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Abstract

In this article we discuss the economic approach to evaluate landscape preferences for land-use planning. We then use the choice experiment method to examine public preferences for three landscape features – hedgerows, farm buildings and scrubland – in the Monts d'Arrée region (in Brittany, France), in the context of re-design of landscape conservation policy by the local environmental institute. Surveys were undertaken on two user groups, visitors and local residents. Our objective was to obtain empirical evidence of the difference between the preferences of tourists and residents, for landscape attributes. We then analysed the welfare changes of tourists and residents affected by different landscape programmes. Our results point out the strong divergence between the landscape preferences of the public and those of local public actors. The comparison of the estimated values of willingness to pay for single-attribute landscaping action shows some divergence between residents' and tourists' ranking of preferences for agricultural landscape areas.

Keywords: landscape preferences, attributes, choice experiment, welfare estimates

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1. Introduction

Research results on landscape evaluation techniques are the subject of an abundant literature. As Arriaza *et al.* (2004) point out, there is a complex classification of landscape

evaluation techniques and models. In the model underlying the process of evaluation of individuals' preferences, we can distinguish ecological, formal aesthetic, psychophysical, psychological and phenomenological models (Daniel and Vining, 1983). On the other hand, if we consider the types of methods used, direct methods can be distinguished from indirect ones (Arriaza *et al.*, 2004). Moreover, recent changes in the methods used for landscape evaluation reveal application of the quantitative approach. This consists in establishing a relationship between different objective components of landscapes and the preferences of the observers, identified on the basis of the scores given to scenes presented by photos, for example (Daniel, 2001) (Arriaza *et al.*, 2004).

The notion of landscape quality as the basis for and result of the models and methods proposed above remains partial and is not operational for use in public decision-making based on economic aspects. In this context, one needs an objective measurement of the impact of public action on landscapes, which is comparable to implementation costs (Santos, 1998). The problem we are faced with is then to find a valuation method compatible with some rules of public choice procedure.

Landscape preferences are relevant to economic valuation because of its use value and non-use value. Use value is of concern to residents and visitors even if they also express some non-use value because of global interest in landscape preservation. For some areas of national interest, potential beneficiaries of preservation action are also non-users in this specific area, which may express non-use value (Hanley *et al.*, 2001) (Willis and Garrod, 1993).

The methods of economic valuation of the benefits of public actions, based on valuation of the welfare variations of the main beneficiaries of public actions, can also serve to assess the benefits of landscape conservation programmes. Since the welfare indicator is given by the consumer "surplus", the welfare change is calculated as the variation of the surplus. For any market good, the price expresses the willingness to pay (WTP) for the last unit of the good

that a consumer may have. The difference between the maximum WTP and the market price is the consumer surplus, a measure of the individual welfare. For non-market goods, the WTP is not expressed on markets. It has to be expressed differently.

Usually, we distinguish two different methods to infer WTP. Revealed preference methods assume a relation of complementarity or substitutability between a market good and the non-market good of interest. For example, the hedonic pricing method uses the price variations on real estate markets to infer economic values of landscape changes (Luttik, 2000) (Cavailhès *et al.*, 2006). On the other hand, stated preference methods (contingent valuation or choice experiment method) directly ask respondents about their preferences for hypothetical transformation(s) of the considered landscape. Various studies have looked at landscape valuation using the standard contingent valuation method (Gonzalez and Leon, 2003) or the multi-programme contingent valuation method (Santos, 1998). Recently, the choice experiment method has been applied to environmental concerns and more specifically to landscape issues (Hanley *et al.*, 1998b) (Campbell *et al.*, 2006) .

We expect to see that a landscape of high visual quality has a high economic value. Yet Willis and Garrod (1993) show that the WTP for landscape depends very little on its beauty, since the coefficient of the scoring variable is close to zero. Moreover, in the case study by Bullock and Kay (1997), this variable is not significant. The estimated WTP may reflect the wish not to preserve the aesthetic dimension of landscapes but to protect a living or recreational environment, depending on its use. In this context, it is interesting to compare tourists and residents' WTP. On this specific point, Willis and Garrod (1993) cannot conclude on the superiority or not of tourists' WTP, compared to that of residents. Bullock and Kay (1997) show that the average of residents' WTP is higher than that of visitors in the case of an ESA[1] in Scotland. But Hanley *et al.* (1998a) infer the opposite result for another Scottish

[1] Environmentally sensitive area

ESA. Note, however, that the CAP evaluation from contingent valuation remains limited since it suggests only one possible action, the one presented and compared in relation to a situation of status quo. Moreover, it conceals differing preferences for the various landscape attributes in the different user categories. The choice experiment method therefore seems to be more appropriate to elicit landscape preferences since it allows for the valuation of preferences in terms of financial benefits of each of the objective components of the landscape, and for the subsequent valuation of preferences for their combinations.

