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## People preferences for spatial land use attributes: how it can support land management decisions?

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Special session  
Territorial Governance, rural areas and local agro food systems

People preferences for spatial land use attributes: how qualitative data may improve  
discrete choice experiments method?

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**Abstract**

Coastal areas have known from recent decades an increasing attractiveness that puts an important pressure on these specific territories and their resources, and that generates important land uses conflicts (GOETZ, *et al.*, 2007). Such conflicts may appear because of the different services that land resources provide, and that people are looking for.

If economics literature refers to numerous studies of land transactions and land-use patterns, few studies deal with values of land services (BOYLE, *et al.*, 2006). This study takes place in this area of research, eliciting consumers' preferences and willingness to pay for alternative land uses and supplying interesting information to land use decision makers about the expected benefits of alternative patterns of development (JOHNSTON, *et al.*, 2003).

We apply choice experiments method on a coastal area, the French Arcachon bay, in order to understand how people value the different land attributes of this site. Different hypothetical scenarios that are supposed to describe different spatial organisation of the territory are presented to respondents, who have to choose the scenario they prefer. These scenarios are defined from the main land attributes, so they need to be correctly understood by respondents (HANLEY, *et al.*, 2001).

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For this first stage of the method, we use focus groups results and experts point of views in order to define the attributes and construct the different choice sets that will be presented to respondents in a survey. Three focus groups (KRUEGER etCASEY, 2009) have been realised and experts' interviews have been carried out among some main local agricultural activities. Both qualitative inputs are not supposed to give the same kind of information (KAPLOWITZ etHOEHN, 2001). Then, these qualitative informations are used to implement the survey design.

Integrating such a qualitative approach and survey designs is supposed to improve the process of valuing land use changes benefits (DESVOUSGES etFREY, 1989). The authors will discuss this specific methodological point.

## **1. Intro**

Coastal areas have known from recent decades an increasing attractiveness that puts an important pressure on these specific territories and their resources, and that generates important land uses conflicts (GOETZ, *et al.*, 2007). Such conflicts may appear because of the different services that land resources provide, and that people are looking for.

The Pays “Bassin d’Arcachon Val de l’Eyre” is one of these territories under numerous pressures, which are likely to generate land use conflicts. The first one, whose gradient is logically decreasing with the distance from the sea, is exerted by inflows of populations and firms attracted by the littoral amenities. The second one, whose gradient is perfectly opposite the first, results from the agglomeration of Bordeaux. These two kinds of pressure are affecting, among other things, the coastal and inland forest, which constitutes a very large part of the land (79%) (Database CORINE LAND COVER, 2006) and by this way a great landed supply. The population inflows and firms imply the development of new or existing activities<sup>1</sup>, which are sometimes complementary, other times rival, very often land consumers. Thus, land management of such a territory needs to take in account both the several types of land demands and the externalities of the activities exercised on each parcel of land in order to design a coherent spatial organization which may satisfy the great diversity of users.

To construct this coherent spatial organization, many regulation tools have been developed: environmental zoning: “ZICO, ZNIEFF, Natura 2000”, areas managed by the conservatory of littoral, directory schemas as “territorial coherence schema” or “urbanism local planning” ... The State or the territorial collectivities can use them in order to restrict land conversion or to manage the land use changes. The application of each of these tools, whose list above is not exhaustive, reveals quasi systematically a competition between public and private interests and logics (GOETZ & al., 2005), which generates a part of land use conflicts. Indeed, the aggregation of private interests, which can be completely rational from an individual point of view, is incompatible with the public interest. So, there is a continuous tension between logic of using and logic of conservation of lands, and the public interest is looking for a balance between these both land uses logics, without creating a segmentation of the land which on the contrary has risks to

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<sup>1</sup> We make a difference between the land use which corresponds to the land cover (e.g. the forest) and the activities which are possible from this land use (e.g. wood production, hiking, etc.).

intensify the conflicts. Indeed, some regulation tools are accentuating the dichotomy between “natural areas” and “urban areas” (GERARD, 2008) and may amplify the land use conflicts by crystallizing the opposition between logic of conservation and logic of using.

So, the regulator must try to find a compromise between the different land consuming uses, notably in order to solve or reduce the land use conflicts or on the contrary to valorize the positive interactions between two land uses. Indeed, land provides some services for the proprietor and the neighborhood may benefit from the positive externalities of this land use as he can suffer from its negative externalities too. So, geographical proximity plays a great role in generating conflicts by revealing the externalities of (RALLET & TORRE, 2005). As it appears, spatial organization is a tricky issue in terms of land uses, and more precisely in terms of land uses services.

