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Maximising the value of research on ecosystem services: Knowledge integration and guidance tools mediating the science, policy and practice interfaces

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ABSTRACT

Progress towards sustainable development ultimately depends on policy makers' and practitioners' capacities to protect Natural Capital (NC) stocks so that they are not exploited beyond Earth's capability to renew them. This involves a sound understanding of the benefits and values derived by society from NC and ecosystem services (ES). Scientific evidence to support this understanding is growing rapidly, but access to the data, methods, tools and expertise that underpins this evidence base is fragmented, particularly at the science – policy – practice interfaces. Two large EU research projects have therefore developed a joint knowledge platform – called Oppla – aimed at providing access to a wide range of resources on NC and ES. This new approach in the EU Research Area aims not only at integrating knowledge into one single platform, but also at making this knowledge operational amongst communities of science, policy and practice. Furthermore, it fosters the more efficient use of research funds by providing an open and freely available platform in which existing and new NC and ES projects can integrate their outcomes. This paper focuses on the knowledge integration and some guidance tools within Oppla to help users to find research outcomes.

1. Introduction

Progress towards sustainable development ultimately depends on the capacity of policy makers and practitioners to properly define, target, implement and evaluate strategies to keep the use of stocks of Natural Capital within the Earth's capability to renew them (UN, 2015, Erhard et al., 2016). They need to draw on a sound understanding of the benefits and values derived by society from Natural Capital (NC) and ecosystem services (ES), and of their relevance in many sectors including agriculture, forestry, tourism, health, energy and water (Chan et al., 2012, Furman et al., in press). The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) recognises the need to strengthen the science-policy interface for NC, ES and nature-based solutions for long-term human well-being and sustainable development. However, it has been emphasised that to be effective, the IPBES must draw on a much broader range of knowledge holders and stakeholders (Turnhout et al., 2012).

Whilst there is a growing body of scientific evidence about the social and economic benefits of NC and ES resources (see e.g. Jacobs et al., 2016), the landscape of science, policy and practice interfaces is still very fragmented. Information and Communications Technology (ICT) is increasingly seen as a key tool to create effective mechanisms that mediate these interfaces (Arts et al., 2015). More specifically, web portals can support policy action towards sustainable management of natural resources. For example, portals can support the outreach of relevant policies and instruments to a broad range of actors involved in the delivery of ES. They can also support coherence across sectoral policies and integration of various policy fields (biodiversity, water, energy, agriculture, forestry, etc.) by offering services, tools, and knowledge from a community representing multiple sectors and interests. Furthermore, web portals with state-of-the-art knowledge on NC and ES can provide a cost-effective channel of communication, enhancing the sharing and dissemination of data, information, knowledge, and empirical evidence. There are a number of initiatives in this direction,

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including the Biodiversity Information System for Europe (BISE) (biodiversity.europa.eu), ValuES (www.aboutvalues.net), Ecostar (www.ecostarhub.com), the Natural Capital Coalition (NCC) (naturalcapitalcoalition.org), and the Ecosystem Services Partnership (ESP) (www.es-partnership.org). A remaining challenge for all these web portals is to mobilise information effectively and to provide practical and tailored solutions for integrating ES into management and decision-making.

In this paper, we describe a set of interlinked guidance tools, as well as their development process, underpinned by co-design and co-production with the end users. These tools provide assistance in finding methods and approaches that are fit for purpose in a broad range of management and policy-making contexts in different social-ecological systems and institutional contexts. They include a Case Study Finder, an Ecosystem Service Assessment Support Tool (ESAST), a set of Decision Trees, and a tool for filtering different methods based on their requirements using a Bayesian Belief Network (BBN). These tools are hosted by Oppla (www.oppla.eu), which is a new knowledge platform where the latest thinking on ES, Natural Capital and nature-based solutions is brought together. Oppla has been developed jointly by the OpenNESS (www.openness-project.eu) and OPERAs (www.operas-project.eu) projects, and it is underpinned by a community of practice including research organisations and businesses (Delbaere et al., 2014, Brown et al., 2016, 2017).

