmental factors are not sig. For WTP
- Consumer format of WTP question provide more clear distinction between public and private motivation

## Discussion-Purpose of valuation

The term "national forest programme" is a generic expression for a wide range of approaches towards forest policy **formulation, planning and implementation** at the subnational and national levels.

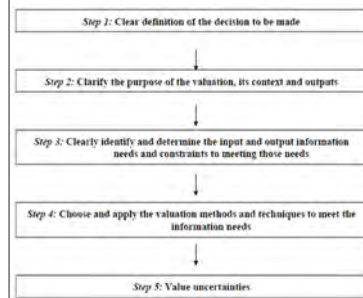
(2006): *Understanding national forest programmes Guidance for practitioners*, Food and Agriculture Organisation of the United Nations, Rome

Policy instruments:  
•Informational  
•Planning  
•Financial  
•Legislative



## Instead of Conclusion

Figure 1. Suggested steps in forest valuation.



Why, who is the user of results, what is the object of valuation, what kind of value is needed...?

Research availability of inputs, (saving time and money)

The most appropriate techniques to apply will depend on the context.

Uncertainty is an inherent part of forestry. Basic economic data, physical inputs, costs, physical production response, market structure and prices, technological change and the dynamic of the forest ecosystem, POLITICAL POWER

Kengen S. (1997): *Forest Valuation for Decision Making - Lessons of experience and proposals for improvement*, FAO, Rome

Thanks for your attention

## Making public Goods provision -the core business of Natura 2000

Ms. Benedetta Concetti

ERSAF Lombardia  
ITALY

FOREST EUROPE "Workshop on Valuation of Forest Ecosystem Services"  
24<sup>th</sup> – 25<sup>th</sup> September 2014, Belgrade (Serbia)



**Life + Making Good Natura**  
Making public Goods provision the core business of Natura 2000  
LIFE11 ENV/IT/000168

Benedetta Concetti, Bruna Comini - ERSAF      Uta Schirpke, Claudio De Marco - EURAC

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FOREST EUROPE "Workshop on Valuation of Forest Ecosystem Services"  
24<sup>th</sup> – 25<sup>th</sup> September 2014, Belgrade (Serbia)  
Benedetta Concetti, Bruna Comini (ERSAF), Uta Schirpke, Claudio De Marco (EURAC)

**LIFE + Environmental Policy and Governance**

Project start date: 01/09/2012  
Project end date: 15/06/2016

European Commission grant, through the Life+ program, € 1,863,441 - 49.95% of the total (overall contribution € 3,751,684)

**PARTNERS**  
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CILENTO AND VALLO DI DIANO NATIONAL PARK  
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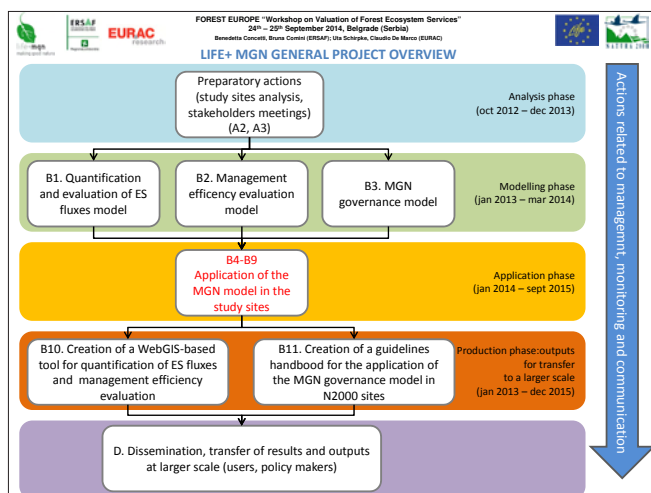
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**AIMS OF THE PROJECT:**

creating tools for qualitative and quantitative valuation of the ecosystem services in the study sites of the Natura 2000 network in order to develop innovative approaches of environmental governance to preserve agro-forest-ecosystems


**Specific objectives:**

- Identify and evaluate ES provided by Natura 2000 sites considering the fluxes of ES at different scales
- Create and demonstrate innovative models for financing (and self-financing by rules, regulation and Payments for Ecosystem Services - PES) the application of Natura 2000 management plans and conservation measures as requested by the art. 8 of the Habitat Directive (92/43/CEE)
- Identify innovative models for financing (and self-financing by rules, regulation and Payments for Ecosystem Services (PES)) measures for the next programmed period of the CAP 2014 – 2020 (FEAR, FESR)
- Create and demonstrate models, in cooperation with the management authorities of Natura 2000 sites, for better governance in conservation management (flora and fauna habitat) and for socio-economic development of local communities
- Define and apply participative processes together with local communities and stakeholders to improve the interaction between public governance and private sector
- Apply and improve the different created models to selected study sites to demonstrate their functionality
- Create a web-based tool for Natura 2000 sites to evaluate ES qualitatively and quantitatively by processing spatial datasets
- Produce a handbook with self-financing instruments and strategies.



