



Assessment and illustration of cultural ecosystem services at the local scale – A retrospective trend analysis



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ABSTRACT

There is a need to develop non-monetary methods for the assessment of cultural ecosystem services, in order to integrate them into the ES framework in a more balanced way. With this in mind, an adequate and comprehensive indicator base and mapping methods are required to communicate and discuss cultural ecosystem services, for it to be understood holistically. Referring to land use changes as an important driver for ES changes, we demonstrate the analysis of cultural ecosystem services trends, in a retrospective, as a supporting tool to better understand social and natural interactions as drivers behind land use changes, which are reflected in the landscape scene. There are two main outcomes of this study: (1) first, we developed and tested a catalogue of indicators as an approach to evaluate cultural ecosystem services trends at the local scale and (2) we established a mapping method for cultural ecosystem services trends in parallel with land use changes. This we did following the example of the afforestation processes which had taken place since the 19th century in the suburban area of Göttingen (Lower Saxony/Germany), called Hainberg. Our main conclusion is that cultural ecosystem services trends can indicate the reasons and drivers for land use changes that can be beneficial to forest/landscape management issues by means of the restoration of lost services. The proposed assessment method can be integrated into the development of future landscape plans, e.g. by providing information on historical guiding principles.

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1. Introduction

The assessment of ecosystem services (ES) is currently one of the most popular topics within several disciplines, like ecology, economy, geography, and the social sciences. ES, which are defined as the “benefits people obtain from ecosystems” (MA, 2005), result from the linkage between the structures and functions of ecosystems and human needs and expectations (Daniel et al., 2012). Thus, an interdisciplinary approach is indispensable for their analysis (Tengberg et al., 2012; Grunewald and Bastian, 2013).

Since the establishment of the MA framework (2005) the political relevance of ES discussion has been disseminating (Daily et al., 2009), e.g. by the analytical framework for ES assessments under action 5 of the EU biodiversity strategy towards 2020 (Maes et al., 2013) as a helping tool to map and assess ES of EU-member states on the national level. All are based on the categorization and further differentiation of the following four essential types of ES:

supporting services, provisioning services, regulation services, and cultural services. In our study we focus on cultural ecosystem services (CES), described as “non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences”, and connected to 10 subservices, to wit: cultural diversity, spiritual and religious values, knowledge systems, educational values, inspiration, aesthetic values, social relations, sense of place, cultural heritage as well as recreation, and ecotourism (MA, 2005). According to the categorization system of CICES (common international classification of ES) CES “include all non-material ecosystem outputs that have symbolic, cultural or intellectual significance” by dividing them into (1) “physical and intellectual interactions and (2) spiritual, symbolic and other interactions with biota, ecosystems and land/seascapes” (Maes et al., 2013). Others see CES as the “ecosystems contribution to the nonmaterial benefits (e.g. capabilities and experiences) that arise from human-ecosystem relationships” (Chan et al., 2012b).

Many studies underpin that cultural aspects – such as aesthetic values, inspiration, and sense of place – are indispensable for assessing cultural landscapes (Schaich et al., 2010; Tveit et al., 2006). These are not only motivators for the ownership and

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management of land that enriches human life (Chan et al., 2012a; Daily, 1997) but also important drivers for the protection of ecosystems, in taking care of the cultural value of our surroundings. Therefore, cultural values – derived from traditional aspects/customs and conventions – are definitely reflected in the “characteristics” of landscapes, an “area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors” as defined in the European Landscape Convention (Council of Europe, 2000). This way, CES are unique and irreplaceable values of our cultural landscapes.

For the maintenance of multifunctional and sustainable landscapes the well-known three pillars of ecological, economic and social dimensions have to be satisfied. Although the framework of ES is based upon an anthropocentrically oriented idea of human well-being (Chan et al., 2012b; Grunewald and Bastian, 2013), where cultural values essentially make a contribution (Wu, 2013), CES are still receiving insufficient attention, due to the difficulties that accompany their operationalisation and quantification (Daniel et al., 2012; Chan et al., 2012a; Plieninger et al., 2013). However, CES are not the only services that have to deal with incommensurability (Satz et al., 2013).

The biggest problem is that there is no commonly accepted framework for assessing CES (Chan et al., 2012a). With a weak social pillar and without a defensible framework of CES, the ES framework is not comprehensive (Chan et al., 2012b). There are many arguments, discussions and suggestions on how to incorporate a wider set of social perspectives into the ES framework. Chan et al. (2012a), for example, propose a framework for CES research and practice while Satz et al. (2013) deal with challenges for the analysis of CES like “interconnected benefits with other services, incommensurability, plurality of values, relevant units”. In addition, Tengberg et al. (2012) foster the involvement of cultural heritage assessment for the evaluation of CES.

