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THE CARRYING CAPACITY OF CYCLING PATHS AS A MANAGEMENT INSTRUMENT. THE CASE OF EBRO DELTA (SPAIN)

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Abstract

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The Delta of the Ebro river was declared a Natural Park in 1983 and it is one of the most important wetland areas in Spain. Currently, the tourism market has now begun to make inroads into this natural area, and consequently this type of activity can often lead to considerable strain on the environment. In this context, this present paper introduces the determination of carrying capacity as an appropriate tool to improve environmental management of the Delta tourist destination. In order to achieve this goal, the carrying capacity of the two busiest cycling paths is proposed from two perspectives: as a warning indicator to allow evaluation of whether or not the area is under stress beyond the desirable threshold and as an instrument of sustainable management of a protected area.
The results show that it is precisely in spring and summer when it is most likely that the greatest pressure is imposed on the delta area, and consequently these results emphasize the necessity for careful planning of recreational activities.
This paper also introduces the applicability of "carrying capacity" concept to tourism. Even when certain constraints are considered, the appropriateness of this concept as a beneficial tool in environmental and recreational management is confirmed.

Key words: sustainable tourism, visitor management, trails, warning indicator

Introduction

In recent years there has been a progressive change in social preferences and consequently a demand for different tourist products has been observed. The new tendencies include research into finding differentials – from both a natural and cultural viewpoint – and allowance of new market segments to be established. From the point of view of the area, this

will allow new and potentially attractive resources to be defined and also open the way for the development of economic activities related to recreational use. These activities would allow diversification in a number of rural areas (Troitiño, 2001) and also increase their possibilities of generating revenue in terms of income, jobs, infrastructure, rehabilitation and the conservation of their heritage and folklore. This phenomenon may give way to transformation and intensification in the use of the area – including its extension, built-up areas, water consumption, waste generation, loss of biodiversity and its socio-economic re-adjustment. If these were taken beyond the capacity of the area to absorb them, then their increased use would mean losing uniqeness in the mid-term, and also the reasons why people are attracted to the area in the first place (Mbaiwa, 2005). It is for these reasons that debate is still on-going into the effects of tourism on sustaining balance in this environment (Mihalic, 2000). The final balance will depend on the level, type, frequency and length of the tourist activities that evolve (Van der Zande, Vos, 1984; Glyptis, 1991; Bergstrom, Stoll, 1993; Sun, Liddle, 1993; Gomez-Limón, De Lucio, 1994, 1995; Hammitt, Cole, 1998; Day, Turton, 2000; Leung, Marion, 2000; Turton, 2005). From this perspective, the organisation, planning and administration of sustainable tourist activities consist of basic elements to optimise recreational activities and to minimize the degradation of the environmental and cultural heritage (ORRRC, 1962; European Commission, 1994; Sun, Walsh, 1998; Europark, 2002; Ramsar, 2002, 2006).

The Delta of the Ebro river (from here on in Ebro Delta) was catalogued as a protected area in 1983, it is situated in the south of Catalonia, in the north-east of Spain and constitutes a geographical entity of about 320 km^2.

Currently the deltaic plane goes 26 km into the sea, tracing an equilateral triangle of about 25 km at the base and a maximum altitude of between 3 and 4 m.

As with other delta areas, it is a dynamic sedimentary area which records the transition between marine and land habitats. Its special morphology, a blend of marsh and fluvial environments, creates an important ecological niche and therefore a great diversity of inhabitants and species can be found there (Ibáñez et al., 1999). Many of these are uncommon in other areas of the Western Mediterranean or on the Iberian Peninsula (Maldonado, 1977).

It is important to point out that the Delta is a vulnerable area due to the regression of the levels of sediment, the erosion of some stretches of coastline, the extension of salinity, the eutrophy of the bays and the subsistence of the deltaic plain.