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**STUDY SITES**

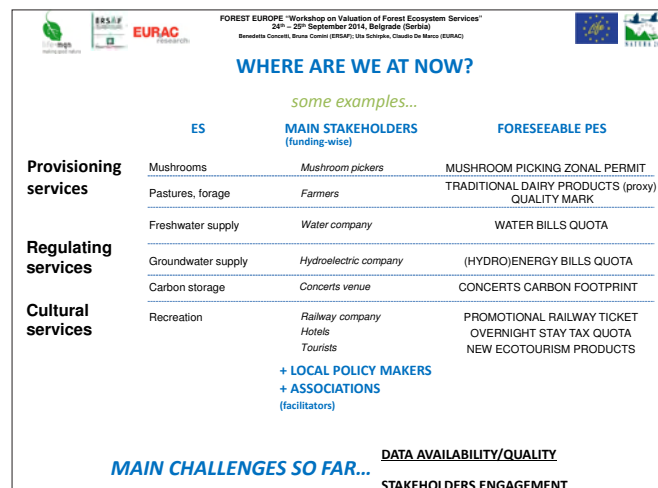
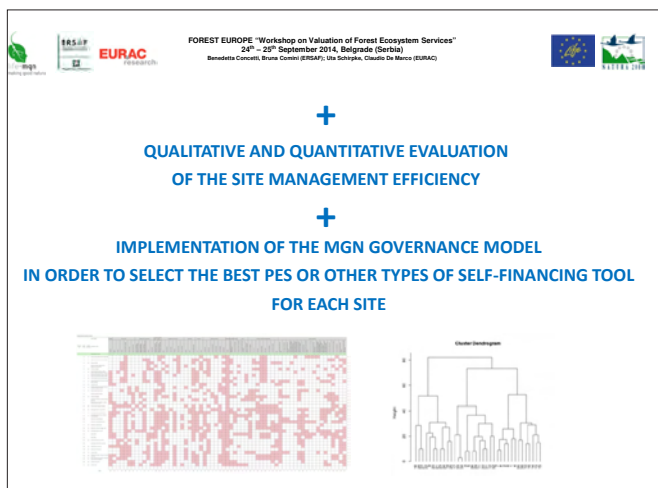
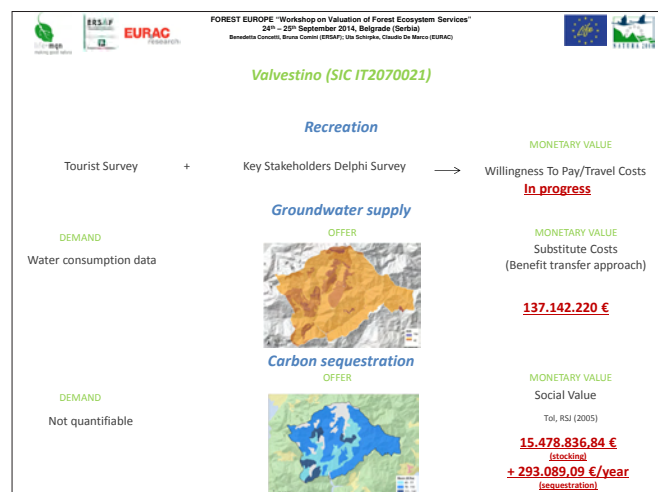
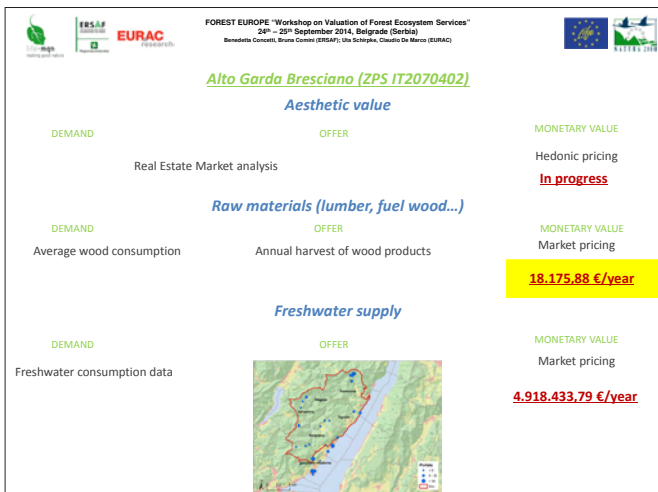
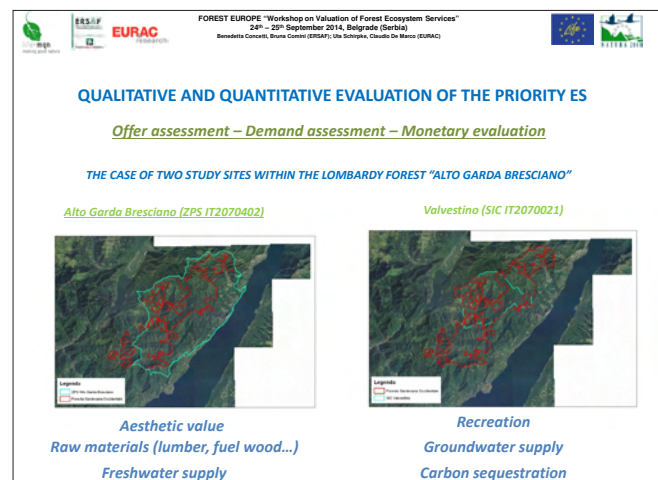
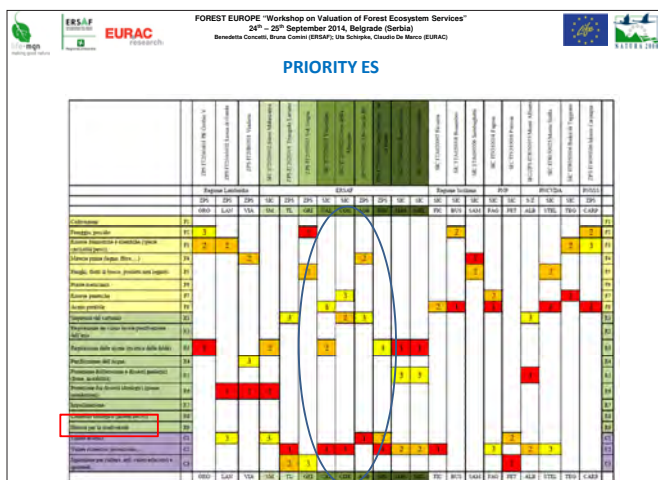
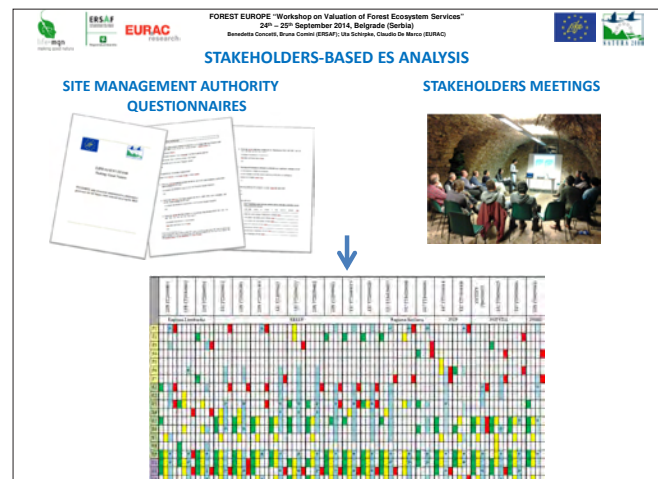
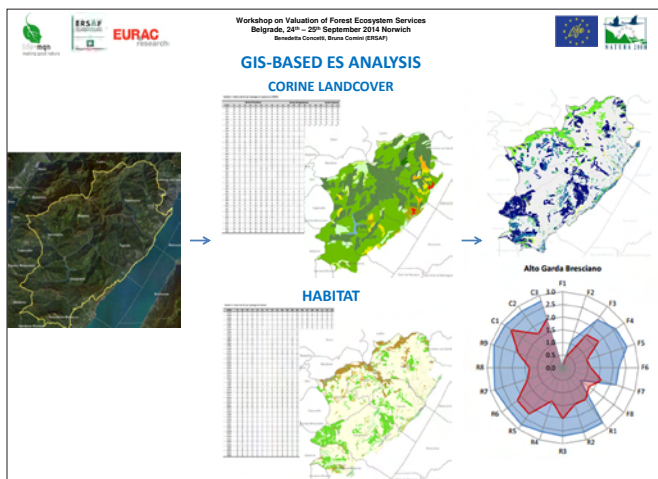


21 pilot sites (7 Regions, 3 biogeographic regions) belonging to the Natura 2000 network  
Total area of 90,239 hectares

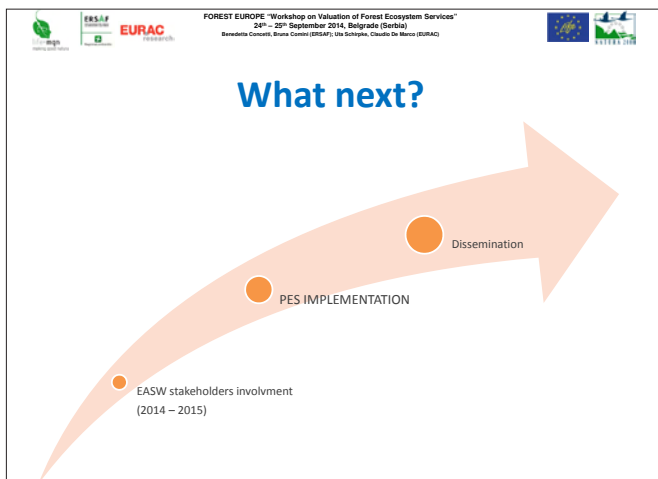
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Benedetta Concetti, Bruna Comini (ERSAF), Uta Schirpke, Claudio De Marco (EURAC)

**For each Natura 2000 pilot site, the specific actions are:**

- Data collection and preparation of spatial datasets compatible with software GIS
- Application of the model to evaluate the ES qualitatively and quantitatively; assessment of the supply and demand for associated ES and identification of different fluxes from "providershed" and "benefitshed", evaluating in monetary terms all costs and benefits
- Application of PES scheme mechanism with emphasis on self financing and financing mechanism and strategies.
- Demonstration actions related to the evaluation of management effectiveness and the administration of Natura 2000 sites together with stakeholders and the management staff.









## Advances in Valuing Non-Timber Forest Ecosystem Services in Norway

Mr. Ståle Navrud

Norwegian University of Life Sciences - NMBU

78

Workshop on a "Pan-European approach to valuation of forest ecosystem services"; Belgrade, 24-25 September.

## Advances in Valuing Non-Timber Forest Ecosystem Services (NTFES) in Norway

Ståle Navrud

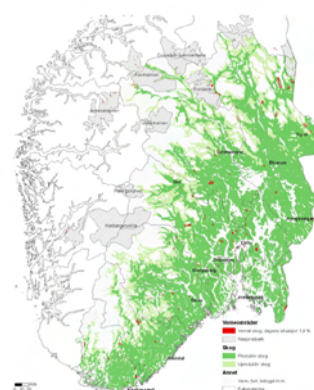
School of Economics and Business  
Norwegian University of Life Sciences (NMBU)

e-mail: [stale.navrud@nmbu.no](mailto:stale.navrud@nmbu.no)

## Valuing National Preservation Plans for Coniferous Forests in Norway

- Contingent Valuation (CV) internet survey to a *webpanel* of Norwegian respondents; but also as in-person interviews and mail surveys to subsamples;
- Conducted in September-November 2007 by the survey firm TNS Gallup (incl. focus groups and pilot tests), 2881 respondents, 69 % response rate
- 10 different subsamples (2 for the mail survey, 1 for in-person interviews, 7 for internet survey) – that were all given different treatments (see table 1.)