We implement the choice experiment method to analyse landscape preferences of the two categories of rural landscape users – residents and visitors – at the Monts d'Arrée site in Brittany (France), and discuss some rules of decision-making on the basis of the potential impact of landscape programmes on their welfare variation.

Estimations of WTP reported in this study and other studies suggest that landscape has an economic value and can therefore be considered as a public good which is in demand. We closely examine the economic properties of this landscape demand, at least for the socio-economic context of the study.

The paper is organised as follows. The first section presents the methodology, the study site, the design of the experiments and the data collection. The second section presents econometric modelling of choice behaviours. The results are then presented and discussed in the third section. Section 4 focuses on the implications, for decision-making, of various options of landscape action.

2. Material and method

The Choice Experiment (CE) method was developed in the marketing and economics of transport literature (Louviere, 1988) (Louviere, 1992) (Louviere and Woodworth, 1983) and extended to environmental concerns, initially by (Adamowicz *et al.*, 1994). Various

applications in environmental economics have served to calculate use and non-use values (Adamowicz *et al.*, 1998) (Boxall *et al.*, 1996) and, more recently, to estimate the recreational benefits of forest management practices (Nielsen *et al.*, 2006).

The choice experiment method was implemented in the present study to elicit respondents' preferences for different hypothetical changes in the visual landscape of the areas in which they were involved as residents or visitors during the survey period. Respondents were asked to choose between a set of alternatives called choice sets. In our case, each choice set was made up of two alternatives that compared the situation, changed by landscaping action, to the baseline alternative for which there was no public action, i.e. the status-quo situation. Alternatives were defined on the basis of the levels taken by the "attributes" of the landscaping action programme. Different alternatives between which respondents were asked to choose within a choice set were constructed by varying "attribute" levels. A landscaping action programme was defined for each alternative on the basis of the condition of the visual landscape attributes and the financial burden it imposed on respondents. The proposed alternatives for each choice set were then all different in terms of the visual landscape attributes and the financial burden attribute. The choice task was repeated as many times as the number of choice sets built for the empirical analysis. The resultant sequence of choice outcomes enables the probability of an alternative being chosen to be modelled in terms of the impact of attribute levels on the utility generated by landscaping action and described by this alternative for each user category. It is possible, on the basis of this choice modelling, to infer people's willingness to pay for a landscape attribute level by assessing economic welfare variation. This variation is obtained by calculating the difference between the utility achieved by the individual under the status-quo alternative and some other alternative, and dividing this value by the negative of the coefficient of the cost attribute (for more details see below).

2.1 Identifying landscape attributes for choice design

The landscape of the Monts d'Arrée is typical of central Brittany, in the far west of France. It overlaps with the Armorique Regional Nature Park (PNRA). This landscape is characterised by two clearly distinct landscape scenes: in the north of the study area, an "agricultural" landscape with mostly hedgerows and farm buildings, and in the south a "wild" landscape in which scrubland prevails.

The environmental stakes in this area are therefore also twofold. The first relates to the agricultural areas and concerns the maintenance of hedgerows and the landscape integration of farm buildings. Agriculture in this region was highly intensive, with many farm buildings for intensive outdoor production of pigs. The second stake relates to the maintaining of traditional scrubland, considered to have a high ecological value and threatened by spontaneous forest progression. The PNRA, whose main missions are to manage its rural area harmoniously, to maintain the biological diversity of its environment, and to preserve and improve its resources and its most remarkable or fragile sites, at the end of the nineties, decided to undertake three main actions: the landscape integration of farm buildings; the maintenance or planting of hedges to relay agri-environmental action; and the preservation of scrubland from forest extension. It therefore appears interesting to propose an ex-ante valuation of landscape changes that would occur if some landscape protection measures were taken (Dachary-Bernard, 2004).

