

The background of the top section is a photograph of a river flowing through a lush, green forest. Overlaid on this is a white outline map of Europe. The word "ESMERALDA" is written in large, bold, white capital letters across the center of the map. Two small white stars are positioned on either side of the word. Below the map, the website address "www.esmeralda-project.eu" is written in a smaller white font.

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Glossary for Ecosystem Service mapping and assessment terminology

Deliverable D1.4

Glossary for Ecosystem Service mapping and assessment terminology

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**Enhancing ecosystem services mapping for policy and
decision making**

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2.1	Draft	18.04.2018	Co-authors comments included
2.2	Final	20.04.2018	Submitted to coordinator

The content of this deliverable does not necessarily reflect the official opinions of the European Commission or other institutions of the European Union.

Preface

Mapping and the assessment of ecosystems and their services (ES) are core to the EU Biodiversity (BD) Strategy 2020. Specifically, Action 5 of the Strategy's Target 2 sets the requirement for an EU-wide knowledge base developed by Member States designed to be: a primary data source for developing Europe's green infrastructure; a resource to identify areas for ecosystem restoration; and, a baseline against which the goal of 'no net loss of BD and ES' can be evaluated.

In response to these requirements, ESMERALDA (Enhancing ecoSystem sERvices mApping for poLicy and Decision mAKing) aims to deliver a flexible methodology to provide the building blocks for pan-European and regional assessments. The work is supporting the timely delivery of EU member states in relation to Action 5 of the BD Strategy, supporting the needs of assessments in relation to the requirements for planning, agriculture, climate, water and nature policy. This methodology is building on existing ES projects and databases (e.g. MAES, OpenNESS, OPERAs, national studies), the Millennium Ecosystem Assessment (MA), IPBES and TEEB. ESMERALDA is identifying relevant stakeholders and has taken stock of their requirements at EU, national and regional levels.

The objective of ESMERALDA is to share experience through an active process of dialogue and knowledge co-creation that enables participants to achieve the Action 5 aims. The mapping approach proposed is integrating biophysical, social and economic assessment techniques.

The six work packages of ESMERALDA are organised through four strands (see Figure P1), namely policy, research, application and networking, which reflect the main objectives of ESMERALDA.

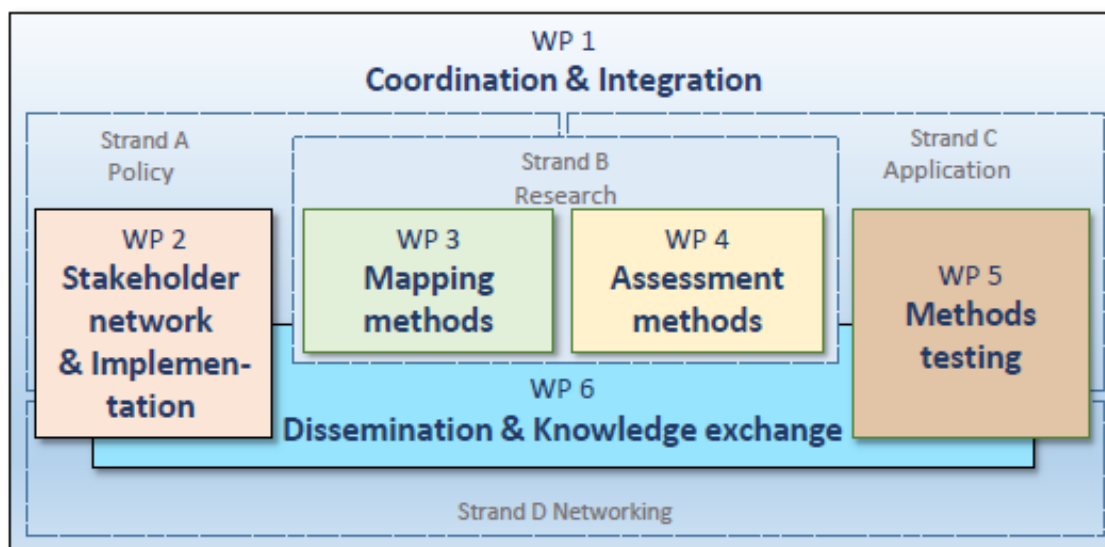


Figure 1: ESMERALDA components and their interrelations and integration within its four strands.

This glossary covers terms for all work packages and strands. It also finds its dominant place in the ESMERALDA Guidance (online tool) documentation, one of the key outcomes of the project.

Summary

In month four of the life time of ESMERALDA, a glossary with 225 working definitions was circulated to the consortium members. These definitions were mainly based on an existing Glossary produced by the FP7 project OpenNESS¹, which listed over 200 ecosystem service related terms and their definitions. While this was extremely helpful, for instance as it was available at the beginning of the ESMERALDA project, these terms needed to be tested in relation to the specific focus of ESMERALDA, namely mapping ecosystems and their services as part of the Mapping and Assessment of Ecosystems and their Services (MAES²) initiative.

The consultation on terms and their usage in the ESMERALDA project was open till the end of the third year of the project (month 36) and this here presented 'ESMERALDA Glossary' (version 2) is the result of the consortium-internal consultation. On top of adjusting existing definitions, also 77 new terms were added, mainly method categories as well as more mapping and ecosystem condition specific terms.

This 'ESMERALDA Glossary' with its now 302 terms and definitions, as well as references and comments, is the most updated and comprehensive glossary for ecosystem service related terms so far available. Furthermore, and as a general experience it can be said, that producing a glossary with working definitions early in the project is essential and having a consultation process within the consortium proved essential to get the 'engagement and approval' of partners.

¹ <http://www.openness-project.eu/>

² <https://biodiversity.europa.eu/maes>

Introduction

The aim of ESMERALDA (<http://www.esmeralda-project.eu/>) is to “to deliver a flexible methodology to provide the building blocks for pan-European and regional assessments”. Deliverable 1.4 “Glossary for ES mapping and assessment terminology” as a draft was produced in months 04 as an “internal agreement”. After a consultation process within the ESMERALDA consortium, this is the final version of the glossary, which will also to be uploaded onto the ESMERALDA guidance documentation framework, including an ecosystem services mapping and assessment method finder as well as final guidance documents.

It has been agreed in the ESMERALDA Executive Board to use an existing glossary as a base, which had been developed in the OpenNESS³ project as a working document.

In using and reviewing the terms it is important to note the scope and purpose of the work. The following is the background on which the original OpenNESS Glossary⁴ was built:

- The starting point was the set of Ecosystem Services/Natural Capital related terms developed through other initiatives such as the MA⁵, TEEB⁶, the UK NEA⁷, and Rubicode⁸. The ‘OpenNESS Glossary Editorial Team’ consolidated the terms they defined into one list in early 2014, so that the similarities and differences could be reviewed and the applicability to OpenNESS discussed.
- Through a three-month consultation process within the OpenNESS consortium, the Glossary Editorial Team asked for comments on the range of terms included in the glossary, the definitions themselves and suggestions for any additional terms.
- As a result of the consultation, the OpenNESS Glossary contained about 200 terms. It should be noted, however, that the terms included did not just reflect the ES literature, but also the particular subjects that OpenNESS aimed to cover. The original list was constructed through a dialogue in with the OpenNESS consortium.
- The major changes made were to improve consistency and clarity, especially with the work done through the development of the OpenNESS Synthesis Papers⁹.

Structure of the final ESMERALDA Glossary

The entries in the glossary are arranged in a tabular format so that users can see the background to the terms covered. The columns deal with the:

- ‘Term’: List of 302 ecosystem service (mapping and assessment) related terms.
- ‘Definition’ reflects agreed definition from the ESMERALDA consortium.

³ <http://www.openness-project.eu/>

⁴ <http://www.openness-project.eu/glossary> Also used as the glossary for Oppla (<https://www.oppla.eu/>)

⁵ The Millennium Ecosystem Assessment (MA): <http://millenniumassessment.org/>

⁶ The Economics of Ecosystems and Biodiversity (TEEB): <http://www.teebweb.org/>

⁷ UK National Ecosystem Assessment: <http://uknea.unep-wcmc.org/>

⁸ Rationalising Biodiversity Conservation in Dynamic Ecosystems (RUBICODE):

<http://www.rubicode.net/rubicode/index.html>

⁹ <http://www.openness-project.eu/library/reference-book>, see Potschin and Jax (2016).

- ‘Source’, that is where the direct quote was taken from. Note, this does not mean origin, that is where it was first used or suggested.
- In the source column, where there is an attribution to TEEB, MA or UK NEA, the term appears in their glossary. When the ESMERALDA Glossary editorial team took terms from other sources, we mainly have acknowledged the first one to define it. So if, for example, TEEB or UK NEA has kept the same definition as MA, we have put MA in as source. If UK NEA has changed it, or Rubicode added to the MA or other definitions, we added those as the source.
- Where the word ‘OpenNESS’ is used in the source column, the wording has been changed or different definitions merged to better reflect what has been discussed in OpenNESS. Sometimes the definition is new but sometimes it is a modification of another source. The term has been newly defined for OpenNESS.
- ‘Comment’: Here we make reference from which glossary this term has been taken and where in ESMERALDA related initiatives it has been used. Sometimes suggestions are made of how (or not) to use terms.

Developing the glossary

In preparing the glossary, it was not implied that all the terms listed were developed from the Ecosystem Service (ES) community, but that they are often used in the ES literature, and potentially within ESMERALDA. Although some terms may have been used by other people in other disciplines, the main concern has been not to trace their origins but to identify their relevance and applicability for ecosystem assessments. The purpose of the exercise was not to reinvent anything, but to provide a set of working definitions for the consortium, and for the implementation of MAES/Action 5 in EU member states and other related initiatives and projects.

