The Structure of Rural Landscape in Monetary Evaluation Studies: Main Analytical Approaches in Literature

Lorenzo Idda[(a)] – Graziella Benedetto[(a)] - Fabio A. Madau[(b)]
Elia Orrù[(a)] - Pietro Pulina[(a)]

(a) Department of Economics and Woody Plant Ecosystems
07100 – Sassari (ITALY)
(b) National Institute of Agricultural Economics (INEA)
07100 – Sassari (ITALY)

Phone (+39) 079 229259 **Fax** (+39) 079 229356 **e-mail** famadau@uniss.it

Paper prepared for presentation at the XIth Congress of the EAAE

(European Association of Agricultural Economists),

'THE FUTURE OF RURAL EUROPE IN THE GLOBAL AGRI-FOOD SYSTEM',

Copenhagen, Denmark, August 24-27, 2005

THE STRUCTURE OF RURAL LANDSCAPE IN MONETARY EVALUATION STUDIES: MAIN ANALYTICAL APPROACHES IN LITERATURE

IDDA L. - BENEDETTO G. – MADAU F.A. – ORRÙ E. – PULINA P.

Abstract
Over recent years considerable research has been devoted to the assessment of the rural landscape value. These studies have concerned both *use* and *non-use* value estimation. An important issue in monetary evaluations is about taking (or not) into account the structural complexity of landscape. Three analytical approaches may be recognized on the basis of whether landscape structural attributes are involved (global, mono-attribute and multi-attribute approach). The present work is part of a research aimed to seek out rational instruments for guidance policies on rural landscape. It consists in a survey of the main studies appeared in literature. The specific purpose is to classify these empirical analyses in accordance both to the approaches mentioned above and to the landscape typologies (agricultural or forestry) involved.

Keywords: rural landscape, structural attributes, landscape demand, contingent valuation models, choice experiment.
J.E.L. Q26

---

1. Introduction

As underlined by OCDE (2001), any landscape can be view as composed by three key elements: 1) *structure*, 2) *functions*, and 3) *value*. Remanding to the OCDE (2001) document for a more exhaustive description of the last two elements, in this work attention is focused on the *structure* component. This element reflects the whole of physical components of landscape as it appears. Specifically, *structure* includes interactions and relationship among various environmental features (*e.g.* flora, fauna, ecosystems and habitats), land use patterns and distributions (*e.g.* crop variety, systems of cultivation and vegetation), and man-made objects (*e.g.* building, hedges and rural roads) that characterize rural landscape.

It points out that landscape is composed by several structural attributes. It also means that each attribute contributes to determine landscape value. These landscape attributes may be either complements in utility, because of they can be perceived as parts or mot of the same scene, so the problems of landscape evaluation are a multidimensional ones. In this context, the benefit of conserving attributes that are complements for consumers within a joint programme is smaller than the sum of the benefits of conserving them independently. If this is not the case, attributes are also complements in valuation that the joint benefit is higher than the sum of the individual benefits. With particular regard to the *use value* (e.g. recreational value) it is clear that landscape demand depends by the bundle of attributes describing landscape. In other terms, factors affecting demand are connected with landscape attributes (Santos 1998; Hanley et al., 1998b; Cicia and Scarpa, 1999).

In the recent economic literature several studies have been published with the aim of assessing public landscape preferences. These studies have handled landscape structure and its components in several ways. The present work is part of a research aimed to seek out rational instruments for guidance policies on rural landscape. Specifically, it consists in a survey of the main studies on monetary assessment of rural landscape appeared in literature. The specific purpose is to classify these

---

This research is carried out from the project "Gli **I**nterventi **P**aesaggistico-**A**mbientali nelle **Po**litiche **Re**gionali di sviluppo rurale (**IPAPoRe**)" coordinated by the prof. Francesco Marangon and financed by the Italian Ministry of Education, University and Scientific Research (MIUR).

empirical analyses in accordance to the landscape typologies (agricultural or forestry) involved, and, most of all, to the approach used for analysing the complexity of the landscape structure. The aim is to put in evidence the underlying principles that move to follow an approach rather than others and the preferable methodological procedures adopted for investigating structural complexity of the landscape.

Section 2 briefly illustrate some methodological issues that are at the basis of the evaluation of the various landscape attributes. It also provides a classification of the evaluation approaches with respect to the modalities used for managing the inherent complexity of the landscape. After a brief description of the pros and cons of adopting the two most utilized methodologies – i.e. the Contingent Valuation Models (CVM) and the Choice Experiment (CE) – the section 3 proceed with to classify the studies examined in the survey in accordance to the approaches followed for analysing the landscape structure. Some final considerations are furnished in the section 5.

2. The structural attributes of landscape: some methodological issues

2.1. Methodological problems

A particularly sensitive point is in the monetary assessment of any landscape is the evaluation of the various landscape attributes. Evaluation concerns some empirical questions such as 1) role of attributes into the landscape, 2) effects (in value) on landscape of a transformation of one or more attributes, and 3) kind of attributes that contribute the most to landscape value.

On the other hand, decomposition of landscape in structural attributes and specific evaluation shows some methodological problems.

The first problem is inherent with the assessment of environmental and public goods and it regards recognition of the most significant landscape attributes. Really, this problem seems particularly marked in landscape evaluation, especially in *use value* assessment, because – as underlined above – significance of each attribute is related to landscape demand. It implies that attribute are, *de facto*, subjective and not objective components of landscape and, as consequence, the selected bundle of attributes describing landscape may be not explanatory of general public perception. It draws that components chosen to estimate landscape value might affect the final result if selection is not sufficiently careful.

The second problem concerns the mutually exclusivity, separability, and independency requisites of the chosen attributes. If structural attributes are not independent or exclusive, shortcomings as multi-collinearity or double-counting of some components may be encountered (Willis and Garrod, 1993; Hanley and Ruffell, 1993). Final scores could be not absolutely reliable if a high correlation level among attributes results. In this case, landscape value may be over-estimated or under-estimated. Over-estimation could rise up when correlation between two or more attributes is not recognized. On the contrary, analysis might be sensitive to under-estimation in case of presence of the as called "inclusion effect" (Hoehn, 1991; Rambonilaza, 2004).

The third problem is strongly connected with the preceding two issues and it regards the nature of the landscape demand. As mentioned above, this demand can be view as a demand of attributes. This view is reflected in the literature because of the most of the empirical studies has adopted a demand *lancasterian* approach. If the theoretical framework is the model of Lancaster (1966), it needs identify the relationships of "substituibility" and "complementarity" among the various components that characterize the utility function associated with the landscape demand. The main risk consists in describing landscape trough structural attributes not directly correlated with the demand, but representing a bundle or substitutes of other more elementary attributes really related to the demand. In both cases, analysis is conducted with respect attributes not effectively explanatory of the utility function.

2.2. Classification of analytical approaches relative to evaluation of landscape attributes

These and other analytical problems (*e.g.* linearity or not of relationship between quality of an attribute and value increasing in proportion to its size) have limited use of models able to evaluate role and/or value of the individual landscape attributes (see Willis and Garrod, (1993) for more information on this issue).

