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SOMMAIRE

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VALUATION OF NATURAL RECREATIONAL SITES : THE CONTINGENT TRAVEL COST METHOD

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ABSTRACT

The acknowledgement of the economic and social weight of the natural assets used for recreational use naturally resulted in the question of their valuation. The Contingent Valuation Method and the Travel Cost Method appeared as the main ways of estimating the benefits connected with a non-market use of these assets. Being used mostly in a competitive way, the idea of their combination is relatively recent and establishes a promising way to improve the valuation process. So, we propose here the Contingent Travel Cost Method to estimate the benefits the footfishermen of Brittany could attribute to the restoration of their sites of shellfishing which are exposed to damages that might make shell-eaters seriously ill.

Key-word : Contingent valuation, food safety, risk perception, recreational demand, water quality

JEL Classification : Q26, D12, D80, Q25

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1. PRINCIPLES AND LIMITS OF THE TRAVEL COST METHOD AND THE CONTINGENT EVALUATION METHOD

1.1. The Travel Cost Method (TCM)

The travel cost method (Clawson, 1959 ; Clawson and Knetsch, 1966) are based on the observation of the effective individuals behaviors concerning site frequenting (revealed preferences). It is used more and more to evaluate the benefit associated with the sites with recreational uses (walking, fishing, swimming, …). It is based on the assumption that time and costs associated with travel constitute the shadow price of the site frequenting. The shadow demand function for this site is then built starting from the relation existing between this shadow price and the quantity i.e. the frequenting of this site. The estimate of this demand function can be done starting from data gathered by concentric zones around the studied site (zonal travel cost approach) or starting from individual data (individual travel cost approach). The traditional application of this method then consists in measuring the consumer's surplus associated with the frequenting of the site, by defining the consumer surplus as the surface included between the demand function and the shadow price line (Freeman, 1993).

In connection with a large part of the concerns of public policies, the travel cost method is used in order to measure the effects of a site quality variation: improvement or deterioration of the quality of a site led to a shift of this demand function towards the right or to the left. Thus, when the environmental quality changes and, for a travel kilometric cost unchanged, the number of visits increases. The value of this improvement (or degradation) is then measured by the economic surplus variation. However, there is then a difficulty of identifying in a precise way the changes in the demand functions associated with an improvement of quality: the solution (Vaughan and Russel, 1982; Smith and Desvougues, 1985) then consists in using a model with variable parameter which integrates quality in the demand functions. This procedure proceeds in two stages: initially, for each site with different quality, one estimates a demand function, then, in the second time, one compares these demands for these sites with different quality level in order to build the shift of the demand curve following a quality variation.

In spite of continual improvements, a certain number of reserves remains as for the applicability of this method. Thus, a limit of this practice results from the definition of the quality variable. The majority of quality measurements are built on objective data (thresholds of chemical or organic pollution,…). This procedure implies that individuals determine their frequenting according to these presumedly known objective data. However, this presupposed is far from being obvious, in particular concerning medical or sanitary quality: there can exist an important difference between objective quality of a site (measured for example by the public authorities) and that perceived by its users. This phenomenon was clearly highlighted, for example by a survey aiming at determining the footfishermen perception of the health risks connected with shellfish consumption (Appéré, 2002).

This method[1] based on the actually observed behaviors suffers from a lack of flexibility in particular in the valuation of potential situations which will be carried out only in the future. It is dependant on the levels of quality actually observed on the sites: the amplitude of the possible quality variations is thus imposed by the observation and does not correspond inevitably to that aimed by an improvement project.

[1] T.A. Cameron (1992) mentioned other critics such as the problem of valuation of the travel time, the taking into account of people staying several days to attend the site,

Recent alternatives of the travel cost method were proposed to face some of these defects: in addition to the combination between the latter and the contingent evaluation method (which is the object of this article), the methods of discrete choices associated to travel costs are used more and more because of their flexibility and because of their capacity to apprehend well the estimate of the benefit related to the change of recreational sites quality. Based on the Random Utility Model, these approaches suppose that the users choose the site which they consider as the best; this choice reveals their relative preferences between the characteristics of a site and the cost to reach it. By combining the data relating to the choices of site with the costs and the characteristics of all alternative sites, it is then possible, generally through Logit or Probit models, to estimate the relation between the choice of a site and costs and characteristics of all alternative sites. This alternative method however requires information on all the possible sites that the visitor could select, in particular on their characteristics in term of quality and on travel cost for each one of these sites. For certain recerational activities, this last condition can be rather difficult to satisfy in particular when there is *a priori* a great number of sites which can be used as substitutes.

