Adoption of the ecosystem services concept in EU policies

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ABSTRACT

The concept of ecosystem services has gained a strong political profile during the last 15 years. However, there is no specific EU policy devoted to governing ecosystem services. This article shows that the ecosystem services concept is already embedded in recent EU (environmentally-related) policies, such as the Biodiversity Strategy 2020 and the Invasive Alien Species Regulation. Our review of 12 policies shows that, overall, the coherence between existing policies and the ecosystem services concept is moderate. Policies showing very high coherence are confined to the policy arenas that address natural ecosystems, forestry, or agriculture. Given the sectoral nature of most EU policies and the limited options for revision in the near future, opportunities for improving coherence are most apparent in furthering the integration of the ecosystem services concept in the implementation of existing EU policies at national and regional levels.

1. Introduction

Concepts – encompassing a set of ideas – develop and change over time and often become embedded in policies and legislation. Even individual ideas have been recognised as an important factor instigating policy change (Hall, 1993). Why some ideas become policy relevant, and others not, and what triggers their adoption into policies, programs, and philosophies, has been a subject of study in political science (Schmidt, 2008). At a time when streamlining regulation and deregulation have been called for, it is important to understand how new concepts fit in with existing policies (Taylor et al., 2012). The way new concepts are operationalized to become a target and a means of steering, and the ways in which they fit the existing policies, is a matter of policy coherence. Policy coherence usually refers to the extent to which policies complement or are in line with one another or form a meaningful ensemble (Nilsson et al., 2012). Ensuring policy coherence is particularly important in cases where the policies feature a mode of steering that is detailed or complex.

A rapidly institutionalizing concept dealing with the relationship between humans and nature is the 'ecosystem services' (ES) concept, which highlights the interdependence of ecosystems and humans. The first ideas on the importance of nature as a resource for humans were coined in the 1940s. The term 'ecosystem services' was first introduced in 1970 (SCEP, 1970; cf. Mooney et al., 1997). At the beginning of the 21st century, the ES concept entered the policy agenda, following several important science-policy projects, such as the Millennium Ecosystem Assessment in 2005 (MEA), The Economics of Ecosystems and Biodiversity in 2010 (TEEB), and the establishment of the Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES) in 2012 (Chaudhary et al., 2015; Mace, 2014).

Since 2009, a uniform definition and a standardised typology for ecosystem services has been developed in the European Union (EU), namely – the Common International Classification of Ecosystem Services (CICES) (Haines-Young and Potschin, 2011). The EU has mandated a Mapping and Assessment of Ecosystem Services (MAES)

(Maes et al., 2012), and several European countries have conducted systematic national ecosystem assessments; the UK and Spain being the forerunners (NEA UK, 2011; Spanish National Ecosystem Assesment, 2013). These assessments categorise ecosystem services into provisioning, regulating, cultural, and supporting ecosystem services,[1] paying varying degrees of attention to the overlaps of and interdependencies between these categories. In these ecosystem assessments, attention is also given to the role of biodiversity in securing the provision of ecosystem services as well as in defining the limits of this provision.

The EU has subscribed to the '2030 Agenda for Sustainable Development', which aims to eradicate poverty and achieve sustainable development by 2030. The ambition might be met through an explicit consideration of the effects of different policies on the three dimensions of sustainable development: economic, environmental, and social. The ES concept might provide an overarching framework that supports this consideration in a structured fashion and that is sensitive to the interactions within and across different ecosystems and socio-economic systems. The first EU policies addressing environmental problems in the early 1970s have gradually developed into the current elaborate field of environmental policy, with a number of instruments (Jordan and Adelle, 2012). Among these, two major categories of instruments at the EU level can be identified: 1) binding legislative instruments, such as directives, regulations, and decisions, and 2) non-binding programme instruments, such as strategies, recommendations, and communications. In this article, 'policies' refers to both binding legislation and non-binding programs.

Although some specific environmental policy areas derived from particular ideas or concepts can be distinguished, such as pollution prevention or biodiversity conservation, concepts are not always framed as distinct policy areas. Indeed, there is no specific EU policy framework addressing ecosystem services, despite the fast increasing use of the concept. Instead, the ES concept might – and in fact is already to some extent implicitly – embedded in existing policies on nature and natural resources (Maes et al., 2013). This fragmented inclusion of the ES concept in EU policies is the motivation for our analysis.

The aim of this article is to evaluate the adoption of the ES concept in EU policies by analysing the use of the concept in twelve policies that deal with or are directly related to the use of natural resources or land: Green Infrastructure Strategy (2013); Habitats Directive (1992); Biodiversity Strategy to 2020 (2012); Invasive Alien Species Regulation (2014); Water Framework Directive (2000); Marine Strategy Framework Directive (2008); Forest Strategy (2013); Common Agricultural Policy (2013); Thematic Strategy on the Urban Environment (2006); Renewable Energy Directive (2009); Climate Change Adaptation Strategy (2013), and Trans-European Network – Transport (2014) (Table 1). We review coherence at the level of definitions, objectives, and implementation. On the basis of this analysis, we discuss what factors might advance or hinder the operationalisation of the ES concept in practice. Finally, we provide some ideas for increasing the explicit uptake of the ES concept in EU policies.