In order to provide data and tools for an effective regulation, coastal areas are the object of many works in terms of land transactions and land use patterns but few studies deal with land use economic valuation (BOYLE, *et al.*, 2006). In this context of increasing attractiveness of coastal zones, we need more information on residents and tourists’ main motivations to look for such areas, their main reason to choose such areas for residential use (main residence or punctual stay). Understanding the values people give to the different land uses of these specific territories is important to local planners to implement effective land use policies. In this article, we propose to deal with this question of land use values on the Pays “Bassin d’Arcachon Val de l’Eyre”. We use a stated preference method called *choice experiments*, fed with qualitative inputs driven from focus groups in order to improve the all methodology.

The paper is tortured as follow. The first part presents the Choice Experiments method in order to show how it can help in land use planning. The second part comes back to focus group technique and describes the way we implement it in our case study. The third part exposes the way focus groups results are used to improve choice experiments design. The last part briefly concludes and presents the future stages of the research.

## **2. Choice experiments, a multi-attributes approach**

Discrete Choice Experiments (DCE) is a stated preference valuation method that was developed within the marketing and the economics of transports literature (Louviere, 1988;

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Louvière, 1992; Louvière and Woodworth, 1983). More recently, it has been applied to some environmental questions for the first time by Adamowicz, Louvière and Williams (1994). However, one has to wait the end of the 90's to approximate environmental non-use values by choice experiments technique (Adamowicz, Louvière and Swait, 1998).

Theoretically based on Lancaster theory (LANCASTER, 1966), the good is considered as composed of attributes that provide satisfaction to the consumer of the good. Supposing that people choose the good that maximise their satisfaction, the choice exercise is analysed into the random utility framework as proposed by Thurstone (1927) and formalised by Mcfadden (1974).

The DCE consists in presenting to several respondents different *hypothetical* states of the good of interest. Respondents have to choose their most preferred situation between the different proposed alternatives. This experience of choice is repeated several times with new alternatives each time. Within a same choice set (or experience), an alternative differs from the other regarding the level taken by the attributes of the good. That is the reason why the implementation of the method starts by the determination of the main attributes which define the good and from which different scenarios will be constructed and then presented to the respondents. This constitutes the first step of the evaluation process implied in the DCE. Literature reviews and focus groups are used to select attributes that are relevant to people while experts consultations help to identify the attributes that will be impacted by the policy. A monetary cost is typically one of the attributes to allow the estimation of WTP. Different levels are assigned to each of these attributes in order to allow variety of scenarios according to different combination of attributes levels. The second step consists in creating such scenarios. Statistical design theory is used to combine the levels of the attributes into a number of alternative scenarios or profiles to be presented to respondents.

These two first steps in implementing DCE are particularly important to create good surveys, and to be allowed to deal with individual choices of good quality. Indeed, once choices have been done, collected data may be analysed in a discrete choice modelling in terms of willingness to pay for different attributes changes (from one level to another one) (DACHARY-BERNARD, 2008).

Knowing that these two steps are of particular interest, the next section will present the main results of the focus groups realised, and the design procedure that we will follow to deal

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with people preference for the different land uses in the area of the Arcachon Bay (Gironde-France). Before that, in order to illustrate the entire valuation process and to integrate our work into the literature over concern, we look to past studies that use DCE to deal with specific land uses.

The DCE has been little used to land use changes issue. As Boyle wrote (2006, p. 229), only one conjoint application occurred in the review *land economics* between 1990 and 2001 related to land use valuation: it is the one of Johnston (1999) who studied the values of various watershed management options.

From 2001, some more studies have been realised concerning land use options, but only few. (JOHNSTON, *et al.*, 2000) use such a valuation method to study people preferences for packages of growth management. The different scenarios address hypothetical development options regarding forested open space, undeveloped lands, recreation fields, roads and residential subdivisions. The alternatives are illustrated with simplified maps since the scale of analysis is a 400 acre parcel. As the author concludes (JOHNSTON, *et al.*, 2002), special factors are of real importance since they influence welfare estimations. Moreover, this valuation has give rise to different interesting results. According to residential use (JOHNSTON, *et al.*, 2003), residents prefer development plans characterised by larger area of preserved open space and lower housing density.

Others (MALLAWAARACHCHI, *et al.*, 2001) have used choice modelling to study different land use options that vary in terms of environmental protection, residential development and agricultural production. The main idea of their research is “to guide decisions to allocate resources between production and environmental uses” (MALLAWAARACHCHI, *et al.*, 2001, p.301). An interesting result is that people have a negative utility from residential development or agricultural (sugar cane) production. They clearly favour the environmental use of land.

This review of literature firstly reveals the needs to feed this part of the land use research. Secondly, all recent discrete choice modelling studies use focus groups to better calibrate the choice experiences. However, this is not easy and our research takes part in this area of the research. Qualitative methods as focus groups may be used in combination to stated preference methods in various stages of the valuation process. It can help to design the choice experiments selecting the attributes and their levels(HANLEY, *et al.*, 2001). Focus groups can also be employed

as a diagnostic tool to validate the stated preferences results already obtained (POWE, *et al.*, 2005). The next part presents theoretical focus groups background and our empirical strategy.