2. Background on the Oppla web-platform

During the past four years, 60 research institutes, professional organizations and Small and Medium Enterprises (SMEs) from European and non-European countries, collaborated on developing and testing new tools and methodologies with regards to operationalising ES and NC in practice (see for overall description Jax et al., 2018). This is a new approach in the European Research Area, aiming not only at integrating the knowledge on NC and ES produced by the two projects into one single web-platform – Oppla –, but also at sharing effectively the working examples, best practices and quantifiable evidence amongst researchers, policymakers and practitioners, to make the knowledge operational amongst communities of science, policy and practice. This has also resulted in a more efficient use of the EU research funds by reducing the cost and time invested in both projects for developing their own web portals.

Oppla was co-designed with various user groups using a participatory approach. Consultation with the user groups resulted in a definition of Oppla as 'a platform to enable business, citizens and policy makers to better manage our ecosystems for human well-being. It should facilitate the sharing, obtaining and creation of knowledge to better manage our environment.' From the resulting long wish list (see Table 1), the following five key products and services were given priority (Verweij et al., 2015):

- case studies and narratives to learn from the experiences of others;
- marketplace to share tools, methods, data, services and documents;
- guidance to structure all the available information and sign-post users to relevant information;
- expert listing to connect experts and different actors;
- a Q&A helpdesk service.

Fig. 1 shows a screen impression on how these elements are incorporated on Oppla.

The following section describes a set of guidance tools that were developed for Oppla mainly by the OpenNESS project, as part of the 'guidance to structure all available information'. The tools integrate and guide users in a seamless fashion to methods and tools, and main projects outputs, including the case studies.

3. The guidance tools

Given the abundance of information and approaches to assess ES, guidance is essential to help practitioners, policy makers and researchers to find what they need, in accordance with their needs and constraints (Harrison et al., 2018). In this section we describe a range of guidance tools aimed not only at integrating the project's research outcomes, but also at guiding the user to find them in Oppla. The tools include:

- ESAST – a comprehensive guidance tool that contains links to other guidance tools (see section 3.2);
- Case Study Finder – for guiding users to case studies according to a user's need (see section 3.3).
- Decision Trees (DTs) – for structuring the process of selecting relevant ES methods (see section 3.4);
- Bayesian Belief Network (BBN) tool – for filtering different bio-physical, socio-cultural and monetary assessment methods according to a user's needs (see section 3.5).

The tools were co-designed with various end-users through an iterative participatory process described in section 3.1.

3.1. Co-design and co-production approach of the tools

In order to include the needs from the end-users into the guidance tools from the very start of the development process, their conceptual and technical designs were closely interlinked using software engineering science. Software engineering addresses all aspects of developing information and collaboration systems, with the focus on methods for transfer of a question or problem into a software system. From the development approaches reviewed by Verweij et al. (2010), we chose the *User Centered Design* approach (Raskin, 2000) software, because it involves iterative design and testing with the expected users throughout the development process. Each iteration builds on insights from a previous one. There are many advantages of co-design, including a higher degree of satisfaction from users through an improved understanding of their needs, better relationships with and support from users, the generation of new ideas, better market acceptance and a better cooperation between developing individuals and organisations (Steen et al., 2011, Verweij et al., 2014).

Several user groups were used for the co-design of the tools: the OpenNESS project partners during the four annual project meetings, and smaller groups or individual interviews with representatives from business (e.g. Shell,[1] ENI),[2] society (e.g. IUCN, Eurosite,[3] Europarc,[4] EC and some Dutch municipal governments) and academia, in many ad-hoc meetings. In this way representatives from business, society, policy and academia contributed to the design from their different perspectives.

The process of co-designing the tools included three phases, which are linked to their software development: (i) *Scoping* – requirements inventory of the process aspect; (ii) *Software concept* – structure and design of the system aspect; and (iii) *Technical implementation and technical architecture* – (re)use of a technology aspect.

[1] http://www.shell.com/.
[2] https://www.eni.com.
[3] http://www.eurosite.org/.
[4] http://www.europarc.org/.