Preferences for European agrarian landscapes: A meta-analysis of case studies

Boris T. van Zanten *, Peter H. Verburg, Mark J. Koetse, Pieter J.H. van Beukering

Institute for Environmental Studies, VU University, De Boelelaan 1087, 1081 HV Amsterdam, The Netherlands

HIGHLIGHTS

- We compare landscape preferences across a diverse set of European case studies.
- We find generic preferences for livestock, mosaic land and historic buildings.
- Preferences for landscape attributes are related to population density and income.

ARTICLE INFO

ABSTRACT

Stated preference studies are increasingly employed to estimate the value of attributes of European agrarian landscapes and changes therein. Despite the vast amount of case studies, preferences for landscape attributes are context specific, which inhibits cross-case comparison and up-scaling. In this study, we address this problem by applying a meta-analysis of stated preference studies that focus on attributes of European agrarian landscapes ($n = 345$). The main objective of this study is to identify generic preferences for particular types of landscape attributes across case studies. In addition, landscape context variables that explain preference heterogeneity between different cases that address similar landscape attributes are identified. We find that landscape attributes that describe mosaic land cover, historic buildings or the presence of livestock generally receive the highest stated preferences across cases. Furthermore, we find relations between preferences for particular attributes and context variables – such as population density and GDP per capita – using a meta-regression analysis. The results of the present study provide the first cross-disciplinary and cross-case evidence on relations between preferences for landscape attributes and socio-economic and landscape context conditions. The study is a first step toward up-scaling of landscape preferences and the development social landscape indicators that reflect the perceived value of landscapes at regional and pan-regional scales, which is increasingly important as landscape policies are progressively implemented at European level.

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1. Introduction

Agricultural landscapes provide multiple ecosystem services beside the production of food, feed and fibers (Van Zanten et al., 2014). Amongst the most common services are recreation and tourism as well as cultural heritage and aesthetic functions, often summarized as cultural services (Chan et al., 2012; Daniel et al., 2012). A common way to obtain insight into these cultural services is to study stated landscape preferences. In Europe, various scientific disciplines have made contributions to the landscape preference literature. Many of these research efforts were driven by changes in landscapes due to processes such as intensification, scale enlargement and agricultural abandonment (Howley, Hynes, & Donoghue, 2012; Hunziker & Kienast, 1999; Van Berkel & Verburg, 2014). These processes have drastically changed landscape structure and composition and, therefore, the visual appearance and quality of many post-war European agrarian landscapes (Klijn, 2004; Van der Zanden, Levers, Verburg, & Kuemmerle, in review).

Landscape preferences have been addressed by numerous empirical studies. These studies have applied different methodologies originating from different disciplines, among others environmental psychology, landscape ecology, environmental economics and geography. Despite addressing a similar problem,

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* Corresponding author. Tel.: +31 205989556.
E-mail addresses: boris.zanten@vu.nl, boris.vanzanten@gmail.com
(B.T. van Zanten), Peter.verburg@vu.nl (P.H. Verburg), Mark.koetse@vu.nl
(M.J. Koetse), Pieter.van.beukering@vu.nl (P.J.H. van Beukering).

methodological heterogeneity constrains the comparison of landscape preferences across empirical studies and, therefore, inhibits the advancement of cross-case evidence. An important conceptual distinction can be made between monetary and non-monetary valuation of landscape preferences, where monetary valuation studies present beneficiaries with landscape alternatives that also include a financial tradeoff, while non-monetary studies use ranking methods to measure the landscape preferences of relevant beneficiaries. Another important conceptual distinction between empirical preference studies arises from differences between expert-based and stakeholder-based assessments of landscape quality. The former type of studies regard landscape quality to be an intrinsic attribute of the landscape, whereas the latter type regards landscape quality as a subjective value that is derived through the eyes of the beholder (Lothian, 1999; Tveit, 2009).

In stakeholder-based landscape assessments, researchers have applied both cognitive (e.g. Sevenant & Antrop, 2009) and physical landscape attribute approaches (e.g. Arnberger & Eder, 2011; Dachary-Bernard & Rambonilaza, 2012) to measure visual preferences for landscapes. Cognitive attributes, such as landscape coherence, disturbance, and naturalness, often measure aspects of landscape preference based on evolutionary theories that emerged in environmental psychology (Appleton, 1975; Kaplan & Kaplan, 1989). This category of attributes does not address preferences for a specific physical component of a landscape, but provides a holistic assessment of landscape character (Tveit, Ode, & Fry, 2006). Physical attributes address preferences for tangible and quantifiable landscape components, such as the presence of hedges or a land cover type. Studies that address physical attributes often estimate a change in preferences as a result of (potential) landscape change. Hunziker and Kienast (1999), for example, examined stakeholder preferences for different stages of afforestation in Switzerland. Campbell (2007) estimated the economic value of landscape attributes, such as hedgerows and stone walls in Ireland, using stated preferences.