### **3. Focus groups interests : theory and practical implementation**

The quantitative approach of the choice modeling can be completed by qualitative methods, group or individual qualitative approaches, which enable to improve survey design and to solve some valuation problems (POWE, 2007).

#### 3.1. Focus groups in an economic valuation method

Powe (2007) has proposed to make a state of the art of the interest of a combination of qualitative and quantitative methods. Finally, this combination proved to be interesting upstream and downstream the survey design. Indeed, on the one hand, a qualitative approach helps the researcher to “choose potential motivational factors for survey questionnaires” and on the other hand, it is a useful tool in order to “pilot test the questionnaires”, and more largely “to consider the public acceptability and appropriateness of the overall valuation approach” (POWE, 2007, p.35). So, when it is associated with an economic valuation method, qualitative method may be used either for designing a survey, or for validating the survey. In the study here, we use qualitative results at the first stage. They help us define the attributes and construct the different choice sets which will be presented to respondents in the survey. More accurately, the qualitative method used here must help us to have answers to the following questions: **How do permanent and second residents describe the land uses of their territory? In other words, which land uses are likely to influence their preferences and with which words do the residents designate them?**

At this stage, it remains to be seen which qualitative method is the most appropriate. As the study of Kaplowitz (2001) about natural resources valuation seems to show, and on the account of the differences of the process applied, individual interviews and focus groups may give access to distinct data. Powe (2007) explains that, even if similar conclusions have been not widely shown, group methods present the advantage of leading to a more in-depth discussion. Indeed, the group enables interactions between people on the talk of each other and gives the opportunity to anyone to reformulate his response or still to make some respondents aware of their real motivations.



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This enables the author to conclude that “group-based methods [...] are much better for considering the public acceptability of stated preferences approaches” (p. 35). In coherence with this conclusion, we made the choice to realise focus groups in order to improve the survey questionnaire used for the choice experiment method applied to understand how people value the different land attributes of the Bassin of Arcachon.

There are a lot of works which deal with the behavior of groups and the interaction among people in the group. Based on the results of this theoretical and empirical research about people interactions in a group, many methodological papers and practical guides have been published and have contributed to show the high informational potential of group discussion. Among the existing qualitative approaches, Compared to individual interviews, we find three interesting points in favor of focus group. First, it “reveals participants’ similarities and differences of opinion”, second, “the topics raised in focus groups may reflect “groupthink””, and third a group discussion can be “helpful identifying variables, issues and hypothesis for quantitative research”(KAPLOWITZ etHOEHN, 2001). Initially, focus groups have been developed for a marketing application. But, progressively, a certain number of researchers applied it.

Finally, focus group can be seen as a technique of diagnostic or of exploration useful for a contingent valuation method and notably for the choice modeling (CHILTON etHUTCHINSON, 1999). The survey questionnaire, main and crucial material of this type of valuation is not a direct output of the focus group, but focus group helps us to specify and precise the version already built.

The following key-sentence from Krueger & Casey can be quoted to sum up our demarche: “by involving people who possess certain characteristics, focus groups provide qualitative data from a focused discussion in order to help understand the topic of interest” (KRUEGER etCASEY, 2009, p.6).

### 3.2. Focus groups designing in the Bassin of Arcachon

Firstly, focus groups’ designing means identifying obviously which kind of information we are researching. We must be really well aware of the relevant qualitative data in order to focus the discussion in the right direction. All the choices made in terms of organization (place), public, questions, etc. depend on this problematic. As we already said, what we want to know is: **How do permanent and second residents describe the land uses of their territory? In other**

**words, which land uses are likely to influence the preferences and with which words do the residents designate them?**

Once these questions are raised, the framework of the focus groups can be designed and the next step is gathering people whose characteristics suggest an interest for the topic under conditions which enable the emergence of the sought-after information. As we said, several focus group practical guides have been published. The purpose of such a literature is to provide tools and pieces of advice guaranteeing the achievement in information sampling. Nevertheless, even if it enables to avoid some big mistakes, it must not make us forgive that each research, each study case, has its specificities and requires some adjustments. This underlines the importance of having a great understanding of the issue and of the context of the study. That is why we refer to a territorial diagnostic realised last year (LEMARIÉ, 2009).

This diagnostic notably reveals the heterogeneity of the studied territory as well in terms of spatial organization/ land uses than in terms of territorial flows. This heterogeneity is explained among other things by the great diversity of natural resources (CAZALS et LEMARIÉ, 2010). In one hand, we have 79% of the territory covered by a productive forest of maritime pines (Database CORINE LAND COVER, 2006) which encloses mixed timber forests of maritime pines and leafy species, very few farms lands, natural protected sites localized essentially around the Eyre River and in the coastal forest, and some little urbanized areas linked with departmental roads. In the other hand, we have the Bassin of Arcachon, support of oyster farming, fish and yachting, whose south coast concentrates more 50% of the population and a very large part of the employment generated by the residential sphere. This south coast is directly connected with Bordeaux by a highway where the north coast welcomes more little towns separated by the coastal forest, which are less easily accessible. All of this information can be observed on the map below. Finally, three spatially coherent zones are identified. Except for two communes, these three zones correspond to the three intercommunalities that compose the Pays: the COBAS which gathers the communes of the south coast of the Bassin, the COBAN which is composed by the north coast, and the community of communes of the Eyre valley which assembles a large part of the inland forest communes. This spatial organization justifies our choice to lead three focus groups. Indeed, in coherence with the works about proximity effects, we assume that the inhabitants of a same coherent spatial area share some common spatial references and experiences and consequently are susceptible to understand each other (and not automatically to