2. Empirical methods and analytical framework

To get an overview of the EU policies in which the ES concept is already addressed – either explicitly, i.e. actually using ecosystem services-related terminology, or implicitly, i.e. by referring to particular services or with terms referring to ecosystems as complex systems or ecosystem functions – we carried out a policy scanning in three steps.

First, a literature and document review resulted in an initial list of 53 EU policies; second, the policies were prioritised based on their relevance for a set of case studies analysing the operationalisation of ecosystem services (OpenNESS, 2012); and, third, EU policy makers identified key policies at a focus group workshop in Brussels in January 2014 (Schleyer et al., 2015).

The eleven EU policies selected through this process included both binding and non-binding instruments, covering the policy fields of biodiversity, forest, climate, water, and rural and urban areas, as well as a mobility and infrastructure-related policy (see Table 1 for policy fields and reviewed policies) (Schleyer et al., 2015). Finally, to account for recent developments in the field of environmental policies, we supplemented the original selection of policies with the Invasive Alien Species Regulation, which was adopted in October 2014.

As we were interested in how the ES concept is used in EU policies, we did not apply one particular standard definition or delineation. We reviewed the documents for the term '(ecosystem) services' and whether particular services were mentioned. For analytical and illustration purposes, however, we assigned specific ecosystem services mentioned in the EU policies into the three categories being provisioning, regulating, and cultural ecosystem services. The review focused on the main policy documents (Table 1), and did not review all supporting documents (guidance manuals, impact assessments, plans and programs).

As we were also interested in how the policies were funded, we reviewed some of the main funding instruments associated with the selected policies and the extent to which they referred to the ES concept. The following funding mechanisms were reviewed: Cohesion Fund; EU Agricultural Fund for Rural Development (EAFRD); EU Regional Development Fund (ERDF); LIFE/ LIFE+ Program.

We analysed coherence at the level of definitions, objectives, instruments, or in implementation processes (Nilsson et al., 2012; Volkery et al., 2011) and use the term coherence to show the extent to which the different EU policies already address or can incorporate the ES concept to 'produce' a meaningful and integrated policy at each of the levels. We investigated internal (or vertical) coherence to understand the link between goals, objectives, instruments, and the implementation processes within a particular policy field as well as the coherence between the ES concept and the EU policy. External (or horizontal) coherence was used to analyse the overlap or alignment across different policy fields. In other words, the analysis sought to answer the question: what is the level of internal coherence between the ES concept and the various dimensions of a particular EU policy. To account for the gradual integration of the ES concept, we noted the date the policy came into force and possible revisions made since then.

As EU policy is considered to be regulatory in nature (Jordan and Adelle, 2012), it is usually implemented and analysed with an idea of a top-down implementation process, even if attention is paid to processes taking place at different governance levels in a non-hierarchical fashion (Hooghe and Marks, 2001; Wurzel et al., 2013). In practice, several directives and regulations define the ambitions, goals, instruments, and settings as well as the targets to be achieved, leaving little room for 'freedom' of implementation. In this approach, the interest lies in the dominance of goals, ambitions, and instruments formulated by the EU and how they are designed, as well as the 'coherence' of policies and policy instruments across policy fields.

Another approach to the implementation of policies argues that the meaning of policies is constantly reframed in various debates at all levels of implementation (i.e. EU, national, regional, or local level) (e.g., Hajer and Wagenaar (2003)). This reframing can lead to situations in which the original policy intent deviates considerably from what is happening 'on the ground'. The attention is on implementation practices and the degree of freedom inherent in the design of a particular policy: how policies are (and can be) interpreted and modified at the various implementation levels, how they play out in real life, and how this varies in different settings (Howlett and Rayner,

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[1] Earlier publications on ecosystem services distinguish supporting services. More recent studies, including CICES, identify only three main categories: provisioning, regulating, and cultural services – supporting services are now usually considered part of regulating services.

Table 1
The twelve analysed policies relating to natural resources and land use.

Policy Field	Name of policy *(abbreviation; year of adoption)*	Binding instrument	Non-binding instrument
Biodiversity policies	**GI Strategy (2013):** Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the regions. Green Infrastructure (GI) — Enhancing Europe's Natural Capital. COM(2013) 0249		Communication
	HD (1992): Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora	Directive	
	Biodiversity Strategy (2011): Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the regions. Our life insurance, our natural capital: an EU biodiversity strategy to 2020. COM(2011) 244 final		Communication
	IAS (2014): European Commission (EC) (2014). Regulation (EU) No 1143/2014 of the European Parliament and of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species	Regulation	
Forest policy	***Forest Strategy* (2013):** Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the regions. *A new EU Forest Strategy: for forests and the forest-based sector. COM(2013) 659 final*		Communication
Climate policies	**RED (2009):** Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC	Directive	
	***Adaptation Strategy* (2013):** Communication from the commission to the European Parliament, the Council, the European Economic and Social committee and the Committee of the Regions. An EU Strategy on adaptation to climate change. COM(2013) 0216 final		Communication
Water policy	**WFD (2000):** Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy	Directive	
	MSFD(2008): Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive)	Directive	
Policies for rural and urban areas	**CAP/RDR (2013):** a) Regulation (EU) No 1305/2013 of the European Parliament and of the Council of 17 December 2013 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and repealing Council Regulation (EC) No 1698/2005 b) Regulation (EU) No 1306/2013 of the European Parliament and of the Council of 17 December 2013 on the financing, management and monitoring of the common agricultural policy and repealing Council Regulations (EEC) No 352/78, (EC) No 165/94, (EC) No 2799/98, (EC) No 814/2000, (EC) No 1290/2005 and (EC) No 485/2008 c) Regulation (EU) No 1307/2013 of the European Parliament and of the Council of 17 December 2013 establishing rules for direct payments to farmers under support schemes within the framework of the common agricultural policy and repealing Council Regulation (EC) No 637/2008 and Council Regulation (EC) No 73/2009 d) Regulation (EU) No 1308/2013 of the European Parliament and of the Council of 17 December 2013 establishing a common organisation of the markets in agricultural products and repealing Council Regulations (EEC) No 922/72, (EEC) No 234/79, (EC) No 1037/2001 and (EC) No 1234/2007.	Regulations	
	***Urban Strategy* (2006):** Communication from the Commission of 11 January 2006 on a thematic strategy on the urban environment. COM(2005) 718 final		Communication
Mobility and Infrastructure-related Policy	**TEN-T (2013):** Regulation (EU) No 1315/2013 of the European Parliament and of the Council of 11 December 2013 on Union guidelines for the development of the trans-European transport network and repealing Decision No 661/2010/EU.	Regulation	