The set of landscape attributes considered in the survey is a combination of attributes aimed for by the PNRA preservation scheme, and attributes considered to be important by local residents. These were identified by means of a qualitative survey conducted in 2000 in the same areas by a team of sociologists (Le Floch, 2000). They include: scrubland, hedgerows and aesthetic aspect of farm buildings. Three levels were used to depict each

landscape attribute according to its density for a given scene. To control for respondent confusion, the levels for each landscape attribute were denoted using the same labels: (1) the attribute appears in the scene as undesirable; (2) an intermediary situation, owing to partial public intervention; (3) the optimal level of the attribute from the landscaping viewpoint. Experts' opinions were taken into account at this stage in order to validate these attributes and their credibility. This was to prevent their rejection during the choice task. The table 1 recapitulates attribute levels.

2.2 The cost attribute

The monetary values of individual preferences for the different landscape attribute changes may be estimated by using a cost attribute, or monetary attribute, that suggests the (hypothetical) price people would pay to benefit from a landscape change caused by a specific policy. In our study it takes the form of an increase in tax, although this tax would differ, depending on the population interviewed, as shown in Table 1. For tourists, the cost attribute is an increase of the resort tax defined on a basis of € per person and per night, whereas residents' tax is an increase in municipal taxes (expressed in € per household and per year). Their levels were identified on the basis of, respectively, the current resort tax levels and the average municipal taxes paid in this area. Three positive levels are considered for the experimental design.

<< INSERT TABLE 1 HERE >>

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2.3 Experimental design

This section describes the experimental designs and the mathematical process by which, on the basis of an orthogonal criterion, each level of each attribute is combined with other levels of other attributes within each alternative to obtain choice sets. Combining the three-level cost attribute with the three-level landscape attributes would result in 81 distinct alternatives with a full factorial design, which is unwieldy. Therefore, as usual, we use a fractional factorial design applying different macros, as suggested by (Zwerina *et al.*, 1996). This statistical procedure ensures orthogonality between attribute levels considered within the same scenario and then efficiency of the whole choice set together. The parameter estimates provided by logit models are then efficient. The different alternatives are therefore grouped into choice sets, each composed of three alternative scenarios. The third possible choice, common for all choice sets, describes the *status-quo* condition defined as the no public landscaping action and for which the monetary contribution is consequently nil. A pair of photographs illustrates each scenario: the first photograph reflects the state of the scrubland, while the second one illustrates the state of the agricultural area as regards the state of hedgerows and farm buildings. An illustration of this photographic description of the scenarios is given in Appendix B for one of the choice sets used.

The fractional factorial design process generates eighteen alternatives, or nine choice sets as the smallest efficient design (Hensher *et al.*, 2005). However, in order to facilitate respondents' task (Hanley *et al.*, 2000), we chose to present six choice sets and decided to drop three alternatives from pragmatic considerations since the landscape changes expressed by the different scenarios have to be realistic. The list of the six choice sets is presented in Appendix A.

2.4 Data collection

The data collected for this study are drawn from two surveys based on personal interviews carried out in the Monts d'Arrée in Brittany. The first survey was carried out on visitors randomly interviewed in 2002. In the second survey, in the spring of 2003, local residents were interviewed at their place of abode to assess their preferences. In these two surveys, all alternatives and choice sets were identical as regards landscape attribute levels but differed for the monetary attribute levels. The empirical analysis presented in this paper addresses the landscape preferences of first home local residents (284) and French visitors (230). All descriptive statistics are available from the authors.

3. Implementation of the econometric estimation of choice behaviour

3.1 Defining the utility functions of the baseline model

The next step of the evaluation process consists in estimating the choice behaviours. As is usually supposed, people choose the alternative that maximises their utility or well-being. Moreover, as the random utility theory proposes (Thurstone, 1927) (Mcfadden, 1974), the utility function that an individual q can expect from choosing an alternative i is assumed to be composed of a deterministic part (V_{iq}) and a random part (ε_{iq}). Thus, an alternative i is chosen when the utility associated with it is higher than for all other alternatives $j \neq i$ of the choice set C:

$$\begin{aligned} & U_{iq} > U_{jq} \ , \ \forall j \neq i \in C \\ \Leftrightarrow & (V_{iq} + \varepsilon_{iq}) > (V_{jq} + \varepsilon_{jq}) \\ \Leftrightarrow & (V_{iq} - V_{jq}) > (\varepsilon_{jq} - \varepsilon_{iq}) \end{aligned} \qquad (1)$$

When the distribution of the random components of the utility function ε_{iq} is assumed to have a Weibull form, the probability to choose an alternative *i* can be written as follows:

$$P_{iq} = P(U_{iq} > U_{jq}) = \exp(V_{iq}) \Big/ \sum_{j=1}^{J} \exp(V_{jq}) \quad \text{for } i, j = 3. \qquad (2)$$

We then obtain a conditional logit model.