1.2. The Contingent Valuation Method (C.V.M)

The contingent valuation method appeared about at the same time as the travel cost method: the first known survey goes back to 1961 and was undertaken by Davis (1963). The CVM is a direct method to value (*inter alia*) the variations of the non-market good quality by asking individuals their willingness to pay for an environmental improvement or their willingness to accept for a degradation of this environment. These values are obtained starting from an interview of users in accordance with the presentation of a hypothetical scenario specifying the object to be valuated.

The decisive advantage of this method lies in its great flexibility in use, making it possible for example to obtain the benefit which the individuals would grant to the considered environmental results: it is thus applicable to a large scope of situations. The success of this method is also explained by the fact that it meets an increasing need for expertise concerning environmental valuation, following a tougher stance of legislation in a majority of Western countries.

However, the contingent valuation method was early criticized through the possible existence of biases. If some of them finally do not have the importance which one supposed (in particular the strategic bias), others continue to pose problem in particular the hypothetical bias and instrumental biases.

Particularly in the field of the environmental assets, there is a real difficulty of making the contingent scenario credible when the question of payment vehicle associated with the willingness to pay is asked: the use of vehicles such as an increase in taxes, an increase in the water invoice, the creation of a voluntary contribution etc… is sometimes badly felt by the questioned people. Indeed, in addition to make them pay for a use that was hitherto perceived as free, these supports give them the unpleasant impression to make them undergo the not very equitable “polluted-payer” principle. It often results in a high rate of “false-zero” sums (zero-WTP): the phenomenon means that some respondents provide a willingness to pay equal to zero because they refuse the scenario suggested (“protest response”) and not because the improvement suggested is for them without value.

Moreover, the fact of requiring users to provide a money value for the improvement of an environmental good, which generally is perceived as free, requires on behalf of these users very developed cognitive capacities. It results from it that there is a risk to obtain aberrant and/or non-cohesive values (for example the existence of the bias of inclusion). There are statistical procedures making it possible "to eliminate" these values but which appear often artificial and stripped of theoretical bases.

More generally, the contingent valuation method always encountered a strong skepticism on behalf of certain economists, decision makers or experts because it is based on stated preferences: "it would produce hypothetical answers to hypothetical questions" (Cameron T.A., 1992).

This mistrust as well as the possible existence of some biases generated a long series of studies aiming to cancel or confirm this method. In particular, one sought to compare the values obtained by the CVM with those obtained by the other valuation methods. For example, Bishop and Heberlein (1979), Heberlein and Kealy (1983) compared the estimates made by the CVM and by the travel cost method. From these studies, it comes that the data obtained by the CVM seem valid and credible (Whitehead J.C., Haab T.C., Huang J-C., 1999). Thus, Loomis (1993) shows that they are not statistically different when one vary the level of quality of a site. However, the results obtained by the CVM can sometimes be prone to certain biases like the hypothetical bias (Cumming and Al., 1997; Diamond and Hausman, 1994).

2. COMBINATION BETWEEN THE CONTINGENT VALUATION METHODE AND THE TRAVEL METHOD

2.1. A possible combination: the hypothetical travel cost method

Thus, the travel cost method and the contingent valuation method, suffer each one from disadvantages which respectively limit their application field and their credibility. The idea to combines these two major methods devolves to T.A. Cameron (1992): noting that hitherto, this two methods had been rather used in a competitive way to produce values, T.A. Cameron requires at the opposite to combine them. Thus, the TCM provides data on the behaviors really observed, while the CVM method gives information making it possible to supplement the comprehension of the preferences of the individuals by providing explanations on their probable behaviors in some situations defined by the contingent scenario – these situations being able to be singularly different from those observed in the usual facts-.

This procedure was improved thereafter and leads to the hypothetical travel cost method (Layman R.C., Boyce J.R., Criddle K.R., 1996): in a first phase, the TCM makes it possible to estimate the agregated demand curve of a site in the usual circumstances. In one second phase, a hypothetical scenario considering different conditions (for example concerning the quality levels of the site) is subjected to a sample of users that are asked to determine the frequenting according to these hypothetical conditions. The frequenting of the site according to various levels of quality then becomes the contingent variable instead of a traditional willingness-to-pay sum. Combined with the variables obtained before by the travel cost method (in particular the distance covered), this contingent data then makes it possible to calculate indirectly the average willingness-to-pay for the variation of quality considered, corresponding to the variation of the consumer's surplus.

Contrary to a traditional contingent valuation method, the price and the vehicle of payment are not explicitly asked. The respondents are questioned on a familiar variable with namely the variation of frequenting: this procedure is much more realistic and accessible that a traditional CVM which requires from individuals to directly provide a monetary sum for an activity usually perceived as free. It thus avoids *a priori* part of the problems involved in a CVM: strategic behavior, refusal to pay and probably hypothetical bias.

