



Demonstrating the importance of intangible ecosystem services from peri-urban landscapes

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ARTICLE INFO

Article history:

Received 5 May 2009

Received in revised form 18 September 2009

Accepted 21 September 2009

Available online 24 October 2009

Keywords:

Landscape values

Cost of provision

Ecosystem services

Landscape functions

Recreation

Aesthetics

Peri-urban landscape

ABSTRACT

Among ecosystem services, the various categories of intangible services linked to human perception, such as aesthetics, recreational values and cultural heritage, must be rated alongside tangible services linked to physical processes, such as wildlife habitats, clean water and air, and filter- and buffer effects. This is a pre-requisite for a sustainable development with a balance between ecological, social and economic values. We analyse ecosystem services in areas of the urban fringe of Copenhagen, where the services provided are mainly related to human perception. We employ relatively simple methods in selected landscapes to qualify or quantify the aesthetics and recreational value, and the scale of the welfare economic value of these ecosystem services. In the first case area, the Danish state acquired 50 villas covering more than 50 ha in order to recreate open vistas and gain access for the public to the seaside. In the second case area, peri-urban open landscapes were protected by conservation orders, to maintain and enhance the benefits of green space for the growing urban population. We assess the value – in a broad sense – of these ecosystem services using three practical methods: a landscape evaluation in terms of services and qualities, an assessment of actual recreational use, and finally an assessment of the costs – in terms of residential development values lost – of securing the provision of aesthetic qualities and recreational opportunities.

Searching the original planning documents we uncovered the original motivation for the land evaluation and decision. The arguments behind the designation and protection of the areas were primarily aesthetic and potentials for recreational use. The two areas receive annually 2–2.5 million and 400.000 visits respectively, proving their strong recreational value. The value of the demolished houses in the first case area exceeds 115 million €, and the value of the lost development opportunities in the second case area exceeds 280 million €.

By combination the three methods, we substantiated that the intangible services may dominate the tangible in cases like these, stressing the need for planners to assess the role and value hereof.

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1. Introduction

The complexity of the provision of services from ecosystems, i.e. production, regulation, habitats and information services (see, e.g. de Groot et al., 2002) has been extensively discussed during the past couple of decades. Contemporary problems in the human–environment systems, e.g. climate change, loss of wildlife habitats and water shortages, call for analytical tools which can provide insight into the concrete value of ecosystems. There is a growing consensus that we need to assess the value of non-marketable goods and services from ecosystems to balance the classic values from production-related activities. Environmental valuation (see, e.g. Freeman, 2003 for a theoretical introduction) has emerged as an

independent discipline, aiming at valuing and balancing these various goods and services when planning the exploitation of natural resources. A strong challenge for this thinking is its practical applications: qualification and quantification of single and jointly produced ecosystem services as input to management and planning (Turner et al., 2003). Experiences in rating and valuing the values of “hard” ecosystem services such as flood control, CO₂-sequestration, denitrification, filter effects and to some extent recreation have been gained in recent decades. Attempts to aggregate these values even at the highest level have been made (Costanza et al., 1997), but there is still considerable uncertainty about how to practically assess and value the even more intangible or “soft” ecosystem services, such as aesthetics, the mere presence of open space, experience and cultural heritage (e.g. Price, 2008). While valuation methods for non-marketed ecosystem services are of importance, they face at least three key challenges for landscape management and planning to internalise the values of the more intangible ecosystem services.

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Firstly, undertaking primary environmental valuation studies is time consuming and expensive. Secondly, the stated preference methods in particular are difficult to communicate and potentially flawed by, e.g. hypothetical bias or other methodological uncertainties (e.g. Kahnemann and Knetsch, 1992). This makes it hard to obtain widespread application and in particular acceptance of the approaches. Thirdly, these methods can only capture values, use- or non-use values that people *perceive* as related to the ecosystem in question. Several, even quite “hard” value components may thus escape quantification (Costanza, 2008).

Multiple studies have addressed the challenges of classifying ecosystem services, or the synonymous ecosystem or landscape functions. Classification systems and nomenclatures of ecosystem services (ecosystem functions, landscape functions) vary according to the scientific or strategic point of departure: agriculture (Anon., 2001), landscape planning and management (Brandt and Vejre, 2003a) or conservation of ecosystems (Farber et al., 2002; de Groot et al., 2002). There is a general consensus of distinguishing between marketable goods and other goods or services, the latter being a very heterogeneous group. Distinction between material and non-material services or functions has been proposed by several authors (de Groot et al., 2002; Costanza et al., 1997). Brandt and Vejre (2003b) suggested a further distinction between the intangible or transcending functions, separating perceived functions or services from statutory functions or services, i.e. the articulated visions for the development or status of areas as it is encountered in planning documents. While the many contributions represent some degree of consensus on nomenclature and definitions, severe difficulties persist in classifying and valuing the various services in a consistent and quantitative manner.