To construct alternative choices, landscape attribute levels are defined on a qualitative basis, so that we introduce each level in the utility function as a variable. Our choice design involves three levels of three landscape attributes. We then create two variables for each attribute and keep the corresponding level for the status quo scenario as the reference. With dummy coding the coefficient estimates of attribute variables are correlated to the intercept of the regression (Bech and Gyrd-Hansen, 2005), which corresponds to the alternative dummy code in the conditional logit model. Effects coding constitutes an alternative to dummy coding in which the effects are uncorrelated with the intercept of the regression. Attribute levels are then effects coded. They are set to one when for the scenario the attribute level is present, equal to –1 if the status quo level is present, and equal to 0 otherwise. The utility function from choosing alternative i for each social group g in the baseline model can then be expressed as follows:

$$U_{iqg} = \beta_{1g} l_2 + \beta_{2g} l_3 + \beta_{3g} b_2 + \beta_{4g} b_3 + \beta_{5g} b_{a2} + \beta_{6g} b_{a3} + \beta_{7g} p + \varepsilon_{iqg} \qquad (3),$$

where l_2 and l_3 are the effects variables when scrubland takes respectively the level 2 or the level 3, b_2 and b_3 are the effects variables for hedgerows and ba_2 and ba_3 are the effects variables for farm buildings. The variable p represents the cost attribute. The parameters $\beta_{a=1,\ldots,6;g}$ values are the coefficient associated with landscape attributes, and β_{7g} is the parameter of the cost attribute. Finally, ε_{iqg} represents the random term.

We estimate equation (3) for the tourist sample, the resident sample and pooled data. For three regressions, the estimate of the cost attribute parameter was positive. Then a non-linear utility

function was estimated by introducing the square value of this variable. The parameter of this new variable was significant and negative. The utility functions retained for the rest of the paper are then non-linear and take the following form:

$$U_{iqg} = \beta_{1g} l_2 + \beta_{2g} l_3 + \beta_{3g} b_2 + \beta_{4g} b_3 + \beta_{5g} b_{a2} + \beta_{6g} b_{a3} + \beta_{7g} p + \beta_{8g} p^2 + \varepsilon_{iqg} \qquad (4)$$

where β_{8g} corresponds to the parameter of the square value of the cost attribute.

In order to investigate whether attribute levels affect choice behaviour of both social groups in the same way or not, a Swait-Louviere likelihood ratio test is implemented (Swait and Louviere, 1993). We conclude in rejecting the null hypothesis that the regression parameters for the tourist and resident choice behaviour models are equal at 0.01% significance level. We thus perform our analysis on the basis of separate estimation of the choices of the two social categories.

3.2 Introducing socio-demographic variables in the choice modelling

- The income effect

Choice modelling from stated preferences data indirectly captures the effects of income on utility by embracing the income effects in terms of the cost attribute. When the quadratic term of the cost attribute is significant, it indicates that the marginal utility of income is not constant (Adamowicz *et al.*, 1998). It is decreasing with income at least over the social context examined in this case study. However, we must make sure that this relation is not rather related to the payment vehicle used for the survey. Then, in order to check a differential impact of cost attribute according to income level, on the one hand, and according to the fact of paying the local tax or not, on the other, we introduce two kinds of interaction variable, both for tourist and for resident choice behaviour models. The first one is the interaction of cost attribute with an income dummy variable. This variable takes the value of one for

respondents declaring an income level higher than €1,500 per month and zero otherwise. The second one is the interaction of cost attribute with a tax payment dummy variable. For tourists, the tax dummy variable takes the value of one if the respondents stated that they had benefited from free accommodation during their trip and had not paid local tax, and zero otherwise. For residents the tax variable is set to 1 if they stated that they had paid the local tax, and zero otherwise. These crosscutting terms are supposed to affect utility in a linear form. For tourists' choice model, for the two interaction terms, the Student-t values were significant. In contrast, for residents, Student values were not non-significant. Wald-tests were then run to validate the need for their maintenance in the regressions but the Wald-test results confirm their rejection from the utility function.