Since it was catalogued as a Natural Park (from here on in NPDE), the Ebro Delta has become an important tourist attraction. The number of visitors has continued to grow over the past 20 years, and it currently caters for about 500,000 people annually. The protected areas have been growing concurrently so that they now represent 25% of the Ebro Delta.

Currently the Delta offers its visitors a wide range of activities to explore the area: including aquatic activities, beaches, nature hikes, birdwatching and cycling. According to Bartual et al. (2007) and the NPDE (2005a), the main attraction of the Delta is its rich landscape, nature hikes and the relaxation provided by the Delta environment. Cycling is one of the alternative activities to experience the Delta. In fact, the management of NPDE considers

cycling the mainstay of potential tourism for this area (NPDE, 2005b). In this sense, the objectives of this paper are:

1. to estimate carrying capacity of the two most heavily used recreational cycling paths in the Delta: the Encanyissada and the Tancada paths,
2. to define warning indicators of levels of pressure on areas with tourist activities,
3. to propose instruments of planning and management for the sustainable use of the territory.

Within this framework, some particular issues are identified which serve either as tools for achieving values or as conditions that are environmentally and socially acceptable These include quantified indicator variables – the number of visitors encountered along a natural cycling trail – which can be used to assess progress toward attainment of sustainable objectives, thus serving as warning indicators. Finally, according to these warning indicator results, a new way of thinking about alternative management action is suggested.

Material and methods

One of the first explicit references to the carrying capacity associated with tourism and recreational areas is found in Wagar (1964), where it is defined that the carrying capacity (hereinafter, CC) of a natural area "is a quantitative limit beyond which undesirable consequences may occur". According to this, some authors agree that CC is mainly an ecological concept, which expresses the relationship between a population and the natural environment (Buckley, 1999; Papageorgiou, Brotherton, 1999). Other definitions consider the physical impact of tourism which will reflect behavioural components,from environmental and experimental aspects. In this sense, Mathieson and Wall (1982) and Hovinen (1982) define the term "as the maximum number of visitors that can be accommodated without causing environmental deterioration and without leading to a decline in visitors' satisfaction". Alternatively, some authors claim CC can be established from physical, experimental, social, cultural and economic perspectives (Lindsay, 1986; O'Reilly, 1986; Martin, Uysal, 1990). With this perspective in mind, the tourism carrying capacity (hereinafter TCC), can be considered as the maximum number of tourists that can simultaneously visit a tourist area without contributing to the deterioration of the physical environment, the economic or socio-cultural activities or a reduction in the quality of the experience for the user. However, the issue of CC is often debated as being too subjective and as having unclear limits. Indeed, TCC is not an absolute or temporal value, depending not only on the physical and environmental conditions of the area, but also on the level of tourists and the effects of human and economic activity on a temporal and spatial scale., Rather, TCC can only be defined in relationship to an objective of economic, social and cultural management related directly to management capacity (hereinafter MC). Currently, no single method even exists to precisely calculate the TCC. Human values and perceptions concerning the resources, indicators, the host community's tolerance for tourists, tourist's perceptions of quality experiences, implicit judgement management, and impacts and management practices derived from them currently provide the milestones for this debate. According to this, some studies recognize that CC is difficult to define and to measure (Wall, 1983; Buckley, 1999; McCool, Lime, 2001; Miller, 2001; Simon et al., 2004). Nevertheless, most consider that some form of intervention is necessary to protect environmental areas. An example of this is the WTO's (1983) establishment of a complete series of criteria to evaluate TCC. Although many of their criteria are not quantifiable, they do consider the size of the area used by visitors, the fragility of the ecosystem, the set of natural resources available, the topography and vegetation, and the interaction between animals and humans and the tourists' perceptions.

Despite these remarks, some authors advocate that TCC can be useful as a framework for planning and sustainable management and they also admit that the concept of use should lead tourism planners and managers to offer more specific imput and answers at the local tourism level (McCool, Lime, 2001; Saarinen, 2006; Sæþórsdóttir, 2010).