Mostly, analyses has been conducted with an holistic approach without estimating marginal value of each attributes. On the other hand, it does not mean that all these studies have not taken into account the structural complexity of landscape. Despite this fact, several studies have estimated the whole landscape value trough analytical models that involve recognition of a plurality of attributes. In other words, attributes serve to clearly describe landscape features or the proposed modifies on landscape. A typical empirical case is the evaluation of landscape following measures aimed to vary one or more of its components. Another typical case is individuation of the optimal bundle of attributes that maximize landscape demand. In both case it needs a well-defined description of attributes, however without enucleate the specific role of each components in landscape value establishment.

In the light of these considerations, monetary analysis can be classifiable in the follow categories (Rambonilaza, 2004):-

- **Global Approach**. Evaluation is conducted with respect to whole landscape, without proceeding to a decomposition for attributes. In other words, landscape is evaluated in its entirety.
- **Mono-Attribute Approach**. Evaluation is conducted refereeing landscape to ad only attribute. In this case, evaluation question is estimation of landscape value following a specific transformation (e.g., construction of a building, reduction of land area devoted to pasture).
- **Multi-Attribute Approach**. Evaluation concerns estimation of landscape taking into account its structural complexity. Regarding this last approach, it is our opinion that a second classification level urges in accordance with presence or not of a marginal values estimation (Figure 1).

Regarding these classification, some considerations are need to be done.

In some cases, it results difficult to pick out the sort of analytical approach. The most of these difficulties concern the global approach studies. Also when structural decomposition is not effected, evaluation is conducted comparing – more or less expressly - the *status quo* with (at least) an alternative landscape in which (at least) an attribute is modified. However, in global approach studies the modify generally implies a strong transformation of landscape (*e.g.* form agricultural to forestry) with the scope to prospect an "extreme" scenery in order to facilitate its value estimation (Drake, 1992). Therefore it should not appropriate refereeing to a simple change of one or more attributes. In other cases, structural decomposition for attributes serves to improve knowledge about landscape features by interviewed people, but it is not functional for analytical scopes (Pruckner, 1995).

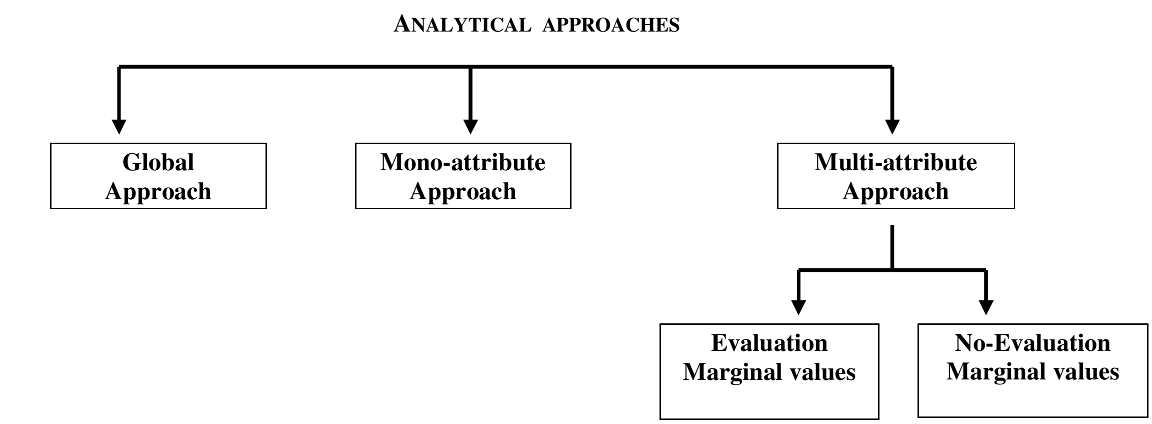

Figure 1. Classification of monetary analytical approaches regarding landscape structure

3. The survey

The present paragraph illustrates the survey on monetary evaluation analyses on rural landscape. The purpose is to describe the main works published in literature, especially with respect to the approach used for managing the structural complexity of the investigated landscape.

Selected works were classified in accordance to the adopted approach regards to whether structural complexity of landscape has been dealt in (global, mono-attribute, and multi-attribute approach). Furthermore, a second level classification key was the rural landscape typology. Empirical analyses was, i.e., distinguished for two typologies: agricultural and forestry landscape.

Table 1 shows selected works subdivided for the two classification keys. Really, a third key appears in the Table 1 because the studies were classified also according to the specific purpose of the analysis. More exactly, studies were divided in analyses turned to landscape preservation purpose and to landscape restoration or transformation purpose. However, in this context discussion is refereed only to the two classification key. More details about obtained results, methodological approach and characteristics of the investigated area are reported in Allegate 1.

Some considerations urge to be done regarding this survey. It is not an exhaustive survey on monetary evaluation studies on rural landscape. Selection was effected with regard the main international reviews and journals concerning themes such as agricultural economics and policy, environmental economics and policy, operational research in agricultural and environmental fields. Furthermore, survey includes some studies or national technical reports published in Italy. However, it is logical that international literature on the theme is wider of our selected works.

On the other hand, selection was focused only on studies expressly turned to rural landscape evaluation, omitting works in which landscape is considered but its value is not estimated.

Secondly, we are conscious that a dichotomic classification (agricultural and forestry) of the rural landscape is largely approximate. However, two reasons have driven our choice. 1) simplification had to be done and this key permits to individualize two categories scarcely complementary; 2) only in few cases, as reported below, it is really difficult discerning the object in agricultural and forestry landscape. In the most of study we can distinguish landscape in agricultural (or prevalently agricultural) landscape or forestry (or prevalently forestry) landscape.

Although many monetary studies on landscape have adopted a global approach, the most of the analyses have used a multi-attribute approach. Some common elements seem drive choice of approach relative to the structural components approach.

Finally, our survey is referred to single evaluation studies and not to single papers. It means that if a paper includes more monetary evaluation of landscape, we handle them separately as single studies when there are significant difference with respect to the approach to the structure, and/or to the used methodology, to the experimental design, etc.

3.1. Advantages and disadvantages of using CE versus CVM: a brief note

As can be easily view in Allegate 1, two are the main methodologies used for valuing landscape and environment in the monetary studies: Contingent Valuation Models (CVM) and Choice Experiments (CE). The *first one* uses survey questions to elicit people's preferences for public goods by finding out what they would require as compensation (so that they would be no worse off) for specified changes in them. Thus, CVM, in every version, is aimed at eliciting people's willingness-to-pay (WTP), or willingness-to-accept compensation (WTA), in monetary amounts. As such, this approach circumvents the absence of market for public goods by presenting consumers with hypothetical market in which they have the opportunity to buy the good question. In a CVM study, respondent are presented with material, usually in the course of a personal face to face interview, which consists of:

-a detailed description of the good(s) being valued and the hypothetical circumstance under which it is made available to respondents;

-questions which elicit the respondents' preferences, and their maximum WTP, for the goods being valued (or where an environmental nuisance reduces respondents' welfare, the minimum sum which would just bring the sufferers back to their previous level of satisfaction, i.e. WTA);

-questions about respondents' characteristics (*e.g.* income, preference relevant to goods being valued, their use of the goods, substitutes, age, family size, etc.).