Environmental valuation methods may capture parts of the value aspects of the intangible functions or services, but unresolved challenges remain. One challenge is the task of describing the exact spatial extent of the particular service, addressing questions such as “where is the landscape beautiful, and where is it not?”, “where are the recreational qualities and where are they not?” i.e. drawing exact boundaries in landscapes where such boundaries are only vaguely defined. Nevertheless, in a world with rapidly developing paradigms for assessing “hard” services, there is also a strong need to develop and highlight the soft values by valuing them with the same priority and rigor as the hard ones.

In the western world, there is a long tradition of valuing landscapes through the instruments of landscape protection by designation (reviewed by Hamin, 2002). A multitude of mostly qualitative methods have been employed in the identification and delineation of landscapes of high cultural and aesthetic quality in most European countries, leading to the declaration of protected landscapes of various kinds. However, there is often limited documentation of methodology and exact criteria for these delineations; rather, they rest on subjective descriptions and qualitative assessments.

The aim of this study is to identify and value a sample of soft landscape services: the landscape aesthetics and the recreational use, and further to assess the monetary value of open landscapes reserved for these two services. We aim at identifying the exact criteria used for the identification and delineation of protected areas where intangible services are the primary outputs, as well as assessing the extent of recreational use of these areas, and establish an economic valuation of the same areas.

2. Methods of assessment

2.1. Case study approach

The point of departure of this paper is a number of landscapes, an approach which bears resemblance to the case study approach

known from social sciences (e.g. Yin, 2003). The social science approach aims at characterising the real world, which may be highly complex, and cannot easily be subdued to controlled experiments. By working with cases we attempt to illustrate the complexity of assessing the intangible ecosystem services provided by real-world peri-urban landscapes. As such we employ explorative, descriptive and explanatory approaches in the study.

We choose areas in the peri-urban landscapes north of Copenhagen (Fig. 1) known for their high aesthetic and recreational qualities, representing a long conservation tradition. The areas provide several ecosystem services, including, e.g. production, habitat protection and drinking water supply. However, the areas are not unique in terms of any of these specific functions or services, but they are unique in their provision of intangible landscape values in the Greater Copenhagen area, making them particularly suitable for studies of intangible services.

The advantage of a case study approach is that we leave environmental valuation theory related to ecosystem services and its more abstract and generic applications somewhat behind, and we limit ourselves to the challenge of describing the complexity of the type of ecosystem service to that relevant to the case study areas. This of course limits the generality of observations made, but it enhances their value for communication with decision-makers. Further, the access to data is adequate, and the knowledge of the history of the case areas is comprehensive and detailed.

2.2. Description of case areas

The case areas are located north of Copenhagen, the capital of Denmark (Fig. 1). The landscape consists of an undulating moraine plateau with scattered hills and hillocks, dissected by deeply cut glacial valleys and ravines. Lakes and forests are abundantly scattered in the landscape, making this part of the urban fringe of Copenhagen quite attractive. A summary of data regarding the case areas is given in Table 1.

2.2.1. Springforbi

The Springforbi case area is approximately 50 ha, located at the eastern-faced coast north of Copenhagen (Fig. 1), and generally considered the most fashionable high-life urban area of Denmark. The area possesses high icon value in terms of aesthetics and cultural history. The coastline became scattered with bourgeoisie's villas through the second half of the 19th century, and further developed from 1900 to 1920, with a dense urban structure to a distance of 20 km from Copenhagen, eliminating public access to the coast (Vejre et al., 2007). The same period brought an increasing pressure for recreational opportunities, not least pertaining to the coast. The growing stock of industrial workers in Copenhagen living under poor conditions revealed urgent needs for access to open space. Hence, the 1920s brought a clash between private property rights and a rising democratic agenda of gaining access to the coast for recreational and public health purposes. Simultaneously, there was a rising concern as to the consumption of what was considered high value landscapes in terms of aesthetics and cultural history. This concern was probably most pronounced at Springforbi, where there was a particular consciousness of the loss of access to the coast (Struckmann, 1929). The combined forces of the conservative interests in aesthetics and cultural history, and the labour movements' interests in recreational opportunities and public health spawned the 1930s decisions of acquiring more than 50 villas at the most high-rated (in terms of real estate) address of Denmark (Struckmann, 1942). From 1940 all 50 villas, covering approximately 52 ha, were gradually taken over by the State. The procedure was a simple acquisition of the properties whenever they became available on the market. After acquisition the single lots were opened to the

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