Explanation: A 'Directive' is a legislative act that sets out a goal that all EU Member States must achieve. However, it is up to the individual countries to devise their own laws on how to reach these goals. A 'Regulation' is a binding legislative act. It must be applied in its entirety across the EU. A 'Communication' is a policy document with no mandatory authority. The EU Commission takes the initiative of publishing a Communication when it wishes to set out its own thinking on a topical issue. A Communication has no legal effect.

2007). Due to the complex policy mix, such a reframing is often problematic.

Focussing on EU policies, we adopted both these approaches by focussing on the high-level obligations or expectations and the established systems of reporting and monitoring on the one hand, and by recognising the practical implications and room for local interpretation on the other. The analysis covered the policies' inherent degrees of freedom for implementation provided to EU Member States (MS) and local stakeholders, since this would have considerable bearing on the implementation practices they could develop. It defines the flexibility MS have to address issues that are of particular importance at the national or regional level and to incorporate new emerging ideas and concepts.

In summary, the dimensions of coherence covered in the analysis were:

1. *Coherence at the level of definitions:* whether the term 'ecosystem service(s)' was used.
2. *Coherence of aims or objectives:* the degree to which the policy objectives were in principle compatible with the ES concept. Here, the analysis focussed on the aims and objectives of the respective policies: how far the policies refer to the environment or to the need for sustainable use of natural resources, and whether specific categories of ecosystem services or individual services are mentioned (and whether they are framed as an ecosystem services, or not).

Table 2

Typology of EU policies with respect to references to the environment and/or (the) ES concept based on Helming et al. (2013).

Type	Description	Level of coherence with ES concept
Type 0	No ecological or environmental issues mentioned or referred to	None
Type 1	Environment mentioned but neither a prominent objective nor relevant for/mirrored in policy measure design or monitoring	Very low
Type 2	Environment mentioned and/or relevant for/mirrored in policy measure design or evaluation	Low
Type 3	Strong environmental framing and evaluation, but the ecosystem services terminology is not used – some services might be mentioned	Moderate
Type 4	Contains framing around ecosystem services and /or use of terminology but is hardly relevant for/mirrored in policy measure design or evaluation	High
Type 5	Ecosystem services fully embedded throughout the policy, including objectives and policy measure design and monitoring	Very high

Some degree of incoherence occurs if a policy under scrutiny does not relate to ecosystem services or would mention no ecosystem services or only a few. As most of the policies selected relate to the environment in one way or the other, incoherence to some degree was expected.

3. *Coherence at different levels of implementation (degrees of freedom)*: three aspects were reviewed being the dominant mode of steering (e.g., command-and-control, advisory, or economic), the reporting or monitoring requirements, and financing mechanisms of the respective policies.

The policies were assessed using a scoring system that was adapted from a characterisation of impact assessments (based on Helming et al. (2013); Table 2).

3. Results

The analysis shows that, overall, the coherence between existing EU policies and the ES concept is increasing gradually, but still confined to nature and natural-resource policies. Altogether, six policies had very high to high coherence and six others were assessed to be lower. Six EU policies referred to ecosystem services explicitly, and only four reflected the ES concept in the design of measures (Table 3).

3.1. Coherence at the level of definitions, aims, and objectives

The more recently a policy had been formulated or updated, the more likely, and the more thoroughly the ES concept had been addressed explicitly, at the level of definitions or goals. However, some recent policies, like the Adaptation Strategy, did not explicitly address the ES concept in the main communication document. Before 2008, ES framing was absent from environment-oriented EU policies, such as the HD (1992), the WFD (2000), the CAP of 2004, and the Urban Strategy (2006). The first EU policy that contained framing of the ES concept was the MSFD introduced in 2008. Since then it started to feature prominently in new or revised environment-oriented policies.

Table 3

Extent of reference to ES, the ES concept, and 'environment in general' of investigated EU policies (Typology according to Helming et al. (2013); see Table 2). Source: modified from Schleyer et al. (2015).