## National Preservation Plan for Coniferous Forests in Norway - How much to preserve? Status 2007



Kart laget av Norsk institutt for skog og landskap

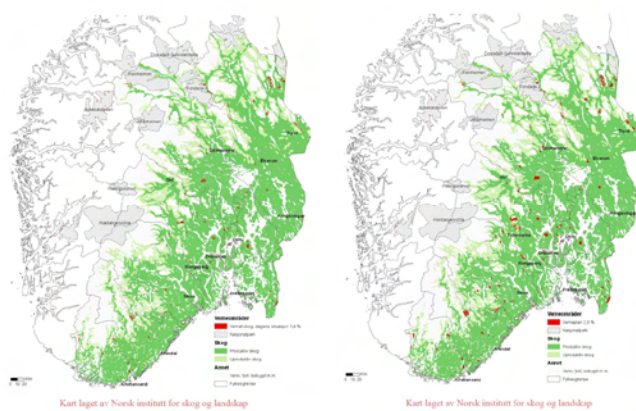
Table 1 Survey design: Split (sub)samples and different treatments

	I (n=500)	III (n=300)	IIa (n=450)	IIb (n=450)	IIc (n=450)	IId (n=450)	IIf (n=450)	IIg (n=450)
Mode type	Mail	PI	Web	Web	Web	Web	Web	Web
Frame	Norw		Norw	Norw	Norw	Norw	Norw	Norw
Treatment 1: Modes								
Web survey Oslo			X					
Pers.int Oslo		X						
Treatment 2: Scope								
Protection 2,8% & 4,5%	Ia: 250	X	X	X				
Protection 2,8% & 10%	Ib: 250				X	X	X	X
Cheap talk 1: Scope						X		
Info: # of species								X
Treatment 3: Hhld vs indiv.								
WTP household	X	X	X	X	X	X	X	X
WTP personally						X	X	
Follow up probe						X	X	
Treatment 4: Protest & High bids								
Cheap talk 2:				X	X	X		X
High bids				X	X	X	X	X
Cheap talk 3:								
Protest 0								
Web survey features								
Time measure			X	X	X	X	X	X
Definitions of terms			X	X	X	X	X	X

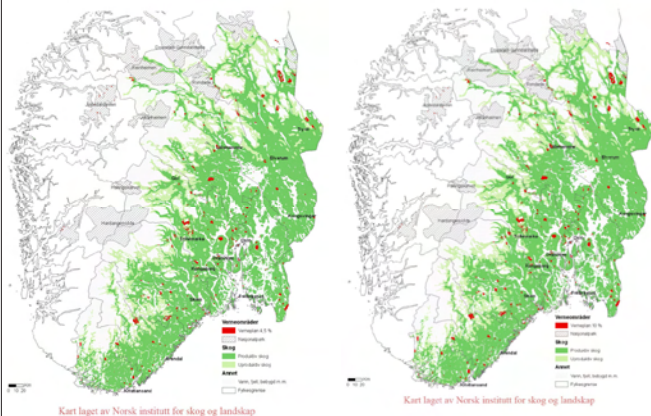
## PHOTOS OF ENDANGERED SPECIES Shown IN THE CV SURVEY



## 1.4 % (2007) and 2.8 % of productive forest preserved



## 4.5 % and 10 % of productive forest preserved



## Preservation Plans

Project alternative	Percent conserved (%)	Area conserved (km <sup>2</sup> )
Reference (2007)	1.4 %	571 km <sup>2</sup>
A1	2.8 %	+ 571 km <sup>2</sup>
A2 (ecologists' "minimum alt.")	4.5 %	+ 2001 km <sup>2</sup> (+ 18.7 mill m <sup>3</sup> )
A3 (ecologists' "preferred alt.")	10 %	+ 5144 km <sup>2</sup> (+ 48.1 mill m <sup>3</sup> )

## RESEARCH DESIGN: CV SCENARIO AND OPEN-ENDED WTP QUESTION (W/ PAYMENT CARD)

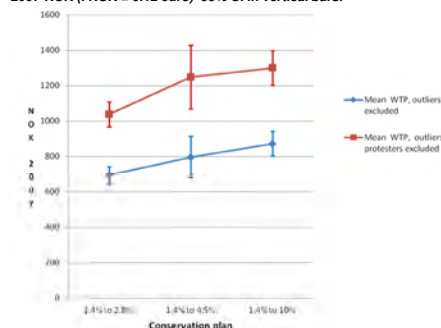
"Now we ask you to consider how much the two alternative plans are worth for your household. Think carefully through how much the 2.8% plan is worth compared to the current situation, before you give your final answer to the next question. Try to consider what would be a realistic annual amount given the budget of your household. Your household must choose whether to spend the amount on the forest conservation plan, or on other things."

**WTP question:** "What is the most your household almost certainly is willing to pay in an additional annual tax earmarked to a public fund for increased forest conservation from today's level of 1.4% to 2.8 (and to 4.5/10 %) of the productive forest area? Choose the highest amount, if anything, your household almost certainly will pay".

Payment card : Amounts ranging from 0 to 15.000 NOK (1 euro = 8 NOK)

## Social Benefits

Midpoint estimates of annual, mean WTP per household for the three forest conservation plans, in 2007-NOK (1 NOK = 0.12 euro) 95% CI in vertical bars.



Source: Lindhjem, Grimsrud, Navrud & Kolle (2014): "The Social Benefits and Costs of Preserving Forest Biodiversity and Ecosystem Services". Forthcoming in *Journal of Environmental Economics and Policy*

## Present value (PV) of costs and benefits for three conservation plans; protest zeros removed (in million 2013-NOK; 1 NOK = 0.12 euro)

Conservation plan:	2.8%	4.5%	10%
<b>Present value of benefits, PV(B):</b>			
Total quantified conservation benefits	65 957	79 273	82 569
<b>Present value of costs, PV(C):</b>			
Compensation costs (opportunity costs)	2 891	6 196	17 486
Transaction costs	578	1 239	3 497
Inefficiency costs of taxation	694	1 487	4 197
Total quantified costs	4 164	8 922	25 180
<b>Net present value (NPV) = PV(B) – PV(C)</b>	<b>61 794</b>	<b>70 351</b>	<b>57 389</b>

## Sensitivity analysis: Present value (PV) of costs and benefits when "don't knows" and all zero responses are assumed to be true zero (in million 2013-NOK; 1 NOK = 0.12 euro)

Conservation plan:	2.8%	4.5%	10%
<b>Present value of benefits, PV(B):</b>			
Total quantified forest conservation benefits	44 012	50 565	55 346
<b>Present value of costs, PV(C):</b>			
Compensation costs (opportunity costs)	2 891	6 196	17 486
Transaction costs	578	1 239	3 497
Inefficiency costs of taxation	694	1 487	4 197
Total quantified costs	4 164	8 922	25 180
<b>Net present value (NPV) = PV(B) – PV(C)</b>	<b>39 848</b>	<b>41 643</b>	<b>30 167</b>

## Generalizing Values → Benefit Transfer (BT)

- Benefit transfer (BT)** = Transfer economic value of public good from study site (primary valuation study) to policy site; both benefits and costs transfer (i.e. rather call it "value transfer")
- Four basic requirements for valid BT:**
  - Complete, searchable and accessible database of domestic and foreign valuation studies → NTFES database
  - Best practise criteria for **assessing quality** of primary valuation study  
COST E45 Euroforex Revealed (RP) and Stated Preference (SP) Study Protocols for NTFES
  - Benefit transfer techniques;**  
Unit value (wo/w income adjustment), benefit function, meta analysis
  - Best practise criteria for benefit transfer** of NTFES  
COST E45 Euroforex BT protocol, and general BT protocols (e.g. UK Defra BT guidelines and Danish EPA BT Guidelines)
- Transfer in:** i) space, ii) time and iii) area/adding up.

## i) Spatial benefit transfer

Often lack time and resources to conduct new primary valuation studies:

- Simple transfers of unit values** (WTP per household per year) from existing valuation studies often used, but often high transfer errors
- Meta-analysis (MA)** claims to have the potential to increase precision in benefit transfer (BT); but few have tested this

Lindhjem, H. and S. Navrud 2008: How Reliable are Meta-Analyses for International Benefit Transfer? *Ecological Economics*, 66; 425-435.

