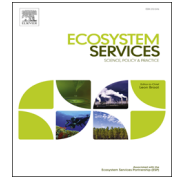




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Governing ecosystem services: National and local lessons from policy appraisal and implementation

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ABSTRACT

The TEEB approach to the use of ecosystem services has found its way to policy as a means to biodiversity conservation and greening of the economy. In this paper we analysed the uptake of the TEEB approach at national and local levels by applying a framework that revolves around the problem, approach and solution frame. At the national level (United Kingdom, Belgium, the Netherlands) TEEB is mainly used to develop integrated decision making. In policy documents the importance of clearly formulated divisions of tasks is emphasised, while the practical implementation is transferred to lower government levels and stakeholders from the private sector. At the local level explorative studies are implemented, while a shared vision is often a major outcome of such processes. Shared visions are directed to incentives and management plans and also point to new societal challenges for future development. The uptake of an ecosystem services approach requires new types of contracts, ample resources, sufficient knowledge and new modes of governance to attract societal involvement. The research suggests that long term engagement of stakeholders in the participatory processes was however not guaranteed due to insufficient resources.

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1. Introduction

Biodiversity conservation policies using intrinsic value arguments have often produced disappointing outcomes (Primmer et al., 2015). As a response, new policies are now addressing the concept of ecosystem services (ES) as a means to conserve biodiversity. International initiatives, such as the Millennium Ecosystem Assessment (MEA) of the United Nations (Millennium Ecosystem Assessment, 2005; Reid et al., 2005) and the Economics of Ecosystems and Biodiversity (TEEB, 2010a), have been very influential in the policy appraisal of ES (e.g., Jordan and Russel, 2014; Turnpenny et al., 2014). The concept of ES has become highly attractive to policy makers by its focus on a broader societal involvement and the use of market-based instruments. This in turn may put nature conservation on the economic policy agendas (e.g., OECD, 2011; Ring et al., 2010). Linking ES to biodiversity conservation has also found its way in EU policies, for example the action plan ‘EU Biodiversity Strategy 2020’ (European Commission, 2011). National governments are currently developing policies to integrate and safeguard ES in their national programs (e.g., Schleyer et al., 2015).

Much research on ES focusses on the design of models to estimate physical quantities, valuation of ecosystem goods and services, and development and evaluation of ecosystem payment schemes (e.g., Braat and de Groot, 2012). Very little research has yet been conducted on the translation of policy formulation into implementation of ES in planning and decision making in ‘coproduction’ with stakeholders (McKenzie et al., 2014; Orenstein and Groner, 2014; Primmer et al., 2015; Schleyer et al., 2015).

An ecosystem services approach (ESA) involves complex knowledge coproduction, by which diverse and interacting forms of knowledge use may be realised (Waylen and Young, 2014). However, it is not clear under which circumstances ESA can help policy makers and planners in the development of nature inclusive solutions (e.g., Haines-Young and Potschin, 2014). The limited understanding on the applicability of the approach also constrains the ability to learn, replicate and communicate its effect on nature conservation (McKenzie et al., 2014).

In the scientific literature an ecosystem services approach is sometimes referred to as ‘ecosystems approach’ (Haines-Young and Potschin, 2014) or ‘ecosystem services framework’ (Turner and Daily, 2008). References to the ecosystems approach are found multiple times in British research (e.g., Haines-Young and Potschin, 2014; Waters et al., 2012; Waylen et al., 2013). It refers to the 12 principles of the Convention on Biological Diversity (CBD) of 1995 (Waters et al., 2012). The Department for Environment, Food &

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Rural Affairs (Defra) in the United Kingdom distilled the 12 CBD principles down to six, which includes a holistic approach to policy making by ensuring that the values of ecosystem services are fully reflected and that environmental limits are respected, promoting adaptive management and including relevant stakeholders in the decision and plan making process (Waters et al., 2012). Cowell and Lennon (2014) defined ESA as an approach to ensure that the 'full value' of the environment is considered in decision making (e.g., Adelle et al., 2012; Braat and de Groot, 2012; UK NEA and UNEP-WCMC, 2011). At the core of the approach described by Cowell and Lennon (2014) is an attempt to capture and visualise the processes through which natural ecosystems provide benefits to human society. The definition of Cowell and Lennon (2014) strongly resembles the definition and approach used by TEEB (2010b). With respect to the use of the concept of ecosystem services, Braat and de Groot (2012) refer to the different dimensions proposed by Farley (2012). In the 'TEEB approach' a structured methodology is envisaged to help decision makers recognise the wide range of benefits provided by ecosystems and biodiversity, demonstrate their values in economic terms and, where appropriate, capture those values in decision making. Therefore, both economic instruments (cost-benefit analysis, effectiveness measures) and integrated decision making are central in the ESA.

In this paper, we define an ESA as a planning and decision making approach in which ES is the central issue and starting point of a planning process. For a definition we adapt the description provided by Schleyer et al. (2015) as "an ESA helps to understand, define, and conceptualise more clearly the links between human well-being and the state of ecosystems and it facilitates communication of economic and non-economic values and their integration into decision making across different governance levels and different sectors". Whether the 'full value' of ES is measured, economic instruments are used or holistic (inclusive) decision making is taking place, is object of our study. Our perspective to the approach includes both the policy appraisal of an 'ES-inclusive' strategy to biodiversity conservation defined by national governments and the use of such a strategy in local settings.

We analyse the policy development and implementation of ES using the approach envisaged by TEEB (e.g., Hedden-Dunkhorst et al., 2015) as departure and aim to add insights into the accomplishments made in operationalising this in practice. The main research questions we address are (1) how the process of mainstreaming ecosystem services into decision making is dealt with at various governance levels, (2) to what extent the notion of ecosystem services is used in practical applications, and (3) which conditions are favourable and which ones are a barrier to problem solving in ecosystem management. In this paper we present and discuss findings on these matters by studying policy documents on ES and the application of an ESA in different EU member states. To this purpose we developed an analytical framework that we used as a 'filter' to analyse national and local policy documents.

2. Theoretical framework

2.1. Framing ecosystem services

The concept of ecosystem services refers to various frames. Frames comprise a set of concepts used in a way that gives a particular meaning to words and a social construction of a certain issue (e.g., Brick and Cawley, 2008). Framing can help stakeholders and decision makers to reduce the complexity of the issue (Keune and Dendoncker, 2013), but may have strong implications for the outcome of policy processes (Opdam et al., 2015). The TEEB approach can be seen as a starting point of the 'operationalisation' of

ES in policy appraisal. Originally the TEEB-approach to ES was aiming at "the provision of economic evidence of the values of ecosystems and biodiversity for societies and the costs of their degradation" (Hedden-Dunkhorst et al., 2015). Although Hedden-Dunkhorst et al. (2015) argued that "TEEB is not specifically concerned with economic accounting", many researchers and policy makers that make use of TEEB apply an 'economic frame' to ES (e.g., Bateman et al., 2013; Christie and Rayment, 2012; Christie et al., 2011; Fisher et al., 2009; Norgaard, 2010; Turner and Daily, 2008). There have been strong debates on such a frame, in which concerns are raised regarding for example the legitimacy and validity of monetization (e.g., Arsel and Büscher, 2012; Hedden-Dunkhorst et al., 2015; Opdam et al., 2015 for an overview). Such an economic frame may be related to the development of market incentives.