Policy	Type	Level of coherence
GI Strategy	5	Very high
Biodiversity Strategy	5	Very high
Forest Strategy	5	Very high
IAS	5	Very high
MSFD	4	High
CAP/RDR	4	High
HD	3	Moderate
WFD	3	Moderate
Urban Strategy	3	Moderate
Adaptation Strategy	3	Moderate
RED	2	Low
TEN-T	2	Low

The IAS (2014) was the first legislation to explicitly feature a definition of ecosystem services. The concept even featured in some revisions of policies that were beyond the responsibility of European Commission's Directorate General of Environment, such as the latest CAP reform (2013). The CAP appeared to be an exception, however, as no mainstreaming could be observed in other EU policies outside the environment-domain, for example the TEN-T or RED. Other communications, such as the Urban Strategy and the Adaptation Strategy also focussing on environmental issues and the linkages between ecosystems and humans, did not mention ES or the ES concept explicitly, though they covered rather non-traditional environmental policy fields. (Fig. 1).

3.2. Coherence with different ecosystem services

The analysis of the alignment of policy objectives with the ideas of the ES concept showed that there was variation in how much emphasis policies would put on different ES and their interconnectedness. The review of the types of services mentioned in the policies revealed that regulating services were mentioned most frequently and also in greatest detail, followed by provisioning and cultural services (Fig. 2, Table 4). The relatively few references to cultural services usually focussed on tourism and recreation.

The analysis of drivers to which the policy would respond revealed a broad and diverse selection of natural and social drivers. These ranged from overexploitation of natural resources, spread of invasive alien species, and climate change, to changes in lifestyle, education, and demographic change. Most direct drivers related to the main objectives pursued, such as maintenance of biodiversity in the Biodiversity Strategy, spread of invasive alien species in the IAS, or improvement of water quality in the WFD, reflecting the focus and sectoral nature of these policies.

3.3. Coherence at different levels of implementation

When analysing the mode of steering of the different policies, we found that all policies that explicitly addressed ecosystem services and that had the ES concept fully embedded, featured an advisory (sometimes even symbolic) mode of steering (Table 5). With the exception of the IAS, they were all programs of the European Commission that formulated policies at the strategic level (e.g., communications or strategies). This reflects the novelty of the ES approach and might be a signal of a reluctance among MS to sign up to strict regulation across different ecosystem services categories at the EU level. Despite being a 'regulation' and featuring a 'command-and-control' mode of steering, the IAS nevertheless leaves the development of concrete measures and comprehensive action plans to prevent the "unintentional introduction and spread of invasive alien species" to the MS (cf. Article 13). This observation is also in line with the current trend in the EU to reduce direct regulation and simplify procedures.

The ES concept was apparently integrated in a policy type for which the specific design of measures and related ways of monitoring and – if applicable – sanctioning had been delegated to MS or sub-national
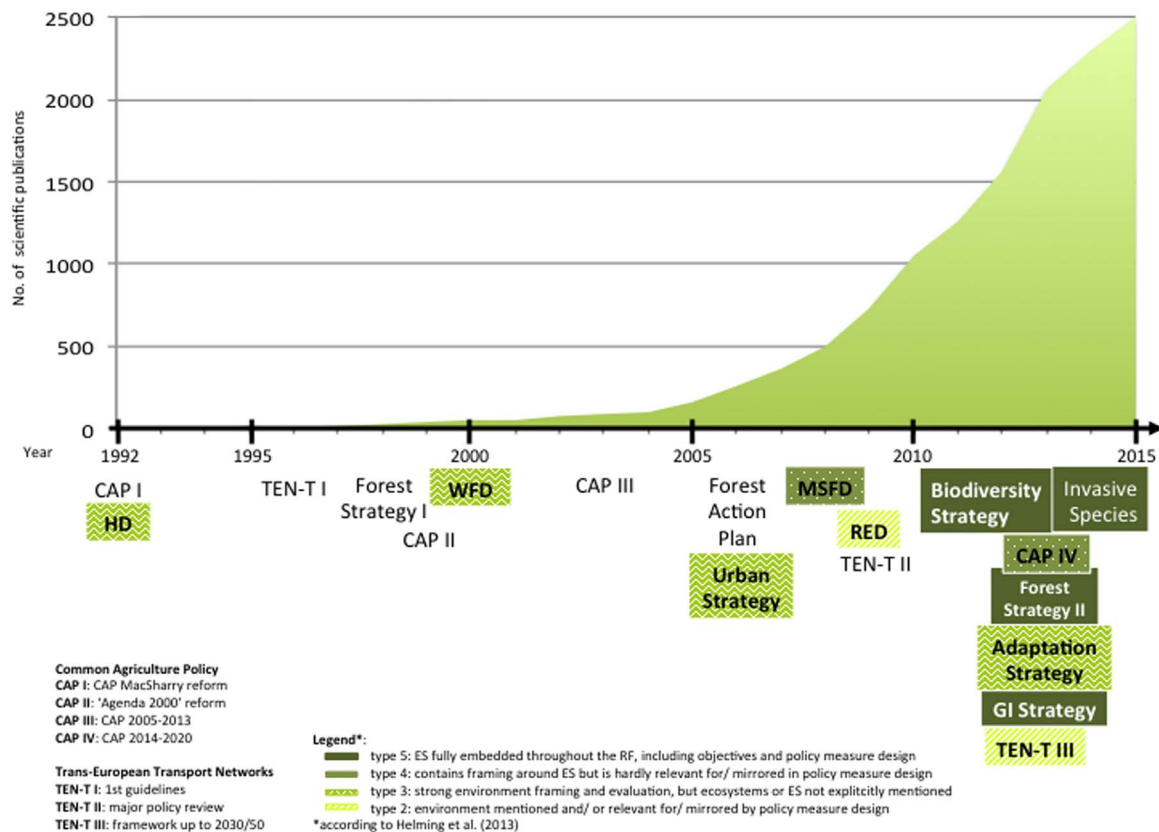
Fig. 1. Timeline of EU policies under scrutiny and extent of reference to ecosystem services, the ES concept, and 'environment in general' and use of term 'ecosystem services' in scientific publications (1992–2015).
Source: updated from Schleyer et al. (2015); Note: The lower part of the figure shows the investigated EU policies (cf. Table 1) arranged on a timeline; the different shades of green reflect the scoring. It is important to note that we applied the typology – and thus the green-shading – only to those versions of the policies that we analysed in-depth. Thus, earlier versions such as Forest Strategy I and CAP I (incl. RDR), introduced in 1998 and 1992, respectively, might as well be classified as type 3 or type 2, respectively, yet, we did not cover them in our analysis. The top of the figure contains a graph showing the increasing number of scientific publications containing the term 'ecosystem services' (own search carried out on 3 June 2016 using Scopus database).
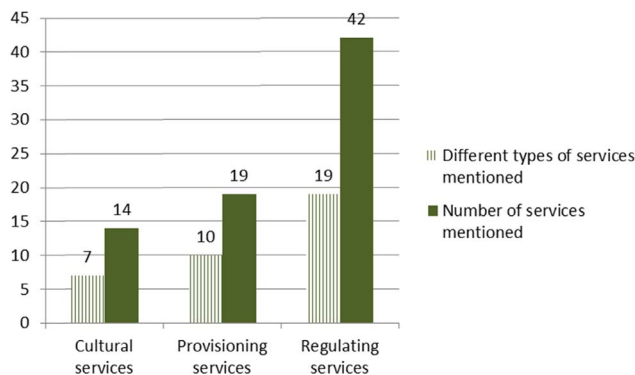