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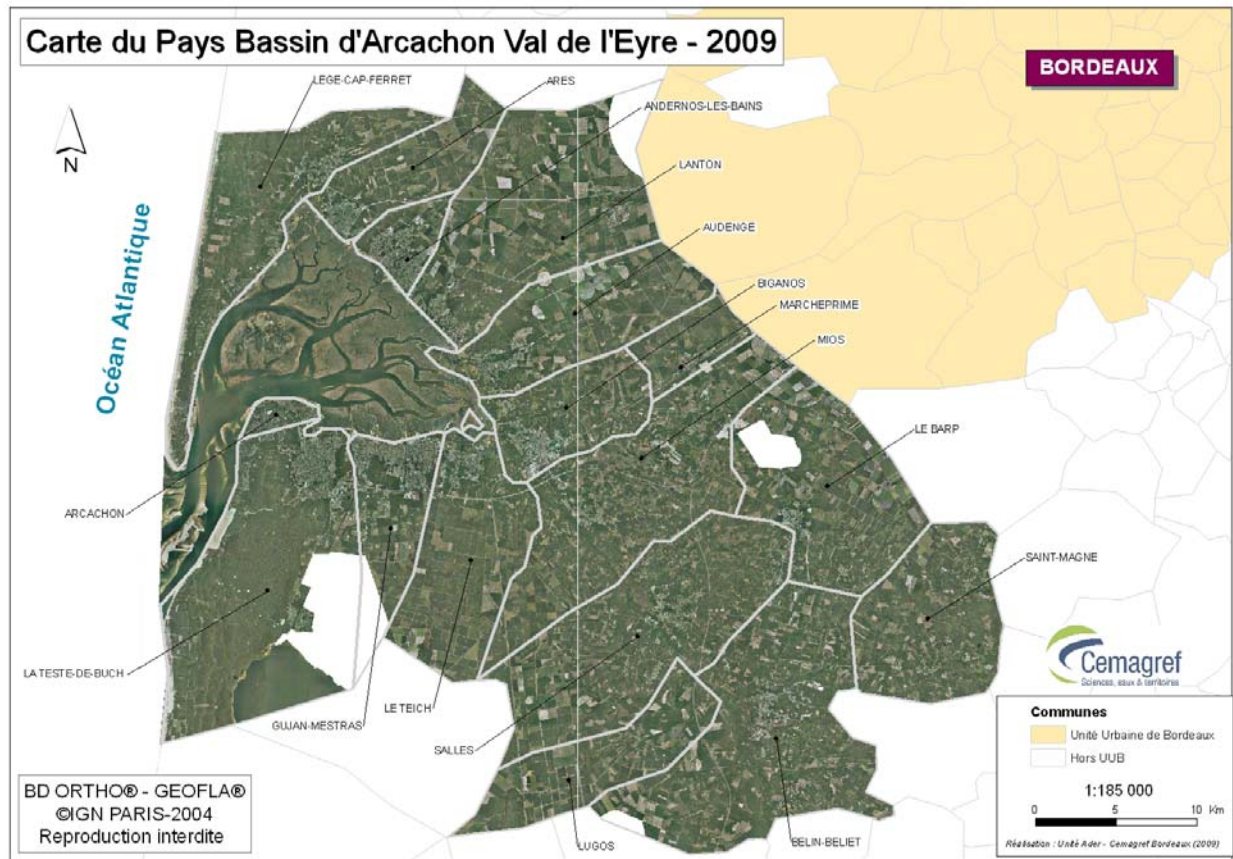
agree!). Gathering inhabitants according to their residential place have two advantages: a scientific one - making easier the exchange in order to sample the focused information – and a more pragmatic one - limiting the distance until the focus group place in order to mobilize people.

**Table 1: Focus groups context**

Focus group n°	1	2	3
Area	4 Communes of the south coast	6 Communes of the north coast	7 Communes of the Eyre valley
<b>Urbanization rate of the area (CORINE LAND COVER, 2006)</b>	18%	11%	4%
<b>Forestation rate of the area (CORINE LAND COVER, 2006)</b>	55%	69%	75%

Thus, three focus groups were constituted: in each of them, a mean of 8-10 inhabitants voluntary engaged gathered in one emblematic place. Each focus group was lead with the same protocol. We expose here briefly the protocol followed for the realization of focus groups on the Pays BARVAL. This protocol takes into account the recommendations of the literature but also the specificities of the scientific question.