The *second one* is an application of the characteristics theory of value (Lancaster, 1966), combined with random utility theory (Thurstone, 1927, Manski, 1977). It thus shares strong links with the random utility approach to recreational demand modelling using revealed preference data. In this case respondents are asked to chose between different bundles of (environmental) goods, which are described in terms of their attributes, or characteristics, and levels that these take.

Table 1. Monetary Studies on rural landscape for purpose, analytical approach regarding structural attributes and landscape typologies.

Approach / **Purpose**	GLOBAL		MONO-ATTRIBUTE		MULTI-ATTRIBUTE	
	Agricultural	***Forestry***	***Agricultural***	***Forestry***	***Agricultural***	***Forestry***
PRESERVATION	Drake (1992) – (3) Pruckner (1995) Tempesta (1993) Willis and Garrod (1993) Colson and Stenger.-Letheux (1996) Cicia and Scarpa (1999) Leon (1997) Wood et al. (2000) Fleischer and Tsur (2000) Křůmalová (2001) Kask et al. (2002) Allali (2003) Mathews et al. (2003) Schlapfer (2004) Kubíčková (2004)	Daniel (1989) Hanley (1989) Willis and Garrod (1993)			Willis and Garrod (1993) Garrod and Willis (1995) – (4) Willis et al. (1995) – (2) Bullock and Kay (1997) -(4) Santos (1998) Hanley et al. (1998a) Alvarez et al. (1999) Marangon and Tempesta (2001) Kask et al. (2002) Gonzales and Leon (2003) - (2)	Hanley and Ruffell (1993)* Maxwell (1994) Hanley et al. (1998a) – (3) Hanley et al. (1998a)* Tempesta et al. (2002) Mathews et al. (2003)
RESTORATION/ TRANSFORMATION			Colson and Stenger-Letheux (1996) Bonnieux and Le Goffe (1997) Marazzi and Tempesta (2004)	Walsh (1991)	Willis and Garrod (1993) Bullock and Kay (1997) -(4) Tempesta (1997) – (2) Nunes (2000) Kask et al. (2002)	Maxwell (1994) Hanley et al. (1998b)* - (2) Mathews et al. (2003)

* Multi-Attribute approach that involves marginal value attributes estimation
The number in parenthesis after the author and the date of publication of the paper indicates how many landscape evaluations were effected in the work.

One of these attributes is usually price. The CE approach is essentially a structured method of data generation. It relies on carefully designed choice tasks that help reveal the factors influencing choice. Designing a CE requires careful definition of the attribute space such that the attribute space includes the portion relevant for the policy questions being asked. Furthermore, the CE approach involves the use of statistical design theory to construct choice scenarios which can yield parameter estimates that are not confounded by others factors. The CE approach was first applied to environmental management problems by Adamowicz et al. (1994), although many application in other fields (notably marketing and transport economics) predate this (see within others Louviere and Woodworth, 1983).

Since CE models share the same random utility framework as dichotomous choice (DC) CVM models, the welfare estimates from each are directly comparable. So many studies used the two techniques with the aim of comparing the results. For example, Boxall et al, 1996 point out that the CVM model only allowed the welfare gain from increasing one attribute (moose population) to be estimated, whilst the CE model allowed gains for increasing all (desiderable) attributes to be calculated. So the WTP per trip for an increased moose population was much lower for the CE data than for the CVM data. Tests showed that this may have been due to respondents in the CVM sample ignoring substitution possibilities.

Several authors point out the advantage and disadvantage related to these two approaches. For example Hanley et al (1998) said that: «*relative to CVM the CE method would seem to possess several advantages; these are: it is easier to estimate the value of the individual attributes that make up an environmental good, such as landscape. This is important since many management decisions are concerned with changing attribute levels, rather than losing or ganging the environmental good as a whole. CE provides the opportunity to identify marginal values of attributes that may difficult to identify using revealed preference data because of co-linearity or lack of variation; because of this, CE may offer advantages over CVM in terms of benefits transfer, if environmental goods can indeed be decomposed into measurable attributes with money values which can be estimated; and if socio economic variable are included in the CE models used; CE also avoids the "yea saying" problem of DC design CVM (Ready, et al., 1996; Brown et al. 1996), since respondents are not faced with the stark "all or nothing" choice in that design of CV. They may choose one of two environmental alternatives, or the status quo, in each choice pair, of which they receive many. There are thus repeated opportunities for them to express their environmental preferences within a CE design; etc*» (p. 416). Furthermore, Boxall et al. (1996) suggest that the ability of CE to better capture substitution possibilities, and to incorporate a wider range of environmental quality changes, may be important advantages over CVM. On the other hand CVM may be subject to many biases (see Garrod and Willis, 1990 for a review of these) above all if the good being supplied is not defined with precision and if the CVM technique in not rigorously applied. However if either these problems are eliminated, where appropriate comparisons can be made, the techniques appears to be at least as accurate as other valuation methods. Certainly because of landscape is an aesthetic good, which is qualitative in nature and it is difficult to ensure that description captures all of the important attributes in the image it creates in the mind of the respondent, the valuation by CVM approach can easily be influenced by information contained in the definition of the good, resulting in variations in response values deriving from divergent perceptions of the good rather than from differences in tastes and income. The problems could be circumvented valuing aesthetic goods by eliciting responses from visitors to and residents of the landscape, who were thus already familiar with the landscape's aesthetic features, and also establishing today's landscape as a familiar point of reference, then presenting literary descriptions, and paintings, of landscapes which would result from different agricultural policies and government support for rural areas (Willis and Garrod, 1993). Also Mitchell and Carson (1989) in addressing skeptics on the use of CVM, point out the potential sources of error and bias in using the method and in designing CV scenarios and look at how these problems might be met; they conclude that the CVM can obtain valid valuation information on public goods, but only if the method is applied in a way that addresses the potential sources of error and bias.

3.2. Global Approach

In this survey, our specific attention is focused on 17 papers written by Daniel (1989), Hanley (1989), Drake (1992), Tempesta (1993), Willis and Garrod (1993), Pruckner (1995), Colson and StengerLetheux (1996), Leon (1997), Cicia and Scarpa (1999), Wood et al. (2000), Fleischer and Tsur

(2000), Křůmalová (2001), Kask (2002), Allali (2003), Schlapfer (2004), Kubíčková (2004). The number of studies amounts to 20 because of Drake (1992) conducts three separate surveys on Sweden population and, as consequence, he obtains three separate landscape value estimations.

The most of these studies (16) concerns evaluation on agricultural landscapes. The analysis of Willis and Garrod (1993) was included in both agricultural and forestry categories because it aims to evaluate a mixed agricultural and forestry landscape value (the National Park of Yorkshire Dales).

As underlined in the precedent section, generally these analyses are focused on monetary evaluation of a *status quo* landscape with respect to an its strong transformation. In same cases, the alternative is showed with the aim to facilitate the evaluation by the interviewed person (Drake, 1992). With reference to this approach, often the alternative scenery at the *status quo* describes a real or very probable deterioration of the actual landscape caused by the reduction of agriculture (Colson and Stenger-Letheux, 1996; Cicia and Scarpa, 1999). In other cases, the *status quo* landscape is compared with a set of possible future agricultural landscapes in order to evaluate which landscape could meet preference of community (Willis and Garrod, 1993). According to Dunn (1974), the opinion of Garrod and Willis (1993) is that when a set preference are requested, global approach should be preferable because of the value should reflect the landscape in its entirety.