The consultation process

The ESMERALDA Glossary version 1 was produced in May 2015 and available to the ESMERALDA consortium for over three years to be tested. An online consultation process within ESMERALDA followed in spring 2018 and the following changes have been made for the final version (2.0):

- Through the consultation, seven existing terms have been changed and adopted for ESMERALDA;
- Altogether 43 method definitions (categories) as developed in ESMERALDA (see ESMERALDA methods compendium, Santos Martín et al., 2018) have been added;
- 35 terms and definitions from the 5th MAES report (Maes et al., 2018) have been added. If terms already existed in the glossary, the MAES definition ‘override’ existing definitions;
- The “Mapping Ecosystem Services” Book (Burkhard and Maes, 2017) includes a glossary of 105 ES mapping relevant terms and their definition. The majority is based on the “original OpenNESS” glossary”. 25 terms from ‘the Mapping Book terms’ have been added or have overridden the original [OpenNESS] ones. Many of these terms specifically refer to ES mapping; and,
- 11 further terms and definitions from a glossary for ecosystem condition (Czúcz & Condé, 2017) have been added to version 2 of the ESMERALDA Glossary.

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The original OpenNESS Glossary base should be cited as:

Potschin, M.; Haines-Young, R.; Heink, U. and K. Jax (2016): OpenNESS Glossary (V3.0). Grant Agreement No 308428. Available from <http://www.openness-project.eu/glossary>

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Glossary

Term	Definition	Source	Comment
Abatement Cost	See 'Marginal Abatement costs'	MA (2005)	
Abiotic	Referring to the physical (non-living) environment, for example, temperature, moisture and light, or natural mineral substances.	Modified from Lincoln et al. (1998: 1)	
Abundance	The total number of individuals of a taxon or taxa in an area, population, or community. Relative abundance refers to the total number of individuals of one taxon compared with the total number of individuals of all other taxa in an area, volume, or community.	MA (2005)	
Adaptation	Adjustment in natural or human systems to a new or changing environment.	MA (2005)	
Adaptive Capacity	The ability of ecosystems and social systems, to adjust and renew as a response to contextual changes. The term can be distinguished from coping capacity, which is defined as the ability to deal with changes, especially those relating to climate, as they actually happen.	New, draws on Gunderson and Holling (2002); Primmer (2011), Dunford et al. (2014)	
Adaptive Management	A systematic process for continually improving management policies and practices by learning from the outcomes of previously employed policies and practices. In active adaptive management, management is treated as a deliberate experiment for purposes of learning and achieving a desired goal.	Adapted from the MA (2005)	
Additional (system) Inputs	Non-ecosystem-based anthropogenic contributions to ecosystem services, referring for example to fertiliser, energy, pesticide, technique, labour or knowledge use in human-influenced land use systems.	Burkhard et al. (2014)	As used in Maes et al.(2014)
Afforestation	Planting of forests on land that has historically not contained forests (as opposed to Reforestation).	MA (2005)	
Agro-biodiversity (or agricultural biodiversity)	The biodiversity in agricultural ecosystems (including domestic animals and cultivated plants, e.g. crop plants).	MA (2005)	
Agro-ecosystem	An ecosystem, in which usually domesticated plants and animals and other life forms are managed for the production of food, fibre and other materials that support human life while often also providing non-material benefits. Besides providing ecosystem services, agro-ecosystems are also users of other ecosystem services (e.g. nutrient regulation, erosion control, water supply, natural pest control).	Common usage, added from Burkhard and Maes (2017)	

Term	Definition	Source	Comment
Alien Species	A plant or animal whose distribution is outside its natural range; alien species are frequently introduced by human activity.	Common usage and consistent with MA (2005)	
Alternative cost Method	See 'Replacement cost'		
Analytical Framework	An analytical framework consists of a conceptual framework complemented with the main definitions and classifications needed for its operational use.	based on OECD (2016)	As used in Maes et al. (2018)
Aquaculture	Breeding and rearing of aquatic organisms (fish, molluscs, crustaceans and aquatic plants) in ponds, enclosures, or other forms of confinement in either fresh or marine waters for direct harvest of the product.	Adapted from MA (2005)	extended by FAO yearbook Fishery and Aquaculture Statistics (2011)
Assemblage	A group of organisms from either one taxon (e.g. birds) or from different taxa.	Common usage	
Assessment	The analysis and review of information derived from research for the purpose of helping someone in a position of responsibility to evaluate possible actions or think about a problem. Assessment means assembling, summarising, organising, interpreting, and possibly reconciling pieces of existing knowledge and communicating them so that they are relevant and helpful to an intelligent but inexperienced decision-maker.	(Parson, 1995).	Also used in Maes et al. (2014, 2018)
Basic Spatial Unit (BSU)	The smallest spatial unit of a mapping project for which the elements of its conceptual framework are estimated. The typical size of BSUs is called spatial resolution.	based on SEEA-EEA (2012), modified	As used in Czúcz and Condé (2017)
Bayesian Belief Network	A probabilistic graphical model for reasoning under uncertainty, consisting of an acyclic, directed graph describing a set of dependence and independence properties between the variables of the model represented as nodes, and a set of (conditional) probability distributions that quantify the dependence relationship.	Adapted from Kjærulff & Madsen (2013)	[a.k.a. Bayesian Network]
Beneficiary	A person or group whose well-being is changed in a positive way by [in this case] an Ecosystem Services.	OpenNESS	
Beneficiary Approach	The classification of Ecosystem Services according to beneficiary (sub-)categories.	OpenNESS	

Term	Definition	Source	Comment
Benefit Transfer	Estimates economic values by transferring existing benefit estimates from studies already completed for another location or issue		Consolidated as of ESMERALDA Deliv. 3.2
Benefits	Positive change in wellbeing from the fulfilment of needs and wants.	TEEB (2010)	Also used in Maes et al. (2014, 2018)
Biodiversity	The variability among living organisms from all sources, including inter alia terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part, this includes diversity within species, between species, and of ecosystems.	(cf. Article 2 of the Convention on Biological Diversity, 1992).	Also used in Maes et al. (2014, 2018)
Biodiversity Offsets	Conservation activities that are designed to give biodiversity benefits to compensate for losses – ensuring that when a development damages nature (and this damage cannot be avoided via prevention or mitigation) new, bigger or better nature sites will be created. They are different from other types of ecological compensation as they need to show measurable outcomes that are sustained over time.		
Bioenergy	Renewable energy made available from materials derived from biological sources.	Common usage	
Biofuel	A fuel that contains energy from geologically recent carbon fixation, produced from living organisms, usually plants.	Common usage	
Biogeographic Realm	A large spatial region, within which ecosystems share a broadly similar biota. Eight terrestrial biogeographic realms are typically recognised, corresponding roughly to continents (e.g. Afrotropical realm).	UK NEA (2011)	
Biological Diversity	See Biodiversity		
Biomass	The mass of tissues in living organisms in a population, ecosystem, or spatial unit derived by the fixation of energy through organic processes.	MA (2005)	
Biome	The largest unit of ecological classification that is convenient to recognize below the entire globe. Terrestrial biomes are typically based on dominant vegetation structure (e.g. forest, grassland). Ecosystems within a biome function in a broadly similar way, although they may have very different species composition. For example, all forests share certain properties regarding nutrient cycling, disturbance, and biomass that are different from the properties of grasslands. Marine biomes are typically based on biogeochemical properties. The WWF biome classification is used in the MA.	MA (2005)	

Term	Definition	Source	Comment
Biophysical Structure	The architecture of an ecosystem as a result of the interaction between the abiotic, physical environment and the biotic communities, in particular vegetation.		As used in Maes et al. (2014)
Biophysical Valuation	A method that derives values from measurements of the physical costs (e.g., in terms of labour, surface requirements, energy and material inputs) of producing a given good or service.	TEEB	As used in Maes et al. (2014)
Biotic	Living or recently living, used here to refer to the biological components of ecosystems, that is, plants, animals, soil microorganisms, leaf litter and dead wood.	Maes et al. (2014)	As used in Czúcz and Condé (2017)
Boundary Concepts	Terms, such as 'ecosystem services' that help to structure and ease exchange across policy fields, political-administrative levels, and stakeholder groups by providing the basis for a shared understanding.	based on OpenNESS, simplified [Mollinga 2010]	As used in Czúcz and Condé (2017)
Capacity	(for an ecosystem service): The ability of a given ecosystem to generate a specific ecosystem service in a sustainable way.	based on SEEA-EEA (2012)	As used in Maes et al. (2018)
Capacity Building	A process of strengthening or developing human resources, institutions, organisations, or networks. Also referred to as capacity development or capacity enhancement.	UK NEA (2011)	
Carbon Sequestration	The process of increasing the carbon content of a reservoir other than the atmosphere.	MA (2005)	
Cartography	The art and science of representing geographic data by geographical means.		As used in Burkhard and Maes (2017)
Choice Modelling (choice experiment, discrete choice modelling)	A stated preference method that uses surveys to ask respondents to make trade-offs between ecosystem service provision and payments to elicit willingness to pay for changes in ES.	New for ESMERALDA	Consolidated as of ESMERALDA Deliverable 3.2
Classification System [for ES]	An organised structure for identifying and organising ES into a coherent scheme.	Common usage	
Coastal System	Systems containing terrestrial areas dominated by ocean influences such as tides and marine aerosols, plus near shore marine areas. The inland extent of coastal ecosystems is the line where land based influences dominate, up to a maximum of 100 kilometres from the coastline or 100-meter elevation (whichever is closer to the sea), and the outward extent is the 50-meter-depth contour.	Adapted from UK NEA (2011)	