- Heterogeneous preferences as a link to the living area characteristics

A large proportion of tourists (40%) said they lived in a rural area. In order to compare the landscape preferences of tourists who are specifically from urban areas, with those of tourists from rural areas, all landscape effect-coded attributes are crossed with a dummy variable which takes the value of 1 when respondents claimed to live in an urban area and 0 otherwise. For residents, landscape preferences are supposed to be different between people living in the agricultural landscape of the northern part of the study area and people living in the southern part that is specifically composed of scrubland. We then cross all landscape attribute variables with a dummy variable set to 1, when the respondent is living in the agricultural zone and 0 otherwise. Wald-tests were also run to validate the need for maintaining these interaction variables in the regressions. For tourists' choice modelling, the Wald tests are significant for all interaction terms. In contrast, for residents, all additional variables have been non-significant regarding the Student-test values and the Wald test results.

- The "independence from irrelevant alternatives" assumption

Lastly, our estimation is based on a conditional logit model by maintaining a strong assumption of "independence from irrelevant alternatives" (IIA). The violation of the IIA hypothesis in the conditional logit model can be avoided by the inclusion of socio-demographic variables (Bennett and Blamey, 2001). In our case, the inclusion of a large set of *cross*cutting variables of choice attributes with socio-demographic attributes could meet this requirement.

4. Econometric results

In Table 2 we summarise the values of the parameters for the landscape attributes considered in the utility function of three user categories: residents, visitors from urban areas and visitors from rural areas. The econometric results of the final regressions retained for discussion are provided in Table 3 in the appendix.

The effects-coding system that is used to take into account the landscape attribute levels does not directly estimate the parameter of the base level, but we can infer it from the estimation of the two effects-coded corresponding attribute parameters:

- concerning scrubland : $-(\widehat{\beta}_1 + \widehat{\beta}_2)$
- concerning hedgerows : $-(\widehat{\beta}_3 + \widehat{\beta}_4)$
- for farm buildings : $-(\widehat{\beta}_5 + \widehat{\beta}_6)$

Table 2 below provides the impact of landscape attributes on the utility value, including the parameters of landscape attributes of the utility function for the status-quo alternative.

"INSERT TABLE 2 HERE"

We find that for agricultural area attributes, three groups show preferences for hedgerows (3) and farm buildings (3), but they diverge regarding the desired state of the scrubland. Residents and tourists of urban origin have a clear preference for a mixture of forestland and scrubland, while tourists of rural origin prefer completely forest landscape. We may therefore wonder whether a preference ordering can be established for the three types of attribute. Following (Bennett and Blamey, 2001), the comparison of utility parameter values do not enable us to deduce the individuals' true preferences. For that, we need their welfare variation from the status quo situation.

To obtain the welfare variation associated with a landscaping action, the value of utility corresponding to the changed situation V_{1g} is subtracted from the value of utility with the status-quo option $V_{status-quo,g}$. The values of V_{1g} and $V_{status-quo,g}$ are calculated using the utility function provided in the table 3, by maintaining the corresponding parameter value of the landscape attribute effects-code level of each scenario, with all price variables set to zero. This utility difference is then divided by the negative of the coefficient associated with the cost attribute. However, because of the quadratic form of monetary attribute in the utility function, this ratio takes the following form in our case:

$$CS_{ig} = -\frac{V_{status-quo,g} - V_{1g}}{\left(\widehat{\beta}_{7g} + 2\widehat{\beta}_{8g}\, p_{\max}\right)} \qquad (5)$$

where $p_{\max}$ represents the minimum cost attribute value that will make the denominator of equation (5) negative. This indicates that we can calculate welfare variation for all values of cost attribute higher than $p_{\max}$, and the value of equation (5) obtained with $p_{\max}$ corresponding to the maximum boundary of the mean value of welfare variation. The minimum value will then be 0 for $p_{\max} \to +\infty$. A negative value of equation (5) indicates that

the individual is willing to pay for the change. $\widehat{\beta}_{7g}$ and $\widehat{\beta}_{8g}$ are the corresponding estimated parameters of cost attribute. The denominator of equation (5) represents the marginal utility of the income.

According to equation (5), our calculation of welfare variation is then dependent on the $p_{\max}$ value we choose to use. For residents, the minimum value for which the denominator of equation (5) will be negative is 39.5. We can then choose $p_{\max}$ €40 as a starting value and calculate the mean value of residents' welfare variation according to the evolution of $p_{\max}$. Remember that for tourists, the econometric results show a clear difference in the impact of price, according to level of income and to whether the respondent paid the resort tax or not. It is thus necessary to calculate four subcategories within this category (tourists with income <€1,500 paying the tax, tourists with income >€1,500 paying the tax, tourists with income <€1,500 not paying the tax, and tourists with income >€1,500 not paying the tax). The actual value of the parameters of the cost attribute is given in Table 4 in the appendix. These values suggest that if we calculate the willingness to pay of each tourist subcategory using equation (5) for the same value of $p_{\max}$, the willingness to pay of tourists benefiting from free accommodation is lower than the willingness to pay of tourists really paying the resort tax. For the rest of the analysis, when we make comparisons between several groups that involve tourists' preferences, we refer only to this latter group. The minimum value of $p_{\max}$ is around €0.25. We then choose as starting value the maximum amount proposed in the survey, €0.30/person/day.