However other frames of ES also exist. These frames include amongst others a 'sustainability or holistic frame', in which inclusive decision making is the central issue (e.g., Chan et al., 2012; Opdam et al., 2015), a 'social-cultural frame', where landscape aesthetics, cultural heritage and spiritual significance of nature are key elements (e.g., Chan et al., 2012; Daniel et al., 2012), or a 'biodiversity frame' where the focus on ES is to gain (financial) support to the conservation of biodiversity (e.g., Norgaard, 2010; Opdam et al., 2015). These frames can be found both in policy appraisal and scientific literature.

In policy development and implementation, different frames are used simultaneously by policy makers, scientists and other stakeholders. Distinct frames may imply different expectations in terms of valuations, trade-offs and therefore decision making (Opdam et al., 2015). An ESA can be considered a frame in itself (Opdam et al., 2015) but may also constitute various elements of other frames, such as those described above. The frames that constitute an ESA will direct problem definition, the approach that is likely to be used and its outcomes. Therefore, descriptions of frames are an integral part of our analytical framework.

2.2. Analytical framework

TEEB argues that a whole range of policy responses is required to solve the largely public goods problem underlying biodiversity loss and ecosystem service degradation - such as changes in land use planning, regulation, community access rights, and schemes for payments for ecosystem services. In the process of translating TEEB from the stage of analysis into implementation it recommends a stepwise approach based on a joint framing of the problem by stakeholders, defining and specifying a joint approach, and the identification of feasible responses or solutions (TEEB 2010a). This approach has culminated into 6 distinct steps (TEEB, 2010b): (i) specify and agree on the problem, (ii) identify which ecosystem services are relevant, (iii) define the information needs and select appropriate methods, (iv) assess expected changes in availability and distribution of ecosystem services, (v) identify and appraise policy options, and (vi) assess distributional impacts of policy options. According to TEEB (2010b) these steps should be incorporated in the decision making at various levels, from national to local. Primmer et al. (2015) recognise four types of governance modes in the uptake of ES: 'hierarchical governance', 'scientific-technical governance', 'adaptive collaborative governance', and 'governing strategic behaviour'. These types of governance are not only relevant for the problem framing, but are also part of the frames behind problem solving. Therefore, next to problem framing, frames are also used in analysing the (choice of the) approach and the achievements. Hence we will focus on these frames in our analytical framework. Rephrasing the steps in the TEEB-approach then results in problem framing (steps 1 and 2), approach framing (steps 3 and 4), and solution framing (steps 5 and 6), see Fig. 1.

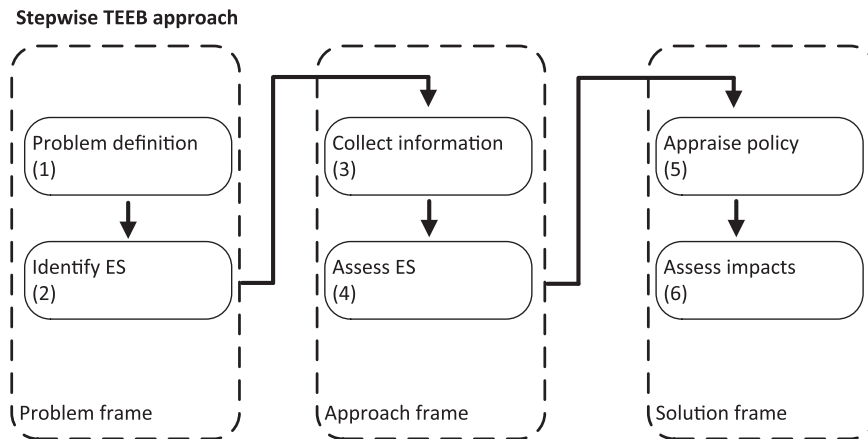


Fig. 1. The stepwise TEEB approach aligned according to the three frames.

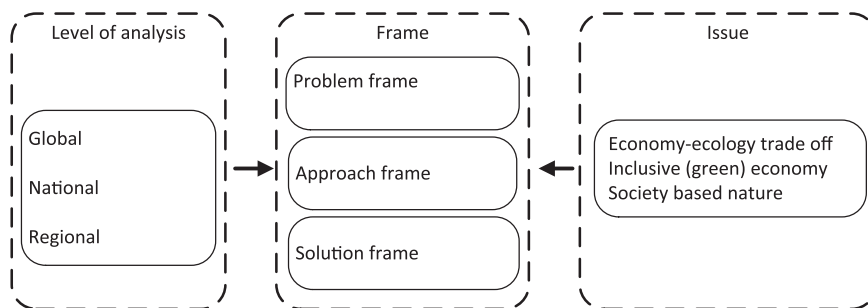


Fig. 2. The analytical framework that is used for document analysis.

Policy formulation and implementation are likely to deal with different issues. In our analytical framework, see Fig. 2, the frames are further broken down into three separate issues of interest. First, the environmental impacts of economic growth are part of the frame, which we refer to as the ‘economy-ecology trade off’. Second, the issue of inclusive decision making, inclusive growth, or as it is referred to in many policy documents as ‘green growth’, is worked out. The third issue deals with the societal inclusiveness of the approach, which we refer to as ‘society based nature’. These issues constitute the three frames and are used as reference for the document analysis and interviews.

Ecosystem services are governed in multi-stakeholder settings and at different governance scales (e.g., [Primmer et al., 2015](#)). Hence the framework should be able to cover frames at different scales. We apply the framework to the analysis of policy development on ecosystem services at the national level and its implementation at the regional level in the form of pilot studies.

2.3. Data: country level

In the analysis at the national level we were mainly interested in the policy formulation, use and translation of the so-called ‘TEEB-approach’ emphasised in the different TEEB monographs. Other aspects revolving around biodiversity conservation, such as the commitment to the EU Bird and Habitat directives are not dealt with in our analysis.

For the selection of countries and pilot studies we restricted our analysis to West-European countries for which driving forces and pressures on biodiversity degradation – agriculture, urban development – are comparable. Another selection criterion was that an ESA would have some form of practical implementation in pilots or regional case studies while such cases should be operational and have documented results. Such implementation should go beyond scientific scoping studies and should include stakeholder involvement and

a participatory process in spatial planning and decision making. During the collection of data and first analysis between May 2012 and February 2013, this was the case in the United Kingdom (UK), the Netherlands and Belgium.