Consequently, the hypothetical travel cost method widens the TCM by including potential effects of events affecting the attributes of the studied site. So this method applies to the class of problems traditionally analyzed by the TCM, namely the restoration or degradation of environmental assets for which there is an effective frequenting requiring a travel.

2.2. The total integration of the TCM in a contingent framework: the Contingent Travel Cost Method

The method suggested in this article starts from the same reports exposed previously on the respective limits of the CVM and of the TCM and from the interest to combine these two methods. However, the specificity of this method (that I describe as the Contingent Travel Cost Method) consists in integrating within a contingent framework the totality of the elements obtained usually by the TCM (and not partially contrary to the hypothetical travel cost method). One aim of this method is to obtain individual willingness-to-pay whereas the hypothetical travel cost method is only able to calculate an average willingness-to-pay obtained via an agregated demand function. In this way the contingent travel cost method is able to produce values that can be directly compared with values obtained by the Contingent Valuation Method.

From a theoretical point of view, the contingent travel cost method transposes in a non-market framework the contingent hedonist pricing method used in a market framework: the latter consists in calculating the willingness to pay for a quality improvement of a market product through the variation from its unit price. Transposed to the non-market framework, this one amounts to determine the variation of the travel costs (i.e. variation of the shadow price) that the users accept to benefit from an quality improvement. As in the model of R.C. Layman, J.R. Boyce, K.R. Criddle, respondents are not explicitly asked to pay for this improvement, but are asked the supplement of distance that they are ready to do to reach such a site but are also asked the reduction in frequenting that could result from this lengthening.

However, the nature of the goods to which the evaluation relates complicates the implementation of this method. Indeed, the majority of the environmental and/or recreational sites are characterized by their unicity thus posing the problem of the definition of a substitute with a better (sanitary) quality. One could have planned to propose to the respondent a list of real alternative sites with better quality and located at variable distances from the initial site. However, because of unicity of each site, the sites suggested are only imperfect substitutes that have not characteristics strictly identical to those of the initial site. Consequently, the valuation of the additional distance consented by a user will be altered by the imperfection of the substitutes proposed. Thus, in an extreme case, a user can reveal a null additional distance by the fact that he is not interested by the substitute sites while he has objectively a positive willingness to pay for a restoration or an improvement of the quality of his usual site.

The approach adopted by the present method then consists in introducing the concept of "twin sites": we submit to the user the hypothetical existence of a site strictly identical to his usual site, but that has a higher (sanitary) quality. By definition, this last one constitutes a perfect substitute of the usual site.

This clearly hypothetical approach constitutes at the same time the strong point of the method (since the substitute is perfect and is not constrained by the real existence of alternative sites) but also its weak point: it is a hypothetical artifice which requires be well understood and assimilated by the respondent. Thus, the incapacity of this last to imagine a "twin" site can generate the announcement of a consented distance equal to zero and consequently a zero-WTP not corresponding to his true preferences. So the introduction of a hypothetical site is a potential source of "false zeros" related to a bad comprehension of the scenario (but not related to a protest from users unlike a "classic" contingent valuation method).

Consequently, it is essential not only to give a detailed attention to the construction and to the presentation of the contingent scenario but also to detect following on from the hypothetic scenario, the existence of possible "false zeros" related to a bad comprehension of the "twin site" concept.

Concretely, the introduction of this concept into the hypothetical scenario consist in asking the following question: "If your usual recreational site suffers a (sanitary) degradation, what maximum additional distance are you ready to make to reach another site with a better (or pristine) quality and is besides strictly identical to your usual site ?".

From a theoretical point of view, this procedure is based on the assumption that each user is able to operate individually a cost-benefit analysis, between on one side, the benefit he gets from frequenting a site with a better (or pristine) quality, and on another side, the costs (in term of additional distance) that he is ready to do in order to reach this site.

This method is based on the following microeconomic model. We define first the following variables:

- D: distance (round trip) to reach the site
- n: the frequenting of the site (number of visits per month)
- φ: (sanitary) quality of the site
- p_x: price of a composite market good x
- U: utility function
- α: unit material (i.e. not including time cost) travel cost (FF/km or €/km)
- β: unit time devoted to travel (Hours/km)
- w: unit cost of time spent in transport to reach the site (FF/hour or €/hour)

The shadow price of the site frequenting corresponds to the transport costs per travel:

$$p_Z = (\alpha + w \times \beta) \times D = p_Z(D)$$

In the contingent scenario, the distance varies now according to the quality of the site: D = D(φ). It results from it that the shadow price of the site frequenting becomes a function of the site quality:

$$p_z = p_z(\varphi)$$

We can then state that, for a given user, the willingness to pay to move from a quality level φ^0 (corresponding to a damaged site) up to a quality level φ^1 (corresponding to the pristine quality site) is given by the following equation:

$$WTP(\varphi^0, \varphi^1) = \int_{p^0 = p_Z(D(\varphi^0))}^{p_Z^1 = p_Z(D(\varphi^1))} n^*(p_X, p_Z, w, U^0, \varphi^1) dp_Z$$

This expression corresponds to the surface under the final hicksian demand curve[2] for this site (quality φ^1) between the initial price and the final price.