- Main research question:**  
Using data from three countries (Norway, Sweden, Finland), how does meta-analytic (MA) BT compare to a simple BT technique (unit value)?
- Main finding:**  
Simple unit value transfer from domestic studies performs no worse (in terms of transfer error; ca 50%) on average than MA-BT

## ii) Temporal Benefit Transfer

- **Very few test-retest studies of Stated Preference studies over time**  
*Zandersen et al 2007 (Land Economics): Testing Benefits Transfer of Forest Recreation Values over a Twenty-Year Time Horizon*
- Travel Cost Method applied to forest recreation in 52 public forests in Denmark in 1977 and 1997.
  - Preferences for characteristics of the forest e.g. biodiversity and age of the forest, and modes of transportation have changes significantly over this 20 year period. Results in a temporal transfer error of 282 %, which can be reduced to 25% if the WTP function is updated with new estimates for these characteristics.
  - Temporal transfer of NTB using the consumer price index will lead to biased estimates of forest recreation
- **Adjusting WTP for increased income over time**  
→ **need income elasticity of WTP**  
*Hökby & Söderqvist (2003) (Environmental and Resource Economics): Elasticities of demand and WTP for environmental services in Sweden – meta analysis including use and non-use values of forests*  
→ *Income elasticity of WTP in most studies in the range 0.3-0.7*

## ii) Transfer in area/ Adding up

- Lindhjem, H. (2007) : 20 years of Stated Preference Valuation of Non-Timber Benefits from Fennoscandian Forests: A Meta Analysis. *Journal of Forest Economics*, 12 (4); 251-277.
- Stated preference (SP) surveys** have been conducted to value non-timber benefits (NTBs) from forests in Norway, Sweden and Finland for about 20 years. The paper reviews 28 studies (72 estimates of mean WTP) and summarizes methodological traditions in SP research in the three countries. A meta-regression analysis is conducted explaining systematic variation in Willingness-to-Pay (WTP)
- WTP is found to be **insensitive to the size** of the forest, casting doubt on the use of simplified WTP/area measures for adding up NTFES (especially non-use values) to get national values from local studies → rather conduct national SP studies.

Table 1 Stated preference valuation surveys of non-timber benefits from forests in Finland, Norway and Sweden, 1985-2005

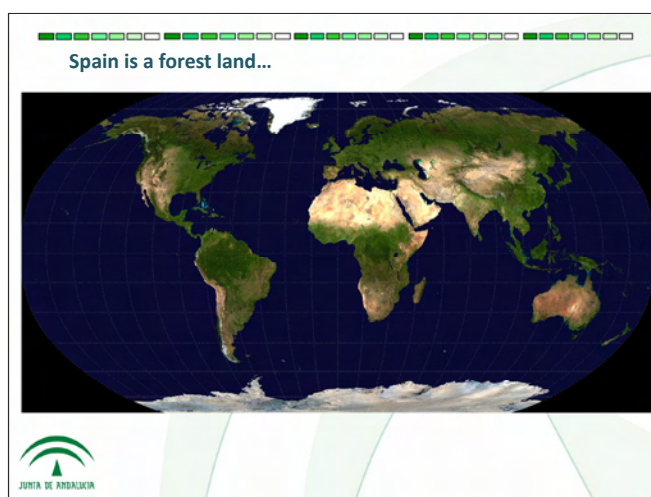
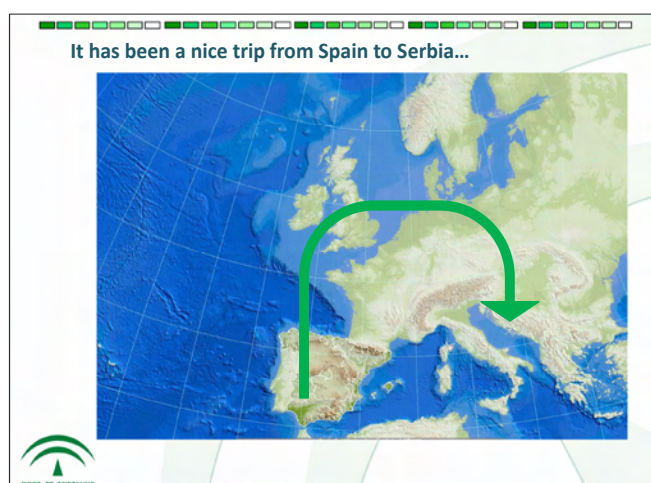
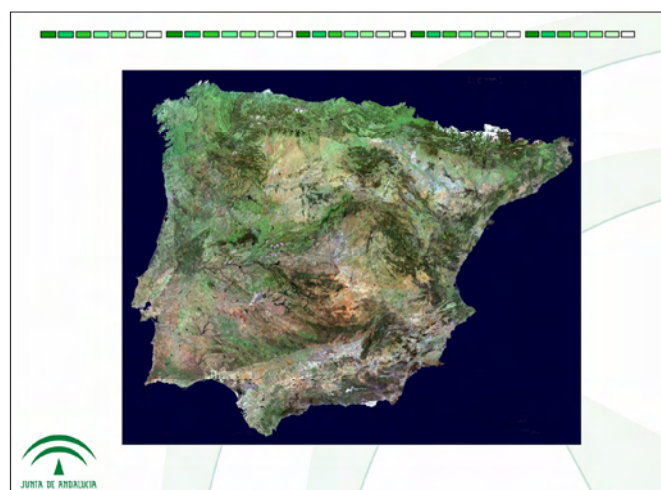
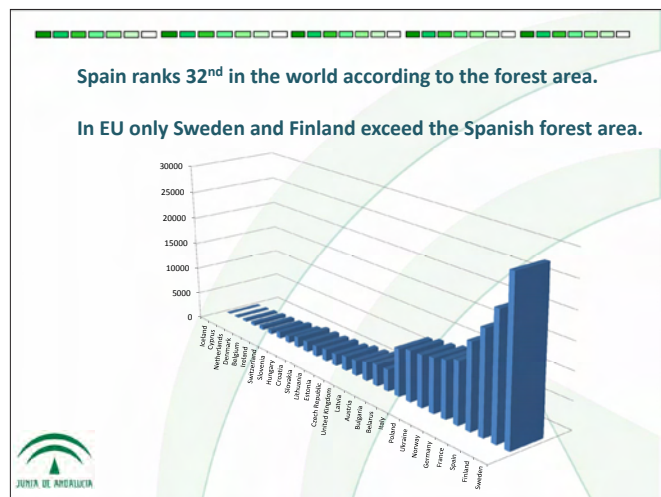
Main references	Year	Good <sup>1</sup>	Gain/loss	Mode	Scope <sup>2</sup>	Method	#	WTP (USD)
<b>Finland</b>								
Kuiviluoma (2004)	2000	P	L	Mail	R, L	CV: DC	2	61-107
Lehtonen et al (2003)	2002	P	G	Mail	R	CV: DC	5	190-342
Pouta et al (2000; 2002)	1997	P	G/L	Mail	N	CV: DC	4	154-227
Pouta (2003; 2004; 2005)	1998	M	G	Mail	N	CV: DC	2	287-299
Rekola and Pouta (2005)	1995	M	G	Mail	L	CV: DC	1	20
Siiikamäki and Layton (2005)	1999	P	G	Mail	N	CV: DC, CE	3	79-134
Mäntymäki et al (2002)	1999	P, B	G	Mail	N	CV: OE	4	224-380
Horne et al (2005)	1998	P, M	G/L	Interv.	L	CE	1	-16
Tyrväinen & Väinänen (1998)	1995	P, O	L	Mail	L	CV: OEPC	5	31-124
Tyrväinen (2001)	1996	P, O	L/G	Mail	L	CV: OEPC	6	22-248
<b>Norway</b>								
Simonsen and Wind (1990)	1989	P, M	G	Interv.	L	CV: OE	3	21-159
Hoen and Winther (1993)	1990	P, M	G	Interv.	N	CV: OEPC	6	14-65
Veisten et al (2004a; b)	1992	B	L	Interv.	N	CV: OE/OEPC	3	138-210
Sandsbråten (1997)	1997	M	L/G	Interv.	L	CV: DC	2	43-45
Leidal (1996)	1996	P	L	Interv.	L	CV: DC/OE	3	455-504
Skagstad (1996)	1996	P, M	G	Interv.	L	CV: OEPC	1	15
Veisten and Navrud (2006)	1995	P	L	Mail	R	CV: DC/OE	4	3-104
Hoen and Veisten (1994)	1992	M	G	Interv.	L	CV: OE	1	50
Hoen and Veisten (1994)	1993	M	G	Interv.	L	CV: DC	1	48
Strand and Wahl (1997)	1997	P	L	Interv.	L	CV: OE/DC	2	172-243
<b>Sweden</b>								
Bojö (1985)	1985	P	G	Interv.	L	CV: DC	1	58
Bostedt and Mattsson (1991)	1991	M, O	L	Mail	L	CV: OE	1	385
Mattsson and Li (1993)	1991	M, O	L	Mail	R	CV: OE/DC	2	469-907
Mattsson and Li (1994)	1992	M, O	L/G	Mail	R	CV: DC, CE	2	440-1280
Kriström (1990a; b)	1987	P	G	Mail	N	CV: DC/OE	4	275-725
Johansson (1989)	1987	B	L	Mail	N	CV: OE	1	254
Bostedt and Mattsson (1995)	1992	M, O	G	Mail	L	CV: OE	2	78-84
Fredman & Emmelin (2001)	1998	M, O	G	Mail	R	CV: OE	1	92
<b>Total number of estimates</b>							<b>72</b>	