Fig. 2. Synthesis of different categories of ES mentioned in the reviewed policies. The number indicates the different types of ES mentioned (see Table 4).

levels. A prominent example is the Biodiversity Strategy where mapping, assessment, and valuation are to be undertaken by the MS, albeit with support from the EU (Maes et al., 2016). This way, it is not necessary to organise a formal consensus at the EU level about the selection of ecosystem services targeted or the methods for mapping and assessment, and valuation of these services. This means that a detailed binding operationalisation is not undertaken at the EU level.

The analysis showed that very few policies required MS to report on the stock/flow of a particular ecosystem services. In general, mandatory reporting on environmental impacts appeared to be rather specific to the policy area (e.g., WFD), rather than across different types of impacts. Only the IAS requires that a surveillance system should

monitor the effectiveness of the policy on biodiversity, ecosystem services and, if applicable, human health and the economy. This relative absence of pronounced and mandatory systems of measuring environmental impacts could be due to the feasibility of establishing (environmental) monitoring systems and the administrative burden of carrying out systematic monitoring. In some cases, for example in the CAP/RDR, environmental impacts are not directly measured, but assessments are made based on proxies that signal the change in a (negative) driver, such as observed reduction in the use of pesticides.

For most policies, there were various EU funds available to finance measures. In some cases, these EU funds were complemented by national and regional financing mechanisms also incorporating private sector funding. There was, however, a small set of EU funds that featured prominently across many of the analysed EU policies, including the EU Cohesion Fund, the Life/Life+ Programme, the EU Regional Development Fund (ERDF), and the EU Agricultural Fund for the Rural Development (EAFRD) (Table 6).

This reliance on a restricted set of EU-funded and designed financing tools with their own internal logic and rules might in practice jeopardize the degree to which a policy can address all ecosystem services. For example, financing multiple – or bundles of – services at the same time (to reduce trade-offs between ecosystem services and to account for the joint production of ecosystem services) is usually impossible with EU financing schemes such as EAFRD (Plieninger et al., 2012). The example of financing biofuel production shows that schemes fostering single ecosystem services remain dominant and as a result might lead to (unwanted) trade-offs with other services. An additional challenge is the interaction between the needs of the ecosystem and the given social system. For example, supporting

Table 4
Detailed information on categories of and individual ES considered in the policies.

EU policy	Provisioning ES	Regulating ES	Cultural ES
GI Strategy	• Food • Materials • Water • Fish stocks	• Cleaning air & water • Climate regulation/ • Carbon sequestration • Ensuring water flows/ quality • Water levels/ quantity • Flood prevention • Pollination • Pest control • Keeping soil function • Urban temperatures	• Recreation • Cultural heritage • Local identity • Education benefits • Aesthetics/ attractiveness
Biodiversity Strategy	• Food • Shelter • Medicine • Fresh water	• Cleaning air & water • Mitigation of natural disasters • Pest control • Disease control • Climate regulation	
IAS	ES mentioned in general, but no reference to any categories of or individual ES		
MSFD	• Marine activities/ fishing • Marine goods	• Ecological function • Sea water quality	• Tourism • Recreation
Forest Strategy	• Wood (for products and energy)	• Climate regulation • Conserving genetic resources • Controlling forest health risks	• Supporting rural and urban communities: social functions of sustainable forest management • Knowledge and awareness • Diverse livelihoods
CAP/ RDR	• Biomass and other renewable energy sources	• Keeping soil function • Climate regulation • Cleaning water	• Tourism • Recreation • Cultural heritage
HD	• Taking of specimen (animals/plants)		
WFD	• Fresh water (ground and surface water)	• Maintaining fresh water quality and quantity	• Preserving water as heritage
Urban Strategy		• Flood prevention • Climate regulation/ • Carbon sequestration	Not further specified
RED	• Biofuels • Bioliquids	• Watershed protection • Erosion control	
Adaptation Strategy	• Food • Wood • Water	• Flood prevention • Soil function • Cleaning air & water	Not further specified
TEN-T		• Soil function • Cleaning air & water • Noise mitigation • Climate regulation/ • Carbon sequestration • Habitat provisioning	