Illustration 1: Support material<sup>2</sup>



The discussion guide designing has a central and tricky place in this protocol: in terms of animation, it structures the development of the focus group, and in terms of scientific aim, it is one of the conditions of success in the collect of the focused data. By mobilizing the results of the studies of the behavior of groups and the interaction among people in the group, several authors (STEWART, *et al.*, 2007) (KRUEGER etCASEY, 2009) propose pieces of advice for designing a questioning route<sup>3</sup>.

By guaranteeing a framework of discussion invariable from one focus group to another, the questioning route is a rigorous mean to make the participants reveal the information looked for.

<sup>2</sup> To catalyze the exchanges, it may be useful to complete the questioning route by a visual support. On our case, we made the choice to distribute a simple map (cf. illustration n°1) of the territory of the Pays “Bassin d’Arcachon Val de l’Eyre”. Nevertheless, if it may be a playful mean to begin the discussion, this support mustn’t alter the information by influencing people. That’s why we used a raw satellite map without interpretative layer.

<sup>3</sup> Concretely, we kept the structure designed by KRUEGER & CASEY (2009): thus, the discussion guide respected in this study case is organized by four successive types of questions, whom sequence is important for accessing to the focused data: one opening question, one theme introduction question, one transition question, and numerous key-questions.

#### **4. FG results and choice experiments design**

##### **4.1. Focus Group results and choice experiments attributes**

In this section, we expose the results from the focus groups and we show how they have been integrated in the survey design. Before a detailed description of the results, the Table 2 below gives a panorama of the organization and of the context of the three focus groups. The number of participants is satisfactory considering the population rate represented in each area and the constraints of realization of a focus group.

**Table 2 : Focus Groups Statistics**

<b>Focus group n°</b>	<b>1</b>	<b>2</b>	<b>3</b>
<b>Area</b>	4 Communes of the south coast	6 Communes of the north coast	7 Communes of the Eyre valley
<b>Population rate (RGP 2006)</b>	47%	33%	20%
<b>Meeting place</b>	Conference room of the IFREMER - University Bordeaux 1 (Arcachon)	Meeting room of the Community of Communes of the North Bassin	House of the Regional Natural Park of Landes of Gascogne
<b>Number of participants</b>	13	7	7
<b>Women</b>	4	3	2
<b>Men</b>	9	4	5

As previously announced, two kinds of information, linguistic and economic, were looked for. In order to spot the vocabulary employed by people to describe land uses is not trivial. This doesn't only help the survey designer to formulate questions understandable by respondents, but through the choice of words, this translated how residents perceive the land uses too. Totally, 3.5 hours of discussions were recorded and then, transcribed. The results of the analysis of this textual material are synthesized in the following table (Table 3).

Guided by the questions of the questioning route, five themes were mainly broached by the participants: the forest land use, the farming land use, the maritime "land" use of the Bassin, the residential land use and finally, the global organization of the territory approached in terms of distances and proximity. Each of these themes is treated differently according to the area, whereas the questioning route should guarantee the same animation of the discussion in each group. And that is the first information of the focus groups: there is really a differentiation of the perceptions of the land uses by actors according to their residential place. This validates our

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hypothesis that the heterogeneity of the Pays “Bassin d’Arcachon Val de l’Eyre” may lead into different acceptability and appropriateness of the survey questionnaire between the south coast, the north coast and the Eyre valley.

**Table 3: Focus groups synthetic results**

Focus group n°	1	2	3
<b>Area</b>	4 Communes of the south coast	6 Communes of the north coast	7 Communes of the Eyre valley
<b>Land use : Forest</b>	Focus on the mixed Usage Forest (coastal forest)	Differentiation between the mixed coastal forest and the inland forest → landscape perception and well-being (null for inland forest)	Landscape perception and well-being
<b>Land use: Farming</b>	Controversial perception of the use		
<b>Land use : Bassin</b> ( <i>stricto sensu</i> )	<u>Vocabulary</u> : ambiguity of the word “Balnéaire <sup>4</sup> ”		-
	Differentiation of several forms of coast → ecological environment and laying out of beaches	Differentiation of several forms of coast → maritime activities and laying out of beaches	-
<b>Land use : Urbanized areas</b>	Differentiation of several forms of housing → height, individual/collective, architectural type	Differentiation of several forms of housing → height, individual/collective, architectural type	<u>Vocabulary</u> : “Village” “Quartier <sup>5</sup> ” Differentiation of several forms of housing → height, individual/collective, architectural type
<b>Proximity and transports</b> (relative coordinates)	-	Access to the Urban Community of Bordeaux, to stores and leisure places (organization of the Pays in areas of activity) Type of transport network (Roads)	Access to the Urban Community of Bordeaux, to stores and leisure places (near the villages) Type of transport network (Public transports)