Barančok, Barančoková (2008) go further and consider the CC as a potential instrument for the landscape ecological regionalization and optimization of a territory.

Most studies related to TCC distinguish the following three levels of CC: (1) the physical carrying capacity, PCC, which relates to the size of the space available to visitors, (2) the actual carrying capacity, RCC (Formula A), which is obtained from the PCC by applying a set of correction factors, CF:

$$A \quad RCC = PCC \times \prod CF_i$$

and (3); the effective carrying capacity, ECC (Formula B) which considers the management capacity MC, together with the RCC (Cifuentes et al., 1999; Alvarado et al., 2000 and recently Boggian et al., 2007; Lobo, 2008) in the sense that:

$$B \quad ECC = MC \times RCC$$

Keeping in mind all these capacities, it is the ECC which is closest to the TCC of an area.

Consequently, and following these methodologies, this research calculates the three levels of CC using different information sources. For the first two (PCC and RCC), the following environmental and physical characteristics of the zone are considered: the length and width of the paths and the different correctional factors related, basically, to the best way to ride, with regard to the number of cyclists. The seasonal meteorological conditions analyzed and provided by the Catalan Meteorological Service will form part of the assessment basis. Finally, the results of a survey carried out on 158 visitors to the NPDE in August 2006 will be used to establish the effective carrying capacity, ECC. These results also allow evaluation of the management capacity, MC, of the paths.

Results and discussion

Initial conditions and physical carrying capacity

Despite the fact that the NPDE has many cycling paths, the CC of only the two most important of them has been estimated. These are the Encanyissada and the Tancada paths, located between the towns of Sant Jaume d'Enveja, Amposta and Sant Carles de la Ràpita. The estimation model which will be used herein is related to the three levels of carrying capacity as discussed above. These CC's will indicate the maximum number of daily visits, or runs, on these paths.

The TCC of these two paths was calculated during the months of March, April, May and June (hereinafter Spring) and throughout the whole period including July, August and September (hereinafter Summer), because these periods experience a substantial increase in the number of visitors.

The most relevant physical characteristics of two paths are:

length: Encanyissada: approximately 3.5 km and Tancada 3.7 km,

- width: both paths measure 2.10 m consistently. Moreover, the Encanyissada has an additional non-asphalted lane that runs beside the main one,
- surface: even throughout,
- average time needed to complete one direction: about 25 minutes for the Encanyissada and 30 minutes for the Tancada.

In order to evaluate the TCC of both paths, this research has taken into account the following considerations:

- Neither path is circular, and tourists ride along the paths in both directions. Thus, the total length, S, of the Encanyissada will be 7,000, with 7,400 m for the Tancada. The total

time reqired to complete the journey will be 50 minutes for the Encanyissada and 60 minutes for the Tancada.

- About 8 m of path has been assigned to each cyclist, to avoid unexpected interference from others cyclists. This basically accounts for riders directly in front and behind others. Thus s = 8.
- The paths are generally used 8 hours a day in Spring and 12 hours in Summer (it is necessary to note here that this time roughly corresponds to the hours of daylight in each period).

Formula C defines the physical carrying capacity estimation (PCC):

$$C \quad PCC = (S / s) \times NV,$$

where: NV is the quotient of the number of cycling hours in a day and the ones actually used by every cyclist in each journey. Thus, it can be concluded that the PCC of the Encanyissada is 8,333 visits per day in Spring and 12,500 in Summer, whereas that of the Tancada is 7,400 visits per day in Spring and 11,100 in Summer.

Actual carrying capacity estimation

Four correction factors, CF, in the evaluation of the actual carrying capacity, RCC, were considered for this study: social correction factor CF_{soc}, rain correction factor CF_{rain}, sun-brightness correction factor CF_{sun}, and the wind correction factor CF_{wind}. The last three are related to weather conditions which create difficulties for cycling along these paths. In fact, all these correction factors are percentages which reduce the PCC to reach the RCC.