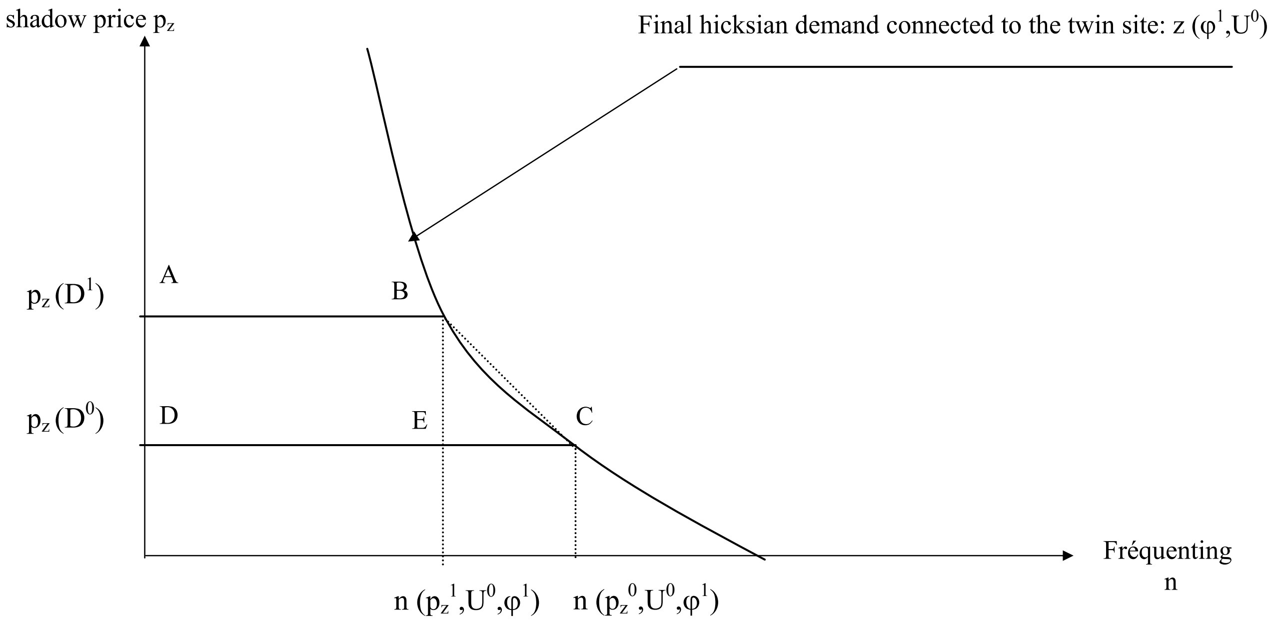

Figure 1 : Willingness to pay for an increase of the quality site

For each user, it is possible to approximate the willingness to pay starting from the lengthening of distance granted by this last and starting from the possible reduction of the frequenting resulting from this lengthening. For example, one can frame the WTP in the following way:

- on the one hand we can calculate the surface of the rectangle ABED that gives a lower limit of the WTP. It corresponds to the case where the convexity of the final demand curve is extreme between the points B and C in such a way that surface EBC is cancelled.

- on the other hand we can calculate the surface of the trapezoid ABCD that gives an upper limit of the WTP. It corresponds to the case where the final demand curve between B and C is reduced to a segment [BC].

We then obtain:

$$WTP_{min} \leq WTP \leq WTP_{max}$$

With:

$$WTP_{min} = n^*(D^1, U^0, \varphi^1) \times (\alpha + \beta \times w) \times [D^1 - D^0]$$

$$WTP_{max} = \frac{n^*(D^0, U^0, \varphi^1) + n^*(D^1, U^0, \varphi^1)}{2} \times (\alpha + \beta \times w) \times [D^1 - D^0]$$

The determination of WTP for an improvement of the site quality, starting from the maximum additional travel distance, thus requires the knowledge of the following elements:

[2] i.e. the demand function that maintains the level of utility U unchanged (U^0).