> Forest and farming Land use

As we already said, 78% of the territory is covered by forest (CORINE LAND COVER, 2006), whose large part, the inland forest, is composed of a homogenous and relatively young trees planting. In comparison with it, the coastal forest, which is older and mixed, covered a very small area. Nevertheless, the focus group of the north Bassin reveals that residents are very sensitive to these differences concerning the forest land use. This sensibility is explained by the

<sup>4</sup> (French) Seaside resort

<sup>5</sup> (French) neighborhood

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sensible changes in the landscape but in the panel of possible activities on these two types of forest too. According to a quasi consensus between the participants from the north coast, the coastal forest is less monotonous and is the support of periurban activities (cycling, walking...). Even if they don't give different results in the Eyre valley in terms of appreciation of the inland forest, we observe that inhabitants of this part of the territory use the same motivational factors.

Whereas forest land use was broached with spontaneity, farming land use was not really dealt with. Enclosed in the forest, it generates controversial points of view, because farming on the Pays is torn between two extreme production types: an extensive production with few parcels hidden by the pines planting and so not really seen by the residents, and a high intensive production rejected in the limits of the Pays. That may explain that they are not associated to the Pays in the awareness of the residents, although these parcels are widespread on many hectares and contrast in the landscape with the forest. So, we explain the very interest of the residents for farming land use by the non visibility of the parcels or the particular geographical position. So, focus groups give indicators about forest land use services, but few in terms of farming land use.

> Maritime use of the Bassin

Obviously, there were quickly a lot of talk about the Bassin of Arcachon, that-is-to-say the maritime part of the territory, in the focus groups of the north and south coasts. But, as the geographic and ecologic differences between the both coasts let foresee, the perception of the organization spatial maritime area is not the same between Arcachon and Lège/Cap-Ferret and complete each other to describe spatially the maritime "land" use. Three factors are identified: the ecological environment of the coast, the laying out of the beaches and the maritime activities intensity. The Bassin is a public domain but this space is mainly shared by oyster farming and yachting and the debates confirm it. And on account of the explanations of the residents, the intensity of these activities can clearly influence (in the both senses) their choice of frequenting or settling on some littoral areas. For example, whereas oyster farming houses, ports and concessions can be looked for by some inhabitants sensitive to patrimonial amenities, such structures and their negative externalities (port sludge) can make afraid others who look for white sand and bathing. The non-consensus observed between residents about the definition of the

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French word “balnéaire” illustrates the complexity of the manner that residents can perceive the Bassin organization.

So, focus groups underline notably the fact that oyster farming, as a use of the space of the Bassin, influences the preferences of the residents, as well as the laying out of the coast and the ecological environment.

> Residential Use

Endly, the focus groups have enabled to reveal how residents describe the residential use. Three factors, shared by all the focus groups focus on the forms of housing. The height of the housing, the individual or collective character and the architectural type appear to influence the preferences of the residents. As we already repeated, this doesn't mean that these factors take the same value in all the areas covered by the focus groups but this shows that people share the same references and manners of perceiving the residential use.

The discussion about residential use was closely linked to discussions about proximity and transports. Focus groups participants expressed their interest for a spatial organization which takes into account the distances from services, particularly leisure places. This could have two consequences on the spatial organization: 1) a connection and/or superposition of residential and commercial urbanized areas or 2) a development of the transport network, either by increase of the part of land used for transports ways (with a variable environmental impact) or by an increase of the public transport supply.

The focus groups results synthetically presented in Table 3 give us a certain number of indications for survey design and for attributes definition.

According to the main focus groups results and the main issues of our specific study area, we retain four attributes to describe best the different land use of the Pays Bassin d'Arcachon Val de l'Eyre: agricultural use, forest use, residential use and oyster farming use.

The hardest point is to define the way each of them has to be qualified or defined. We need at the same time satisfying comprehensive, realistic and statistic criteria. Comprehensive criteria mean that the way attributes are defined needs to be understandable by people, and focus groups give information of that kind. Realistic criteria mean that the different levels of the attributes, that define different states of the land use under concern, are feasible from a political point of view (Is it possible that a public measure involves a change in the attribute from level 1 to level 2?).



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Finally, the statistic argument refers to the choice design step as it will be detailed in the next section. Indeed, some orthogonality and efficiency criteria must be respected during the statistical designing process, and the real sense of the attributes must agree with that.

Concerning the agricultural land use, the best way to qualify it seems to be the evolution of the surface area knowing it is now around 8% of the Pays area. Knowing that the usual trend is a lost of agricultural lands, two levels below this maximum level are defined, the maximum level being the one of the status quo option.

The forest land use is defined in a qualitative manner. Today (status quo option), forest use is mainly productive, with some low recreative uses. We propose an evolution of this activity to more recreative uses and less productive ones.