By the methodological point of view, CVM have been largely used in this kind of studies. Mathews et al. (2003) utilize a Choice Modelling (CM) approach to evaluate the landscape value of the National Park of Blue Ridge in North Carolina. The Travel Cost (TC) is used by Mathews et al. (2003) and by Hanley (1989). More exactly, in the study of Hanley (1989), the TC analysis is only used as to estimate eventual difference with the CVM value. Really original is the procedure adopted by Fleischer and Tsur (2000) that involves a combination of the CVM and TC. The authors use trip data to estimate the consumers demand of the Hula and Jezreel Valleys (in Israel) and then they used visitors' stated affinity to agricultural landscape to detect the change in their visitation decision – based on a contingent behaviour - as result of a change in agricultural landscape

3.3. Mono-attribute approach

Four studies adopt a mono-attributed approaches (Walsh et al., 1991; Colson and StengerLetheux, 1996; Bonnieux and Le Goffe, 1997; Marazzi and Tempesta, 2005). Only Walsh et al. (1991) evaluate a forestry landscape (the Rocky Mountains Forests), whether the remain three studies concern agricultural landscape evaluations. In reality, the object of the Marazzi and Tempesta (2005) investigation is not a typical agricultural landscape, but however agriculture is the main activity.

In the same paper cited above, Colson and StengerLetheux (1996) effect also an assessment of the WTP of the residents in Loire-Atlantique District for the improvement of the quality of the typical "bocage" landscape, characterized by hedges and grassland. The CV is conducted comparing the "bocage" with a damaged landscape without hedges. In other terms, the presence/absence of hedges is the landscape attribute that better of others describes the "bocage" landscape. Starting from the same considerations of Colson and StengerLetheux (1996), Bonnieux e Le Goffe (1997) undertake a CV survey for estimate the WTP to restore the "bocage" landscape in the Natural Park of Cotentin (in the South Normandy) through a replacement plan of the damaged hedges. It is curious that the WTP estimated by these authors (with a dichotomous choice elicitation form) is significantly lower than the value obtained (with an open ended form) by Colson and StengerLetheux (1996) (201 vs. 607 francs/person/year).

Also the Walsh et al. (1991) and the Marazzi and Tempesta (2005) analyses are conducted trough a CV survey. Walsh et al. (1991) adopt the Iterative Bidding Game (IBG) elicitation form to estimate the WTP reflecting the total economic value of the Rock Mountains forests landscape. The WTA a possible tax increase for support a plan aimed to inter the electricity high-tension pylons in an Italian rural area.

3.4. Multi-attribute approach

A multi attribute approach for the assessment of the monetary rural landscape valuation can be found in 17 papers (Willis and Garrod, 1993; Hanley and Ruffell, 1993; Maxwell, 1994; Garrod and Willis, 1995; Willis et al., 1995; Bullock and Kay; 1997; Tempesta, 1997; Santos, 1998; Hanley et al., 1998a; Hanley et al., 1998b; Alvarez et al., 1999; Nunes, 2000; Marangon and Tempesta, 2001; Tempesta et al., 2002; Kask et al., 2002; Mathews et al., 2003; Gonzales and Leon, 2003). Really, many paper provided more landscape evaluations, therefore the studies amounts to 30 monetary assessments.

As showed in Table 1, some multi-attribute evaluations have been effected in order to assess landscape value for a double (conservation and restoration) or multiple scope (total economic value) (Garrod and Willis, 1993; Maxwell, 1994). On the other hand, some authors carried on two or more evaluations to provide to achieve results for both conservation and restoration scopes (Kask et al., 2002; Mathews et al., 2003). Studies on forestry landscapes amount to 12, and the most of these regard monetary assessments turned to landscape conservation.

An important dichotomy is connected with the presence of evaluation of single marginal value for each attribute. It needs a distinction between studies that provide to enucleate the value of the single landscape attribute and not.

Studies without a marginal value evaluation for each landscape attribute. This approach is largely widespread in the literature on monetary evaluation on landscape. In the most of the cases, the authors have used the CV to evaluate the landscape value.

With reference to agricultural landscapes, in the underlined above work of Garrod and Willis (1993) on the National Park of Yorkshire Dales, attributes of this landscape are illustrated in order to assess which landscape features are mainly preferred by visitors and residents in the Park. Authors sought level of preferred quantity (less, same or more) for 11 attributes (*e.g*. dry stone walls, wild flowers, presence of coniferous) by part of each interviewed person. The same authors (Garrod and Willis, 1995; Willis et al., 1995) in two studies on the South Downs and the Somerset Levels and Moors Environmental Sensitive Areas (ESA), proceed to furnish a detailed description of the landscape as to facilitate the individual answer on WTP.

Alvarez et al. (1999) utilized a CVM for evaluating the landscape in an other two ESA. In a first step, they individuate the more characterizing attribute and successively illustrate to people a set of possible future modifies relative to each attribute and/or for their combination. Finally, this set is proposed into two sceneries: into or out of the ESA.

Rural Scottish landscape is the object of the studies of Bullock and Kay (1997) and Hanley et al. (1998a). Using the case study of the Central Southern Uplands of Scotland, the work shows some CV evaluations devoted to estimate the public benefits of landscape changes that could arise from reductions in grazing levels. Among the other landscape evaluations effected in the Hanley et al. (1998a) paper, the authors carry out three dichotomous choice CV survey to quantify the landscape (a mixture of agricultural and forestry attributes) of the ESA benefits in terms of WTP of the Scotland population and of the Scotland ESA visitors. In both these papers, description of landscape attribute is functional for better illustrating its characteristics.

With reference to the forestry landscapes, we report a brief note on the Maxwell (1994) and Tempesta et al. (2002) studies. The first study is focused on evaluate benefits arising from environmental changes in the Marston Vale Community Forest. One of these changes regards indirectly the landscape generated by the forest. Four CV questions reflecting different payment form were asked to 100 households to estimate their WTP for change. The second study aims to estimate the recreational landscape value of the Friulan (Northeast Italy) woods. The authors use an alternative methodology to CV, i.e. a Poisson Regression Model (PRM). Contrary to the CV, the PRM consents to put better in evidence the relationship between the landscape demand and the attributes of the site (Cameron and Trivedi, 1998).

Studies with a marginal value evaluation for each landscape attribute. A few papers that conduct a marginal value estimation for the landscape components have been appeared in literature (Hanley e Ruffell, 1993; Hanley et al., 1998a; Hanley et al., 1998b).