Term	Definition	Source	Comment
Community (Ecological)	An assemblage of species occurring in the same space or time, often linked by biotic interactions such as competition or predation.	UK NEA (2011), and common usage	
Community (Human, Local)	A group of people who have something in common. A local community is a fairly small group of people who share a common place of residence and a set of institutions based on this fact, but the word 'community' is also used to refer to larger collections of people who have something else in common (e.g., national community, donor community).	Adapted from MA (2005) and UK NEA (2011)	
Conceptual Framework	See term "Framework"		
Conceptual Model	Conceptual models of ecosystem services describe systemic interactions between nature and people. They are, for instance, illustrations of ecosystem structures and functions, or impact of drivers and pressures on state variables. Conceptual models can also describe complexity of various approaches in the quantification of ecosystem services.		As of ESMERALDA compendium (also ESMERALDA Deliverable 3.3)
Conservation	The protections, improvement and sustainable use of natural resources for present and future generations.		As used on Burkhard and Maes (2017)
Conservation Status	The sum of the influence acting on a habitat and its typical species that may affect its long-term natural distribution, structure and functions as well as the long-term survival of its typical species.	EEC (1992)	Also used in Maes et al. (2014, 2018)
Contingent Valuation	A stated preference method that uses survey approaches to ask respondents how much they are willing to pay (or accept) for specified changes in the provision of ES.	Adapted from MA (2005)	As of ESMERALDA compendium (also ESMERALDA Deliverable 3.2)
Coordinate System	It is used to define the positions of the mapped phenomena in space. Furthermore, it acts as a key to combine and integrate different datasets based on their location.		As used on Burkhard and Maes (2017)
Corporate Ecosystem Service Review	A structured methodology that helps private sector decision-makers to develop strategies to manage business risks and opportunities arising from their company's dependence and impact on ecosystems.		As of ESMERALDA compendium (also ESMERALDA Deliverable 3.2)

Term	Definition	Source	Comment
Cost-Benefit Analysis (CBA)	An evaluation method that involves summing up the value of the costs and benefits of an investment/policy/project and comparing options in terms of their net benefits (the extent to which benefits exceed costs).		As of ESMERALDA compendium (also ESMERALDA Deliverable 3.2)
Cost-Effectiveness Analysis (CEA)	An evaluation method that involves identifying the least cost option that achieves a specified goal.		As of ESMERALDA compendium (also ESMERALDA Deliverable 3.2)
Critical Natural Capital	That set of environmental resources which performs important environmental functions essential to human well-being, and for which no substitutes in terms of human, manufactured or other natural capital currently exist.	New, modified version of Ekins (2003)	
Critically Endangered Species	A species which has been categorised by the Inter-national Union for Conservation of Nature as facing a very high risk of extinction in the wild. It is the highest risk category assigned by the IUCN Red List for wild species.	IUCN	
Cultural Landscape	Cultural properties (that) represent the combined works of nature and of man	World Heritage Committee	
Cultural Ecosystem Service (CES)	All the non-material, and normally non-consumptive, outputs of ecosystems that affect physical and mental states of people. CES are primarily regarded as the physical settings, locations or situations that give rise to changes in the physical or mental states of people, and whose character are fundamentally dependent on living processes; they can involve individual species, habitats and whole ecosystems. The settings can be semi-natural as well as natural settings (i.e. can include cultural landscapes) providing they are dependent on <i>in situ</i> living processes. In CICES, a distinction between settings that support interactions that are used for physical activities such as hiking and angling, and intellectual or mental interactions involving analytical, symbolic and representational activities is made. Spiritual and religious settings are also recognised. The classification also covers the 'existence' and 'bequest' constructs that may arise from people's beliefs or understandings.	As defined in CICES	

Term	Definition	Source	Comment
Damage Cost Avoided	Calculates the damage costs that are avoided due to the regulation of environmental flows by a ecosystems (e.g. flood attenuation, storm buffering).		As of ESMERALDA compendium (also ESMERALDA Deliv. 3.2)
Decision-maker	A person, group or an organisation that has the authority or ability to decide about actions of interest.	MA (2005)	
Defensive Expenditure	Expenditure on the protection of ecosystems and ES is used as a proxy of the value of ES.		As of ESMERALDA compendium (also ESMERALDA Deliv. 3.2)
Degradation of an Ecosystem Service	Reduction in the contribution that an ecosystem service, or bundles of services, makes to human well-being as a result of loss of a stock of natural capital or its condition (capacity) to generate service output.	OpenNESS	
Deliberative Assessment	Deliberative methods are an umbrella term for various tools and techniques engaging and empowering non-scientist participants. These methods ask stakeholders and citizens to form their preferences to ecosystem services together in a transparent way through an open discourse.		As of ESMERALDA compendium (also ESMERALDA Deliv.3.1)
Demand	See “ecosystem service demand”.		
Direct Measurement (of ES)	A measurement of a state, a quantity or a process from ecosystem observations, monitoring, surveys or questionnaires which cover the entire study area in a representative manner		As of ESMERALDA compendium (also ESMERALDA Deliverable 3.3)
Direct Use Value (of Ecosystems)	The economic or social value of the goods or benefits derived from the services provided by an ecosystem that are used directly by an agent. These include consumptive uses (e.g., harvesting goods) and non-consumptive uses (e.g., enjoyment of scenic beauty). Agents are often physically present in an ecosystem to receive direct use value	New, adapted from MA (2005) and Rubicode (2010)	
Disservice	Negative contributions of ecosystems to human well-being; undesired negative effects resulting from the generation of other ecosystem services.	New, modified TEEB	
Diversity	See 'Biodiversity'		

Term	Definition	Source	Comment
Drivers of Change [Direct & Indirect]	Any natural or human-induced factor that directly or indirectly causes a change in an ecosystem. A direct driver of change unequivocally influences ecosystem processes and can therefore be identified and measured to differing degrees of accuracy, an indirect driver of change operates by altering the level or rate of change of 1 or more direct drivers.	MA (2005)	As used in Maes et al. (2014, 2018)
Eco-agri-food System	An interacting complex of ecosystems, agricultural lands, infrastructure and markets playing a role in growing, processing, distributing and consuming food		As used on Burkhard and Maes (2017)
Ecological Asset	The stocks of potential services which the ecosystem, conditioned by structure and processes, might provide. In economic terms these represent the 'wealth' of the ecosystem.	UK NEA (2011); Bateman et al. (2011: 182)	
Ecological Character	See term 'Ecosystem properties'.		
Ecological Connectivity Models	Ecological connectivity models are used to evaluate the structural and/or functional degree to which the landscape facilitates or impedes movement of different ecological processes. Connectivity of the landscape (e.g. urban green) promotes the provision potential of many ecosystem services as connectivity is fundamentally linked to the ecological processes providing these services.		As of ESMERALDA compendium (also ESMERALDA Deliverable 3.3) (to include methods/software such as Zonation, MSPA, MatrixGreen, TerrSet (former IDRISI), FunCon, etc.)
Ecological Damage	See term 'Degradation of ecosystems'.		
Ecological Degradation	See 'Degradation of ecosystems'.		
Ecological Process	An interaction among organisms, and/or their abiotic environment.	shortened from Mace et al. (2012)	
Ecological Value	Non-monetary assessment of ecosystem integrity, health, or resilience, all of which are important indicators to determine critical thresholds and minimum requirements for ecosystem service provision.	TEEB (2010)	As used in Maes et al. (2014, 2018) We suggest not to use the term

Term	Definition	Source	Comment
Economic Valuation	The process of expressing a value for a particular good or service in a certain context (e.g., of decision-making) in monetary terms.	TEEB (2010)	As used in Maes et al. (2014, 2018) [See terms 'monetary valuation' and 'non-monetary valuation'.]
Ecosystem	1. [in a general context] Dynamic complex of plant, animal, and microorganisms communities and their non-living environment inter-acting as a functional unit. Humans may be an integral part of an ecosystem, although 'socio-ecological system' is sometimes used to denote situations in which people play a significant role, or where the character of the ecosystem is heavily influenced by human action. 2. [in the MAES context] An ecosystem type	Modified MA (2005)	As used in Maes et al. (2014, 2018): For practical purposes it is important to define spatial dimensions of concern.
Ecosystem Accounting	Ecosystem accounting is a coherent and integrated approach to the measurement of ecosystem assets and the flows of services from them into economic and other human activity.	(SEEA-EEA, 2012)	As used in Maes (2018)
Ecosystem Approach	A strategy for the integrated management of land, water, and living resources that promotes conservation and sustainable use. An ecosystem approach is based on the application of appropriate scientific methods focused on levels of biological organisation, which encompass the essential structure, processes, functions, and interactions among organisms and their environment. It recognises that humans, with their cultural diversity, are an integral component of many ecosystems.	MA (2005)	
Ecosystem Assessment	A social process through which the findings of science concerning the causes of ecosystem change, their consequences for human well-being, and management and policy options are brought to bear on the needs of decision-makers.	UK NEA (2011)	As used in Maes et al. (2014, 2018)
Ecosystem Asset	Any set of ecosystem units in their respective conditions. Ecosystem asset represent stocks in an accounting context	based on SEEA-EEA (2012), modified	As used in Czócz and Condé (2017)
Ecosystem Attribute	A biological, physical, or chemical characteristic or feature of an ecosystem.	Modified, after Nahlik et al. (2012)	

Term	Definition	Source	Comment
Ecosystem Characteristic	Key attributes of an ecosystem unit describing its components, structure, processes, and functionality, frequently closely related to biodiversity. The term characteristics is intended to be able to encompass all of the various perspectives taken to describe an ecosystem.	based on SEEA-EEA (2012), simplified	
Ecosystem Capacity	See 'Capacity'		
Ecosystem Change	Any variation in the state, process rates, outputs, or structure of an ecosystem.	MA (2005)	
Ecosystem Condition	<p>1. The capacity of an ecosystem to yield services, relative to its potential capacity.</p> <p>2. The physical, chemical and biological condition or quality of an ecosystem at a particular point in time (definition used in MAES).</p> <p>3. The SEEA-EEA defines ecosystem condition as the overall quality of an ecosystem asset in terms of its characteristics.</p> <p>4. The overall quality of an ecosystem unit, in terms of its main characteristics underpinning its capacity to generate ecosystem services.</p>	<p>MA (2005)</p> <p>Maes et al. (2018)</p> <p>SEEA-EEA (2012)</p> <p>Czúcz & Condé (2018)</p>	
Ecosystem Degradation	A persistent reduction in the condition of an ecosystem.	Maes et al. (2018) modified from MA (2005)	
Ecosystem Extent	The spatial area covered by an ecosystem or ecosystem type.	based on SEEA-EEA (2012)	As used in Maes et al. (2018)
Ecosystem Function	<p>Subset of the interactions between biophysical structures, biodiversity and ecosystem processes that underpin the capacity of an ecosystem to provide ecosystem services.</p> <p>See also ecosystem capacity and ecosystem condition.</p>	TEEB (2010)	As used in Maes et al. (2014)
Ecosystem Functioning	The operating of an ecosystem. Very often, there is a normative component involved, insofar as ecosystem functioning not only refers to (any) functioning/performance of the system but to 'proper functioning' and thus implies a normative choice on what is considered as a properly functioning ecosystem (operating within certain limits).	Based on Jax (2010)	
Ecosystem Health	A state of nature (whether managed or pristine) that is characterized by systems integrity: that is, a healthy nature is a largely self-organized system.	Rapport (1992: 145)	