Note also that for resident and tourist groups, the mean WTP values reported below are significantly positive as regards to the Wald test results run on the WTP obtained from the starting values of $p_{\max}$.

5. Implication for decision-making when implementing landscaping actions

5.1 Without financial constraint: the issue of the divergence between the public preferences and the public actor preferences

When the decision-maker has sufficient funds to implement a complete action plan comprising all three attributes, the principal concern relates to the level of each attribute to reach, regarding public preferences. In our case, for the agricultural landscape attributes, all social categories agree on the level to be maintained. This is not the case for scrubland, since tourists who are from rural areas wish for a completely forest landscape whereas the other categories of users, the residents of the areas themselves and the tourists from urban areas, would like a mixture of scrubland and forestland. However, what is really sure is that none of the user categories wants completely close-cropped scrubland like that which the local public actors currently maintain in this region.

5.2 In a context of limited funds: the issue of heterogeneous preferences of the social categories involved

When the decision-maker has limited financing and can set up only one programme aimed at one attribute, he is forced to look closely at the preferences of each social category of users with respect to each attribute. In our study, regarding the impact of income level on the value of the parameters of the cost attribute for tourists, it is necessary to distinguish those tourists with an income lower than €1,500 from those with a higher income, for all comparison tasks. In this section we compare residents' preferences with those of tourists from urban areas because they show identical preferences for each attribute level. In Graph 1

residents' ranked preferences on the basis of their willingness to pay are compared only to those of richer tourists from urban areas since the second comparison, to poorer tourists, reveals the same orders. Graph 1 shows that tourists give priority to the landscape integration of farm buildings before the restoration of hedgerows and the preservation of scrubland. In contrast, residents are interested mainly in programmes to restore the hedgerows and do not have specific preferences for a programme for farm buildings or one for scrubland.

"INSERT GRAPH 1 HERE"

5.3 Landscape economic values and equity concern

According to equation (5), an increase of the cost attribute induces a decrease of the value of the marginal utility of income and likewise a decrease of the willingness to pay for the alternative. Our estimation for the two user categories (tourists and residents) shows that the marginal utility of the income is decreasing. For residents, this observation is only maintained at the individual level because we did not detect any income effect on the cost attribute parameter. However, for the tourists, there is a clear effect of income level on the cost attribute parameter values (see Table 4 in appendix), which means that the decreasing marginal utility of income is also confirmed for an interpersonal comparison. Graph 2 illustrates this comparison of the willingness to pay for farm building integration, between income categories, within the group of tourists of urban origin on the one hand and within a group of tourists of rural origin on the other. For both groups we find that higher income-level tourists' willingness to pay is greater than that of the poorer tourists, and these values decrease in relation to the cost attribute increase. Moreover, the WTP for programme for farm buildings are greater for tourists of urban origin than for tourists of rural origin.

"INSERT GRAPH 2 HERE"

These results also mean that apart from their sociological, aesthetic or ecological values, we can advance that landscape attributes of rural areas also possess economic value and can be considered as "normal" consumer goods (Whitehead, 1995), at least for landscape users. Moreover, agricultural landscape preservation thus tends to be relatively more beneficial to low-income social groups.

Conclusion

Using the choice experiment valuation method, this study reached its goals in (1) comparing landscape preferences of two categories of users who are residents and tourists of the Monts d'Arrée area in Brittany, (2) calculating landscape value at the attribute scale in order to be able to assess any particular multi-attribute landscape programme, and (3) analysing the results with regard to public decision-making. In this particular area, and given all the limits of the econometric modelling applied, results reveal some interesting divergences between the landscape preferences of different groups of actors (tourists, residents and even decision-makers). Moreover, preferences heterogeneity also appears among tourist samples and is affected by two socio-economic factors: income level and the kind of environment of their main area of residence (urban or rural). But no divergence is revealed among residents with regard to their landscape attribute preferences. At this stage, considering that residents are more familiar with the landscape surrounding them in their daily lives, we may wonder to what extent an experience of the landscape and learning about landscape changes leads to a sort of consensus regarding landscape protection to undertake in the area.

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