- $D^1 - D^0$: consented distance variation
- $n(D^0,U^0,\varphi^1)$ et $n(D^1,U^0,\varphi^1)$: hypothetical site frequenting [3]
- α unit material travel cost (FF/km or €/km)
- β unit time devoted to travel (hour/km)
- w: the unit cost of the time spent in transport (FF/hour or €/km)

Let us note that the sole knowledge of the distance variation is not enough to calculate the WTP, since frequenting (n) is likely to vary concomitantly with the distance variation.

Moreover, the solution that would consist in considering the number of visits as invariant is likely to over-estimate the WTP. Indeed, in this case, one obtains:

$$\boxed{WTP(\varphi^0,\varphi^1) \approx n^*(D^0,U^0,\varphi^1) \times (\alpha + \beta \times w) \times [D^1 - D^0]}$$

However, it is probable that: $n^*(D^0,U^0,\varphi^1) \geq n^*(D^1,U^0,\varphi^1)$ i.e. the number of visits decreases with the distance.

Let us underline finally that the mode of calculation of WTP differs from the procedures usually followed by the usual travel cost method and its alternatives: classically, one estimates initially and for each level of quality, the aggregate demand function for visits according to the shadow price which is itself calculated through the distance (see, for example, Goffe, 1999). From these aggregate demand functions, one can then calculate the aggregate surplus of the users for each level of quality. In the second time, the total WTP for an improvement of the site quality as well as the average WTP are calculated starting from the variation of the aggregate surplus between the two quality levels. However, as it is underlined for example by N.E. Bockstael and al. (1990) or by F. Bonnieux (2002), the estimate of these demand curves is very sensitive to the choice of the functional form used (linear, log-linear,…).

The contingent travel cost approach does not follow this way: it initially seeks to calculate the indidividual WTP i.e. for *each user* (from which it can then obviously calculate the average and the total WTP). This choice unusual (and undoubtedly criticisable) is justified by the will to put in parallel the contingent travel cost method with the traditional contingent valuation method that collects individual WTP. This procedure makes it possible for example to know the distribution of the individual WTP or to establish a comparison with CVM about (for example) the phenomenon of "false zeros".

[3] In practice, obtaining $n(D^0,U^0,\varphi^1)$ is quite difficult: we have to know the number of times that an individual would frequent the initial site (with a distance D^0) but with a higher quality (φ^1), while preserving the utility U^0, i.e. with the same utility as when this site had a lower quality (φ^0). The solution chosen in this survey was to approximate the compensated demand $n(D^0,U^0,\varphi^1)$ by the ordinary demand $n(D^0,Y^0,\varphi^1)$ where Y^0 is the initial income: "How much time you would frequent the initial site (distance D^0) knowing that it has now a better quality (φ^1)". If the site frequented by the respondent has in fact usually the quality level φ^1, then this question is equivalent to the following question: "How much time do you usually go to this site? ", that one can pose in a question upstream contingent scenario.

The principles of the contingent method of the costs of transport having been exposed, it remains to be known if the advantages that one allots to this method are empirically effective.

3. APPLICATION TO A HYPOTHETICAL DEGRADATION OF RECREATIONAL FOOTFISHING SITES

3.1. Quality deterioration of footfishing sites

The contingent travel cost method was implemented to analyze the value that regular (French) Breton footfishermen grant to a sanitary quality variation of their recreational sites. Let us note that these footfishermen do not have the exclusive use of these sites (there are also other activities such as swimming,…) with the result that the value obtained constitutes only part of the total value of such a quality variation.

Footfishing is a recreational activity of gathering that results in a consumption of shellfishes involving health risks related on the sanitary quality of the littoral. The recreational sites are indeed open mediums vulnerable to chronic or accidental pollution. Their effects are increased in the case of bivalves (oysters and mussels) due to the mechanism of filtration which is not selective and which involves a concentration of micro-organisms and toxic substances. The absence of cooking or partial cooking makes that bacteria are not destroyed. It is necessary, moreover, to underline the possible presence of thermostable toxic substances which are thus not destroyed by cooking. The risk for the consumer depends on the nature of the contaminating agent, its concentration, the consumed quantity and the health status of the consumer. Three main categories of risks can be distinguished: risks related to the microbiological contamination (bacteria and virus), risks related to the contamination by toxins (by toxic seaweed such as Dinophysis) and finally risks related to a chemical contamination. It can follow many pathologies which are expressed by sporadic epidemics or cases concerning more particularly the old or immunodeficient people. The public management of these risks currently rests on the monitoring of these sites and on safety measures intended for the footfishermen: authorization, warning or prohibition of gathering according to the observed sanitary degradation of these sites. Consequently, this recreational activity depends directly on the sanitary quality of the littoral: any degradation for various reasons (oil pollution, biological contamination, development of toxic seaweed,…) can threat partially or totally, episodically or durably this recreational activity.