Term	Definition	Source	Comment
Ecosystem Integrity	Integrity is often defined as an environmental condition that exhibits little or no human influence, maintaining the structure, function, and species composition present, prior to, and independent of human intervention [i.e., integrity is closely associated with ideas of naturalness, particularly the notion of pristine wilderness (Angermeier & Karr 1994, Callicott et al. 1999)]	Hull et al. (2003: 2)	
Ecosystem Management	A direct and conscious intervention (or agreement to refrain from interventions) in an ecosystem by people that is intended to change its structure or functioning for some benefit.	Adapted from MA (2005)	
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)	As used in Maes et al. (2014, 2018)
Ecosystem Properties	Attributes which characterize an ecosystem, such as its size, biodiversity, stability, degree of organization, as well as its functions and processes (i.e., the internal exchanges of materials, energy and information among different pools).	MA (2005) and UK NEA (2011)	
Ecosystem Services	The contributions of ecosystems to benefits obtained in economic, social, cultural and other human activity.	based on TEEB, (2010) & SEEA-EEA (2012)	As used in Maes et al. (2018). Note: The concepts of 'ecosystem goods and services', 'final ecosystem services', and 'nature's contributions to people' are considered to be synonymous with ES in the MAES context.
Ecosystem Service Accounting	A structured way of measuring the economic significance of nature that is consistent with existing macro-economic accounts. Ecosystem service accounting involves organising information about natural capital stocks and ecosystem service flows, so that the contributions that ecosystems make to human well-being can be understood by decision makers and any changes tracked over time. Accounts can be organised in either physical or monetary terms.		As of ESMERALDA compendium (also ESMERALDA Deliverable 3.2)

Term	Definition	Source	Comment
Ecosystem Service Antagoniser	An organism, species, population, functional group, or community which by virtue of their traits can disrupt the provision of ecosystem services.	OpenNESS, adapted from Harrington et al. (2010)	
Ecosystem Service Assessment	An appraisal of the status and trends in the provision of ecosystem services in a specified geographic area. The general aim of an ecosystem service assessment is to highlight and quantify the importance of ecosystem services to society. Ecosystem service assessments are multidisciplinary in nature, applying and combining biophysical, social and economic methods		As of ESERALDA compendium (also ESERALDA Deliverable 3.2)
Ecosystem Service Bundle (supply side)	A set of associated ecosystem services that are linked to a given ecosystem and that usually appear together repeatedly in time and space.	From OpenNESS	
Ecosystem Service Bundle (demand side)	A set of associated ecosystem services that are demanded by humans from ecosystem(s).	From OpenNESS	
Ecosystem Service Card Game	This method specifically focuses on exploring and understanding human preferences and perceptions of ecosystem services. This makes it a useful tool for assessing landscapes that provide various direct benefits to individuals, especially cultural landscapes which have been shaped by long-term human impacts and which are frequent targets of human use and enjoyment		As of ESERALDA compendium (also ESERALDA Deliverable 3.1)
Ecosystem Service Classification	ecosystem service classification: A classification of ecosystem services according to the ecological processes they rely on, and the benefits they contribute to"	Czucz & Condé (2017)	
Ecosystem Service Demand	The need for specific ecosystem services by society, particular stakeholder groups or individuals. It depends on several factors such as culturally-dependent desires and needs, availability of alternatives, or means to fulfil these needs. It also covers preferences for specific attributes of a service and relates to risk awareness.		As in Burkhard and Maes (2017)
Ecosystem Service Flow	See 'Flow'		
Ecosystem Service Mapping	The process of creating a cartographic representation of (quantified) ecosystem service indicators in geographic space and time.		As in Burkhard and Maes (2017)

Term	Definition	Source	Comment
Ecosystem Service Model	A scientific (usually computer-based) for quantifying various socio-ecological indicators of an ecosystem service.		As in Burkhard and Maes (2017)
Ecosystem Service Potential	This describes the natural contributions to ES generation. It measures the amount of ES that can be provided or used in a sustainable way in a certain region. This potential should be assessed over a sufficiently long period of time.		As in Burkhard and Maes (2017)
Ecosystem Service Provider	The ecosystems, component populations, communities, functional groups, etc. as well as abiotic components such as habitat type, that are the main contributors to ES output.	Modified from Harrington et al. (2010) after Kremen (2005)	
Ecosystem Service Supply	The provision of a service by a particular ecosystem, irrespective of its actual use. It can be determined for a specified period of time (such as a year) in the present, past or future		As in Burkhard and Maes (2017)
Ecosystem State	The physical, chemical and biological condition of an ecosystem at a particular point of time.		As used in Maes et al. (2014)
Ecosystem Status	Ecosystem condition defined among several well-defined categories with a legal status. It is usually measured against time and can be compared to agreed policy targets, e.g. in EU environmental directives (e.g. Habitats Directive, Water Framework Directive, Marine Strategy Framework Directive), e.g. "conservation status".		As used in Maes et al. (2018)
Ecosystem Structure	A static characteristic of an ecosystem that is measured as a stock or volume of material or energy, or the composition and distribution of biophysical elements. Examples include standing crop, leaf area, % ground cover, species composition (cf. ecosystem process).	New	
Ecosystem Type	A specific category of an ecosystem typology.		As used in Maes et al. (2018)
Ecosystem Typology	A classification of ecosystem units according to their relevant ecosystem characteristics, usually linked to specific objectives and spatial scales.		As used in Maes et al. (2018)
Ecosystem Unit	An instance of an ecosystem type within a basic spatial unit. In cases when the spatial resolution is relatively fine, it is a meaningful simplification to assume that each basic spatial unit is occupied by just a single ecosystem unit, in which case these two concepts (BSU, EcU) will coincide."	Czúcz & Condé (2017)	

Term	Definition	Source	Comment
Enabling Condition	Critical preconditions for success of responses, including political, institutional, social, economic, and ecological factors.	MA (2005)	
Endangered Species	See term “threatened species”.		
Energy Inputs	See term “Additional Inputs”.		
Environmental Accounting	See term "Natural Capital Accounting".		
Environmental Liability	Obligation based on the principle that a polluting party should pay for any and all damage caused to the environment by its activities (also known as polluter pays principle).	New	
Environmental Policy Integration	The incorporation of environmental objectives into all stages of policy making in non-environmental policy sectors, with a specific recognition of this goal as a guiding principle for the planning and execution of policy, accompanied by an attempt to aggregate presumed environmental consequences into an overall evaluation of policy, and a commitment to minimize contradictions between environmental and sectoral policies by giving principled priority to the former over the latter.	Lafferty and Hovden (2003)	
Environmental Settings	Locations or places where humans interact with each other and nature that give rise to the cultural goods and benefits that people obtain from ecosystems.	UK NEA (2011)	
Equity	Fairness of rights, distribution, and access. Depending on context, this can refer to resources, services or power.	MA (2005)	
Evolutionary Process	A series of events that produce changes in gene frequencies within a population. Such changes can result in the appearance of new species (speciation) or new intraspecific taxa.	Modified from Mace et al. (2012)	
Excludability	Occurs if institutions or technologies exist that prevent other individuals or groups from using a good or service.	Costanza (2008)	
Existence Value	The value that individuals place on knowing that a resource exists, even if they never use that resource (also sometimes known as conservation value or passive use value).	MA (2005)	
Explorative Scenario	The projection of the state and condition of an ecosystem into the future, based on the anticipated impacts of the direct and indirect drivers of change, designed to help people understand the consequences of different sets of assumptions. See 'normative scenarios'.	OpenNESS	

Term	Definition	Source	Comment
Externality	A consequence of an action that affects someone other than the agent undertaking that action and for which the agent is neither compensated nor penalized through the markets. Externalities can be positive or negative.	MA (2005) definition	
Extrapolation	A projection, extension, or expansion of information from what is known into an area not known or experienced, providing conjectural knowledge of the unknown area.	OpenNESS	
Final Ecosystem Service	See 'ecosystem service'.	Potschin-Young et al. (2017)	See also Term 'Goods' Ecosystem services can only be final – hence there is no need to use 'final' (see also intermediate services which we suggest not to use)
Flow (of an ecosystem service)	The amount of an ecosystem service that is actually mobilized in a specific area and time	Modified from OpenNESS	As used in Maes et al. (2018)
Framework	A structure that includes the relationship amongst a set of assumptions, concepts, and practices that establish an approach for accomplishing a stated objective or objectives.	Nahlik et al. (2012)	
Functional Diversity	The value, range, and relative abundance of traits present in the organisms in an ecological community.	UK NEA (2011)	
Functional Group	A collection of organisms with similar functional trait attributes. Some authors use 'Functional Type' in the same way. Groups can be associated with similar responses to pressures and/or effects on ecosystem processes. A functional group is often referred to as a guild, especially when referring to animals, e.g. the feeding types of aquatic organisms having the same function within the trophic chain, e.g. the group (guild) of shredders or grazers.	Harrington et al. (2010)	
Functional Richness	This includes two components, which authors have used selectively or jointly to denote: a) the range of trait attributes represented in the community, i.e. the amount of niche space filled by species in the community (Mason et al., 2005); or, b) the number of functional groups or trait attributes in the community (Petchey et al., 2004).	Harrington et al. (2010)	