In these three countries, policy development is strongly driven by various scientific scoping studies. Therefore we analysed both scientific and policy documents (see [Supplementary material](#)). In addition, we carried out interviews to collect information that could not be derived from the documents. For this we developed a semi-structured interview guide with open questions and we made transcripts upon further analysis. In each country we held interviews with policy makers at ministries or departments and with policy researchers who worked at this governance scale. In total we interviewed eight persons.

2.4. Data: case studies

In the countries studied the implementation of an ESA took place in pilot studies or regional case studies, although the purpose of such studies differed among the studied countries. In the UK the use of pilot studies to test the ESA in practice was proposed by Defra in the Biodiversity Strategy ([Defra, 2011a](#)). [Waylen et al. \(2013\)](#) identified 24 projects that deal with the ‘ecosystems approach’ in the UK (including Scotland) and Ireland. We restricted the analysis to the pilots initiated by Natural England as these are well documented and are referred to as the ‘Upland pilots’ in the UK research (e.g., [Waylen et al., 2013](#): Exmoor, Dartmoor, South Pennines and Bassenthwaite). After the first round of interviews we were pointed at a recent case study of the ‘Parrett Catchment’ carried out by the Environmental Agency. We added this case study to our analysis (see [Supplementary material](#)).

While the links between national policy development and testing the concept in pilot studies was clear in the UK, this was not the case in Belgium and the Netherlands. In Flanders (Belgium)

only few case studies deal with the concept of ES in practical settings (e.g., Janssens, 2013; Vangansbeke et al., 2013; Verboven and Ulenaers, 2013). The case study 'Wijers' was selected as it was mentioned several times by interviewees as an example of a spatial planning process in a regional setting in which stakeholders are using the concept in practice.

In the Netherlands, a combined search of 'case study' and 'ecosystem services' and the consultation of the interviewees during the 'country assessment' did not provide much relevant results. However, an 'ES-like approach' was already established in the Netherlands during the 1990s in (spatial) planning processes, but framed as 'multifunctional land uses' (see [Supplementary material](#)). The executive public body 'Dienst Landelijk Gebied' (DLG) of the Ministry of Economic Affairs was promoting the concept of ES in area based developments. An interview with DLG led to the selection of one area, called 'Gebrookerbos'. This is a spatial planning assignment with stakeholders. In contrast to the UK and Belgium case studies, the Gebrookerbos case had limited documentation and therefore relied more on interview results.

For all case studies we collected relevant material for further analysis. In addition, we carried out semi-structured interviews. In all cases we interviewed the project officers/coordinators or project leaders. Most project leaders had an affiliation with a governmental body (Natural England in the UK, the Flemish Land Association in Belgium, and DLG and a municipality coordinator in the Netherlands). In addition we also interviewed researchers, managers of private companies and representatives of NGOs (such as Bird Life International in the UK). All interviews were carried out between April and October 2013. We used the transcripts of the interviews for further analysis using the developed framework depicted in [Fig. 2](#). A detailed description of the cases and the list of relevant documents are provided in the [Supplementary material](#).

For both the country and case study material we clustered information from the (policy) documents and interviews according to the analytical framework and the three frames, depicted in [Fig. 2](#). In the next step of analysis, for each case the clustered information was further processed according to the three frames: 'economy-ecology trade off', 'inclusive green economy' and 'society based nature'. Each case was further analysed along these dimensions, recognising the multilevel and multi-actor settings the cases are part of. This resulted in sets of structured qualitative information ready for interpretation.

3. Findings at the national level

In the United Kingdom (UK), Belgium (with emphasis on the federal district Flanders) and the Netherlands new nature policies were developed between 2010 and 2014. In the UK policies incorporating ES are described in the white paper 'The Natural Choice' (HM Government, 2011) and in the National Biodiversity Strategy (Defra, 2011). In Belgium, ES is incorporated in the National Biodiversity Strategy of 2006, the Environmental policy of Flanders 2011–2015 and the update 'Biodiversity 2020' (Belgian National Focal Point to the Convention on Biological Diversity, 2013). In the Netherlands, the policy development on ES is formulated in the policy brief 'Green Growth' (Ministry of Economic Affairs, 2013a), the implementation agenda 'Natural Capital' (Ministry of Economic Affairs, 2013b) and the Nature Vision (Ministry of Economic Affairs, 2014).

In the policy documents ecosystem services (ES) are introduced as a part of a broader commitment to protect biodiversity. The policy documents in the studied countries all take account of and use inspiration from the MEA and TEEB studies.

3.1. The problem frame

In the UK and Belgium the economy-ecology trade-off is emphasised towards the adverse effects of economic development on natural ecosystems. In the UK this is specified as degraded ecosystems, and in Belgium as adverse competing claims on scarce land. In the Netherlands the frame is mostly directed to the nature legislation itself. Legislation is enforced by the EU directives, but also seen as a major obstacle to economic development in the vicinity of Natura 2000 areas. A new nature policy should better align economic development with nature protection and as such should remove the barriers that are encountered (Ministry of Economic Affairs, 2014).

A second issue in the problem frame is the issue of a green economy, or sometimes referred to as a 'nature-inclusive economy' (in the Netherlands). In the UK and Belgium the policy builds on ecosystem services as an instrument to deliver a green economy. The result of such a 'new' economy is an improved focus on a 'society-based' nature development. While the problem frame in the UK and Belgium primarily seeks for a better 'valuation' of nature to be integrated in inclusive decision making, in the Netherlands a shift from state control of biodiversity protection to green entrepreneurship in developing nature is evoked through shifts in the modes of governance.

The policies in the studied countries emphasize the importance of clearly formulated divisions of tasks, where the practical implementation is transferred to (decentralized) lower governments and stakeholders from the private sector. This requires engagement of new types of stakeholders. Thus the national policy programs on ES hardly effectuate policy objectives, but focus on facilitation of the approach and delegation to others.

3.2. The approach frame

Knowledge development is a key element in the approach frame. The TEEB-approach is a central feature in all documents studied, although in the Netherlands it is not always explicitly elaborated. The development of a 'Digital Atlas on Natural Capital' in the Netherlands is such an initiative aiming at delivering a TEEB approach on the ground (Ministry of Economic Affairs, 2013b). Natural capital accounting of business is another approach to a nature inclusive economy delimited in policy documents, and strongly advocated in the UK and the Netherlands. Since business activities are seen as a major pressure on remaining biodiversity, accounting for natural capital can serve as a tool for communication and action. This presumes an active role of business in the protection of biodiversity. In the UK and Belgium the development of pilot projects is advocated. These projects are mainly set out to test and learn from an ESA in practical settings. In the Netherlands, the approach frame builds mostly on bottom up initiatives. These are developed by green entrepreneurs and partnerships and revolve around governmental subsidy programs, such as 'green deals' and 'green tables' which provide a (governmental) platform for new green initiatives (Ministry of Economic Affairs, 2014).