The first estimation is the CF_{soc}. When some aspects related to the quality of the cycling journey are considered, it appears reasonable to assume that some journeys will be made in groups, especially when the influx of people is high. Therefore, the social correction factor CF_{soc} in this model is:

$$CF_{soc} = s \times n_G /(d_G + s \times n_G),$$

where: s is the stretch of the path that each cyclist occupies at a given time (in our case 8 m), n_G is the number of cyclists per group and d_G is the distance between groups.

Taking into account that these groups are often made up of students from primary and secondary schools, or young people in general, each of these groups is considered to contain 10 cyclists, at the most.[1] However, when it is already established that many birds in the Ebro Delta breed or nest there in Spring when there is a very high influx of people, the maximum number of cyclists riding together should be reduced to 8 for the Tancada because: 1) unlike the Encanyissada, it does not have an additional gravel path beside the main asphalted one and 2) the nesting zones at some points of this cycling path are located

[1] See *Decret 137/2003, DOGC nº 3 902 de 11 de juny de 2003.*

at a distance of **just 100 m from the people**. This correction agrees with scientific studies which recommend maintaining a prudential distance from bird populations, to reduce as much human disturbance to them as possible (Rodgers, Smith 1997).

Therefore, in order to avoid unexpected interference from others cyclists, and at the same time increase the tourist experience quality, a distance d_g of approximately100 m is advisable on the Encanyissada and 400 m on the Tancada (this Tancada value is higher than on Encanyissada because, as mentioned above, it does not possess an additional pathway). When these facts are considered, the formula listed above can be applied, and it is therefore concluded that the social correction factor CF_{soc} for the Encanyissada is 44% and 14% for the Tancada.

For the rain correctional factor CF_{rain} determination, if it is taken into account that on average it rains 24.4 days in Spring (annual periods lasting 122 days) and 18.8 days in Summer (92 days of the year),[2] it is established that it does not rain for approximately 80% of the days in both Spring and Summer. The rain correction factor CF_{rain} is therefore 80%.

The sun-brightness correction factor CF_{sun} depends on the number of hours in Summer that the sun's brightness makes cycling on the two paths difficult (in Spring, this is not a problem). Because the sun's brightness is stronger for four hours on every summer day (between 1 p.m. and 5 p.m.), there are 368 hours (4 hours in 92 days) of strong sun for approximately 1,104 hours on which it is possible to ride the paths (12 hours in 92 days and 368/1104= 67%. Since the sun does not impede use on either path for 67% of the summer cycling hours, the sun-brightness correction factor CF_{sun} is 67%.

For determination of CF_{wind}, calculation of the number of hours a year when it is very difficult to use these paths because of the wind called "*mestral*" *is utilized.* Although this wind often blows strongly in gusts of varying intensity at the beginning of Spring, it is almost imperceptible during Summer. Since it is assessed that there is an average of 3.8 days in Spring when the *mestral* blows at almost 8 m per second (5 on the Beaufort scale)[3] and that Spring has 122 days, it is necessary to assume that the wind does not impede normal cycling activity in the Delta zone for approximately 97% of Spring-time. The wind correction factor CF_{wind} is therefore 97%.

Finally if the actual carrying capacity, RCC, in Spring corresponds to the product of PCC, CF_{soc} , CF_{rain} and CF_{wind}, and that in Summer it is the product of PCC, CF_{soc} , CF_{rain} and CF_{sun}, the actual carrying capacity, RCC, is determined at 2,845 journeys per day in Spring and 2,984 in Summer on the Encanyissada, and 804 journeys per day in Spring and 833 in Summer on the Tancada.

Management capacity and effective and tourism carrying capacity

As mentioned above, one of the main keys in this model is management capacity, MC. Generally speaking, MC can be defined as the optimal level of management that must be

[2] Average number of rainy days in Spring and Summer over the last ten years (dates of the *Servei Meteorològic de Catalunya* gathered in the *Illa de Buda-El Fangar*).