Term	Definition	Source	Comment
Functional Traits	A feature of an organism that has demonstrable links to the organism's function. Those characteristics (e.g. morphological, physiological etc.) of organisms that either are related to the effect of organisms on community and ecosystem processes or their response to these processes and the physical environment.		As used in Maes et al. (2014)
Futures Thinking	Thinking about how our understandings of the past and present can be used to understand the future, using a range of approaches such as forecasts, projections, predictions and scenarios. See exploratory and normative scenarios.	OpenNESS	
Generalisation (map)	This aims to represent the ES information on a level of detail appropriate for a given scale, user group and use context. It is necessary in cases where the visual density in maps is increasing too rapidly, symbols overlap or topological conflicts become evident due to graphical scaling.		As used in Burkhard and maes (2017)
Geographic Information System (GIS)	A computer-based system for the Input, Management, Analysis and Presentation (IMAP) of spatially referenced data.		As used in Burkhard and maes (2017)
Geo-tagged photo-series analysis	The analysis of geo-tagged photographs from social networks can be used to assess the actual provision of different cultural ecosystem service (CES) categories, including recreation, aesthetic, intellectual and existence. This method revealed preference for CES and spatially-explicit data on location for nearby CES provision can be obtained from popular social networks.		As of ESERALDA compendium (also ESERALDA Deliverable 3.1)
Goods	The objects from ecosystems that people value through experience, use or consumption, whether that value is expressed in economic, social or personal terms. Note that the use of this term here goes well beyond a narrow definition of goods simply as physical items bought and sold in markets, and includes objects that have no market price (e.g. outdoor recreation).	UK NEA (2011)	The term is synonymous with benefit (as proposed by the UK NEA), & not with service (as proposed by MA).
Governance	The process of formulating decisions and guiding the behaviour of humans, groups and organisations in formally, often hierarchically organised decision-making systems or in networks that cross decision-making levels & sector boundaries.	Adapted from Rhodes (1991) and Saarikoski et al. (2013)	
Green Infrastructure (GI)	A strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services (ES). It incorporates green spaces (or blue if aquatic ecosystems are concerned) and other physical features in terrestrial (including coastal) and marine areas. On land, GI is present in rural and urban settings.	EC (2013: 3)	

Term	Definition	Source	Comment
Group / Participatory Valuation	A stated preference method that asks groups of stakeholders to state their willingness to pay for specified changes in the provision of ES through group discussion.		As of ESMERALDA compendium (also ESMERALDA Deliverable 3.2)
Habitat	<p>1. [in a general context]: The physical location or type of environment in which an organism or biological population lives or occurs, defined by the sum of the abiotic and biotic factors of the environment, whether natural or modified, which are essential to the life and reproduction of the species.</p> <p>2. [in a MAES context]: A synonym for ‘ecosystem type’</p> <p>[Note the Council of Europe definition is more specific: the habitat of a species, or population of a species, is the sum of the abiotic and biotic factors of the environment, whether natural or modified, which are essential to the life and reproduction of the species within its natural geographic range.]</p>	based on EEC, (1992).	As used in Maes et al. (2018)
Health (Human)	A state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity. The health of a whole community or population is reflected in measurements of disease incidence and prevalence, age-specific death rates, and life expectancy.	UK NEA (2011)	
Hedonic pricing	A revealed preference method that estimates the influence of environmental characteristics on the price of marketed goods to identify the marginal willingness to pay for changes in those environmental characteristics.		As of ESMERALDA compendium (also ESMERALDA Deliverable 3.2)
Hemeroby	The degree of the anthropogenic influence on a land use (LU) or land cover (LC) type.		As used in Burkhard and Maes (2017)

Term	Definition	Source	Comment
Heritage [Cultural and Natural]	Our legacy from the past, what we live with today, and what we pass on to future generations. Physical objects produced and used by past generations, ranging from small-scale domestic utensils to large-scale buildings, monuments, places and landscapes, may become valued as cultural heritage by their descendants. Equally, symbolic products of human creativity and imagination such as music, visual arts, poetry and prose, knowledge and know-how contribute to a society or group's understanding of its cultural heritage.	UK NEA (2011)	
Hotspots	Areas that provide large components of particular services in a comparably small area/spot (opposite to ES coldspots).	García-Nieto et al. (2013); Egoh et al. (2008); Gimona & van der Horst (2007)	
Human Inputs	Encompass all anthropogenic contributions to ES generation such as land use and management (including system inputs such as energy, water, fertiliser, pesticides, labour, technology, knowledge), human pressures on the system (e.g. eutrophication, biodiversity loss) and protection measures that modify ecosystems and ES supply.		As used in Burkhard and Maes (2017)
Human Well-Being	A state that is intrinsically (and not just instrumentally) valuable or good for a person or a societal group, comprising access to basic materials for a good life, health, security, good physical and mental state, and good social relations.	Modified from MA (2005)	As used in Maes et al. (2018)
Impact	Negative or positive effect on individuals, society and/or environmental resources resulting from environmental change.	Modified after Harrington et al. (2010)	
Indicator	An indicator is a number or qualitative descriptor generated with a well-defined method which reflects a phenomenon of interest (the indicandum). Indicators are frequently used by policy-makers to set environmental goals and evaluate their fulfilment.	Modified from Heink & Kowarik (2010)	As used in Maes et al. (2018)
Indirect Use Value	The benefits derived from the goods and services provided by an ecosystem that are used indirectly by an agent. For example, an agent at some distance from an ecosystem may derive benefits from drinking water that has been purified as it passed through the ecosystem. (Compare Direct use value).	MA (2005)	

Term	Definition	Source	Comment
Input-Output Analysis	Quantifies the interdependencies between economic sectors in order to measure the impacts of changes in one sector to other sectors in the economy. Ecosystems can be incorporated into input-output models as distinct sectors.		As of ESMERALDA compendium (also ESMERALDA Deliv. 3.2)
Integrated Modelling Framework	This group includes modelling tools designed specifically for ecosystem services modelling and mapping that can assess trade-offs and scenarios for multiple services. They integrate various methods for different services which are usually organized in modules each of them designed for particular service. The integrated modelling frameworks utilize GIS software as a mean to operate with spatial data and produce maps. They can work as extensions of commercial or open-source software packages, stand-alone tools or web-based application. They are designed help researchers in ES assessment and enable decision makers to assess quantified trade-offs associated with alternative management choices and to identify areas where investment in natural capital can enhance human development and conservation.		As of ESMERALDA compendium (also ESMERALDA Deliverable 3.3)
Integration	The level of integration within existing ecosystem assessments varies; but usually falls within i) combining, ii) interpreting and iii) communicating knowledge from diverse disciplines. For example, integration may focus on biophysical elements; integrating ecosystem condition with the services that the ecosystem provides (e.g. MAES assessment framework). Others have extended integration to include socioeconomic information and links to human well-being (e.g. MA) and indigenous and local knowledge (e.g. IPBES Assessments). A number of assessment practitioner may use the word integration to refer to the inclusion of stake-holders within the assessment process and the overall governance structure that they are implementing.	ESMERALDA	As used in Integrated Ecosystem Assessment (ESMERALDA Deliverable 4.8)
Intensification	Intensification of land use aims at raising ecosystem service outputs (e.g. in agriculture raising crop yields per unit area and per unit time), in other words to increase productivity. To achieve this goal, usually the inputs (see term “additional inputs”) are increased. To raise crop yields, a broad range of methods is being applied, often in combinations, including breeding, irrigation, organic and inorganic fertilization, green manure and cover crops, pest and weed management, multi-cropping, crop rotation and the reduction of fallow periods.	Modified after Geist (2006)	

Term	Definition	Source	Comment
Intermediate Ecosystem Service	<p>An ecological function or process not used directly by a beneficiary, but which underpins those final ecosystem services which are used directly.</p> <p>Note: 'Intermediate ES' should not be considered a subtype of 'ecosystem services': in fact, these are mutually exclusive categories, and this distinction is sometimes emphasized by using the term 'final ES' as a synonym of ES. Nevertheless, the 'boundary' between intermediate and final ecosystem services (sometimes called 'production boundary') is context dependent and should be set clearly and consistently for any ecosystem assessment work. This means that there can be contexts in which an 'intermediate ES' would actually be a (final) service through a direct use by a certain beneficiary or through the avoidance of societal costs if the service is degraded.</p>	<p>OpenNESS</p> <p>Note from Czúcz and Condé (2017)</p>	Potschin-Young et al. (2017) suggest not to use this term
Interdisciplinarity	The act of combining of two or more academic disciplines into one integrated activity to create new insights by crossing knowledge boundaries and linking ideas.	OpenNESS	
Institution (Informal)	The conventions, norms and rules that formally or informally regulate the interactions between people and between people and their environment.	Vatn (2005)	
Institutional Analysis	An analysis of the rules regulating the behaviour of people, groups or organizations, paying attention to formal regulations and laws and/or informal rules about customs and practices. The interest lies in what rules have produced current behaviour, or what rules might produce targeted behaviour. Institutional analysis merges approaches from law, economics and organizational studies.	OpenNESS	draws on Ostrom, (1990), Scott, (2001); Vatn, (2005); Paavola, (2007); Primmer, (2011).
Instrumental Value	Value that something has as a means to an end (e.g. game animals used for food).	Harrington et al. (2010) modified	
Integrated Coastal Zone Management (ICZM)	Approaches that integrate economic, social, and ecological perspectives for the management of coastal resources and areas.	UK NEA (2011)	
Integrated Responses	Responses that address degradation of ecosystem services across a number of systems simultaneously or that also explicitly include objectives to enhance human well-being.	UK NEA (2011)	