Hanley and Ruffell (1993) use a CV approach to try to place a value on the physical characteristics of the British forests. The scope is to obtain incremental WTP to access forests with different levels of a number of characteristics by showing visitors pairs of photographs. Each pair of photos depicts two forests which differed significantly with respect to one attribute. Initially, authors selected 6 landscape attributes, but successively found that because of the high degree of multicollinearity, only 3 components could be significantly representative of this landscape (uniform vs. diverse tree heights; a mixture of broadleaved trees and conifers vs. no broadleaved trees; presence vs. absence of a water feature). Through the CV survey Hanley and Ruffell (1993) estimates level of the preference for each attribute and the respective marginal value.

As reported above, the CV method possesses the disadvantaged of to be scarcely suitable for estimating both the single landscape attribute value and the whole landscape value. On the contrary, this shortcoming could be overcome applying a CE procedure.

A CE approach is undertaken by Hanley et al. (1998a, 1998b). In the first work, the landscape typical of the Scottish ESA is described by 5 attributes (presence of broadleaved woods, archeological features, heather moors, wet grasslands, dry stone walls). In the CE survey each attribute could took one of two value, with a level corresponding to the authors forecast “no ESA management agreements” and “ESA management agreements” cases respectively. The WTP values distribution arising from the CV survey was used to establish 8 price levels. A perfectly orthogonal design was constructed, creating pair-wise comparisons and obtaining a ($2^5 * 2^5$) design size. In each choice pair, respondents were asked to select the preferred combination (choice A, choice B or *status quo*), or respond “did not know” which option to choose. Two kind of values arising by two analytical models (linear and quadratic) are obtained for each attribute.

In the second paper, Hanley et al. (1998b) evaluate the marginal value for three significant attribute of the British forests, and each one could assume two states in the CE design: shape (straight edges vs. organic edges); felling (large vs. small scale clear felling); species mix (evergreen only vs. evergreen larch and broadleaves mixture). Analysis results are compared with that obtained with a CV survey. In this survey, respondents were asked to state their preference between each photo - representing a pair/triple combination of the attributes levels – and to state their WTP to move from their least preferred to most preferred image. Similar attribute values are obtained trough the CE and the CV survey, but the first method permits to estimate also the whole forest value, that need to be evaluate a part with the CV method.

4. Conclusions

This paper is a survey of the main published works on monetary assessment of the rural landscape. It also aimed to furnish a classification of these works regards modality of how the structure of the landscape has been managed by the authors. Three category was found: the global approach (landscape described and analyzed in its entirety), the mono-attribute approach (landscape described by an only its attribute) and the multi-attribute approach (landscape described by several its components). With reference to the last category, we distinguished two cases: 1) studies in which the several attributes have been illustrated to interviewed people in order to facilitate the whole landscape value evaluation or in which the specific purpose has been the assessment of the single components; 2) studies in which authors have estimated marginal attribute and whole landscape values together.

The work is a part of a wider research aimed to find rational instruments for guidance policymakers in rural landscape management. It is our intention to enlarge the survey and regarding the collected number of works on landscape monetary evaluation and, especially, regarding individuation of other relevant classification criteria such as the scope of the assessment, the kind of landscape and the nature of policy implications arising from findings.

References

Adamowicz, W., Louviere, J. and Williams, M. (1994). Combining Revealed and Stated Preference Methods for Valuing Environmental Amenities. Journal of Environmental Economics and Management 26 (3): 271-292.

Allali K. (2003). Valeur sociale de la conservation du paysage agricole au Maroc: Application de la méthode d’évaluation contingente au paysage agricole de la Chaouia. Paper, Roles of Agriculture International Conference, 20-22 October, 2003, Rome: Italy.

Alvarez, B., Hanley, N., Wright, R. and Mac Millan, D. (1999). Estimating the Benefits of Agri-environmental Policy: Econometric Issues in Open-ended Contingent Valuation Studies. Journal of Environmental Planning and Management 42(1): 23-43.

Bonnieux, F. and Le Goffe, P. (1997). Valuing the Benefits of Landscape Restoration: a case Study of the Cotentin in Lower-Normandy, France. Journal of Environmental Management 50 (3): 321-333.

Boxall, P., Adamowicz, W., Swait, M., Williams, M. and Louviere, J. (1996). A Comparison of Stated Preference Methods for Environmental Valuation. Ecological Economics 18 : 243-253.

Brown, T., Champ, P., Bishop, R. and McCollum, D. (1996). Response Formats and Public Good Donations. Land Economics 72 (2): 152-166.

Bullock, C.H. and Kay, J. (1997). Preservation and Change in the Upland Landscape: the Public Benefits of Grazing Management. Journal of Environmental Planning and Management 40 (3): 315-334.

Cameron, A.C. and Trivedi, P.K. (1998). Regression Analysis of Count Data, Cambridge, Cambridge University Press.

Cicia, G. and Scarpa, R. (1999). La disponibilità a pagare per il paesaggio rurale nel Cilento: paradigmi interpretativi del metodo della valutazione contingente. Rivista di Economia Agraria 54 (1): 55-94.

Colson, F. and Stenger Letheux, A. (1996). Evaluation contingente et paysages agricoles. Application au bocage de Loire-Atlantique. Cahiers d'econonie et sociologie rurales. 39-40 : 151-177.

Daniel, T.C. et al. (1989). Perceived Scenic Beauty and Contingent Valuation of Forest Campground. Forest Science 35 (1): 76-90.

Drake, L. (1992). The Non-market Value of the Swedish Agricultural Landscape. European Review of Agricultural Economics 19 (3): 351-364.

Dunn, M.C. (1974). Landscape Evaluation Techniques: An Appraisal and Review of the Literature. Working Paper n.4. Centre for Urban and Regional Studies, University of Birmingham.

Fleischer, A. and Tsur, Y. (2000). Measuring the Recreational Value of Agricultural Landscape. European Review of Agricultural Economics 27 (3): 385-398.

Garrod, G.D. and Willis, K.G. (1995). Valuing the Benefits of the South Downs Environmentally Sensitive Area. Journal of Agricultural Economics 46 (2): 160-173

Gonzalez, M. and Leon, C.J. (2003), Consumption Process and Multiple Valuation of Landscape Attributes. Ecological Economics 45 (2): 159-169.

Hanley, N. (1989). Valuing Rural Recreation Benefits: An Empirical Comparison of two Approaches. Journal of Agricultural Economics 40 (3): 361-374.

Hanley, N. and Ruffell, R.J. (1993). The Contingent Valuation of Forest Characteristics: Two Experiments. Journal of Agricultural Economics 44 (2), pp. 218-229.

Hanley, N., MacMillan, D., Wright, R.E., Bullock, C., Simpson, I., Parsisson, D. and Crabtree, B. (1998a). Contingent Valuation versus Choice Experiments: Estimating the Benefits of Environmentally Sensitive Areas in Scotland. Journal of Agricultural Economics 49 (1): 1-15.

Hanley, N., Wright, R.E. and Adamowicz, V. (1998b). Using Choice Experiments to Value the Environment. Environmental and Resource Economics 11 (3-4): 413-428.

Hoehn, J.P. (1991). Valuing the Multidimensional Impacts of Environmental Policy: Theory and Methods. American Journal of Agricultural Economics 73 (2): 289-299.

Kask, S., Mathews, L.G., Stewart, S. and Rotegard, L. (2002). Blue Ridge Parkway Scenic Experience Project Phase 1: Final Report, Report submitted, National Park Service http://www.nps.gov/blri.