1. Good: P = Protection, M = Multiple Use Forestry, B = Primarily forest biodiversity, O = Other; # = Number of estimates in the meta-regression. 2 = Local (L), Regional (R), National (N)



**Mr. Jose Ramón Guzman Álvarez**  
Junta de Andalucía  
SPAIN

**Mr. Jose Ramón Guzman Álvarez**  
Junta de Andalucía  
SPAIN





Neither the forests oriented to timber production of central and northern Europe.



We are at a crossroads, almost at the edge...



Many of our landscapes are typically Mediterranean.



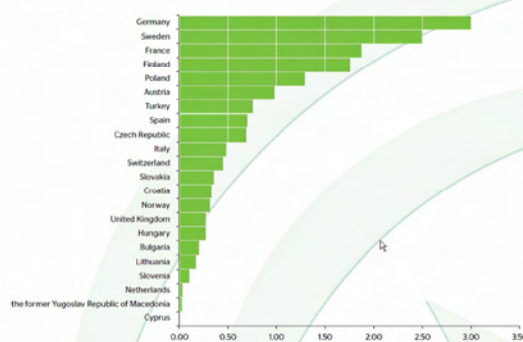
Of course we have forests, ...sometimes with too many trees.



However, what really distinguishes us is the mixed land.



Value of marketed roundwood, 2010 (EUR billion)



In terms of incomes, Spain ranks eight in marketed product

A year ago a new **EU Forestry Strategy** was adopted by the European Commission.

The strategy's **guiding principles** are:

- Sustainable forest management
- Promotion of their multifunctional role

... we have a hard and exciting challenge in developing the Strategy...



However, ... our starting point is not too good

In economical terms it seems that we are not very important: the forestry sector (forestry, wood and paper industry) accounts for approximately 1% of the EU's GDP

But **we are convinced** that this figure underestimates the real contribution of forests to European citizens well-being.





Because (we know) we ought to speak:

- Of values, not only of prices.
- Of services, not only of market.
- Of nature and its "stocks" that allow our economic and social world work.



Let us expose some brief remarks about Andalusia:

- Andalusia is a region of about nine million hectares located in the South of Spain.
- Andalusia is the third EU region with the greatest number of people.
- Andalusia's GDP amounted to 152.217 million euro in 2010.
- Mediterranean forests cover over 52% of the Andalusia's total land.
- 74.4% of the forest area in Andalusia is privately owned.
- Andalusia's Public Forest property reaches 1,2 millions ha.



And, however... a great part of our forest territory is not forest according to the statistics...:

**Forest:** the land within an area of more than 0,5 ha that is covered by at least 10% of its area by trees. These trees should reach a minimum of height of 5 meters once matured.



In any case: we produce as well quality wood ...even having tree plantations to produce cellulose or biomass.



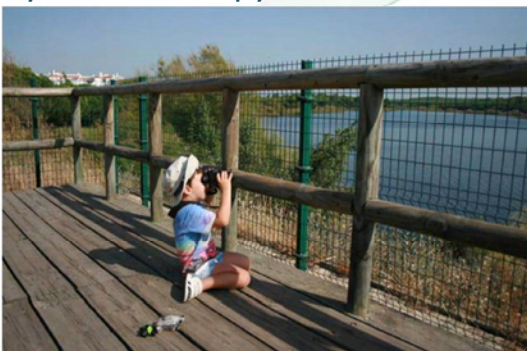
Our forests do not produce usually high quality products ...



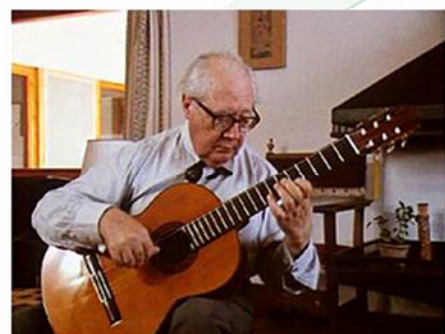
But we supply many other productions, at a modest overall level, but very important to local populations.



And we recognize that the most relevant value of many of our lands is simply its **existence**...



In fact, we can become great specialists, virtuous in doing something well... (sorry for the arrogance)

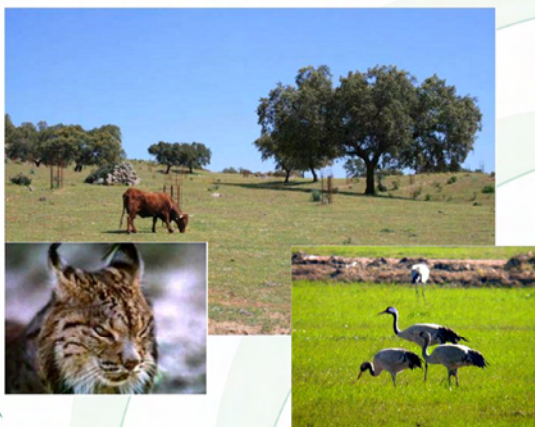




In fact, we can become great specialists, virtuous in doing something well... (sorry for the arrogance)



But **our forests**, in general terms, are more eclectic, mixed...  
...we nowadays classify them as **multifunctional** ...



### Other remarks:

The volume of wood extractions in Andalusia is very low, equivalent to 12% of the annual timber growth. In the other hand, the wood harvested only accounted 6% of the timber consumed in the region.

The use of forest biomass is increasing recently (current consumption of biomass from the forests of Andalusia is around 350,000 t).

The low average productivity, the reduced market price of wood, the rising extraction costs, and the physical constraints of the forests, are limiting factors for a best use of wood in Andalusia.



Around 25-30% of world production of cork is from Spain, 50% from Andalusia.

Pine nut is a scarce food product in the world. Andalusia has the largest area of *Pinus pinea* in Spain (192,144 ha, 51%), but with a low production (8,600 tons).

Chestnut has a strong local presence in some regions of Andalusia. Total production is around 50,000 tons.

And more than 7 million hectares is engaged in hunting (over 8,5 millions).



### As public Administration, we have the obligation of preserving and enhancing our forests

Andalusia has one of the highest reserves of biodiversity in the European continent. In the region is possible to find more than 4,000 taxon, between species and subspecies.

We have to fight against the risks that may severely affect our ecosystems: forest fires, erosion... and lastly, the consequences of global warming.

**To do rightly our duties imply public investments...**

... and we would like to take the better decisions, moreover in a context of economical crisis.





Our forests have a great capacity of providing goods and services...  
we would like to share this concern!



Our starting point (from the earliest years of 2000):

- Obligation to enhance the economy that can generate the natural environment through the rational use of economic goods and services offered by the forest lands
- Obligation to conserve our nature: landscapes, biodiversity, forests,

**Lack of persuading skills:** conventional national accounts is very limited

We need tools to communicate the real costs and benefits and to evaluate the ecosystems services provided by the forests.



With this purpose, Andalusia developed in 2002 a first assessment tool.



We work with two alternative valuation schemes:

#### 1) Millennium Ecosystem Assessment:

1. This analysis was begun in 2008 and completed in 2012.
2. Not include economic valuation.
3. Sets a methodology and an overall assessment of ecosystem services linked to the natural systems of the region.