Term	Definition	Source	Comment
Interventions	See 'Response'.		
Intrinsic Value	Intrinsic value is the value something has independent of any interests attached to it by an observer or potential user. This does not necessarily mean that such values are independent of a valuer (i.e. values which exist 'as such'), they may also require a (human) valuer (but this is a matter of disagreement among philosophers).	OpenNESS, adapted from various sources.	
Land Cover (LC)	The physical coverage of land, usually expressed in terms of vegetation cover or lack of it. Related to, but not synonymous with, land use.	UK NEA (2011)	
Landscape	An area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors. The term “landscape” is thus defined as a zone or area as perceived by local people or visitors, whose visual features and character are the result of the action of natural and/or cultural factors. Recognition is given to the fact that landscapes evolve through time and are the result of natural and human activities. Landscape should be considered as a whole – natural and cultural components are taken together, not separately.	[European Landscape Convention Article 1]	As used in Burkhard and Maes (2017)
Landscape Metrics	Landscape metrics capture composition and configuration of landscape structure in mathematical terms. Not only spatial but also temporal properties of processes can be characterised by a quantifying landscape pattern.		As used in Burkhard and Maes (2017)
Land Use (LU)	The human use of a piece of land for a certain purpose such as irrigated agriculture or recreation. Influenced by, but not synonymous with, land cover.	UK NEA (2011)	
Limit (regulatory)	<i>Regulatory limits</i> refer to points in some variable or state which should not be exceeded or underrun (like in regulations of nitrate or pesticides levels in drinking water). While ecological thresholds (see threshold, ecological) are largely descriptive, regulatory limits involve societal choices and negotiation of values and aims.	New, following Johnson (2013)	

Term	Definition	Source	Comment
Macro-ecological Models (includes habitat models)	Models that assess ES supply based on the presence (or abundance) of specific components of biodiversity, referred to as Ecosystem Service Providers (ESP) or Service Providing Units (SPU), depending on their geographic distribution. The contribution of e.g. different species or functional groups to the ES of interest is assessed based on specific traits (e.g. trophic guilds) or expert knowledge.		As of ESMERALDA compendium (also ESMERALDA Deliverable 3.3)
Map	The main product of cartographic work and is the graphic representation of features of an area of the Earth or of any other celestial body drawn to scale.		As used in Burkhard and Maes (2017)
Mapping	Graphical representation of a procedure, process, structure, or system that depicts arrangement of and relationships among its different components, and traces flows of energy, goods, information, materials, money, personnel, etc.		
Marginal Abatement Costs	The cost of reducing an incremental unit of an undesirable substance, such as a pollutant or carbon.	Modified UK NEA (2011)	
Market-Based Instruments	Mechanisms that create a market for ecosystem services in order to improve the efficiency in the way the service is used. The term is used for mechanisms that create new markets, but also for instruments such as taxes, subsidies, or regulations that affect existing markets.	Adapted from MA (2005) and UK NEA (2011)	
Market Failure	The inability of a market to capture the full value of ecosystem services and/or the costs of their loss/degradation.	New	
Market Price	Prices for ES that are directly observed in markets. Very often such prices need to be adjusted for market distortions.		As of ESMERALDA compendium (also ESMERALDA Deliv.3.2)
Method	A reproducible process relying on specific types of inputs for achieving a specific goal.	Based on Hinkel (2008)	As used in Czúcz and Condé (2017)
Methodology	The particular chain of methods, data and other relevant resources (e.g. stakeholders) that are involved in solving a specific problem.	Based on Hinkel (2008)	As used in Czúcz and Condé (2017)
Mitigation	The action of making the consequence of an impact less severe.	OpenNESS	
Model (scientific)	A simplified representation of a complex system or process including elements that are considered to be essential parts of what is represented. Models aim to make it easier to understand and/or quantify by referring to existing and usually commonly accepted knowledge.	[OpenNESS, based partly on Wikipedia].	As used in Burkhard and Maes (2017)

Term	Definition	Source	Comment
Modifiable Areal Unit Problem (MAUP)	A cartographic phenomenon associated with the use of data (i.e. statistical data or observed data) and their aggregation to geographical areas. The assignment of data to geographical areas and their boundaries do not always make sense, in the context of both scale and aggregation.		As used in Burkhard and Maes (2017)
Monetary Valuation	The process whereby people express the importance or preference they have for the service or benefits that ecosystems provides in monetary terms. See 'Economic valuation'.	Defined for OpenNESS from TEEB	
Multi-Criteria Decision Analysis (MCDA)	Multi-criteria decision analysis (MCDA) is a decision-support method that help to systematically explore the pros and cons of different alternatives, by comparing them against a set of explicitly defined criteria. These criteria account for the most relevant aspects in a given decision-making process. Operationally, MCDA supports structuring decision problems, assessing the performance of alternatives across criteria, exploring trade-offs, formulating a decision and testing its robustness.	Adem Esmail and Geneletti (2018)	
Multi-Disciplinarity	Linking several academic disciplines or professional specializations in an approach to a topic or problem; however, the disciplines retain their identity and perspective, unlike the situation with interdisciplinary approaches.	OpenNESS	
Multifunctionality	The characteristic of ecosystems to simultaneously perform multiple functions which may be able to provide a particular ES bundle or bundles.	OpenNESS	
Multiple-use Management	Management of land resources for more than one purpose.		As used in Burkhard and Maes (2017)
Narrative assessment	Narrative methods aim to understand and describe the importance of nature and its benefits to people with their own words. By using narrative methods, we allow the research participants (residents of a certain place, users of a certain resource, or stakeholders of an issue) to articulate the plural and heterogeneous values of ecosystem services through their own stories and direct actions (both verbally and visually).		As of ESMERALDA compendium (also ESMERALDA Deliverable 3.1)
Natural Asset	A component of Natural Capital.	OpenNESS	

Term	Definition	Source	Comment
Natural Capital	The elements of nature that directly or indirectly produce value for people, including ecosystems, species, freshwater, land, minerals, air and oceans, as well as natural processes and functions. The term is often used synonymously with natural asset, but in general implies a specific component. Note: ecosystem capital and ecosystem assets are sometimes used to refer to the parts of nature that produce benefits for people.	Modified after MA (2005)	
Natural Capital Accounting	A way of organising information about natural capital so that the state and trends in natural assets can be documented and assessed in a systematic way by decision makers.	OpenNESS	
Natural Capital Stock	The tangible biotic and abiotic structures that make up the natural world and which support processes and functions that can contribute to human well-being. Stocks can be represented in various ways, but are more often measured in terms of the areas, volumes or numbers.	Modified after MA (2005)	
Nature-based Solutions	Living solutions inspired by, continuously supported by and using nature, which are designed to address various societal challenges in a resource-efficient and adaptable manner and to provide simultaneously economic, social, and environmental benefits.	EU 2015	
Nature's Benefits to People	See 'ecosystem services'		Terminology used in IPBES
Nature's Contribution to People	See 'ecosystem services'		Terminology used in IPBES
Net Factor Income (residual value method)	Revenue from sales of a marketed good to which the ES is an input, minus cost of other inputs.		As of ESMERALDA compendium (also ESMERALDA Deliverable 3.2)
Net Primary Production	See 'production, biological'		

Term	Definition	Source	Comment
Non-Monetary Valuation	The process whereby people express the importance or preference they have for the service or benefits that ecosystems provide in terms other than money. See monetary or economic valuation.	OpenNESS	
Normative	Relating to values or prescriptions.	OpenNESS	
Operationalization	The process by which concepts are made usable by decision makers.	OpenNESS	
Opportunity Costs	The next highest valued use of the resources used to produce an ecosystem service. As an economic method for quantifying value, the opportunity cost is the monetary value of the foregone alternative use of resources. For example, the opportunity cost of ecosystem services from a natural ecosystem might be the value of agricultural output if the land is converted to agricultural instead of conserved in a natural state.		As of ESERALDA compendium (also ESERALDA Deliverable 3.2)
Participatory Approach	Family of approaches and methods to enable (rural) people to share, enhance, and analyse their knowledge of life and conditions, to plan and to act, to monitor and evaluate.	Chambers (1997)	
Participatory GIS	Evaluates the spatial distribution of ecosystem services according to the perceptions and knowledge of stakeholders via workshops and/or surveys. PGIS allows for the participation of various stakeholders in the creation of an ES map in the identification of ES 'hotspots' on a map, and integrates their perceptions, knowledge and values in the final maps of ecosystem services.		As of ESERALDA compendium (also ESERALDA Deliverable 3.1)
Participatory Scenario Planning	Participatory scenario planning applies various tools and techniques (e.g. brainstorming or visioning exercises in workshops, often complemented with modelling) to develop plausible and internally consistent descriptions of alternative future options.		As of ESERALDA compendium (also ESERALDA Deliverable 3.1)
Payments for Ecosystem Services (PES)	Conditional payments offered to providers (e.g., farmers or landowners) in exchange for employing management practices that enhance ES provision	Modified from Tacconi (2012)	
Phenomenological Models	The phenomenological models describe empirical relationships between biodiversity or ecosystem components and ecosystem services. They are based on the understanding that biological mechanisms underpinning ES supply.		As of ESERALDA compendium (also ESERALDA Deliv. 3.3)