3.3. The solution frame

Inclusive decision making and 'integrated' policies are the most important solutions the policies are aiming for. In the UK and Belgium it was concluded that decisions along separated 'policy silos' did no longer prove to be efficient. The TEEB approach, defined as the 'ecosystems approach' in the UK, the ESA and a 'polluter-pays' principle in Belgium are instruments to deliver a green economy. In the Netherlands, a nature-inclusive economy is not (yet) coupled to specified instruments. The voluntariness of action to create a nature inclusive economy is dominant in the solution frame of the national policies.

Table 1
Summary of the frames at the national level in which 1) economy–ecology trade-off, 2) inclusive (green) economy, 3) society based nature are identified.

Country	Problem frame	Approach frame	Solution frame
UK	<ol style="list-style-type: none"> 1) Pressures of economic growth are threatening the health of natural ecosystems. 2) Ecosystems play a vital role in supporting a strong economy and a fairer society but are not much recognised as such in the present economy. 3) The values of biodiversity are insufficiently recognised and need to be established by the larger society 	<ol style="list-style-type: none"> 1) Establish the value of natural capital in the measurement of economic progress 2) Promoting natural capital accounting by business 3) facilitating local action and improve nature protection by partnerships from business and civil society 	<ol style="list-style-type: none"> 1) Inclusive decision making at all levels, in which nature is fully taken up 2) Markets for ecosystem services as a means to protect nature 3) The 'Ecosystems Approach' as an overarching framework and principle in regional settings
Belgium	<ol style="list-style-type: none"> 1) Competing sectoral claims on available space lead to spatial and ecological problems 2) Inclusiveness not enough developed; neither in the economy, nor by the nature sector. 3) ES is not well developed as a way to reach the broader society. 	<ol style="list-style-type: none"> 1) Scope on multi-functionality of land to join claims 2) Development of instruments ('nature value explorer', financial instruments), building expertise networks (BEES) 3) Creation of example projects to illustrate the ES concept as overarching principle for policy decisions. 	<ol style="list-style-type: none"> 1) Policy development along policy 'silos' replaced by an 'integrated policy' with joint instruments and resources 2) A 'polluter-pays' principle to nature policy 3) Establish public support for ESA through the demonstration of mutual gains.
The Netherlands	<ol style="list-style-type: none"> 1) Nature policy and legislation is an obstacle to economic development. 2) Nature and economic policy: no strong match for the purpose of a green economy. 3) An overly developed state control does not sufficiently embrace society's many shifted green entrepreneurship. 	<ol style="list-style-type: none"> 1) Legislation and policy reinvented to synergies between nature and economy 2) Attention on 'landscape-level approach' to nature in spatial planning with less detail on particular species 3) Advocacy of green entrepreneurs and (public private) partnerships (Green deals, Green tables) and natural capital accounting by business 	<ol style="list-style-type: none"> 1) More focus on natural systems, less on specific species protection, easy nature legislation 2) Creating a 'nature-inclusive' economy (and agriculture), support economic efforts that sustain nature 3) Voluntary investments in nature by civil society, but also a binding commitment.

Table 2
Summary of the frames at the regional case study level in which 1) economy–ecology trade-off, 2) inclusive (green) economy, 3) society based nature are identified.

Region	Problem frame	Approach frame	Solution frame
UK Upland pilots	<ol style="list-style-type: none"> 1) Deterioration of cultural landscapes, pollution of watersheds. 2) Weak economic prospects of agriculture, improvement of water catchment management. 3) Gain practical experience in the approach with stakeholders. 	<ol style="list-style-type: none"> 1) Baseline study, mapping ES, valuation of ES. 2) Partnership programs (Farming Futures, High level Stewardship). 3) Participatory approach with existing partnerships. 	<ol style="list-style-type: none"> 1) Bundles of incentives: agri-environmental schemes, private payments for water. 2) Agricultural subsidies diverted to ES protection and economic resilience of agriculture. 3) Stronger support of stakeholders to meet common solutions.
UK Parrett catchment	<ol style="list-style-type: none"> 1) Recurrent flooding due to unsustainable land use 2) Lack of integration of spatial claims to flood management 3) Lack of partnerships for a joint solution 	<ol style="list-style-type: none"> 1) Scenario studies and ES mapping. 2) Developing a common framework in which values of ES are established for integrating spatial claims to flood management. 3) Stakeholder engagement and consultation in order to link partnerships for a joint solution. 	<ol style="list-style-type: none"> 1) Creating natural areas to reduce flood risks. 2) Ecosystems approach irrefutable in integrated decision making 3) Creation of a common understanding of the problems and solutions ('living within environmental limits').
Belgium Wijers	<ol style="list-style-type: none"> 1) Locked spatial planning of a nature area 2) A shared vision of a nature area in a highly urbanized location is missing 3) A lack of partnerships from different economic sectors 	<ol style="list-style-type: none"> 1) Defining, mapping and prioritisation of ES in workshops. 2) Developing a shared vision of the nature area. 3) Creation of new partnerships for the devilment of a socio-economic vision. 	<ol style="list-style-type: none"> 1) Preserving cultural heritage of the nature area (fish ponds). 2) Connecting water as a binding element of sectoral claims. 3) Conservation of scarce 'open natural' area that meets various societal objectives.
The Netherlands Gebroekerbos	<ol style="list-style-type: none"> 1) Unattractive and abandoned rural area prone to demographic decline 2) An insufficient transformation of the area for recreation services and weak economic prospects 3) Stakeholders are insufficiently involved to deliver solutions. 	<ol style="list-style-type: none"> 1) Using the sustainability windows approach to identify needs of sectors. 2) Searching for financial opportunities for transforming the area. 3) Developing a common language and attract stakeholders to deliver solutions. 	<ol style="list-style-type: none"> 1) A new transformational vision of the area. 2) Attraction of new economic activities. 3) Engagement of stakeholders to take up issues in the plan.

The summary of the main outcomes of the three frames at national level are depicted in [Table 1](#).

3.4. Comparing the country approaches

The integrated decision making, taking better account of nature in spatial planning, is a central frame in the UK and Belgium. However, respondents in the UK pointed to a critical attitude

towards the perspectives of the current planning system. They argued that it is not very realistic to aid the development of a fully integrated approach to different policy lines, as long as the government itself still works along strongly separated 'silos'. In Flanders, a similar picture is revealed, where according to respondents, the relationship between the departments of Agriculture and Nature is characterized as "a state of armed peace". Agriculture is not at all convinced that ES will work, as it comes from advocates

of nature. Representatives from the agricultural sector state that they will investigate the matter themselves. The dominant frame in the Netherlands is that nature policy itself has become too much of a governmental task, which was considered rigid and technocratic. The essay ‘the energetic society’ of Hajer (Hajer, 2011) has attracted much attention to new modes of governance engaging (new) stakeholders in the planning process of sustainability issues. The governance modes proposed by Hajer (2011) have become a base for the new nature vision of the Dutch Ministry of Economic Affairs aiming for the development of a ‘nature-inclusive’ economy (Ministry of Economic Affairs, 2014).