#### 2) Recaman's Project.

•The goal of the **RECAMAN** project is to provide a system of ecosystem national accounts for the Andalusian forests integrating both manufactured and environmental (both priced and non-priced by the market) incomes.

•The project applies at a macro scale the methodology originally developed in Caparrós et al. (2003) and Campos and Caparrós (2006).

•This methodology has two components, a system of accounts, called the **Agroforestry Accounting System (AAS)** and a method to integrate commercial and non-commercial economic values, the **Simulated Exchange Value (SEV) method**.



#### a.- The Simulated Exchange Value method.

•The **SEV method** (Caparrós et al., 2003) proposes to simulate prices for cases where neither direct market price nor prices from similar markets exist.

•The proposal consists in estimating a demand function (using non-market valuation methods) but also a supply function (cost-function). Using these functions and assuming a particular market structure it is possible to simulate the price that would be set if the service were internalized.

• Valuation of items as free access recreational services, forest landscapes and the conservation of threatened biodiversity have required the use of stated preference methods as choice experiment.



#### b.- The Agroforestry Account System.

The **accounting framework** has a production and a capital sheet:

• The **production account** incorporates all the economic flows related to the production process that occur during the accounting period.

• Stock values and their variations are recorded in the capital account.

The AAS distinguishes between intermediate and final production.



The general methodology has been applied to the following items:

- Full-cycle production of forest species in the Andalusian forests.
- Economic analysis of commercial timber production and carbon.
- Technical and economic analysis of commercial hunting in Andalusian forests.
- Assessment self hunting consumption of non-commercial hunters.
- Economic valuation of the mycological production of the Andalusian forests.
- Technical analysis of biodiversity's conservation in Andalusian forests.



The general methodology has been applied to the following items:

- Modelling of changes of use and vegetation of the forests in the availability of regulated water and erosion.
- Public investment in Andalusian forests.
- Income and capital valuation of a representative group of the forest lands of Andalusia.
- Assessment of environmental services from the point of view of forest owners in Andalusia.
- Assessment of environmental services from the point of view of forest visitors in Andalusia.
- Assessment of environmental services from Andalusian forests in Spanish households.



If we apply the methodology of the accounting system to all economic activities taking place within the forest land, we can obtain the total social income for an accounting period.

The specific methodology and the results are published at <http://www.recaman.es>. (in progress).

You can also contact us or the direction of the scientific work.



### Conclusions from our experience :

- 1.The Income and Capital green accounts is a methodology in line with current economic trends that try to internalize in monetary values the services provided by ecosystems. For comparing the values we have to take into account the context.
- 2.It has been a pioneer project developed by a research team of experts in collaboration with the forest and biodiversity public Administration, both with different requirements, points of view and schedules.
- 3.The RECAMAN framework offers relevant information to support sound policy decisions in order to balance economical and conservation approaches.



### Conclusions from our experience :

4. RECAMAN is a pilot project model that may help to design common standards for green accounting in Europe.
5. One weakness is the cost-effective of the project. It has required a great investment effort due to the development and validation of new methodology.
6. It's also necessary to standardize the data collection processes in order to reduce costs. In our case the cost of data collection has been a huge proportion of the whole project.



### Conclusions from our experience :

- 7.- This methodology provide a huge amount of georeferenced information useful for technicians and policy makers. One of our challenges is to develop the tools to add value to this information.
8. The results correspond to the year 2010, a pre-crisis stage. While the application of the methodology is not affected by this fact, the overall results of the environmental accounts of Andalusia should be interpreted in this context.



Hvala!

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The Recaman project has been developed with the participation of many people and organizations who have worked hard to move it forward.





## Practical experience from the Woodland Carbon Code

Mr. Pat Snowdon

Forestry Commission – UK

# Valuing Forest Ecosystem Services

## Practical experience from the Woodland Carbon Code

**Dr. Pat Snowdon**  
Forestry Commission  
Edinburgh, UK

# Outline

- Background
- The Code
- Applying - Practicalities
- Examples
- Future developments

[forestry.gov.uk/carboncode](http://forestry.gov.uk/carboncode)

# Objectives

- Ensure high standards in UK forest carbon market
- Clarity and transparency to bolster market confidence
- Rigorous scientific basis
- increase private investment in woodland creation
- similar principles to VCS, GS...

Set framework that could support mandatory market in future

[forestry.gov.uk/carboncode](http://forestry.gov.uk/carboncode)

# Governance

[forestry.gov.uk/carboncode](http://forestry.gov.uk/carboncode)

# Development

2007 - 2011	Design
2010 -2011	Pilot
July 2011	Launch Woodland Carbon Code
2013	Launch group certification
2013	Launch carbon registry @ Markit
2014	Units available for sale

*Still developing...*

[forestry.gov.uk/carboncode](http://forestry.gov.uk/carboncode)

# UK as of 30 June 2014:

- **>200 Projects registered**
- 14,400 ha woodland
- 5.7 MtCO<sub>2</sub> over lifetime

- **87 projects validated**
- 3,100 ha woodland
- 1.5MtCO<sub>2</sub> over lifetime

# Wales

- **7 projects registered**
- **3 projects validated**

# Verified credits available from 2016

# WCC awards:

2013: Climate Week Awards: Finalist  
2014: Environmental Finance Survey: 3<sup>rd</sup> voluntary standard globally

[forestry.gov.uk/carboncode](http://forestry.gov.uk/carboncode)



How it fits in

- All UK woodland creation contributes to the UK's emissions reduction target (Kyoto Protocol)
- Mandatory** GHG emissions reporting for companies listed on stock exchange
- Verified WCC Units can be used within the UK:
  - To compensate for organisation's emissions
  - In claims of carbon neutrality of an organisation / product/ event
- Verified WCC Units CAN'T be:
  - Traded internationally
  - Used in EUETS
  - Used in the CRC Energy Efficiency Scheme

forestry.gov.uk/carboncode

The Code - Scope

**Includes:**

- Woodland creation
- Carbon sequestration and emissions within a woodland

**Doesn't include:**

- Changes to management of existing woodlands
- Carbon stored in forest products
- Substitution effects (wood products or fuel)
- Avoided emissions from previous landuse

forestry.gov.uk/carboncode

Requirements

- UK Forestry Standard +
- Additionality
  - Legal : Financial : Barrier
- Permanence
  - Forestry Act, Buffer (15-40% of project carbon)
- Predict and monitor carbon sequestration
  - Baseline : Leakage : Project benefit
- Certification
  - Validation
  - Verification + 5 and then every 10 years

forestry.gov.uk/carboncode

UK Woodland Carbon Registry

Financial Information Services

Registry - Public View

Woodland Carbon CO2e

Clear Search: mooride Registry: All Units Page 1

Vintage	Project	Account	Standard	Project Type	Verifier	Units	Measurement	Type
2085 - 2075	Moorside Wood	The Green Insurance Company	UK Woodland Carbon Code	No thinning or clearfell	SFQC	1,848	WCU	Pu View
2085 - 2085	Moorside Wood	The Green Insurance Company	UK Woodland Carbon Code	No thinning or clearfell	SFQC	1,287	WCU	Pu View
2085 - 2105	Moorside Wood	The Green Insurance Company	UK Woodland Carbon Code	No thinning or clearfell	SFQC	783	WCU	Pu View
2075 - 2085	Moorside Wood	The Green Insurance Company	UK Woodland Carbon Code	No thinning or clearfell	SFQC	830	WCU	Pu View
2017 - 2025	Moorside Wood	The Green Insurance Company	UK Woodland Carbon Code	No thinning or clearfell	SFQC	827	WCU	Pu View
2045 - 2055	Moorside Wood	The Green Insurance Company	UK Woodland Carbon Code	No thinning or clearfell	SFQC	1,836	WCU	Pu View
2010 - 2017	Moorside Wood	The Green Insurance Company	UK Woodland Carbon Code	No thinning or clearfell	SFQC	86	WCU	Pu View
2100 - 2110	Moorside Wood	The Green Insurance Company	UK Woodland Carbon Code	No thinning or clearfell	SFQC	317	WCU	Pu View
2035 - 2045	Moorside Wood	The Green Insurance Company	UK Woodland Carbon Code	No thinning or clearfell	SFQC	3,779	WCU	Pu View
2120 - 2125	Moorside Wood	The Green Insurance Company	UK Woodland Carbon Code	No thinning or clearfell	SFQC	4,759	WCU	Pu View