Term	Definition	Source	Comment
Photo-elicitation Surveys	It is a quantitative method, based on the simple idea of inserting a photograph into a research interview. It can be used to assess a range of landscape views at the same time. Respondents specify the principal ecosystem services provided by each landscape from a list of potential services provided by the area.		As of ESMERALDA compendium (also ESMERALDA Deliverable 3.1)
Policy Coherence	An attribute of policy that systematically reduces conflicts and promotes synergies between and within different policy areas to achieve the outcomes associated with jointly agreed policy objectives.	Nilsson et al. 2012: 396	
Policy Consensus	Agreement on an overall plan that embraces goals and procedures.	New	
Policy Maker	A person with the authority to influence or determine policies and practices at an international, national, regional or local level.	Modified UK NEA (2011)	
Population (Biological)	A group of organisms, all of the same species, which occupies a particular area (geographic population), is genetically distinct (genetic population) or fluctuates synchronously (demographic population).	Harrington et al. (2010)	
Potential	See term “ecosystem service potential”		
Precautionary Principle	The management concept stating that in cases 'where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation'.	Modified from UK NEA (2011)	
Prediction [in the context of scenarios]	A description or estimate of the state of a variable or system in the future with a high degree of certainty (in contrast to ->projection).	OpenNESS	See terms Projection, Forecast, Scenario
Preference Assessment	Preference assessment is a direct and quantitative method to demonstrate the social importance of ecosystem services by analysing social motivations, perceptions, knowledge and associated values of ecosystem services demand or use		As of ESMERALDA compendium (also ESMERALDA Deliverable 3.1)
Pressure	Human induced process that alters the condition of ecosystems.		As used in Maes et al. (2018)

Term	Definition	Source	Comment
Process-based Models (includes: landscape function models)	Process-based models rely on the explicit representation of ecological and physical processes that determine the functioning of ecosystems. They provide functional means of plant and ecosystem processes that are universal rather than specific to one biome or region. One purpose of such models is to explore the impact of perturbations caused by climatic changes and anthropogenic activity on ecosystems and their biogeochemical feedbacks. Many process-based models allow the net effects of these processes to be estimated for the recent past and for future scenarios. In terms of ecosystem services, these types of models are most widely applied to quantify climate regulation, water supply from catchments, food provision but also in the wider frame of habitat characterisation.		As of ESMERALDA compendium (also ESMERALDA Deliverable 3.3)
Production (biological)	Rate of biomass produced by an ecosystem, generally expressed as biomass produced per unit of time per unit of surface or volume. Net primary productivity is defined as the energy fixed by plants minus their respiration.	UK NEA (2011)	
Production (economic)	Output of a system	OpenNESS	
Production Boundary	The imaginary 'boundary' between ecological and social system which should be specified in an ecosystem accounting context. Ecosystem processes that cross this boundary and contribute to social benefits should be considered as (final) ecosystem services, whereas processes, that do not cross this boundary are to be considered internal processes of ecosystems (intermediate ES).	based on OECD Glossary Statistical Terms, modified [UNSD SNA]	As used in Czúcz and Condé (2017)
Production Function	Statistical estimation of a production function to quantify the contribution of an ecosystem input in the production of a marketed good. Cost function and profit function methods follow a similar approach and form of analysis.		As of ESMERALDA compendium (also ESMERALDA Deliv. 3.2)
Program Theory	Program theory is a systematic configuration of stakeholders' prescriptive assumptions (what actions are required to solve a problem) and descriptive assumptions (why the problem will respond to the action) underlying a program – whether explicit or implicit assumptions are made by stakeholders. As the success of a program in reaching its goals depends on the validity of its program theory, an evaluation based on the conceptual framework of program theory provides information not only on whether a program is effective or ineffective but the reasons for either.	Chen (2005: 340)	

Term	Definition	Source	Comment
Projection [in the context of future developments]	A potential future evolution of a quantity or set of quantities, often computed with the aid of a model. Projections are distinguished from 'predictions' in order to emphasise that projections involve assumptions concerning, for example, future socioeconomic and technological developments that may or may not be realised; they are therefore subject to substantial uncertainty.	UK NEA (2011)	
Provisioning Ecosystem Services	Those material and energetic outputs from ecosystems that contribute to human well-being.	Shortened from CICES	
Pragmatics (graphics)	Analysis the relationship between signs and their use.		As used in Burkhard and Maes (2017)
Public Good	A good where access to the good cannot be restricted.	Modified from UK NEA (2011)	
Public Pricing	Public expenditure or monetary incentives (taxes/subsidies) for an ES is used as a proxy of the value of the ES.		As of ESERALDA compendium (also ESERALDA Deliv. 3.2)
Q-methodology	Q-methodology has been used as a research tool in a wide variety of disciplines. The methodology is particularly useful when researchers wish to understand and describe the variety of subjective viewpoints on an issue.		As of ESERALDA compendium (also ESERALDA Deliv. 3.1)
Reforestation	Action to restocking the forest cover, either through artificial planting, natural seeds or agamic propagation, in an area that previously had a natural forest cover.	OpenNESS	
Regime Shift	A large, persistent change in the structure and function of (social-) ecological systems, with substantive impacts on the suite of ecosystem services provided by these systems. The transition is characterised by a lack of re-tractability or hysteresis.		
Regulating Ecosystem Services	All the ways in which ecosystems and living organisms can mediate or moderate the ambient environment so that human well-being is enhanced. It therefore covers the degradation of wastes and toxic substances by exploiting living processes.	Modified after CICES	

Term	Definition	Source	Comment
Replacement Cost (Alternative cost method)	The cost of replacing an ES with a man-made service is used as a proxy of the value of the replaced ES.		As of ESMERALDA compendium (also ESMERALDA Deliv. 3.1)
Resilience	A measure of an (eco)system's ability to recover and retain its structure and processes following an exogenous change or disturbance event. If a stress or disturbance does alter the ecosystem, then it should be able to bounce back quickly to resume its former ability to yield a service or utility rather than transform into a qualitatively different state that is controlled by a different set of processes. In order for ecosystem resilience to be defined, the ecosystem must have a degree of stability prior to the perturbation. Resilience relates to return to stability following a specified perturbation.	Modified from Holling (1973); Dawson et al. (2010) and Harrington et al. (2010)	See Brand & Jax (2007) for the variety of definitions of this concept.
Resistance	The capacity of an ecosystem to with-stand the impacts of drivers without displacement from its present state.	UK NEA (2011)	
Responses (in the context of scenarios)	Human actions, including policies, strategies, and interventions, to address specific issues, needs, opportunities, or problems. In the context of ecosystem management, responses may be of legal, technical, institutional, economic, and behavioural nature and may operate at various spatial and time scales. Such responses aim to minimise negative impacts or maximise positive impacts by acting on some pressure or driver of change.	New, based on UK NEA (2011) and Harrington et al. (2010)	
Restoration	The process of actively managing an ecosystem unit in order to improve ecosystem condition.	based on MAES, modified [CBD, 2012]	As used in Czúcz and Condé (2017)
Restoration Cost	Estimates the cost of restoring degraded ecosystems to ensure provision of ES as a proxy of the value of the ES.		As of ESMERALDA compendium (also ESMERALDA Deliv. 3.1)
Rich Picture Modelling	A qualitative method designed to explore, acknowledge and define a situation and express it through diagrams to create a preliminary mental model. A rich picture helps to open discussion and come to a broad, shared understanding of a situation.	Following Checkland (2000)	

Term	Definition	Source	Comment
Risk	The product of the probability of an occurrence and the magnitude of the damage.	Klöpffer (1994: 49)	
Rivalry	The degree to which the use of one ecosystem service prevents other beneficiaries from using it. Non-rival ecosystem services in return provide benefits to one person that do not reduce the amount of benefits available for others.	Schröter et al. (2014); Kemkes et al. (2010); Costanza (2008);	
Robustness	An ecosystem's ability to adapt to or maintain its function under chronic exogenous drivers and pressures. An ecosystem is robust when it is capable of resisting changes caused by long-term drivers or pressures that are external to the ecosystem, such as global warming, nutrient loading or hunting pressure. Robust ecosystems demonstrate adaptability to external forces, for example if a keystone species goes extinct, surviving species can compensate for the loss of function over physiological, demographic, or evolutionary time scales.	Harrington et al. (2010), after Lenski et al. (2006); Dawson et al. (2010)	
Scale (spatial and temporal)	The physical dimensions, in either space or time, of phenomena or observations. Regarding temporal aspects of ES supply and demand, hot moments are equally as important as spatially relevant hotspots.	After Burkhard et al. (2013, Reid et al. (2006)	As used in Burkhard and Maes (2017)
Scale (on a map)	Represents the ratio of the distance between two points on the map to the corresponding distance on the ground.		As used in Burkhard and Maes (2017)
Scenario	Plausible, but simplified descriptions of how the future may develop based on a coherent and internally consistent set of assumptions about key driving forces and relationships. Scenarios are no predictions of what will happen, but ore projections on what might happen or could happen given certain assumptions about which there might be great uncertainty.	OpenNESS, modified from UK NEA (2011)	
Security	Access to resources, safety, and the ability to live in a predictable and controllable environment.	UK NEA (2011)	
Semantics (graphics)	The study of the relationship between signs and symbols and what they are representing.		As used in Burkhard and Maes (2017)
Service-Benefitting Area (SBA)	Spatial unit to which an ecosystem service flow is delivered to beneficiaries. SBAs spatially delineate groups of people who knowingly or unknowingly benefit from the ecosystem service of interest		As used in Burkhard and Maes (2017)

Term	Definition	Source	Comment
Service-Connecting Area (SCA)	Connecting space between non-adjacent ecosystem service-providing and service-benefiting areas. The properties of the connecting space influence the transfer of the benefit.		As used in Burkhard and Maes (2017)
Service Providing Area (SPA)	Spatial unit within which an ecosystem service is provided. This area can include animal and plant populations, abiotic components as well as human actors.		As used in Burkhard and Maes (2017)
Service-Providing Unit	see 'Service Providing Area'		
Shared Social Value	The fulfilment, meaning or significance of the collective needs of society in relation to social, health and cultural services.	UK NEA (2011)	
Social Cost of Carbon	The monetary value of damages caused by emitting one tonne of CO ₂ in a given year. The social cost of carbon (SCC) therefore also represents the value of damages avoided for a one tonne reduction in emissions, in other words, the benefit of a CO ₂ reduction. SCC is a specific application of the "damage cost avoided" method.		As of ESMERALDA compendium (also ESMERALDA Deliverable 3.2)
Socio-cultural Valuation	The process whereby the perceived importance or preference people have for a specific element of the MAES framework is estimated in terms other than money.	based on OpenNESS, simplified	Preferred over term 'non-monetary valuation'. As used in Czúcz & Condé (2017)
Societal Choice	Collective decisions based on a decision-making process that identifies preferences or processes arguments.	OpenNESS	
Socio-Economic System	Our society (which includes institutions that manage ecosystems, users that use their services and stake-holders that influence ecosystems).		As used in Maes et al. (2014, 2018)
Social–Ecological System	Interwoven and interdependent ecological and social structures and their associated relationships.	OpenNESS	Sometimes referred to as 'Socio-Ecological System'
Soil Erodibility (K-factor)	Expresses the susceptibility of a soil to erode.		As used in Maes et al. (2018)