Another problematic undermining of CES is that no adequate indicator catalogue for its assessment has been developed so far (de Groot et al., 2010). According to the workshop report of UNEP-WCMC (2009), ES indicators in the MA framework (2005) have to deal primarily with provisioning services. Only 38 indicators out of 217 were suggested for CES assessment, mainly those related to the subservices of “recreation and ecotourism” (UNEP-WCMC, 2009). This demonstrates the marginal and non-comprehensive treatment of CES in a rather disillusioning way. Moreover, the quality assessment indicator of Hernández-Morcillo et al. (2013) showed that “cultural service indicators are generally lacking in terms of a conscious conceptualization of the subject to be measured, which may lead to confounding outcomes”. Müller and Burkhard (2012) stress the strong demand for the development of a comprehensive indicator-set and they also name useful criteria for improving the suitability and quality of ES indicators, e.g. defining the clear “link and cause-effect relations between indicator and indicandum” as well as “transparency of the indicator derivation strategies”.

With regard to the relevance of ES-assessment for planning, the next challenging topic is related to the spatial definition of ecosystem or landscape functions (de Groot et al., 2010). Maps have a high potential for supporting the understanding of complex systems and interrelationships (Grêt-Regamey et al., 2008). Mapping of ES has been listed as one key element that is required in order to improve acknowledgement and application of ES in organisations and decision-making processes (Daily et al., 2009). Hernández-Morcillo et al. (2013) emphasise that the lack of an approach for ES communication and mapping can be solved by involving stakeholders and using participatory mapping tools. Moreover, the mapping of CES allows the illustration of intangible values and their dynamics spatially, thus promoting their interpretation within other ES (van Berkel and Verburg, 2012) and greatly enhancing awareness of CES. Spatial inventories of

cultural services via mapping approaches can further help to identify possible trade-offs with respect to other local to regional scale ecosystem services. This way they would provide important information as a basis for decision-making in regional landscape planning (Bieling and Plieninger, 2012; Schaich et al., 2010). Additionally, the political interests towards mapping problem shows the discussion paper by Maes et al. (2013), mentioned above. It demonstrates that mapping ES is the most useful tool for prioritize and identify spatially explicit problems as well as it can be a useful communication tool for initiating discussions with stakeholders in planning processes.

There is a clear consensus that ecological processes occur within a temporal setting and that they undergo changes over time that are strongly connected to land use changes. “Landscape changes are the manifestation of the dynamic interaction between natural and cultural (anthropogenic) forces in our ecosystems. Cultural landscapes are the result of consecutive reorganisation of the land in order to adapt its use and spatial structure better to the changing societal demands” (Antrop, 2005). Therefore, to understand land use changes it is important to look behind the human-ecosystem interactions and to identify driving forces that change the face of the landscape. A historical trend analysis of cultural ecosystem services in parallel with land use changes seems to be adequate for this issue. The retrospective analysis of ES-trends is not a completely novel approach, however, only few studies concern themselves with it. Within the report about the “condition and trends of ecosystem services and biodiversity” (Corvalan et al., 2005) 24 sub-global assessment studies have been realised to present information on the conditions and trends of ES retrospectively within different time intervals worldwide. This report compares ecosystem conditions and states that there have been no changes as rapid as those under human influence in the second half of the 20th century. In this respect, land use and land cover changes have been determined to be the most important recent driver for ES (MA, 2005). However, in Central Europe tremendous changes to ecosystems, their functions and conditions under human influence go back at least many centuries (Bork et al., 1998). Hence, to analyse the detailed background of these changes and to identify fostering drivers, longer periods of time have to be involved (Walz, 2008).

A new, most rapid and radical dynamic of change was set in motion during the industrial revolution, starting in Great Britain in 1750, and spreading throughout the European continent in the course of the following 100 years. Within the boundaries of today's Germany it was backed by reforms in property regulations and taxation of agriculturally used areas in the 19th century. Considering all this, we strongly suggest looking at a broader period of time when it comes to changes within ecosystems and their cultural services.

Keeping this in mind, we aim to carry out a retrospective analysis of CES trends that have been the result of land use changes in the suburban area of Göttingen called Hainberg. We chose the afforestation processes in this area to illustrate the CES trends and to discover the local human expectations and demands behind them that changed land use and are reflected in the landscape. We chose the case study of Hainberg because it is a representative example of the afforestation processes that started in the 19th century in all of Germany (Küster, 1998). An interesting point related to CES on the “demand” side is that afforestation initiatives were adopted by private stakeholders, citizens who invested in this out of a personal interest in a more aesthetic urban landscape, efforts the fruit of which present generations reap.

The main questions of our study are:

- What are the interrelations between land use changes and CES trends? Is the analysis of CES-trends helpful to understand land use changes?

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