Residential use is supposed to increase in the next years. Since it is usually measured by the effort of construction, we choose to define this attribute in a qualitative manner and not with the area it would occupy. Thus, residential development may be oriented to (i) detached housing development characterised by small individual property with private garden all around the house at an important distant to urban services (periurban area); (ii) adjoining housing development characterised by individual adjoining houses with small backyard garden and closer to services (the nowadays way of residential development); (iii) collective housing, without private garden but in city centre (so near services).

The next land use attribute that we are studying is the one concerning the oyster farming. This use is partly on the water area (oyster pens) and for the other part on Bassin borders with the oyster sheds. Oyster farming is a traditional activity, with an important heritage dimension but knows important changes regarding to increasing economic and sanitary risks. That is why the levels of this attribute are defined according to the level of standardisation of the activity and the consequences in terms of “land” use. At the middle level, the oyster farming use may be partly standardised and partly traditional, inducing less oyster productive heritage in the water but more oyster hatcheries reducing economic and sanitary risks. The third level describes a standardised activity, with no more activity in the water (i.e no more oyster farming “land” use and no more landscape productive heritage) but hatcheries development with lower risks.




As needed by the method, a monetary attribute has to be integrated in the design. It plays the role of the supplementary cost that the respondent would have to pay to profit from the different proposed alternatives. According to the land use allocation issue, we decide to define it

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as an increase of the accommodation cost of 10%, 15% or 20% which represents about an increase of 1€ to 2€ per person and per day (data of the tourism regional comity of Aquitaine, 2008).

The following Table 4 presents the different attributes and the (discrete) levels they can take (three for each of them). Yellow boxes indicate the status quo levels.

**Table 4. Attributes and levels**

<b>Attributes</b>	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>
Agricultural land use			
Forest land use	High recreation use and low productive use	Medium recreation use and medium productive use	High productive use and low recreation use
Residential land use	Collective housing Null distance to center services	Adjoining housing Distance + to services	Detached housing Distance ++ to services
Oyster farming land use	Traditional production (heritage ++ & risk ++)	Mixte production (heritage + & risk +)	Standardised production (no heritage & low risk)
Accommodation cost [Status quo : cost=0]	+10%	+15%	+20%

#### 4.2. Choice experiments design

Once the attributes and their levels defined, we need construct scenarios and associate them into choice sets or experiences: this is the choice design. Then, this choice design has to be translated and integrated into the survey instrument before starting the investigations: this is the survey design. We present both successively.

##### *Choice design*

The main objective of the choice design stage is to create different alternatives (also called scenarios) that illustrate different hypothetical evolutions of the Arcachon bay area. Each alternative is composed of each attribute at one level. These alternatives will be proposed in a survey and respondents will face different groups (called experiences) of alternatives and will have to choose in each group the scenario they prefer.

Since we have five 3-levels attributes, a full factorial design is of 243 different possible alternatives. This is not possible to present so many scenarios to people. That is why, as it is usually the case, we implement a fractional factorial design (ZWERINA, *et al.*, 1996). Such a

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statistical procedure consists in extracting some of the possible alternatives in respecting statistical criteria (orthogonality and efficiency).

The literature gives us different designing strategies some favouring the orthogonality criterion, others the efficiency one. Burgess, Street and Louvière propose a “quick and easy” fractional design for 2-levels attributes (STREET, *et al.*, 2005) and a more complicate technique for more than 2-levels attributes (STREET etBURGESS, 2007). Kuhfeld (2005) explains the way to design such discrete choice experiences in using SAS macros that supply efficient and orthogonal designs but adapted to linear formulation of choice modelling. Some other authors (ROSE, *et al.*, 2008) have recently developed a new software (NGene) that supply near optimal designs adapted to non linear modelling.

In our case, knowing (i) the initial size of the design and (ii) the experiences size we want to dispose of (each experience of choice is composed of 2 alternatives plus a status quo alternative), the Burgess and Street technique is not a good strategy. Moreover, we want to take into account main effects and one interaction effect (between attributes 3 and 5, i.e. interaction between residential use and price). We used both the SAS Macro and the NGene design. Knowing that our data (the choices people make) will have to be analysed in a multinomial logit model, the Macro SAS does not seem to be appropriate. NGene software has been firstly used to evaluate the design obtained with SAS and secondly to create a design. The NGene design is statistically better than the SAS one and we retain this latter. As it is presented in the Table 5 below, the design is composed of 28 alternatives, grouped by 2 and randomly put into 2 blocks.