Křůmalová, V. (2001). Evaluation of Chosen Benefits on Environmental and Landscape coming from Czech Agriculture. Agricultural Economics – Czech 48: 13-17.

Kubíčková, S. (2004). Non-market Evaluation of Landscape Function of Agriculture in the PLA White Carpathians. Agricultural Economics – Czech 50: 388-393.

Lancaster, K.J. (1966). A New Approach to Consumer Theory. Journal of Political Economy 74 (2): 132-157.

Leon, C. (1997). Valuing International Tourism Benefit from Natural Areas. Tourism Economics 3 (2): 119-136.

Louviere, J. and Woodworth, G. (1983). Design and Analysis of Simulated Consumer Choice. Journal of Marketing Research 20: 350-367.

Manski, C. (1977). The Structure of Random Utility Models. Theory and Decision 8: 229-254.

Marangon, F. and Tempesta, T. (2001). L'impatto paesaggistico della viticoltura collinare. Una valutazione economica in zone DOC del Friuli Venezia Giulia. in Marangon, F. and Tempesta, T. (editors): La valutazione dei beni ambientali come supporto alle decisioni pubbliche. Forum, Udine: Italy: 115-131

Marazzi, M. and Tempesta, T. (2004). Disponibilità a pagare e disponibilità ad accettare per la riduzione dell'impatto paesaggistico delle linee elettriche dell'alta tensione (mimeo)

Mathews, L.G., Stewart, S. and Kask, S. (2003). Blue Ridge Parkway Scenic Experience Project Phase 2: Final Report, Report submitted, National Park Service http://www.nps.gov/blri.

Maxwell, S. (1994). Valuation of Rural Environmental Improvements using Contingent Valuation Methodology: a Case Study of the Marston Vale Community Forest Project. Journal of Environmental Management 41 (4): 385-399.

Mitchell, R.C. and Carson, R.T. (1989). Using Surveys to Value Public Goods. The Contingent Valuation Method, Resources for the Future, USA.

Nunes, P. (2002). Using Factor Analysis to identify Consumer Preferences for the Protection of a Natural Area in Portugal. European Journal of Operational Research 140: 499-516.

OCSE (2001): Environmental indicators for Agriculture. Volume 3: Methods and Results, Parigi.

Pruckner, G.J. (1995). Agricultural Landscape Cultivation in Austria: an Application of the CUM. European Review of Agricultural Economics 22 (2): 173-190.

Rambonilaza, M. (2004). Évaluation de la demande de paysage: état de l'art et réflexions sur la méthode du transfert des bénéfices. Cahiers d'économie et sociologie rurales 70 : 78-101.

Ready, R., Buzby, J. and Hu., D. (1996). Differences between Continuous and Discrete Contingent Valuation Estimates. Land Economics 72 83): 397-411.

Santos, J.M.L. (1998). The Economic Valuation of the Landscape Change. Cheltenham, Edward Elkar.

Schlapfer, F., Roschewitz, A. and Hanley, N. (2004). Validation of Stated Preferences for Public Goods: a Comparison of Contingent Valuation Survey Response and Voting Behaviour. Ecological Economics 51 (1-2): 1-16.

Tempesta, T. (1993). La valutazione del paesaggio nella pianificazione territoriale. in Franceschetti, G. and Tempesta, T. (editors). La pianificazione del territorio rurale del Veneto negli anni ottanta, Unipress, Padova: Italy.

Tempesta, T., Visintin, F., Rizzi, L. and Marangon, F. (2002). Il valore ricreativo dei paesaggi forestali. Rivista di Economia Agraria 57 (4): 636-680.

Thurntone, L. (1927). A Law Comparative Judgement. Psychological Review 4: 273-286

Walsh, R.G., Bjonback, R.D., Aiken, R.A. and Rosenthal, D.H. (1990). Estimating the Public Benefits of Protecting Forest Quality. Journal of Environmental Management 30 (2): 175-189.

Willis, K.G., Garrod, G.D. and Saunders, C.M. (1995). Benefits of Environmentally Sensitive Area Policy in England: A Contingent Valuation Approach. Journal of Environmental Management 44 (2) 105-125.

Willis, K.G. and Garrod, G.D. (1993). Valuing Landscape: a Contingent Valuation Approach. Journal of Environmental Management 37 (1): 1-22.

Wood N. et al. (2000) Interdependence of Agriculture and Tourism: Quantifying the Value of the Agricultural Working Landscape in Vermont, AAEA Annual Meeting, Tampa, Florida.

Allegate1 (a). Main descriptive and methodological features of the view papers on monetary valuation of rural landscape

Author(s)	Country	Landscape typology	Kind of Area	Aim of assessment	Population	Sample
Daniel et al. (1989)	USA (N Arizona)	Forestry	11 USDA Forests	Recreational Value	Visitors (campsite)	707
Hanley (1989)	GB (Scotland)	Forestry	Regional Park	Recreational Value	Visitors	992
Walsh et al. (1990)	USA (Colorado)	Forestry	Rocky Mountains Forests	TEV (use+optional+nonuse)	Local Residents	255
Drake (1992)	Sweden	Agricultural	Swedish Rural Land	Preservation	Swedish Taxpayers	1.089
Drake (1992)	Sweden	Agricultural	Swedish Rural Land	Preservation	Residents in Uppsala County	152
Drake (1992)	Sweden	Agricultural	Swedish Rural Land	Preservation	Residents in Uppsala County	49
Hanley and Ruffell (1993)	GB (England)	Forestry	English Forests	Recreational Value	Visitors	1.000
Tempesta (1993)	Italy	Agricultural	Treviso Province	Recreational Value	Visitors	106
Willis e Garrod (1993)	GB (England)	Agricultural	National Park	TEV	Local Residents and Visitors	600
Maxwell (1994)	GB (England)	Forestry	Community Forest	TEV	Local Residents	100
Garrod and Willis (1995)	GB (England)	Agricultural	10 English ESA[1]	TEV	British Taxpayers	534
Garrod and Willis (1995)	GB (England)	Agricultural	10 English ESA[1]	TEV	British Taxpayers	689
Garrod and Willis (1995)	GB (England)	Agricultural	2 ESA[1] (South Downs)	TEV	Local Residents	218
Garrod and Willis (1995)	GB (England)	Agricultural	2 ESA[1] (South Downs)	TEV	Visitors	220
Pruckner (1995)	Austria	Agricultural	Austrian Rural Land	Preservation	Visitors	2.110
Willis et al. (1995)	GB (England)	Agricultural	2 ESA[1] (Somerset e Moors)	TEV	Local Residents	212
Willis et al. (1995)	GB (England)	Agricultural	2 ESA[1] (Somerset e Moors)	TEV	Visitors	243
Colson and Stenger-Letheux (1996)	France	Agricultural	French Agricultural Land	Preservation	Loira taxpayers	436
Colson and Stenger-Letheux (1996)	France	Agricultural	Loire Atlantique	Preservation, Restoration	Loira taxpayers	428
Bonnieux and Le Goffe (1997)	France	Agricultural	Regional Park	Preservation, Restoration	Local Residents	400
Bullock e Kay (1997)	GB (Scotland)	Agricultural	ESA[1]	Restoration, enhancement	Local Residents	313
Bullock e Kay (1997)	GB (Scotland)	Agricultural	ESA[1]	Restoration, enhancement	Local Residents	248
Bullock e Kay (1997)	GB (Scotland)	Agricultural	ESA[1]	Restoration, enhancement	ESA Visitors (British people)	92
Bullock e Kay (1997)	GB (Scotland)	Agricultural	ESA[1]	Restoration, enhancement	ESA Visitors (British people)	76
Leon (1997)	Spain	Forestry	Natural areas (Canaria)	Turistic benefits	European tourists	606
Tempesta (1997)	Italy	Agricultural	Regional Forestry Land	Preservation	Local Residents	201
Tempesta (1997)	Italy	Agricultural	Regional Forestry Land	Improvement	Local Residents	201