The policy documents frequently recognise knowledge development as part of the solution frame. The paramount importance of knowledge is undisputed in the discussion of ES, but the same cannot be said about the types of knowledge needed. Turnhout et al. (2013) state that research “[...] has focused on the generation of ever more precise knowledge with the assumption that if this knowledge is followed by effective communication, it will translate into a particular desirable ordering of social–natural relations”. In the academic world there is a strong emphasis on a better understanding of the approach both in terms of biophysical and economic aspects. Honey-Rosés and Pendleton (2013) warn for this ‘supply side paradigm’ in which much less knowledge is developed to the informational transfer and use to policy makers. They argue that “better information about ecological processes or abstract [economic] valuations will not spur better decision making” (see also Jordan and Russel, 2014).

4. Findings at the regional level

Building ES into formal decisions and plans is just one part of the policy formulation. Equally important but much more of a challenge is the so-called mainstreaming of ES into the relevant ‘bodies of policy’ (see also Schleyer et al., 2015 for critical comments on this issue). The pilot or case studies in which the ESA is implemented did not start from ‘scratch’. All cases had a long history of failed spatial planning processes, competing objectives and the like. The attempts to adopt an ESA were also a means to create ‘new energy’ in deadlocked regional processes.

4.1. Problem frames

In the Upland pilots in the UK landscape deterioration, land (mis)management and declining financial support to the region were the main problems. Some of the Upland areas provide over 70% of drinking water to urban areas (Defra, 2011a), while water quality is buffered against diffuse and point pollution and can help to regulate flooding (Defra, 2011a). These findings were the starting point of the study on payments for ES. The main objective of the upland pilots engaged by Natural England was to demonstrate the ‘ecosystems approach’ in practice.

The Upland pilots were built on existing partnerships. In the South West, this was initially the Upland Task Force (Waters et al., 2012). In Dartmoor the starting point was the revision of the Dartmoor Vision. This vision guides hill farmers to manage natural and historic resources (Defra, 2011a). In Exmoor the partnership of stakeholders focussed on Wimbleball Reservoir, which is mostly enclosed farmland and collaboration with individual farmers was engaged (Waters et al., 2012).

River flooding and concomitant damage to infrastructure and housing were the main problem in the Parrett Catchment Project in the UK, which was initiated in 2000 by the Environmental Agency (Environmental Agency, 2009). It started as a partnership of over 30 organisations and a management group of 8 central actors that included local government and interest groups from

nature and agricultural organisations. While the first key objective was to reduce flood risks and initializing adaptive measures to flood control, the ‘ecosystems approach’ was later introduced on behalf of Defra. The University of Nottingham (Centre of Environmental Management) took up a study on tools and methodologies to deliver an ecosystems approach, referred to as Catchment Futures (Potschin et al., 2008).

In the Wijers (Flanders), the Flemish Land Association (VLM) had previously (2007) developed a master plan for the area. The project developed in this plan focused on the cooperation between the different governmental levels (Flemish parliament, provincial and municipal) and cross links of policies (environment, rural development, nature conservation, integrated water policy, mobility and spatial planning, culture, heritage policy) with the aim to achieve an efficient and effective synergy for future development and conservation of the area. The master plan developed two objectives to define a territorial strategy to cope with climate change, and to structure, document and evaluate the progress in the pilot (Facts, pilot description of The Wijers, 31-3-2010). According to the stakeholders, the commonality of this plan never matched the sectorial goals and interests. In close cooperation with stakeholders, VLM developed a new common vision which had the overarching goal to take up sectorial needs using the ES approach. This vision was embraced by stakeholders, since ES were the common goal of development.

In Gebroekerbos (the Netherlands), the main objective was to make new spatial connections between the urban and rural landscape as well as a mode to stimulate new economic development in an area of population decline. The green and blue infrastructure in the rural area is deteriorating due to budget cuts and new management plans have to be developed engaging private partners and funding. The transformation plan of Gebroekerbos thus seeks for a variety of new land uses and economic development to enable the envisaged land use change.

4.2. Approach frames

In each Upland pilot a baseline study was established in a participatory stakeholder process. Each baseline contained a summary on the characteristics of the area, including a series of maps of individual ecosystem service provision, maps of beneficiaries and appendices with additional relevant data (Waters et al., 2012). Most data were derived from national sources, but some organisations brought in local data or proxies were developed. In one Upland pilot, South Pennines, there was considerable focus on the valuation process (Harlow et al., 2012), but in the other two Upland pilots the valuation was not found to be influential in the decision making process or the delivery of the pilot goals (Waters et al., 2012). Based on the Dartmoor vision and the establishment of a stakeholder process, maps were created and a partnership between farmers and statutory agencies evolved into the Dartmoor Farming Futures Project (Waters et al., 2012).

The Upland pilots used the ecosystem services cascade framework (cf. Haines-Young and Potschin, 2010) as a mode of operation (see also Spangenberg et al., 2014). In this framework scenarios were developed after which management options were identified for sustainable land use. Respondents noted that the various steps in the framework, intended to be sequential, were taken up by stakeholders in parallel. Stakeholders switched between steps, to better understand. To arrive at useful management tools, participants worked on a matrix of management changes related to ecosystem services. For each combination an assessment was made. This matrix was formalized into an Ecosystem Services Transfer Tool, developed in a spreadsheet.

Catchment Futures in the Parrett Catchment took up scenario studies as a basis for ES mapping. Scenarios were developed to give

more insight into possible future trajectories (Potschin et al., 2008). Decision makers in the case study argued that the ecosystems approach should be obligatory and irrefutable in (spatial) planning. However more than 80% of the stakeholders disagreed that the institutional setting is not able to overcome the current barriers to deliver a sustainable solution to the area. Potschin et al. (2008) suggest to make typologies of services when mapping ES and to study value transfer in more detail. They conclude that current data might not be sufficient to assess all types of services.

The ES approach in the Wijers started with the organisation of three series of workshops. In the first series a vision was developed on the cultural ES by stakeholders from the recreation and education sector. In a second series the producing and regulation services were studied. Various types of stakeholders participated, ranging from land owners, farmers, municipalities, NGO's, various types of citizens groups, researchers and universities. For each type of land use potential ecosystem goods and services were defined. Moreover, within various clusters the goods and services were prioritized. This prioritisation suggests a type of valuation, which was taken up using a card box game (Keune et al., 2013). A third workshop series was devoted to the development of a socio-economic vision of the area. About 50 different organisations were invited to develop such a vision. The valuation of services was postponed to a future project called ECOPLAN.