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Applying

- Employ a project developer or DIY?
- Register your project / group (..within 2 yrs planting)
- Design your project / group  
PDD: Carbon calculation : Finances : Risk : Other evidence
- Get certified (= 'Validated' .. Within 3 yrs registering)

Specialist assurance for the food and farming sectors

- Stay certified (= 'Verified' .. + 5 and every 10 years)

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Applying

Summary of WCC project registration and carbon unit issuance process

On site In the office On the registry

Plan woodland project

Check eligibility and prepare carbon calculation

Prepare Project Design Document (PDD)

Get validated £600-800 per project Savings for groups of projects

Plant trees

Monitor trees

5 years after planting and then every subsequent 10 years

Get verified £7 per project Savings for groups of projects

Register a project  
Open account first time, create a project on the registry and upload carbon calculations

Under development

Update status  
Add draft PDD and map to your project upload carbon calculations

Under validation

Update status  
Check project details and upload final documents including validation statement (at PDD in your account / split - all vintages)

Validated / active

Update status  
Upload monitoring reports and verification statement. Convert PLUS to WCUs Split - current vintages

Verified / active

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Income & Use

- Carbon income in advance** = a one off payment at outset.
  - + Helps landowner with establishment cost
  - + Traditional forestry products as future income.
  - Carbon Buyer has to wait to 'use' credits
- Invest for the future** = sell carbon as its sequestered at each verification.
  - + Regular future income from carbon as well as forestry products

? Carbon price could be higher in future

+ Carbon Buyer can 'use' credits immediately

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How much carbon and £ ?

Current UK prices: £ 3-15 / tCO<sub>2</sub>

Global Average 'forestry' price: £ 6 / tCO<sub>2</sub>

Scenario	Saleable/Claimable Carbon Sequestration by year 50	Saleable/Claimable Carbon Sequestration by year 100
Sitka Spruce, 2.0m spacing, Yield Class 16, mounding on organo-mineral soil. Thinned to standard regimes, but no clearfell. 15% risk of non-permanence buffer.	340 tCO <sub>2</sub> /ha.	470 tCO <sub>2</sub> /ha.
Sitka Spruce, 2.0m spacing, Yield Class 16, mounding on organo-mineral soil. No thinning. Clearfell at 40 years. 15% risk of non-permanence buffer.	135 tCO <sub>2</sub> /ha. This would be achieved by year 40, but no further carbon can be claimed.	135 tCO <sub>2</sub> /ha. This would be achieved by year 40, but no further carbon can be claimed.
Mixed native woodland, 2.5m spacing, Yield Class 4-8, mounding on organo-mineral soil. No thin or clearfell. 20% risk of non-permanence buffer.	375 tCO <sub>2</sub> /ha.	470 tCO <sub>2</sub> /ha.

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Forestry Commission Woodland Carbon CO<sub>2</sub>e Cwm Fagor

- 29ha mixed woodland (native & productive conifer)
- Planted on ex-grazing land in Monmouthshire
- Connects isolated areas of ASNW
- Project Developer: Pryor & Rickett Silviculture
- Will sequester 18,102 tCO<sub>2</sub> over 100 years
  - 15,387 tCO<sub>2</sub> for sale
  - 2,715 tCO<sub>2</sub> to buffer

Thorlux Lighting:

Own & customer emissions




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Forestry Commission Woodland Carbon CO<sub>2</sub>e Yorks Dales Millennium Trust

- YDMT Group: 5 projects, 2-13 hectares
- Project Developer: YDMT
- Will sequester 15,000 tCO<sub>2</sub> over 100 years
  - 13,000 tCO<sub>2</sub> for sale
  - 2,000 tCO<sub>2</sub> to buffer
- Comply Direct marketing/selling carbon units

Lamberts Wood Storthwaite



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Forestry Commission Woodland Carbon CO<sub>2</sub>e Warcop, Cumbria – 160 has, varied objectives!



Forestry Commission Woodland Carbon CO<sub>2</sub>e How to sell carbon

- Via Markit Environmental Registry
  - Request for Information Platform:
  - 'Gumtree' for Selling Carbon
  - [markit.com](http://markit.com)
- Via 'broker'
  - [forestry.gov.uk/carboncompanies](http://forestry.gov.uk/carboncompanies)
- UK Carbon Reporting Framework
  - Advertise your project [ukcarbonreporting.org](http://ukcarbonreporting.org)
- Find a local business

forestry.gov.uk/carboncode

Forestry Commission Woodland Carbon CO<sub>2</sub>e WCC developments

- Monitoring & Verification
- Social and environmental benefits
- Streamlined process for very small projects?
- Scope
  - Changes to management of existing woodlands?
  - Harvested wood products?
- International reporting arrangements
  - Review + Options?

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Forestry Commission Woodland Carbon CO<sub>2</sub>e Other developments

PEATLANDC\*DE



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Forestry Commission Conclusions

Make the case

- Sound evidence (science)
- Measures/ accounting (natural capital)
- Business & economic case
- Promotion

Careful design

- Supporting infrastructure (metrics, verification etc)
- Develop networks
- Engage 'new' expertise

Carry out pilots

- Partnerships
- Evaluate

Develop and adapt

- Market developments and trends
- Best practice

Forestry Commission Thankyou

[www.forestry.gov.uk/carboncode](http://www.forestry.gov.uk/carboncode)

LinkedIn: 'Woodland Carbon' group

WCC Mailing List

[pat.snowdon@forestry.gsi.gov.uk](mailto:pat.snowdon@forestry.gsi.gov.uk)

forestry.gov.uk/carboncode

## ANNEX 2: LIST OF PARTICIPANTS

Mr/Ms	First Name	Last Name	Organisation/Country
Mr.	Jose I.	Barredo	EUROPEAN COMMISSION-JRC
Ms.	Beatriz	Bueno Gonzalez	LUM - FOREST EUROPE
Ms.	Marta	Chicharro	LUM - FOREST EUROPE
Mr.	Strahil	Christov	EUROPEAN COMMISSION - DG ENVIRONMENT
Ms.	Benedetta	Concetti	ERSAF LOMBARDIA (ITALY)
Mr.	Thierry	De Oliveira	UNITED NATIONS ENVIRONMENT PROGRAMME (UNEP)
Mr.	Miljenko	Desković	MINISTRY OF AGRICULTURE, DIRECTORATE FOR FORESTRY, HUNTING AND WOOD INDUSTRY (CROATIA)
Mr.	Andrej	Dimitrijevic	REGIONAL ENVIRONMENTAL CENTER COUNTRY OFFICE (SERBIA)
Mr.	Peter	Elsasser	THUENEN INSTITUTE FOR INT. FORESTRY AND FOREST ECONOMICS (GERMANY)
Ms.	Elena	Estrada Wilke	LUM - FOREST EUROPE
Mr.	Jose Ramon	Guzmán	JUNTA DE ANDALUCÍA (SPAIN)
Mr.	Ylli	Hoxha	MINISTRY OF ENVIRONMENT (ALBANIA)
Mr.	Djordje	Jovic	INSTITUTE OF FORESTRY BELGRADE (SERBIA)
Mr.	Dusan	Jovic	MINISTRY OF AGRICULTURE AND ENVIRONMENTAL PROTECTION-DIRECTORATE OF FORESTS (SERBIA)
Mr.	Predrag	Jovic	MINISTRY OF AGRICULTURE AND ENVIRONMENTAL PROTECTION-DIRECTORATE OF FORESTS (SERBIA)
Mr.	Artti	Juutinen	FINNISH FOREST RESEARCH INSTITUTE
Mr.	Peter	Kampen	CONNECTING NATUTRAL VALUES & PEOPLE (CNVP)
Mr.	Peter	Löffler	EUROPEAN COMMISSION, DG ENVIRONMENT
Ms.	Araceli	Martínez Ruiz	LUM - FOREST EUROPE
Mr.	Robert	Mavsar	EUROPEAN FOREST INSTITUTE (EFI)
Mr.	Cedomir	Mijovic	MINISTRY OF AGRICULTURE AND ENVIRONMENTAL PROTECTION (SERBIA)
Mr.	Radislav	Momirov	MINISTRY OF AGRICULTURE AND ENVIRONMENTAL PROTECTION (SERBIA)
Mr.	Stale	Navrud	NORWEGIAN UNIVERSITY OF LIFE SCIENCES
Mr.	Tomas	Nystrom	SWEDEN
Mr.	Tomas	Nystrom	SWEDEN
Ms.	Anna	Petrakieva	UNION OF EUROPEAN FORESTERS & EXECUTIVE FOREST AGENCY
Mr.	Sasho	Petrovski	CONNECTING NATUTRAL VALUES & PEOPLE (CNVP)
Mr.	Aleksandar	Radosavljevic	MINISTRY OF AGRICULTURE AND ENVIRONMENTAL PROTECTION-DIRECTORATE OF FORESTS (SERBIA)
Mr.	Robert	Rezonja	MINISTRY OF AGRICULTURE AND THE ENVIRONMENT (SLOVENIA)
Mr.	Stevo	Sekulic	JP SRBIJASUME, SG BEOGRAD (SERBIA)
Ms.	Kavita	Sharma	TEEB - UNEP
Mr.	Patrick	Snowdon	UK FORESTRY COMMISSION
Ms.	Maja	Srndovic	PE SRBIJASUME (SERBIA)
Mr.	Sasa	Stamatovic	DIRECTORATE FOR FOREST (SERBIA)
Ms.	Maria	Tourne Whyte	LUM - FOREST EUROPE
Mr.	Branislav	Trudic	INSTITUTE OF LOWLAND FORESTRY AND ENVIRONMENT, UNIVERSITY OF NOVI SAD (SERBIA)
Mr.	Aleksandar	Vasiljevic	THEMIS NETWORK (SERBIA)
Mr.	Miljan	Velojic	PE VOJVODINASUME (SERBIA)
Ms.	Katerina	Ventrubova	CZECH REPUBLIC
Ms.	Dijana	Vuletic	FOREST RESEARCH INSTITUTE (CROATIA)
Mr.	Norbert	Winkler-Ráthonyi	FAO REGIONAL OFFICE FOR EUROPE AND CENTRAL ASIA