The purpose of the survey is then to determine the value that the footfishermen can grant to the restoration quality of their site if this last undergoes a sanitary degradation.

3.2. Contingent scenario

Two scenarios are proposed consecutively to the respondent:

- a **situation of a moderate risk**: the recreational site undergoes a **moderate degradation** of its sanitary quality and thus would present a moderate risk to contract a toxinfection following a shellfish consumption. One seeks the WTP to recover a no-risky pristine site (variable WTP1).

- a **situation of a high risk**: the recreational site undergoes a **high degradation** of its sanitary quality and thus would present a high risk to contract a toxinfection following a shellfish consumption. One seeks the WTP to recover a no-risky pristine site (variable WTP2).

Upstream from the contingent valuation, it was checked that the sanitary quality of the site perceived by the users (that does not always correspond to the "objective" quality) was good, that was the case for 95% of them.

The unit material travel cost was fixed at 0.7 FF (French Franc) per kilometer (i.e. 0.106 € per kilometer) which corresponds to the sole fuel expenditure and not to the taking into account of the other expenditures (i.e. depreciation of the vehicle and insurance). The justification of such a choice lies in the idea that the costs probably felt by a broad part of individuals are reduced to the only fuel expenditures. This position was based in particular on the survey of Le Goffe (1999): this last evaluated the benefit that users grant to an improvement of the water quality in the bay of Brest (France), on the one hand through the contingent method, on the other hand with the travel cost method. He notes that the WTP obtained by the TCM are close to those obtained by the MEC when one calculates the material travel cost with the only fuel expenditures[4] .

Concerning the possible cost associated to the time spent in transport, the survey upstream from the contingent valuation made it possible to show clearly that almost all the users regarded this travel time as a "pleasant moment that is an integral part of this recreational activity" or in the worst case that they were indifferent towards it. Consequently, for the latter, the travel time opportunity cost time is null. This report is important because it take the opposite position to many studies that assign to the travel time a monetary value equal to a fraction of the average wage. It results that these studies would then tend to over-estimate the travel cost and consequently the benefit related to the frequenting of a site or related to the improvement of the quality of this site.

The frequenting is equal to the average number of visits per month. For a great part of the users, it is equal to two visits per month corresponding to the spring tides. So the WTP calculated starting from the variation of distance and the frequenting corresponds by construction to a monthly monetary flow.

3.3. Conditions of the survey

The region concerned with this survey is Brittany (France). One of the reasons that justify this choice is based on a more precise knowledge in this region of the places of footfishing sites and on an evaluation of the footfishermen number, thanks to a survey drawn up by the French IFREMER institute in 1997. The inexistence of precise data on the main population makes impossible the conduct of a survey on a representative sample. The solution thus was to make an investigation directly by randomly interviewing a certain number of footfishermen present on the main recreational sites. The survey proceeded March to April of the year 2000 for each spring tide. The number of workable questionnaires is 501.

3.4. WTP Characteristics

As it was already specified, the mode of calculation retained by the contingent travel cost method makes it possible to know for each individual his WTP. For each scenario, we obtain by construction two distributions: WTPmin and WTPmax.

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[4] The choice of the kilometric cost can of course be modified, by affecting the results obtained with a multiplying coefficient.

3.4.1. Statistical distribution of the WTP (FF/month)

The differences in distribution between WTPmin and the WTPmax being relatively weak, we present only the distributions graphically corresponding to the lower bound of the WTP (WTPmin).