The executive public body of DLG and the local municipality of Heerlen were strongly involved in the development of the Gebrookerbos area. DLG frames the ESA as 'sustainability windows', rather than using the TEEB definition and approach. This framework comprises a matrix of various land uses (nature, agriculture, water, infrastructure and build-up areas) and the three pillars of sustainable development; people-planet-profit. In each pillar different aspects were denoted, such as biodiversity, landscape quality, social contacts, and sustainable agriculture. Stakeholders were invited to define problems within this matrix. In addition, in 2011 ES were separately introduced in the Gebrookerbos project by means of a scientific scoping study (Smit et al., 2011). Results of this study, however, were not used in the participatory process. In the 'sustainability window' matrix, various private initiatives were bundled, and initiators were encouraged to find their own financing mechanism. Nature development in the area was taken up by the water board in combination with other functions, like recreation.

4.3. Solution frames

In the Uplands the participatory process reached various degrees of implementation. First, Natural England wanted to bundle different kinds of agri-environmental payments, both national and EU funding to farmers into payments to deliver ecosystem services. In Dartmoor *Farm Futures* and in South Pennines and Bas-senthwaite *High level Stewardships* and *Woodland Grant Schemes* were developed. New private-private instruments were developed by for example South West Water, a private water company in the Uplands. They developed a scheme for payments to farmers to maintain a high water quality. The company requested a change in agricultural management towards less nutrient and pesticide use. The first contracts were expected due in 2015 and 2016.

According to the respondents, the participatory approach in the Uplands has resulted in stronger support and confidence of stakeholders to meet broadly accepted solutions. There are risks associated with such a participatory approach. It is time demanding and requires specific skills, while governmental agencies have to be prepared to exert little control on the process. Possible outcomes suggested by stakeholders may not always be suitable within the policy context. However, the resulting solutions can be more robust and sustainable.

In the Parrett Catchment the key issue of the project was to create new wet grassland, fens, reed beds and wet woodland, which can help to restore the natural function of the catchment to attenuate flood waters (Environmental Agency, 2009). The project however, remained largely at a stage of developing tools and methods. The participatory work did not result in univocal decision making around providers and beneficiaries of ES. The solution frame in the Parrett Catchment revolved more around the 'inclusive' decision making in which nature and economy are connected through ES. Promoting the 'ownership' of the concept as a joint principle was the main outcome of the process.

The sectoral claims on the area and the issues of biodiversity protection in a highly urbanized region were the main challenges in the Wijers case study. The fish ponds were seen as an overarching element to combine sectoral claims. The series of workshops in the Wijers resulted in so-called 'orientation notes' which were bundled into a final document listing a selection of challenges for the area, rather than the delivery of a 'masterplan'. The outcome of the Wijers process also resulted in a design-oriented research approach and concomitant solutions. The ES were mostly used to focus on key challenges for the area, rather than developing incentives to deliver ES.

The problem of a deteriorated rural landscape in the Gebrookerbos area was changed into an opportunity to develop a green network connecting the rural hinterland to the city of Heerlen (Fontein et al., 2011). In the solution frame recreation and tourism were the main pillars for development. A design of the future landscape was made and in the final plan challenges were developed to meet the requirements. The challenges evoked financing initiatives, citizen participation and commitment of companies and organisations. Nonetheless, the actor network was still dominated by many governmental bodies, like the municipality, province, water board, the city region and the ministry of Economic Affairs (Fontein et al., 2011). The final plan should deliver an attractive landscape, while due to governmental budget cuts the developmental parties in the area were forced to search for own funding. The participation of various stakeholders and exchange of knowledge are seen as important results of the process. The summary of the main outcomes at the case study level are depicted in Table 2.

4.4. Comparing ESA in the cases

A comparison of the implementation of ES in the different cases can provide information on the extent the TEEB-approach is used. Since the Parrett catchment case only delivered methods and tools to be applied in a later stage, we compare the Upland pilots in the UK (Fig. 3) with the cases in Belgium (Wijers) and the Netherlands (Gebrookerbos) (Fig. 4). The different steps distinguished in the approaches are labelled/interpreted according to the three frames, as depicted in Fig. 1.

The first two steps in the TEEB-approach, problem definition and identifying ES, are taken in all cases in a similar way. In addition, the scope on ES was more broadly defined in the Netherlands as 'functions' to be realized, not necessarily connected to ES. In the approach frame, the UK cases lead to explorative studies, e.g. mapping ES and developing baseline studies. However, an important addition is the development of a shared vision, which can be considered a step in itself. In the cases in Belgium and the Netherlands explorative studies were also taken up. Engagement of new stakeholders for future implementation was also part of the approach frame. In the solution frame, the stepwise TEEB-approach includes policy appraisal and impact assessment. While in the Upland pilots management and various types of incentives can be considered a type of policy appraisal, impact assessments are not (yet) carried out.

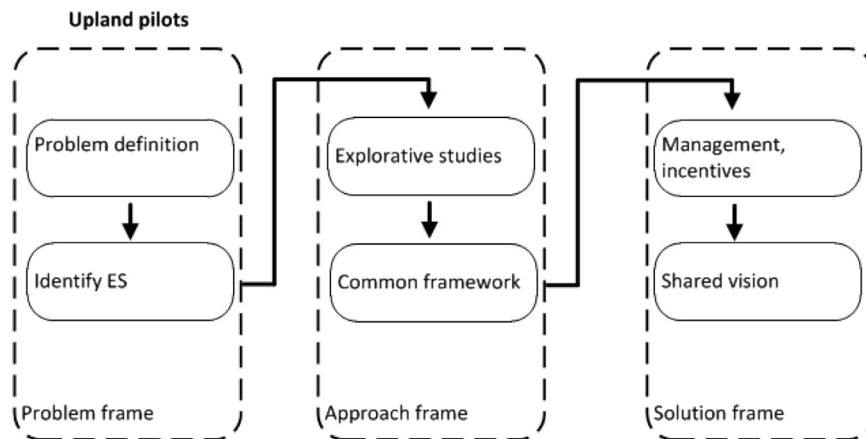


Fig. 3. The steps taken in the problem, approach and solution frame in the UK Upland pilots.