## ANNEX 3: WORKSHOP PHOTO GALLERY



01. Registration desk



02. Participants in the Workshop



03. Participants in the Workshop



04. Head Table: Serbian Authority, (Atila Juhas) and Head of the LUM (Maria Tourné)



05. Opening by the Serbian Authorities (Atila Juhas)

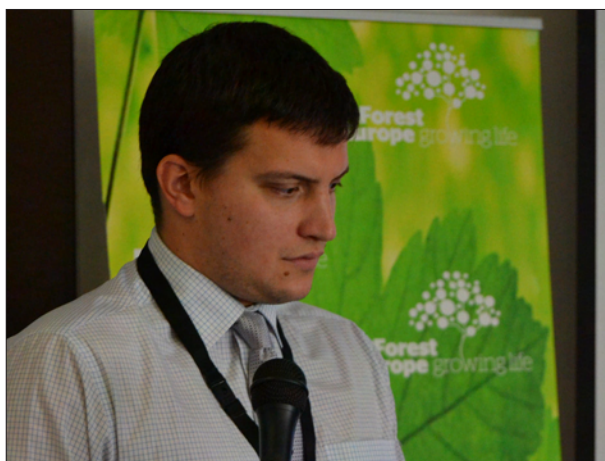


06. Leaders of the Subworking Groups (left to right): Mr. Jose Barredo, Mr. Pat Sonwdon and Mrs. Katerina Ventrubova





**07. Session 1: Presentations of the work developed by the Expert Group of Valuation of Forest Ecosystem Services**



**08. Session 2: Mr. Strahil Christov (EUROPEAN COMMISSION - DG ENVIRONMENT)**



**09. Session 2: Mr. Jose Barredo (EUROPEAN COMMISSION-JRC)**



**10. Session 2: Mr. Robert Mavsar (EFI)**



**11. Session 2: Ms. Kavita Sharma (TEEB)**



**12. Session 3: Mr. Artii Juutinen (Forest Research Institute Finland)**





**13. Session 3: Mr. Peter Kampen (CNVP)**



**14. Session 3: Mr. Sasa Stamatovic (Serbian Directorate of Forests)**



**15. Session 3: Ms. Benedetta Concetti (ERSAF LOMBARDIA)**



**16. Session 3: Mr. Stale Navrud (Norwegian University of Life Sciences)**



**17. Session 3: Mr. Jose Ramón Guzman (Regional Government of Andalusia)**



**18. Session 3: Mr. Pat Snowden (UK Forestry Commission)**





19. Working Group 1: Mainstreaming VFES in National Forest Policies



20. Working Group 1: Mainstreaming VFES in National Forest Policies



21. Working Group 1: Mainstreaming VFES in National Forest Policies



22. Working Group 2: Overcoming difficulties in Valuation of Forest Ecosystem Services and applying valuation results for financing FES



23. Working Group 2: Overcoming difficulties in Valuation of Forest Ecosystem Services and applying valuation results for financing FES



24. Working Group 2: Overcoming difficulties in Valuation of Forest Ecosystem Services and applying valuation results for financing FES





25. Wrap up Session: Rapporteur of Working Group 1



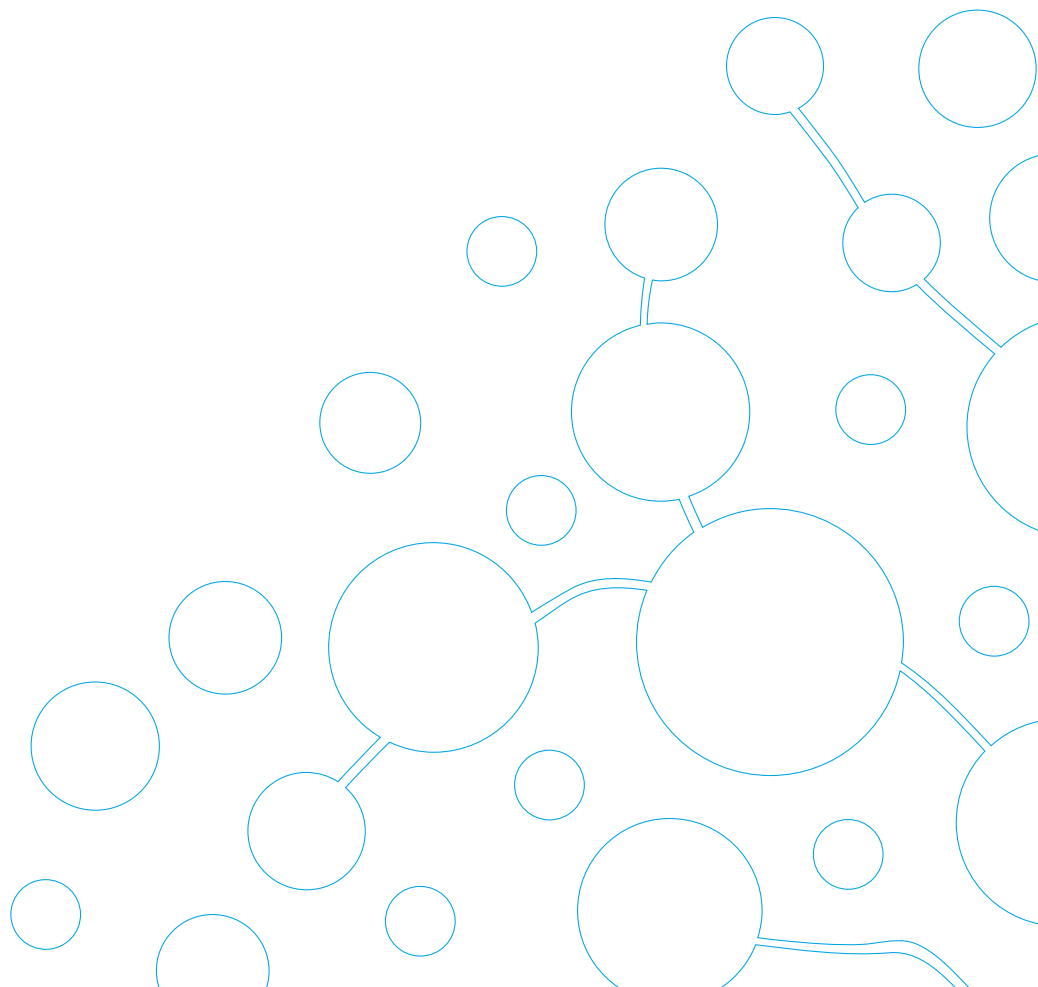
26. Wrap up Session: Rapporteur of Working Group 2



27. Participants in the Workshop









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