collective activities, such as planting hedgerows across several neighbouring farms for fostering ecosystem services is usually not possible with individual payments. With the exception of the CAP, EU policies do not have a dedicated fund to implement them. For example, there is no 'Green Infrastructure Fund' at the EU level for implementing measures in the context of the GI Strategy.

The analysis of the guidelines of the four core EU funding mechanisms revealed that ecosystem services and/or the ES concept was explicitly mentioned across these operational documents.[2] Here, they are part of specific investment priorities (e.g., Cohesion Fund). However, with the exception of the LIFE Multiannual work programme for 2014–2017, no information specifying the ecosystem services of the

area or the expected improvement of services was required as a condition for funding.

4. Discussion

Our analysis of the twelve reviewed policies shows that the ES concept is not (yet) fully incorporated in EU policies, but that it is gradually becoming more integrated, particularly in policies governing natural ecosystems. More recent policies address ecosystem services more explicitly and comprehensively. This is also reflected in the central funding mechanisms in place to implement the policies, such as CAP and LIFE+. At the same time, however, some new policies, such as the Adaptation Strategy, clearly reflect the ES concept only in supporting documents, rather than in the main policy document. There are also inconsistencies in the uptake of the ES concept within certain policy fields: For example, ecosystem services are mentioned in

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[2] Interestingly enough, the LIFE 2014–2020 Regulation No. 1293/2013 itself does not refer to ES explicitly. Yet, the LIFE Multiannual work programme for 2014–2017 contains many different and detailed references to ES.

Table 5

Type of policy and mode(s) of steering.

Source: modified and updated from Schleyer et al. (2015).

EU policy	Policy type	Mode (s) of steering
GI Strategy	Communication (Strategy; supposed to get an 'enabling framework')	Advisory
Biodiversity Strategy	Communication (Strategy)	Advisory
Forest Strategy	Communication (Strategy)	Advisory
Urban Strategy	Communication (Strategy)	Advisory
Adaptation Strategy	Communication (Strategy)	Advisory; yet reporting implies a level of control
WFD	(Framework) Directive	Command-and-control (e.g., River Basin Management Plans), yet considerable leeway for MS to employ other modes of steering
MSFD	(Framework) Directive	Command-and-control (e.g., spatial protection measures contributing to Marine Protected Areas); yet types of measures decided by MS
HD	Directive	Command-and-control; choice of instruments up to MS
RED	Directive	Decentralized decision-making at MS level
CAP/RDR	Policy / Regulation	Command-and-control; division of financial resources between Pillar I and II as well as specific financial instruments up to MS
IAS	Regulation	Command-and-control; yet considerable leeway for MS to employ other modes of steering (e.g., in the Action plans)
TEN-T	Regulation on EU guidelines	Consulted and coordinated planned action

one Communication of the European Commission[3] on water policy published in 2012, but not in other documents on the same topic published in the same year.

Different explanations can be given for our findings. One relates to the character of the policy documents themselves, the second one to the periodicity of the policy process (e.g., the respective implementation stage), and the third potential explanation has to do with potential opposition from actors.

With respect to the ***character of the policy documents***, EU policies vary in nature either being strategic, non-binding documents reporting on progress in a particular field or binding documents. One clear observation is that those policies that have gone far in incorporating the ES concept are documents that are strategic in nature. Policy coherence tends to be easier to achieve at a general level, in general strategic goal statements, than in detailed specific legislation (Makkonen et al., 2015; Nilsson et al., 2012). On the other hand, our analysis shows that a very specific policy, namely the IAS has also adopted the ES concept, perhaps because the approach suits addressing the issue or because the issue is new (Heink et al., 2016). The IAS and strategies incorporating the ES concept leave the practical operationalisation of the ES-concept to the local institutional settings. An exception perhaps is the Biodiversity Strategy where there are fast developments in assessment approaches under various policies for biodiversity conservation (e.g., Maes et al., 2016).