In addition to their conceptual and methodological heterogeneity, studies that address preferences for landscape attributes tend to be context specific and thus lack external validity (Bateman, Day, Georgiou, & Lake, 2006). Local case studies are valuable to gain understanding on local causal mechanisms (i.e. how does one's occupation as a farmer affect one's landscape preferences?), but the strength and magnitude of causal effects could differ from place to place (Gerring, 2007; Rudel, 2008). As a result, it has been proven difficult to upscale locally measured landscape preferences and to use these preference estimates for developing social landscape indicators of the perceived value of landscapes to support landscape planning on regional or pan-regional scales (Paracchini & Capitani, 2011).

To address this problem, this paper aims to review the findings of existing empirical stated landscape preference studies and to examine if there are generic preferences across Europe for particular types of landscape attributes. Stated preference studies assess the general public's preferences by asking respondents to rank, rate or state a willingness to pay for an environmental good or service; contrasting to revealed preference studies that derive environmental quality preferences from observed behavior. We aim to analyze and interpret preference heterogeneity between different contexts by incorporating spatially explicit socio-economic and land use/land cover related proxy variables in a meta-regression analysis. To enable a comparison of preference estimates across cases, we have collected a large set of case studies that measure stakeholder's landscape preferences for physical landscape attributes. We use this subset of the stated landscape preference literature to conduct our meta-analysis. Hence, holistic landscape character assessments and expert evaluations of landscape preferences are not included

in the analysis as they inhibit quantitative meta-analyses of case study results.

Section 2 of this paper describes the methods that were applied; section 3 describes the results of a descriptive cross-case comparative analysis and a meta-regression analysis; section 4 discusses the results and draws conclusions.

2. Methods

2.1. Overview of methodology

This paper uses meta-analysis to synthesize findings of empirical landscape preference studies in Europe. Meta-analyses of case studies are applied to provide a higher level of generalization of specific case study knowledge and address the scale sensitivity of causal mechanisms and effects (Young, Lambin, & Alcock, 2006). To construct a database with comparative cases, this study follows the methodological recommendations for meta-analyses proposed by Rudel (2008). First, empirical studies were selected based on a predefined set of criteria. Second, a typology of agricultural landscape attributes was designed to enable cross-case comparison and frequency analysis of similar attributes. Third, preference scores for specific landscape attributes in the individual studies were normalized to enable cross-case comparison of preferences. Fourth, a number of potential explanatory variables were coded for each case. The database was analyzed using frequency analysis, cross-case comparison of mean preferences for specific landscape attributes, and meta-regression analysis.

2.2. Search protocol and selection criteria

This study analyzed empirical studies ($n = 51$; see S1 in the Supplementary material) that focus on stated landscape preferences for a set of landscape attributes. Every preference estimate for a landscape attribute stated by a defined group of beneficiaries in a defined case study area was treated as a unique case in the database, resulting in 345 cases. The case study areas in the database range from local to national scale and all studies were published between 1993 and 2013. The studies were retrieved by keyword search using the search engines ISI web of Science, Scopus and Google Scholar. Search strings were: (*rural OR agricultural*) *AND landscape AND* (*preferences OR valuation*). In addition, snowball search was applied to selected studies.

The selection criteria for empirical studies were the following: (1) studies measured landscape preferences for particular visual attributes of landscapes; (2) beneficiaries who stated the preferences were defined; (3) case studies addressed landscape preferences in agrarian landscapes; (4) studies were conducted in Europe. The search protocol and selection procedure of this meta-analysis were performed in accordance to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses protocol (PRISMA; checklist see S2 of the SI).

2.3. Landscape attribute typology

To enable cross-case comparison of preferences for landscape attributes, a classification of the attributes used in the different case studies into generic categories is required. As there is a great diversity in European agricultural landscapes, there is also a wide variety of different attributes that potentially contribute to the quality and value of these landscapes (Gobster, Nassauer, Daniel, & Fry, 2007). The types of landscape attributes that are addressed in the empirical studies depend on the objectives of the study, the perspective of the researcher and the research design. In many studies, expert knowledge or focus groups are used to identify the most important landscape attributes that contribute to the quality or the value