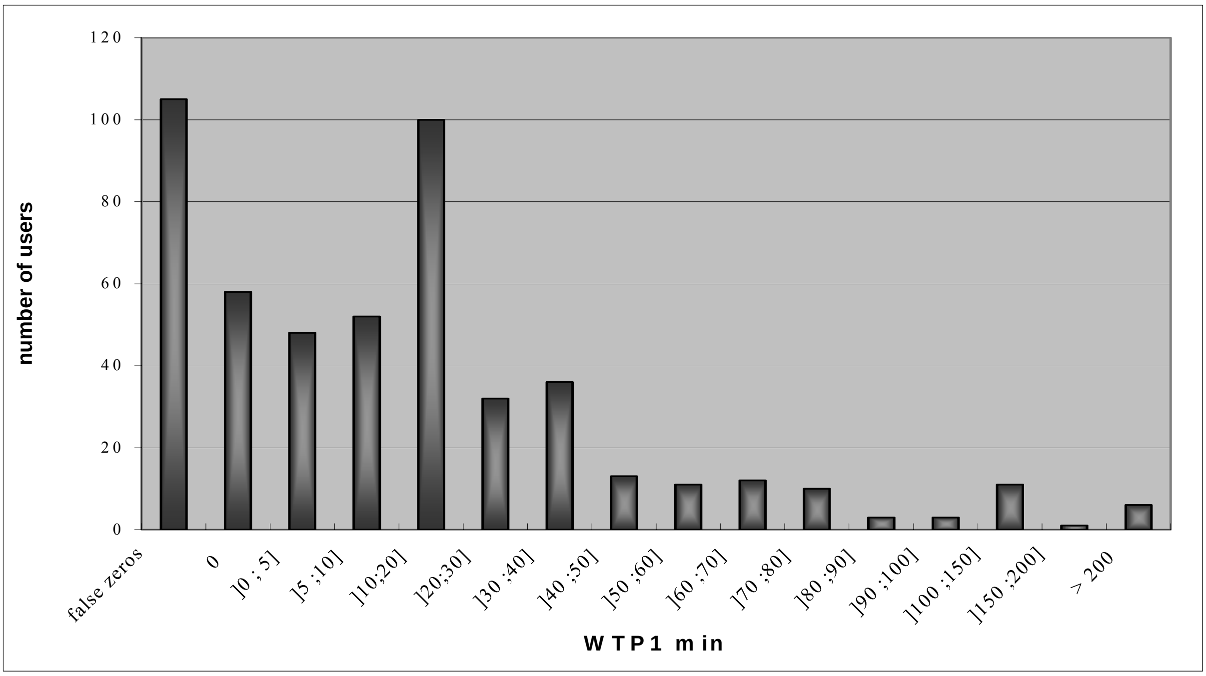

Figure 2: Distribution of WTPmin (FF / month) to avoid a moderate sanitary risk (scenario 1)

(1 € = 6.6 FF i.e. 1 FF = 0.151 €)

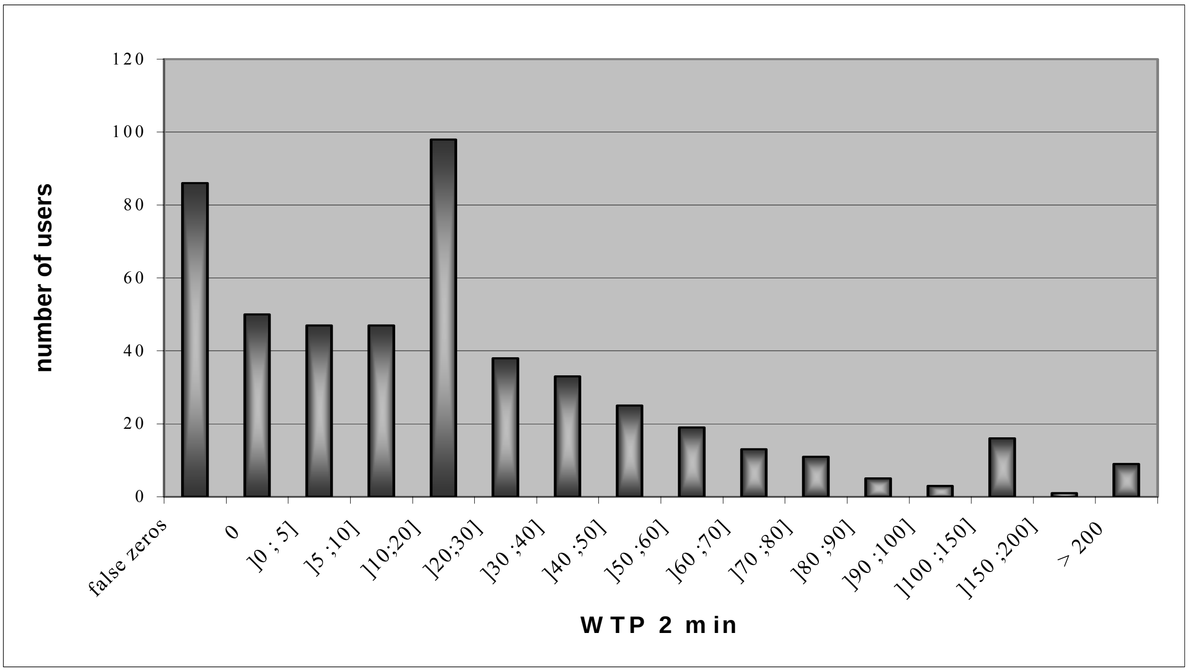

Figure 3: Distribution of WTPmin to avoid a high sanitary risk (scenario 2)

3.4.2. Characteristic values (FF or € / month)

* Complete sample ("false zeros" are not eliminated)