Another reason for the moderate integration of the ES concept is the slow pace of the policy making and revision processes and the often **incremental changes of policy.** The average revision period of the reviewed twelve policies is six to ten years (see Table 7). As such, only limited opportunities for change present themselves. Even when policies are revised, the revision is a complex and lengthy political process involving the European Commission, European Parliament, and Member States. Furthermore also numerous stakeholders at national and regional levels are consulted. As policy formulation and implementation constitute multi-level, nested arrangements (Howlett, 2009; Paavola et al., 2009), it is important to understand how new concepts are integrated into the pre-existing institutional setting at the various political and administrative levels. Our analysis of the incorporation of the ES concept at those different levels illustrates a conceptual and temporal nestedness. Concerning definition, temporal factors play the most significant role: only the most recent policies include definitions and

framings making explicit use of the ES concept. This is in line with the recently made observation that the gradual disciplinary input into developing the ES concept has reached such maturity that political decision-making can use it (Chaudhary et al., 2015). As a new idea enters the pre-existing normative and regulatory frameworks, it is unsurprising that the concept will need to be iterated thoroughly and that this will take time. As a result, a process of layering can occur. Layering is described as an incremental process of policy change in which different policies coexist at the same time (Mahoney and Thelen, 2009).

Implementation does not always follow the ideas set in general goals (Pressman and Wildavsky, 1984). Implementation requires assigned roles and responsibilities as well as resources and monitoring. Our evaluation of coherence in implementation reveals that the operationalisation of the ES concept is currently limited to funding principles, but in a generic way. The development of specific funding mechanisms for those ecosystem services for which markets are not in place and not likely to emerge, might benefit of a more thorough integration of the ES concept.

Further, integration in monitoring processes would allow evaluation of the impact of existing policies on various ES and the related trade-offs between different (types of) ecosystem services in ex-ante and ex-post evaluations.

In our view, this is also where the main added value of the ES concept for current EU policies can be found: By making explicit the trade-offs between different ecosystem services across sectoral EU-policies, particularly at the level of funding and monitoring, the call for sustainability can be translated into practice. However, new ideas pose an important and substantial challenge to policy coherence, and will require adaptability, so that the complexity of a policy does not undermine its feasibility and legitimacy (Ayres and Braithwaite, 1994; Fiorino, 1999; Rammel and van den Bergh, 2003).

Coherence and integration would also likely require ***political advocacy***. Environmental policies are often considered to oppose economic policies (Taylor et al., 2012). Indeed, the attempts to mainstream the ES concept are likely to challenge the established relations within and between the environmental sector and other sectors (Turnpenny et al., 2014). For example, agriculture, forestry, and regional and urban development might have goals that will counter/contest the 'new' concept, and might advocate against its mainstreaming. The tensions thus far have highlighted wording, competencies, and resources (Norgaard, 2010; Potschin et al., 2016; Silvertown, 2015; Turnpenny et al., 2014; Waylen and Young, 2014). Valuation in particular has raised concerns of compromising the inherent value and moral justifications for biodiversity conservation, and of over-simplification of complex ecological and social-ecological system interdependencies. Investment in biodiversity conservation is feared to be under-

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[3] COM(2012) 673 final of 14.11.2012 '*A Blueprint to Safeguard Europe's Water Resources*' and COM (2015) 120 final of 9.3.2015 '*The Water Framework Directive and the Floods Directive: Actions towards the 'good status' of EU water and to reduce flood risks*'.

Table 6
EU funds/programs and other funds used for financing EU policies.
Source: modified from Schleyer et al. (2015); Note: X (cross) indicates financial instruments/funding sources explicitly mentioned in the EU policy as well as those actually used to finance measures.

EU Policy/EU funds	Cohesion fund	EU Regional Development Fund (ERDF)	Horizon 2020/other Research Framework Programs	Connecting Europe Facility	EU Marine and Fisheries Fund	LIFE/ LIFE+ Programme	EU Agricultural Fund for the Rural Development (EAFRD)	Other
GI Strategy	X	X	X	X	X	X		Financing facility set up by European Investment Bank and European Commission
HD	X	X	X		X	X	X	Major part of funding by MS; EU Social Fund
Biodiversity Strategy					X	X		Natural Capital Financing Facility
IAS		X	X			X	X	
WFD	X					X	X	Mainly funding by MS
MSFD					X			
Forest Strategy	X		X			X	X	
(CAP/) RDR							X	Partly national/regional (co-)funding
Urban Strategy	X		X			X		
RED	X	X	X	X				Funds from the European Investment Bank; Global Energy Efficiency and Renewable Energy Fund
Adaptation Strategy						X		Mainly funding by MS
TEN-T	X	X		X				Funds from the European Investment Bank plus national funds

Table 7
Overview of revision periods of EU policies and funding mechanisms.

EU policy	Overall policy	Next reporting/ review period
GI Strategy	2017: Review of progress & recommendations for further action	2017
HD	Fitness check concluded no revision required	2018
Biodiversity Strategy	2020	Recently reviewed (2015)
WFD	Recently revised, no revision foreseen	2021 (second management cycle ends)
MSFD	No revision foreseen yet	2018
CAP/RDR	2020	2018
Urban Strategy	2020	
RED	No revision foreseen	Progress reports biannually
Adaptation Strategy	2020	2017
TEN-T	2030/2050	2023
IAS	New policy	2019
Funding mechanism		
EU Cohesion fund	2020	–
Life/Life + programme	Yearly / 2020	2017 (mid-term evaluation)
EAFRD	2020	2018 (mid-term evaluation)
ERDF	2020	2017 (mid-term evaluation)

mined by resource allocations to human-benefit securing activities. As a result, some of the actors may resist change and block the integration of the ES concept in policy development; and the complex processes of policy revision in the EU offer many opportunities for this.