(1) ESA = Environmental Sensitive Area (2) PLA = Protected Landscape Area

Allegate1 (b). Main descriptive and methodological features of the view papers on monetary valuation of rural landscape

Author(s)	Country	Landscape typology	Kind of Area	Aim of assessment	Population	Sample
Hanley et al. (1998a)	GB (Scotland)	Agricultural	ESA[1]	Restoration, enhancement	British and ESA residents	325
Hanley et al. (1998a)	GB (Scotland)	Agricultural	ESA[1]	Restoration, enhancement	British and ESA residents	249
Hanley et al. (1998a)	GB (Scotland)	Agricultural	ESA[1]	Restoration, enhancement	British ESA visitors	235
Hanley et al. (1998a)	GB (Scotland)	Agricultural	ESA[1]	Restoration, enhancement	British ESA visitors	256
Hanley et al. (1998b)	Great Britain	Forestry	British forest land	Forestry management	British taxpayers	181
Hanley et al. (1998b)	Great Britain	Forestry	British forest land	Forestry management	British taxpayers	181
Santos (1998)	Portugal	Agricultural	NP (Peneda-Geres)	Preservation	Turists	3782
Santos (1998)	GB (England)	Agricultural	ESA[1] (Pennine Dales)	Preservation	Turists	2295
Alvarez et al. (1999)	GB (Scotland)	Agricultural	ESA[1]	Preservation	British visitors, local residents	358
Cicia and Scarpa (1999)	Italy	Agricultural	National Park	Recreational Value	Visitors	344
Fleischer and Tsur (2000)	Israel	Agricultural	Intensive agricultural land	Recreational Value	Visitors from Israel	303
Wood et al. (2000)	USA (Vermont)	Agricultural	Agricultural landscape	Touristic benefits	Adult tourists	270
Marangon and Tempesta (2001)	Italy	Agricultural	Veneto vineyards	Preservation Value	Local residents	360
Kask et al. (2002)	USA (Virginia)	Agricultural	NP (Blue Ridge Parkway)	Preservation, enhancem (WTP)	Visitors (motorists)	302
Kask et al. (2002)	USA (Virginia)	Agricultural	NP (Blue Ridge Parkway)	Marginal enhancement (WTP)	Visitors (motorists)	250
Kask et al. (2002)	USA (Virginia)	Agricultural	NP (Blue Ridge Parkway)	Marginal depletion (WTA)	Visitors (motorists)	250
Krumalová (2002)	Czech Rep.	Agricultural	National agricultural land	TEV	Czech taxpayers	780
Nunes (2002)	Portugal	Agricultural	National Park (Alentejo)	Preservation (use + nonuse)	Visitors	1678
Tempesta et al. (2002)	Italy	Forestry	Regional Forestry Land	Recreational Value	Local Residents	506
Allali (2003)	Morocco	Agricultural	Cereal growingland	TEV	Local households (Settat)	379
Gonzalez e Leon (2003)	Spain	Forestry	Natural areas (Canaria)	Enhance attractiveness	European visitors staying	808
Gonzalez e Leon (2003)	Spain	Forestry	Natural areas (Canaria)	Enhance attractiveness	European visitors leaving	802
Mathews et al. (2003)	USA (N Carolina)	Forestry	NP (Blue Ridge Parkway)	Preservation, enhancem (WTP)	Visitors (motorists)	152
Mathews et al. (2003)	USA (N Carolina)	Forestry	NP (Blue Ridge Parkway)	Marginal enhancement (WTP)	Visitors (motorists)	152
Mathews et al. (2003)	USA (N Carolina)	Forestry	NP (Blue Ridge Parkway)	Marginal depletion (WTA)	Visitors (motorists)	200
Kubíčková (2004)	Czech Rep.	Agricultural	PLA[2] (White Carpathians)	TEV	Taxpayers, residents, visitors	1441
Marazzi and Tempesta (2004)	Italy	Agricultural	Italian Rural Land	Transformation	Residents in Padova	553
Schlapfer et al. (2004)	Switzerland	Agricultural	Weinland Zurich region	Preservation	Adult citizens	816

(1) ESA = Environmental Sensitive Area (2) PLA = Protected Landscape Area

Allegate1 (c). Main descriptive and methodological features of the view papers on monetary valuation of rural landscape