[3] Average wind power in Spring over the last 10 years (*Illa de Buda-El Fangar* zone, *Servei Meteorològic de Catalunya*).

achieved by either public or private administrations in a protected area in order to reach their proposed goals (Cifuentes et al., 1999). When estimating this capacity many variables have to be considered. These include the economic and political variables and also those related to equipment, staff, financing and infrastructure in the areas studied. In this present case, the following five items were considered:

1. information related to the paths,
2. access to the paths,
3. marks on the paths,
4. status of cycling paths,
5. quality of the landscape around the paths.

These items were estimated through a survey of 158 people carried out in August 2006 at NPDE (Table 1). When all these items are graded on a scale of 1 to 7, a table of average values can be generated. Herein the management capacity, MC, denoting the average value of the above five items, was established at 79%.

Hence, the effective carrying capacity, ECC, can be calculated, since it is equal to the product of RCC and MC. Thus the ECC on both paths is 2,248 journeys per day in Spring and 2,329 in Summer for the Encanyissada, and 635 journeys per day in Spring and 658 in Summer for the Tancada.

Following the WTO recommendations noted above, "that the tourism carrying capacity TCC corresponds to the maximum number of visitors (cyclists) that can ride *simultaneously* on the paths", it can be concluded that this TCC is equal to the quotient between the effective carrying capacity ECC and the number of journeys, NV, which each cyclist can ride in a day:

$$TCC = ECC/NV.$$

T a b l e 1. Management capacity.

Item	Average	%
1	5.44	77.7
2	5.63	80.4
3	4.81	68.7
4	5.25	75
5	6.56	93.7
MC	5.54	79.1

Source: Survey carried out by the authors

T a b l e 2. Summary of the carrying capacities of the Encanyissada and the Tancada.

		PCC	RCC	ECC	TCC
Encanyissada	Spring	8 333	2 845	2 248	237
	Summer	12 500	2 948	2 329	166
Tancada	Spring	7 400	804	635	79
	Summer	11 100	833	658	59

Source: The authors

This equates to a tourism carrying capacity, TCC, of 237 cyclists in Spring and 166 cyclists in Summer who can simultaneously cycle the Encanyissada in these periods and the same is possible for 79 cyclists in Spring and 59 in Summer on the Tancada. Table 2 shows all the calculated carrying capacities.

It is emphasised here that the TCC values must be interpreted as a quantitative boundary beyond which management problems can occur.

According to the TCC, it is also clear that the influx of visitors on both paths is higher in Spring than in Summer. This is contrary to the ECC because the number of journeys, NV is greater in Summer than in Spring.

Finally, it must be pointed out that the TCC in Summer is approximately 70% of that in Spring on both paths.

Therefore, to offset the problems presented in the first paragraph of our introduction above, the necessity for periodical review of the estimation parameters is paramount. This is highlighted because these parameters are constantly subjected to changing social expectations and environmental factors which influence the areas' timeless character and subjectivity.

Conclusion

The Delta of the Ebro river has become an important tourist area since it was declared a Natural Park. Nowadays, the average number of annual visitors is about 500,000. The emergence of tourism has proven helpful in enhancing local development. Nevertheless, uncontrolled tourism can contribute to environmental deterioration and, in the medium term, jeopardize the quality of visitors' experience. It is therefore recognised that some form of intervention is necessary to protect the environmental assets, but this protection can only be achieved if the impacts are predicted before the decline in environmental quality becomes inevitable. As previously mentioned, CCT has been widely used as a management and planning instrument. Although criticisms associated with this concept have been noted, its implementation here is enthusiastically proposed. It is also further emphasized that its interpretation should be a tool for warning that "a possible change is not acceptable" instead of a "magic limitation number".