For the ES concept to be accepted by actors outside the environment domain, it has to speak to audiences beyond those who are conservation-minded and draw attention to economic benefits and long-term sustainability. The fact that natural capital accounting systems are being considered by policy makers and businesses shows that sustainable management of ecosystems is an issue that is on the agenda. Furthermore, as society might increasingly experience negative impacts of global environmental trends, like climate change, this might foster the need for a better understanding of ecosystems.

These observations show that the emerging ES concept encounters path dependencies. Yet, new framings, synergies, and political advocacy might make use of instances where sustainable ecosystems demonstrably add to resilience (Quaas and Baumgärtner, 2008) and where there are political windows of opportunity for new bridging concepts (Kingdon and Thurber, 1984) and changing actors coalitions (Sabatier, 1998).

Our analysis shows that, conceptually, those policies that deal with the natural environment and ecosystems have more breadth in the ways in which ecosystem ideas are addressed. This illustrates the broad approaches to sustainability issues that conservation and natural resource use have had for a long time (Adger and Jordan, 2009; Ostrom, 2015; Primmer et al., 2015). However, integration across policies remains an important challenge. Our analysis reveals that each policy focuses on one of the ES categories, sometimes even exclusively on those specific ecosystem services, which are traditionally in the domain of a particular policy. EU policy making follows a sectoral approach (Jordan and Adelle, 2012), and the sectoral role-division maintains itself with path-dependent processes and structures (Howlett and Rayner, 2007). This shows that there is a gap in addressing the system-interdependence idea, which is at the heart of the ES concept (MEA, 2005) and also underlies the justification for improving policy coherence (Howlett and Rayner, 2007). Indeed, the challenges for integrating ES approaches might remain in the policy areas that drive degradation or focus on human welfare. If integrated at the level of definitions, aims, and objectives of the policy itself or the related funding or monitoring schemes, the concept could support policy streamlining, integration, and coherence.

5. The way forward

If ES are going to be further integrated into EU policies several potential governance pathways might be feasible. First, the ES concept could be incorporated when drafting new legislation, such as the bioenergy sustainability policy. Second, the ES concept could be included during the revision of existing programs (e.g., strategies), legislation (e.g., directives), or funding schemes, such as the CAP. For legislation, the EU is undertaking 'Fitness Checks' that allow for the revision of legislation, although for instance the latest Fitness Check of the WFD and HD did not result in any legislative change. The WFD Fitness Check did state, however, that *"Greater consideration is now being given to the importance of protecting ecosystem services.[...]. In order to ensure that the notion of good status under the Directive continues to meet its objective of ensuring the integrity of the aquatic ecosystems and their capacity to maintain their services, more focus should be given to these concepts, both within the framework of the CIS [Common Implementation Strategy] process and also via other policies so that they can be better reflected in the implementation on the ground"* (EC, 2012).

A third option, as suggested also by the WFD Fitness Check, would be to focus on inclusion of the ES concept in the implementation processes at national and/or regional level making use of existing degrees of freedom. While implementing EU policies, MS or regional governments might add additional requirements to also consider the issue of ES in their nationally- or regionally-adopted policies. This could be done by explicitly reviewing the impact of the policy on a broader range of ecosystem services in documents developed to guide implementation. For the WFD, for example, a start might be to develop a guidance document on how in the next planning cycle of the River Basin Management Plans ecosystem services could be considered. In a similar fashion, the new guidance documents for the Habitats Directive could show how updated management plans and the required appropriate assessment for plans and project could explicitly consider the impacts of the management on a broad range of ecosystem services.

If we assume that the ES concept will be gradually incorporated into EU policies, it is important to look at the windows of opportunity for when this can be done. Table 7 shows when elements of the reviewed twelve EU policies might be revised. Overall, the next opportunity for an overall revision of communications (strategies) and related funding schemes is the year 2020. This means that the ES concept must be further operationalised by then to match the sector's needs.

6. Conclusion

The article shows that the ES concept has so far not been coherently established in EU policy making but that it is emerging in several of the strategy-setting policies. Only six of the analysed twelve EU policies refer to ecosystem services explicitly, namely the Biodiversity Strategy,

GI Strategy, Forest Strategy, CAP/RDR, MSFD, and IAS. This shows that those policies that address the natural environment and ecosystems are forerunners in integrating the ES concept. Yet, even in these areas, the operationalisation is only partial. Only the Biodiversity Strategy, GI Strategy, Forest Strategy, and IAS reflect the ES concept in the design of measures. Some more recent policies (e.g., the Adaptation Strategy), however, only take up the ES concept in supporting documents. The coherence of a particular policy document with the ES concept might depend on the type of document, the periodicity, and/or the stage of the implementation of a policy as well as the opposition or support from involved actors. All four policies in which the ES concept is fully embedded are either strategies featuring an advisory mode of steering, or, like the IAS, leave details of operationalisation related to ecosystem services to the MS. This may be due to the novelty of the ES approach or due to the reluctance of MS to sign up to more regulatory modes of steering. Also, involved actors might not be willing to consider other interests. Furthermore, very few policies require MS to report on the stock or flow of a particular ES.

In conclusion, there is considerable scope to improve the mainstreaming of the ES concept through, for example, common methods for monitoring and evaluation of ecosystem services, developing dedicated financing mechanisms, and developing better tools to help policy makers exploit cross-sectoral synergies and manage trade-offs between ecosystem services.

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