	WTP1min	WTP1max	WTP2min	WTP2max
Observations	501	501	501	501
Mean	20,21 FF (3,1€)	22,54 FF (3,4€)	26,27 FF (4,0€)	29,17 FF (4,4€)
Median	8,75 FF (1,3€)	9,52 FF (1,4€)	10,50 FF (1,6€)	10,50 FF (1,6€)
Mode	0 FF	0 FF	0 FF	0 FF
Standard deviation	36,65 FF (5,6€)	42,53 FF (6,4€)	51,27 FF (7,8€)	56,93 FF (8,6€)
Min/max	0/350 FF (0/53€)	0/525 FF (0/79,5€)	0/560 FF (0/84,8€)	0/560 FF (0/84,8€)

* Sample without "false zeros"

	WTP1min	WTP1max	WTP2min	WTP2max
Observations	396	396	415	415
Mean	25,6 FF (3,9€)	28,5 FF (4,3€)	32,3 FF (4,9€)	35,3FF (5,4€)
Median	11,1F (1,7€)	12,3FF (1,9€)	15,5FF (2,4€)	16,6FF (2,5€)
Mode	0 FF	0 FF	0 FF	0 FF
Standard deviation	39,5 FF (6,0€)	46,0 FF (7,0€)	54,7 FF (8,3€)	60,8 FF (9,2€)
Min/max	0/350 FF (0/53€)	0/525 FF (0/79,5€)	0/560 FF (0/84,8€)	0/560 FF (0/84,8€)

3.4.3. The WTP: a measure of the benefits associated with a restoration of the sites sanitary quality

The WTP to restore the quality of the footfishing sites are significantly non-null and vary positively according to the level of sanitary degradation[5]:

- for the reduction of a **moderate risk**, the **average WTP** is around 26 FF/month (3,9 €/month) and the **median WTP** around 11,5 F/month (1,8€ /month).

- for the reduction of a **high risk**, the **average WTP** is around 33 FF/month (5€ / month) and the **median WTP** around 16 F/month (2,4€ / month).

[5] It is thus preferable to know the quality really perceived by the user. In the survey presented here, the near total of the users considers their site as having a very good quality (what does not correspond besides always to the "objective" quality measured by the scientists).

3.5. Advantages of the "contingent travel cost method"

We previously gave the justifications *a priori* of the choice of the contingent travel cost method. The results obtained in this survey seem to validate such a procedure.

Generally, the concept of **false zeros** is defined as a situation where the respondent reveals a null WTP whereas this value does not reflect his true intention. In the majority of contingent surveys, these false zeros correspond to "protest zeros" vis-à-vis the contingent situation suggested (for example, "the refusal to pay for the others").

In this survey, the number of false zero is relatively moderate compared to other contingent studies: according to the scenario, the rate of false zeros varies here from 21% to 17.2% whereas this rate can sometimes, in certain contingent studies, go up beyond 40%.

Moreover, as that had been advanced in the preceding part, these false zeros are not here related to a protest but to a lack of understanding of the contingent exercise. In this case, because of the choice of the method (indirect calculation of the WTP through the travel costs), there were not such values of protest. On the other hand, it seems that false zeros are here related to a difficulty of understanding the scenario, more particularly of understanding the choice of a "alternative site in any point identical to the usual site". Indeed, the detecting of false zeros was operated thanks to a question put about the reasons of a null WTP. When the respondent justifies this choice by the fact that he did not want to leave his "favourite site", it is well an incapacity of this respondent to assimilate the contingent scenario; this person can simultaneously value positively an improvement of the site sanitary quality. In this case, one considers that his null answer corresponds to a "false zero" and not WTP truly equal to zero.

4. CONCLUSION

We have shown the interest to combine the travel cost method with the contingent valuation method. This procedure relatively recent seems particularly adapted to many problems of valuation of (natural but not exclusively) sites being subject of an entertaining use.

The specificity of the work present here compared to those of T.A. Cameron or R. Craig Layman, J.R. Boyce, K.R. Criddle is that the travel cost method is completely integrated within a contingent framework: the variation of distance consented for an improvement of quality and the possible reduction of frequenting that may result from it, become contingent values making it possible to calculate in an indirect way the willingness to pay for such an improvement.

At the base of this procedure, one finds the following idea: the reason that often raises an issue in the contingent valuation method, is not its hypothetical character but more the question of the vehicle of payment. Asking a respondent to give a monetary sum associated with an improvement of a free access site requires an extremely high cognitive capacity. The relative success of the survey exposed here and, more generally, the success of the methods combining the contingent valuation method with the travel cost method aiming to circumvent the problem of the vehicle of payment, seem to confirm this idea.

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