Term	Definition	Source	Comment
Spatial Proxy Methods	Spatial proxy methods are derived from indirect measurements which deliver a biophysical value in physical units but this value needs further interpretation, certain assumptions or data processing, or it needs to be combined in a model with other sources of environmental information before it can be used to measure an ecosystem service. In many cases, variables that are collected through remote sensing qualify as indirect measurement. Examples for terrestrial ecosystems are land surface temperature, NDVI, land cover, water layers, leaf area index and primary production.		As of ESMERALDA compendium (also ESMERALDA Deliverable 3.3)
Species [taxonomic rank only]	A taxon of the rank of species; in the hierarchy of biological classification the category below genus; the basic unit of biological classification.	Lincoln et al. (1998: 280)	
Species Diversity	Biodiversity at the species level, often combining aspects of species richness, their relative abundance, and their dissimilarity.	UK NEA (2011)	
Species Richness	The number of species within a given sample, community, or area.	MA (2005), UK NEA (2011)	
Stability	"[A] kind of overarching meta-concept, comprising very different and more specific concepts such as persistence, resilience, constancy, elasticity [also robustness], etc., each of which also has several different meanings." (Jax 2010: 168). Precise meaning should be specified for each use.	Jax (2010: 168) and Grimm and Wissel (1997)	
Stakeholder	Any group, organisation or individual who can affect or is affected by the ecosystem's services".	OpenNESS	
Stakeholder Analysis	Stakeholder analysis can be defined as a process that: i) defines aspects of a social and natural phenomenon affected by a decision or action; ii) identifies individuals, groups and organisations who are affected by or can affect those parts of the phenomenon (this may include nonhuman and non-living entities and future generations); and iii) prioritises these individuals and groups for involvement in the decision-making process.	Reed at al. (2009)	
Stakeholder Typology	Classification of stakeholders according to the attributes: power, legitimacy, and urgency.	Mitchell et al. (1997).	
State [of a social-ecological system]	Collection of variables that describe the overall physical condition of a social ecological system, including attributes of both ecosystem service providers and ecosystem service beneficiaries.	Modified from Harrington et al. (2010)	
State and Transition Model	Biophysical model that assume there are a number of states in which a system can exist, but there are specific conditions that can drive the system between states. The main focus of these models is the threshold point that separates one state from another and marks the transition between them.		As of ESMERALDA compendium (also ESMERALDA Deliv. 3.3)

Term	Definition	Source	Comment
Statistical Models	Statistical models are mathematical models that measures the attributes of certain population using a representative sample as measuring the whole population is usually not possible. In statistical models ecosystem services are estimated based on explanatory variables such as soils, climate, etc., using a statistical relation.		As of ESMERALDA compendium (also ESMERALDA Deliverable 3.3)
Story Boarding	A verbal description of a problem or situation or system usually developed though qualitative, deliberative methods.	OpenNESS	See also term 'Rich Picture Modelling'.
Storyline	A narrative description of a scenario, which highlights its main features and the relationships between the scenario's driving forces and its main features.	UK NEA (2011)	
Structure [of an Ecosystem, Habitat, Community]	The aggregate of elements of an entity in their relationships to each other. The component parts of an ecosystem; see 'natural capital asset' or 'natural capital stock'.	Common usage, adapted.	
Supporting Services	Ecological processes and functions that are necessary for the production of final ecosystem services. See also 'intermediate services' and 'ecosystem functions'.		In ESMERALDA we suggest not to use the term
Sustainable Use of ES	Human use of an ecosystem so that it may yield a continuous benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations.	UK NEA (2011)	
Sustainability	A characteristic or state whereby the needs of the present and local population can be met without compromising the ability of future generations or populations in other locations to meet their needs. Weak sustainability assumes that needs can be met by the substitution of different forms of capital (i.e. through trade-offs); strong sustainability posits that substitution of different forms of capital is seriously limited.	UK NEA (2011)	
Synergies	Ecosystem service synergies arise when multiple services are enhanced simultaneously.	Raudsepp-Harne et al. (2010)	
Syntactic (graphics)	Deals with the formal properties of language and systems of symbols.		As used in Burkhard and Maes (2017)

Term	Definition	Source	Comment
System	A construct for a reporting unit at a level of aggregation generally above that which is applied to an ecosystem. Systems may include many ecosystems with varying degrees of inter-action and spatial connectivity, in addition to their associated social and economic components. Systems are not mutually exclusive and can overlap both spatially and conceptually.	Modified from MA (2005)	
Taxon (Pl. Taxa)	The named classification unit to which individuals or sets of species are assigned. Higher taxa are those above the species level. For example, the common mouse, <i>Mus musculus</i> , belongs to the Genus <i>Mus</i> , the Family <i>Muridae</i> , and the Class <i>Mammalia</i> .	UK NEA (2011)	
Threatened Species	Species that face a high (vulnerable species), very high (endangered species), or extremely high (critically endangered species) risk of extinction in the wild.	UK NEA (2011)	
Threshold, ecological	A point at which an ecological system experiences a qualitative change, mostly in an abrupt and discontinuous way. In the context of OpenNESS ecological threshold and tipping points were used as synonyms. See also 'regime shift' and the distinction with 'limit'.	OpenNESS	
Tiered Approach	A classification of available methods according to level of detail and complexity with the aim of providing advice on method choice. The provision and integration of different tiers enables ES assessments to use methods consistent with their needs and resources.	Glossary in Burkhard and Maes (2018)	Added for ESERALDA (see also ESERALDA Deliverables. 3.1-3.3)
Time-use Assessment	This method estimates the value of ecosystem services by directly asking people how much time they are willing to invest (WTT) for a change in the quantity or quality of a given ecosystem service or conservation plan.		As of ESERALDA compendium (see also ESERALDA Deliv. 3.3)
Tipping Point	Used here as being synonymous with 'ecological threshold'.	OpenNESS	
Total Economic Value (TEV)	A widely used framework to disaggregate the components of utilitarian value in monetary terms, including direct use value, indirect use value, option value, quasi-option value, and existence value.	OpenNESS	
Trade-off	ES trade-offs arise from management choices made by humans. Such choices can change the type, magnitude, and relative mix of ES provided by an ecosystem. Trade-offs occur when the provision of one ES is reduced as a consequence of increased use of another ES.	Rodriguez et al. (2006)	Note: In some cases, a trade-off may be an explicit choice, in others, trade-offs arise without awareness that they are taking place.

Term	Definition	Source	Comment
Trait-based Models	There is increasing evidence for relationships between traits of organisms and ES supply. Trait-based models quantify ES supply based on (statistical) relationships between functional traits of Ecosystem Service Providers (ESP) and ecosystem properties considered either by experts or by stakeholders to support a given ecosystem service.		As of ESMERALDA compendium (also ESMERALDA Deliverable 3.3)
Transdisciplinarity	A reflexive, integrative, method-driven scientific principle aiming at the solution or transition of societal problems and concurrently of related scientific problems by differentiating and integrating knowledge from various scientific and societal bodies of knowledge.	Lang et al. (2012)	
Travel Cost	A revealed preference method that estimates a demand function for recreational use of a natural area using data on the observed costs and frequency of travel to that destination.		As of ESMERALDA compendium (also ESMERALDA Deliverable 3.2)
Uncertainty	An expression of the degree to which a condition or trend (e.g. of an ecosystem) is unknown. Uncertainty can result from lack of information or from disagreement about what is known or even knowable. It may have many types of sources, from quantifiable errors in the data to ambiguously defined terminology or uncertain projections of human behaviour. Uncertainty can therefore be represented by quantitative measures (e.g. a range of values calculated by various models) or by qualitative statements (e.g. reflecting the judgment of a team of experts).	Modified from UK NEA (2011)	
Urban	Environmental condition linked to high population density, extent of land transformation, or a large energy flow from surrounding area.	OpenNESS, (after McIntyre 2000)	
Urbanisation	An increase in the proportion of the population living in urban areas or systems. See 'Urban systems'.	UK NEA (2011)	
Urban Systems	The total of functional interlinkages within an area designated as “urban” (see definition of “urban”).	OpenNESS	

Term	Definition	Source	Comment
Valuation	The process whereby people express the importance or preference they have for the service or benefits that ecosystems provide. Importance Value can be expressed in monetary or non-monetary terms. See 'monetary valuation' and 'non-monetary valuation'.		
Value	<p>The contribution of an action or object to user-specified goals, objectives, or conditions.</p> <p>The worth, usefulness, importance of something. Thus, value can be measured by the size of the well-being improvement delivered to humans through the provision of good(s). In economics, value is always associated with trade-offs, i.e. something only has (economic) value if we are willing to give up something to get or enjoy it.</p>	<p>MA (2005)</p> <p>After UK NEA (2011), Mace et al. (2012) and De Groot, (2010)</p>	As used in Maes et al. (2014, 2018)
Value Transfer (Benefit Transfer)	The use of research results from existing primary studies at one or more sites or policy contexts ("study sites") to predict welfare estimates or related information for other sites or policy contexts ("policy sites").		As of ESMERALDA compendium (also ESMERALDA Deliverable 3.2)
Value System	Norms and precepts that guide human judgments about value and action.	Shortens from Farber et al. (2002)	
Well-Being (Human)	See 'Human well-being'		

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