In this context, the cycling carrying capacity of the two most heavily used cycling paths, l'Encanyissada and La Tancada, is proposed as an instrument able to detect whether the resources are being used excessively, and thus, if the area is under excessive pressure leading to unbearable stress.

When this line of thought is followed with the objective of planning and managing sustainable tourism in this area, it is proposed that these cycling carrying capacities be used as bi-directional warning indicators. Firstly, they are indicators of pressure on the paths themselves, and secondly, and indirectly, they are indicators of pressure on the area as a whole.

This first dimension makes reference to the ECC and to the TCC of the paths and concurrently presents a point of view from two perspectives. The ECC works as a "static" indicator since it only provides information on the daily maximum influx of visitors permitted,

while the TCC works as a "dynamic" indicator because it allows daily management to use criteria concerning sustainability on both paths, without the need to reach the levels of the ECC. This is especially important when the influx or type of visitor recommends this type of management.

The second dimension introduces a model of indirect management whereby the cycling capacities can be used to provide information about the area. Here, it is the ECC that plays the prominent role. Indeed, since the ECC represents a threshold beyond which the quality of the visit to the paths would diminish, it is perfectly reasonable to assume that when it is at the point of reaching this capacity the remaining natural space may be at its sustainable use limit.

In this particular case, dependent on knowledge of the number of cyclists who access the Encanyissada and the Tancada areas, it is precisely in Spring and Summer when the greatest pressure is most likely to be felt on the delta area. Consequently, this makes it necessary to carefully plan recreational activities. To achieve this,, we can also add the use of continuous year-long mechanisms for the monitoring of visitor numbers, to detect changes in visit dynamics (Švajda, 2009).

In this situation, provision for the implementation of certain control measures should be adopted, especially when the influx of cyclists significantly approaches the ECC values. With regard to the paths themselves, these measures could include limited access and perhaps absolute restricted access during wildlife nesting periods. From this area's global management perspective, an entire scenario of actions should be initiated in order to avoid possible outside interference to the most fragile areas. Among these, the most important will include restriction of access into biologically sensitive areas, the control of parking areas, prohibition of traffic outside permitted areas, unauthorized camping and all other activities that management considers necessary to control. Moreover, these control systems will result from continuous monitoring, and therefore be evaluated and used as feedback into the management system.

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Appendix

VISITOR QUESTIONNAIRE

1. IS THIS THE FIRST TIME THAT YOU HAVE VISITED THE EBRO DELTA ?

YES 1
NO 2

If Yes, How many times do you visit a year?

2 . HAVE YOU VISITED OTHER NATURAL PARKS OR AREAS OF NATURAL INTEREST?

YES 1
NO 2

3. HOW LONG DID IT TAKE YOU TO REACH THE DELTA FROM YOUR HOME / HOME COUNTRY

4. WHO DID YOU COME WITH?

Alone……..... 1
With my family..... 2
With friends or interest group..... 3
Tour……..... 4
Other (Please specify 5

5. ARE YOU STAYING IN THE EBRO DELTA?

YES..... 1
NO..... 2 (go to question 7)
If Yes, (Where? Place) .....

6. WHAT KIND OF ACCOMMODATION?

Vacation house..... 1
Hotel/ Hostel/ Boarding house..... 2
Campsite..... 3
With relatives or friends..... 4
Other (Please specify 5

7. HOW DID YOU ORGANIZE YOUR VISIT?
On my own..... 1
Through a travel agency 2
With a specialist guide..... 3
Other (please specify..... 4

8. HOW LONG DO YOU PLAN TO STAY**?**

A few hours..... 1
A whole day..... 2
Two or three days 3

Four or five days 4
More than five days 5
Other (Please specify 6

9 . DO YOU THINK THE EBRO DELTA HAS FEATURES THAT DISTINGUISH IT FROM OTHER CYCLING AREAS?