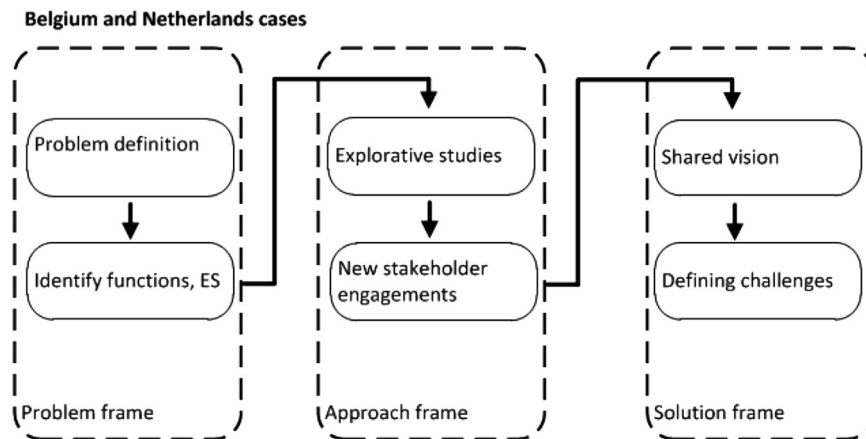


Fig. 4. The steps taken in the problem, approach and solution frame in the Wijers (Belgium) and Gebrookerbos (Netherlands) cases.

An important outcome of the process in the UK is a common vision of the area. Also in Belgium and the Netherlands this is the case, resulting in a list of challenges to stakeholders. However, in Belgium and the Netherlands the processes did not lead to incentives or new policies. The challenges might direct to new incentives in a later stage, but are not (yet) part of the solution frame. The apparent lack of an impact assessment in the Belgian and Dutch cases might be due to the 'design-oriented approach' that puts more emphasis on opportunities rather than on problems.

The stepwise TEEB-approach points at the assessment of expected changes in availability and distribution of ES (TEEB, 2010b). This requires some form of scenario studies in which alternatives are compared. In the Upland cases, which resemble the stepwise TEEB-approach the most, baseline studies were taken up to estimate the future state of ES. However no alternative scenarios were elaborated nor compared. The monitoring of the progress and development of ES in the pilot areas is likely to be implemented in the new agri-environmental schemes and by the private incentives of the water company. In the cases of Belgium and the Netherlands scenario studies or alternatives were not developed. Also future monitoring is not explicitly dealt with. Biodiversity objectives in the protected parts of the nature areas are monitored by governmental bodies, but a monitoring program of ES and the development of biodiversity are not (yet) developed in most parts of the case areas.

5. Discussion

Mainstreaming the concept of ecosystem services requires both horizontal and vertical policy integration (Schleyer et al., 2015). As

Schleyer et al. (2015) pointed out, mainstreaming has different meanings connecting both expectations and challenges. In the United Kingdom (UK), Belgium and the Netherlands the concept is incorporated in various policy documents and domains, indicating horizontal integration. The national problem frames address a multitude of policy domains, such as agriculture, environment and nature. The vertical integration requires involvement of different governmental scales and stakeholders. In the Dutch case for example, this integration is to be achieved by new interactions between government and civil society.

In our study material two main challenges emerge in the application of the concept. First, the problem frame of the national policies refers to the envisaged 'win-win' solution to the economic-ecological trade-offs. This points at the expectation that economic growth can be decoupled from environmental pressures, leading to a gain in both aspects. This issue, however, is assumed rather than backed up with (scientific) evidence (McShane et al., 2011; Muradian et al., 2013). If long term achievements do not meet such 'win-win' solutions, new conflicts may rise leading to less support. In the UK, our respondents pointed at strong discussions among stakeholders on the issue of 'living within environmental limits'. Stakeholders were willing to use the concept, but if economic development would become curtailed support of the concept is expected to decline. We therefore suggest to rephrase the 'win-win' into an 'acceptable loss' frame. This may also indicate the extent to which the concept can deliver acceptable solutions. The second challenge is that nature policy is moving from a governmental directive to a more voluntary society based mission, which requires a participatory approach.

In the regional cases, we identified a number of insights into how an ecosystem services approach is applied and which lessons can be drawn. These are discussed below.

5.1. The need for tailored objectives

It is of great importance to carefully develop and adjust the objectives of a policy and the approach to each other, in order to accommodate the intended change (e.g., [Menzel and Teng, 2010](#)). In the case of ES, the objectives will always carry a type of change that involves the integration of nature values with economic activities ([De Groot et al., 2002](#)). Such change cannot be controlled by a single actor or leader ([Ansell and Torfing, 2014](#); [Termeer and Nootboom, 2014](#)). The approach therefore requires forms of collaboration that bring together different interests, resources and disciplines ([Termeer and Nootboom, 2014](#):170). The stakeholders involved in the Wijers master plan (Flanders) experienced unease regarding the objectives of the plan because in their view various sectoral goals were not included. A solution was found by jointly elaborating a new shared vision.

This is an example of the importance of defining objectives in close conformance with the problem that is to be solved. The objectives are subsequently a guidance for choosing an approach to be put down in a plan. In practice, the actors involved should be allowed to engage in lengthy interaction to achieve a joint understanding of both the problem at stake and the ways forward. We observed that in the UK, it has been tried to achieve such a level of interaction but it appears that this is a time consuming process. In the UK, policy makers at the Department for Environment, Food & Rural Affairs (Defra) have explicitly tested the ecosystems approach as an area based planning approach, engaging stakeholders during a considerable time period. The lesson here is that much effort must be put into the process of matching objectives and approach. Yet this proved to be hard to achieve, because there was scepticism among stakeholders concerning the ability of policy makers to actually achieve such an integration (e.g., [Cowling et al., 2008](#)).

To aim for an efficient delivery of services can attract other aims, as in a cascade of objectives: better awareness, mutual understanding and the identification of sufficient means and possibilities to act as intended. Except for the UK private water management example, the approach is still strongly driven by biophysical and economic data provided by experts, while the ideas and concepts remain abstract and general (e.g., [Menzel and Teng, 2010](#)). This is far from any joint learning process where the parties can find a common ground. Defining the problem jointly among all stakeholders and efficient communication are crucial elements to the development of a shared goal ([Bouwen and Taillieu, 2004](#); [Menzel and Teng, 2010](#); [Termeer and Nootboom, 2014](#)). Only then can agreements lead to legitimate results. As one of the UK respondents argued: “the question is how a lengthy process of building up joint experiences can be facilitated if the government itself is not willing to do so”. A joint set-up between public and private parties could be part of the answer.

5.2. The language of participation

To achieve collaborative action, actors need a common language. Language is essential to trigger joint set-ups and participation. The case studies show that a match between language and participation is important to the ability to achieve results. The language associated with the approach such as the definition of ecosystem services, was for many stakeholders in the case studies too technocratic and it did not trigger enthusiasm (e.g., [Waters et al., 2012](#)). However, as stakeholders became involved in the various stages of the ESA, from problem framing to developing

workable solutions (and to the final implementation), the process is pulled more towards the language of the participants. This is a process where the joint development of local knowledge can help. Since the ‘economization’ of ES in terms of monetary valuation of services is of great importance in TEEB, it is a challenge to the facilitator to feed the process with appropriate language and useful practices. In the UK, it is concluded that knowledge development must relate strongly to the language employed by the stakeholders. From this insight, Natural England strived for a ‘socially negotiated framework’ as the frame for progress; a bottom up approach which in turn could bring a specific valuation approach ([Waters et al., 2012](#)). This may imply that the ‘end points’ of the process are uncertain, but the process itself should bear a strong public support. The proposed framework was successful, because stakeholders sensed that they were taken seriously and their solutions were taken up by the government ([Waters et al., 2012](#)).