Author(s)	Type of interview	Method.	Elicit. format	Payment form	Supporting materials	Landscape complexity approach	Output value (mean or mode)
Daniel et al. (1989)	Direct	CVM[3]	OE[10]	Additional Cost	Photos	Global	-0.77$ to 0.45$ pers x day
Hanley (1989)	Direct	CVM[3]-TC[4]	OE[10]	Entrance Fee	-	Global	£0.80 pers x visit
Walsh et al. (1990)	Direct	CVM[3]	IBG[11]; OE[10]	Tax (annual)	Photos	Mono-attribute	$ 47
Drake (1992)	Direct	CVM[3]	OE[10]- PC[12]	Tax (annual)	-	Global	468.5 SEK (541 SEK)
Drake (1992)	Direct	CVM[3]	OE[10]- PC[12]	Tax (annual)	-	Global	729.4 SEK (712.9SEK)
Drake (1992)	Direct	CVM[3]	OE[10]- PC[12]	Tax (annual)	-	Global	686.5 SEK
Hanley and Ruffell (1993)	Direct	CVM[3]	PC[12]	Entrance Fee	Photos	Multi-attribute*	£0.93
Tempesta (1993)	Direct	CVM[3]	OE[10]	Travel Costs	Photos	Global	0-10,000 Lit
Willis e Garrod (1993)	Direct	CVM[3]	OE[10]	-	-	Global+ Multi-	£25 to £27
Maxwell (1994)	Direct	CVM[3]	OE[10]	Entrance Fee	Maps	Multi-attribute	£4.60
Garrod and Willis (1995)	Direct	CVM[3]	OE[10]- PC[12]	Tax (annual)	Photos	Multi-attribute	£36.6 per family
Garrod and Willis (1995)	Direct	CVM[3]	OE[10]- PC[12]	Tax (annual)	Photos	Multi-attribute	£138.4 (£48.5 median)
Garrod and Willis (1995)	Direct	CVM[3]	OE[10]- PC[12]	Tax (annual)	Photos	Multi-attribute	£27.5
Garrod and Willis (1995)	Direct	CVM[3]	OE[10]- PC[12]	Entrance Fee	Photos	Multi-attribute	£19.5
Pruckner (1995)	Direct	CVM[3]	OE[10]	Trust Fund	-	Global	9.20 ATS (0.64 ECU) pers.x
Willis et al. (1995)	Direct	CVM[3]	OE[10]- PC[12]	Tax (annual)	Photos	Multi-attribute	£17.5
Willis et al. (1995)	Direct	CVM[3]	OE[10]- PC[12]	Entrance Fee	Photos	Multi-attribute	£11.8
Colson and Stenger-Letheux (1996)	Postal	CVM[3]	PC[12]	-	Photos	Global	607 FF
Colson and Stenger-Letheux (1996)	Postal	CVM[3]	PC[12]	-	Photos	Mono-attribute	103 FF
Bonnieux and Le Goffe (1997)	Direct	CVM[3]	DC[13]	Tax (local)	Photos, paintings	Mono-attribute	201 FF
Bullock e Kay (1997)	Postal	CVM[3]	DC[13]	Tax	Text, photos	Multi-attribute	£83 (£46)
Bullock e Kay (1997)	Postal	CVM[3]	DC[13], FU[14]	Tax	Text, photos	Multi-attribute	£55
Bullock e Kay (1997)	Direct	CVM[3]	DC[13]	Tax	Text, photos	Multi-attribute	£69 (£58)
Bullock e Kay (1997)	Direct	CVM[3]	DC[13], FU[14]	Tax	Text, photos	Multi-attribute	£49
Leon (1997)	Direct	CVM[3]	DC[13] (sb)	Entrance fee	Text, photos, map	Global	1,365 PTS
Tempesta (1997)	Direct	CVM[3]	OE[10]- PC[12]	Tax and Trust Fund	Photos	Multi-attribute	5.7 Billion Lit
Tempesta (1997)	Direct	CVM[3]	OE[10]- PC[12]	Tax and Trust Fund	Photos	Multi-attribute	5.7 Billion Lit

(3) CVM = Contingent Valuation Model (4) TC = Travel Cost (5) CE = Choice Experiment (6) FA = Factor Analysis (7) CM P = Count Model (Poisson) (8) CM = Choice Modelling

(9) CVM R = Contingent Valuation Model (ranking) (10) Open ended (11) IBG = Iterative Bidding Game (12) Payment Card (13) Dichotomous Choice (14) Follow Up

(15) Trichotomous Choice * also with estimation of marginal value of landscape attributes

Allegate1 (d). Main descriptive and methodological features of the view papers on monetary valuation of rural landscape

Author(s)	Type of interview	Method.	Elicit format	Payment form	Supporting materials	Landscape complexity approach	Output value (mean or mode)
Hanley et al. (1998a)	Postal	CVM[3]	DC[13]	Tax	Photos	Multi-attribute	£47 (£42)
Hanley et al. (1998a)	Direct	CVM[3]	DC[13]	Tax	Photos	Multi-attribute	£61 (£57)
Hanley et al. (1998a)	Direct	CVM[3]	DC[13]	Tax	Photos	Multi-attribute	£98 (£73)
Hanley et al. (1998a)	Direct	CE[5]		Tax	Photos	Multi-attribute*	£10-87
Hanley et al. (1998b)	Direct	CVM[3]	OE[10]	Tax	Photos	Multi-attribute	£29.1
Hanley et al. (1998b)	Direct	CE[5]		Tax	Photos	Multi-attribute*	£38.1
Santos (1998)	Direct	CVM[3]	DC[13]	Tax	Photos	Multi-attribute	11,559 ESC fam/year
Santos (1998)	Direct	CVM[3]	DC[13]	Tax	Photos	Multi-attribute	£72.05 fam/year
Alvarez et al. (1999)	Postal	CVM[3]	OE[10]	Tax	Photos	Multi-attribute	£13.44
Cicia and Scarpa (1999)	Direct	CVM[3]	DC[13]	Visitors' tax	Photos	Global	2,440 Lit (day/visit)
Fleischer and Tsur (2000)	Direct	CVM[3]-TC[4]		Annual travel cost	-	Global	$167 and $ 51
Wood et al. (2000)	Direct	TC[4]	(TJS)	Tourist expenditure	Photos	Global	$300
Marangon and Tempesta (2001)	Direct	CVM[3]; CE[5]	DC[13] (sb)	Tax (annual)	Photos	Multi-attribute	2.8 to 5.7 B Lit (1.4 to 2.9 M
Kask et al. (2002)	Direct	CVM[3]	DC[13], FU[14]	Personal choice	Text, photos	Global	$21
Kask et al. (2002)	Direct	CM[8]		Personal choice	Text, photos	Multi-attribute	$53 lands. ($116 road.)
Kask et al. (2002)	Direct	CM[8]		Personal choice	Text, photos	Multi-attribute	$359 lands. ($240 road.)
Krumalová (2002)	Direct	CVM[3]	DC[13], FU[14]	Tax + contribution	Photos	Global	€16.20 - 492 CZK
Nunes (2002)	Direct	CVM[3], FA[6]	DC[13]	National Fund	-	Multi-attribute	£49 (non-use); £38 (use)
Tempesta et al. (2002)	by Phone	CM P[7]		Loss of income	-	Multi-attribute	€58.77/ha
Allali (2003)	Direct	CVM[3]	DC[13], FU[14]	Trust Fund	Photos	Global	140MAD (€13)
Gonzalez e Leon (2003)	Direct	CVM R[9]	DC[13]	Entrance fee	Photos, maps	Multi-attribute	€11.6 to €33.2
Gonzalez e Leon (2003)	Direct	CVM R[9]	DC[13]	Entrance fee	Photos, maps	Multi-attribute	€6.7 to €36.3
Mathews et al. (2003)	Direct	CM[8]		Personal choice	Text, photos	Global	$98
Mathews et al. (2003)	Direct	CM[8]		Personal choice	Text, photos	Multi-attribute	$208 lands. ($205 road.)
Mathews et al. (2003)	Direct	CVM[3]	DC[13], FU[14]	Personal choice	Text, photos	Multi-attribute	$468 lands. ($519 road.)
Kubíčková (2004)	Direct	CVM[3]	OE[10]	National Fund	Text, photos	Global	€9- 288 CZK (€8- 262 CZK)
Marazzi and Tempesta (2004)	Direct	CVM[3]	DC[13]	Tax	Photos	Mono-attribute	€68.30 to €241.52
Schlapfer et al. (2004)	by Phone	CVM[3]	TC[15], FU[14]	Tax (federal)	-	Global	430 SFR

(3) CVM = Contingent Valuation Model (4) TC = Travel Cost (5) CE = Choice Experiment (6) FA = Factor Analysis (7) CM P = Count Model (Poisson) (8) CM = Choice Modelling
(9) CVM R = Contingent Valuation Model (ranking) (10) Open ended (11) IBG = Iterative Bidding Game (12) Payment Card (13) Dichotomous Choice (14) Follow Up
(15) Trichotomous Choice * also with estimation of marginal value of landscape attributes