YES 1
NO 2

If, YES, Please specify the most important _____)

10. DO YOU THINK THAT, GENERALLY SPEAKING, THE DISTANCE BETWEEN THE BIRDS AND THE CYCLIST IS ADEQUATE (i.e., FAR ENOUGH NOT TO INTERFERE WITH THEIR ACTIVITY?

YES 1
NO 2

PLEASE SPECIFY THE IDEAL DISTANCE DO YOU THINK THERE ARE OTHER PLACES WORTH VISITING DURING YOUR TRIP TO THE EBRO DELTA?

YES 1
NO 2
Please specify the most important _____

11. HOW WOULD YOU RATE THE HOSPITALITY IN THE EBRO DELTA?
(Rate from 1 to 7 = 1: very bad – 7: very good) ☐

12. IS THE SEA NEARBY AN EXTRA ATTRACTION?
(Rate from 1 to 7 = 1: not at all – 7: yes, definitely) ☐

13. WHAT IS YOUR OPINION OF THE QUALITY OF THE DELTA'S ENVIRONMENT?
(Rate from 1 to 7 = 1: very bad – 7: very good) ☐

14. WHAT IS YOUR OPINION OF THE DELTA'S GASTRONOMY?
(Rate from 1 to 7 = 1: very bad – 7: very good) ☐

15. HOW DID YOU LIKE THE DELTA'S LANDSCAPE?
(Rate from 1 to 7 = 1: not at all – 7: very much) ☐

16. PLEASE RATE THE AREA'S ACCESSIBILITY AND SIGNALLING
(Rate from 1 to 7 = 1: very bad – 7: very good) ☐

17. PLEASE rate the quality and condition of the roads to the delta
(Rate from 1 to 7 = 1: very bad – 7: very good) ☐

18. ARE THERE CAR PARKS? PLEASE RATE THEIR CONDITION AND AVAILABILITY

YES 1
NO 2 ☐
(Rate from 1 to 7 = 1: very bad – 7: very good)

19. WHAT IS YOUR OPINION OF THE DELTA'S FACILITIES?

(Rate from 1 to 7 = 1: very bad – 7: very good) ☐

20. PLEASE RATE THE CYCLING AREA'S ACCESSIBILITY

(Rate from 1 to 7 = 1: very bad – 7: very good) ☐

21. PLEASE RATE THE CYCLING AREA'S SIGNALLING

(Rate from 1 to 7 = 1: very bad – 7: very good) ☐

22. PLEASE RATE THE QUALITY AND CONDITION OF THE CYCLING PATHS

(Rate from 1 to 7 = 1: very bad – 7: very good) ☐

23. PLEASE RATE HOW CROWDED CYCLING PATHS ARE

(Rate from 1 to 7 = 1: very much – 7: very little) ☐

PERSONAL DETAILS

Z0 NATIONALITY _____

Z1. Sex

Male 1

Female 2

Z2a1 ☐ AGE **(write the exact age)**

Z2A2. AGE GROUPS

16–24 years..... 1
25–34 years..... 2
35–44 years..... 3
45–54 years..... 4
55–64 years..... 5
Over 65 6

Z3. PLACE AND COUNTRY OF RESIDENCE ☐

Z4. EDUCATION

<Elementary..... 1
Elementary 2
Secondary..... 3
University 4

Z5. JOB

Liberal professions 01
Businessman/woman 02
Self-employed 03
Management..... 04
Administrative worker..... 05
Unskilled worker 06
Housewife..... 07
Retired..... 08
Unemployed..... 09
Student 10

Z6. WHAT IS YOUR APPROXIMATE NET MONTHLY FAMILY INCOME?

(1 dollar = 1.25 eUROS)

Less than 600 euros 1
600–1200 euros..... 2
1200.01–1800 euros 3
1800.01–2500 euros 4
2500.01–3000 euros 5
3000.01–4000 euros 6
More than 4000 euros 7
Undecided 8
No answer..... 9