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**Table 5. Choice design**

block	experience	Attribute 1	Attribute 2	Attribute 3	Attribute 4	Attribute 5
1	1	3	1	2	3	2
1	1	1	3	2	2	2
1	2	1	2	1	2	3
1	2	3	2	2	2	2
1	3	1	1	1	3	3
1	3	3	2	3	1	3
1	4	3	3	2	2	1
1	4	1	1	3	2	3
1	5	1	3	3	1	1
1	5	3	1	1	3	1
1	6	3	1	3	1	1
1	6	1	3	1	3	1
1	7	2	3	2	2	2
1	7	2	1	2	1	1
2	1	1	2	1	1	1
2	1	2	2	3	2	2
2	2	2	2	3	2	1
2	2	2	2	3	1	3
2	3	2	3	1	1	3
2	3	2	1	2	3	1
2	4	2	1	1	1	2
2	4	2	3	2	3	2
2	5	3	2	2	3	2
2	5	1	1	1	1	2
2	6	2	1	2	3	3
2	6	1	3	1	1	1
2	7	1	2	3	2	2
2	7	3	2	1	2	3

*Survey design*

The choice design involves that 2 different versions of the survey will be done, each proposing 7 different choice experiences. Each version will be presented to a sample of about 200 tourists, which is statistically sufficient.




Respondents will face 7 choice experiences, of three alternatives including the status quo option. This status quo option is the same in all the choice sets: it illustrates the present

The Table 6 below presents an experience of choice as it will be proposed to tourists.

In order to make easier the choice task for respondents, we illustrate each attribute level with a photo or a pictogram. Scenarios illustration by maps, photographs and photomontages have previously been employed in different studies (for more details, see (BATEMAN, *et al.*, 2009)).

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**Table 6. Example of choice experience (Block1 – Experience 3)**

Attributes	Alternative 1	Alternative 2	Status quo
<b>Agricultural land use</b>			
<b>Forest land use</b>	High recreation use and low productive use	Medium recreation use and medium productive use	High productive use and low recreation use
<b>Residential land use</b>	Collective housing Null distance to center services	Detached housing Distance ++ to services	Adjoining housing Distance + to services
<b>Oyster farming land use</b>	Standardised production (no heritage & low risk)	Traditional production (heritage ++ & risk ++)	Traditional production (heritage ++ & risk ++)
<b>Accommodation cost [Statu quo : cout=0]</b>	+20%	+20%	0

If the survey focuses on the attributes via the choice experiences, it is not the only point of interest. Indeed, the survey is composed of 4 different parts. The first one deals with the tourist activity. The second part presents the choice experiences and the third one directly follows with some questions of precision about the way people understand the scenarios and the attributes. The last part deals with the socioeconomic quality of the respondent.

The spatial dimension of the attributes is of main interest: forest, agricultural, residential and even oyster farming have a spatial dimension since they are located in different areas of the Pays, and differently. As Johnston (2002) explain, spatial factors influence people willingness to pay for different development plans. That is the reason why, in this specific study, we must pay a particular attention to the spatial dimension of the attributes and, thus, scenarios. However, the size of our design is already important, and does not allow integrate all the spatial components into the experiences themselves. The spatial aspect of the residential use as it was revealed in the FG is taken into account to define the attribute (with the distance to the urban services), and some following questions have been thought to permit driving more information on this spatial dimension.

Moreover, the spatial character of this land use valuation may also be associated to the place where choice is done. Indeed, people preferences may be different according to the spatial character of respondents (the place where they are met, the place from where they arrive, the place where they live...). Concerning this specific point, FG results revealed that people concerns in regards to some specific land uses are very different in the different zones of the area of

interest. This qualitative result directs the quantitative survey in a geographical sampling. Each of the 3 zones of the Pays will be investigated, according to the number of visits that each zone usually has. Some regional statistics show that the COBAN and the COBAS drive more tourists than the Val de l'Eyre, so our sampling will take it into account. The main tourist attractions will be the main points of interest to interview respondents (see Figure 1 in the appendix).

## **5. Conclusion: future stages of the research and main expected results**

At the moment, focus groups have been realised, and the main results have been computed to help in the definition of the choice attributes, levels and to focus on different aspects of main interest in the survey.

Choice design has been done, using fractional factorial design process that will allow, in next steps, to analyse the choice data in econometric logit models.

Surveys will be carried out during summer 2010, after testing it among a small sample at the beginning of July. The same investigation will be realised during spring 2011 among main and second residents of the Pays. Once the data collected, a discrete choice modelling should be implemented in order to estimate willingness to pay (WTP) indicators for each attributes level. Spatial dimension of people preferences would be analysed.

Different results are expected and give rise to hypotheses to be tested. For example, the heritage dimension of oyster farming let us suspect a positive WTP for traditional activity. However, the repeated oyster sanitary crisis during the past few years let us think that the limited risk associated with a standardisation of this activity may balance this WTP. Moreover, forest land use is very important and associated to productive use of the forest areas. But we suppose that the recreative component of this attribute will play an important role in the people choices. Furthermore, the main interest of such a multi-attributes valuation is that it allows to infer some monetary surplus expected from different planning measures. This would constitute the last stage of the research, with some operational interests for local planners.

This paper empirically validates the interest in using focus groups to improve choice experiments method at the attributes definition level, and also at the choice and survey design

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stage. However, these results are intermediary results and rise interest for future advances according to the land use values.

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## Appendix

Figure 1. tourists sites in the Pays