5.3. The need for an empty signifier to affect convictions and interests

In the scientific literature, much debate revolves around the definition and use of the concept of ES. While [Schröter et al. \(2014\)](#) pointed at the weaknesses of the concept due to its vagueness of definitions, classifications and its normative structure, [Abson et al. \(2014\)](#) and [Kull et al. \(2015\)](#) emphasised this vagueness allows for a so-called boundary arrangement. As defined by [Schleyer et al. \(2015\)](#) a boundary arrangement is a concept that refers to the same object, phenomenon, or process by different disciplines or perspectives, but carries different meanings to those disciplines or perspectives.

In the UK case studies, Natural England (NE) brought the ES concept into the participatory process at a very early stage. Without using strict definitions NE wanted to attract interest of stakeholders rather than formulate accurate descriptions. During the participatory work the stakeholders developed the concept further. This example shows that the ES concept can be used without a strong debate about its definition. Research may run a risk of putting too much energy in better information and educating stakeholders, thus narrowing down the application to the original intent, to the extent it may silence any further engagement and development. Therefore the ES concept might serve as a so-called *empty signifier* (i.e., [Mehman, 1972](#)); it is a concept without any referents, it does not carry strong fixed meanings and as such it does not point to any established interests. It is therefore suitable to mobilize the stakeholders to join and search for common solutions through the development of a common language.

5.4. The governance of participation

Governments can strongly benefit from stakeholder participation, since participation leads to better quality and more legitimate decisions and finally more resilient communities ([Folke et al., 2002](#)). It is also likely that the implementation of ES is then better accepted ([Dorcey and McDaniels, 2001](#); [Webler et al., 2001](#)). In all cases governments were searching for stakeholder participation to bring the concept of ES into practice. Communities, such as those in the UK cases, often have an appetite to engage but they need continuous support, information, advice, resources and time for durable commitments ([Dunn et al., 2011](#)). When solutions rely on changes in the behaviour of those within the community, emphasis on a community-led action is beneficial ([Dunn et al., 2011](#)). The problem, however, is that this requires a long term commitment where governments aim for short term achievements. It is difficult to bridge cultural barriers in such short time spans. In addition in many cases, groups of actors distrust each other while

policy implementation depends on some kind of joint collaboration (Leach et al., 2002). This may lead to conflict, lower levels of legitimacy, and unsatisfying experiences for participants (Leach et al., 2002). In particular the UK cases show that the project managers were well aware of and concerned about this challenge.

Success of the participation process also depends on tangible outcomes from participants forming a group able to collaborate on the matter at hand (Dunn et al., 2011). It is this process that needs to be facilitated, ensuring a match between the different expectations and interests and the desired outcome (Ibid). However, it is far from obvious that such a participatory process will (always) deliver a desired outcome. For example Warleigh (2003) warns against a process which provides such (area based) groups with influence. It is not obvious that such group processes will be legitimate. They might seem to produce commitment, capacity and leverage, but following Warleigh (2003:105), the issue of representativeness of actors can be a reason of concern.

5.5. The puzzling attraction of markets

The preferred use of market based approaches to deliver ES appears to be adding a burden to the already demanding job of facilitating the process. The challenge is that many participants in the cases seemed to be sceptical to market solutions, while governmental agencies, in particular in the UK cases, emphasised the willingness to use new kinds of market instruments. Although there is a widespread aversion towards payments for such services in the cases, we observed that governmental subsidies still remain the major financial instrument. This evoked doubts concerning the advantage of the ESA in the cases: people were already used to public funding, and if this remains a matter of public funding, what is the value added of the ESA? This matter is of great importance, as it might take all the energy out of the process if not dealt with carefully.

The non-legal and non-binding character of ES is therefore a puzzle for policy makers. On the one hand, it fits the timeframe of a green economy and the dominant 'neoliberal' view on the management of public goods (e.g., Turnhout et al., 2014). On the other hand, it also calls for an inquiry into the vulnerability of such voluntary schemes. For governments a major challenge is the monitoring of the process. It is a necessity for maintaining credibility and a social basis for any payment of ecosystem services (e.g., Muradian et al., 2010). Governments need to make a clear frame of reference, in participation with stakeholders, under which legislative conditions a market instrument can be used (e.g., Mulgan, 2000; Tacconi, 2012). However, putting too much emphasis on the benefits alone, may lead to a risk that ecosystem managers change their behaviour with regard to natural assets into something that can generate income for a few individuals rather than to be beneficial to the community (Lindenberg and Steg, 2007; Moore and Loewenstein, 2004).

A major challenge is that the outcomes of voluntary schemes are uncertain while experiences with market instruments are premature at best. The scientific knowledge on the provision of ecosystem services is still limited (e.g. Muradian and Rival, 2012; *Natural England*, 2015). This may result in a type of management that *Natural England* (2015) in the UK cases summarized as "ecosystems [can] deliver complex bundles of ecosystem services that tend to be skewed towards those that can be traded in markets". Among economists doubts are also raised regarding the reliance on market incentives alone, indicating that additional governmental policies are still needed (e.g., Robertson et al., 2014; Farley 2012).

6. Concluding remarks

Although the cases were very diverse in scope and approach, our material allows for a number of observations that deserve further attention. First, the ecosystem services approach requires multiple forms and modes of societal involvement. These call for new qualities of public policies and new roles of governments. New roles include the willingness to engage participatory processes at various governance levels, such as collaborative governance described by Primmer et al. (2015). New qualities of policies encompass new types of contracts, ample resources, sufficient knowledge on ES and long term commitment. In the cases we studied, various government bodies and other stakeholders are involved but longer term commitment is not (yet) guaranteed. Critical aspects to guaranteeing this commitment are the availability of resources in the long run and a demanding participatory process that requires substantial perseverance and conviction.

Second, developing ES as a boundary object appears to be of great importance. This calls for a 'sustainability frame' among all stakeholders where the framing is able to bind sectoral objectives and interests. Although time consuming, joint problem framing is essential in order to establish a common approach and deliver sustainable solutions.

Third, the approach studied in our cases mostly elaborated on the 'multi-functional' aspects in rural landscapes, while it was not applied to nature conservation areas. Therefore we could not test the use of an ESA to support biodiversity conservation in nature areas like governmental policies are aiming for. Future pilot cases would be needed in order to test the implementation of the concept in nature areas as well.

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Appendix A. Supplementary material

Supplementary data associated with this article can be found in the online version at <http://dx.doi.org/10.1016/j.ecoser.2016.03.006>.

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