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The economic value of recreational services in the Middle Brenta area: a Travel Cost Method application

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ABSTRACT

Society's demand for enjoyable recreational environments is growing. At the same time, the increase of urban areas and intensively managed agricultural areas are deemed major threats to ecosystem services provision. Therefore, protected areas are becoming increasingly important for providing recreational ecosystem services. To link the economic and financial aspects of natural resource management to their conservation, it is necessary to quantify in monetary terms the ecosystem services provided by natural areas. This study is embedded in the "Parco Fiume Brenta" project and deals with the economic valuation of recreational services of the Middle Brenta area (Italy), a Natura 2000 site area under protection with significant potential for tourism. Travel Cost Method, both in its zonal and individual versions, was applied, considering as significant variables all the expenditures that visitors have faced during their stay in the area. The annual recreational value turned out to be around 80 000 €, with an average individual surplus of 3 €. Furthermore, we analysed visitors' profiles from the on-site survey, gathering information on the recreational activities that they carried out, their behaviour, their expenditure at the site, their satisfaction with certain facilities, and their knowledge of the Natura 2000 network. Results showed that visitors were mainly middle-aged local recreationists and predominant recreational activities were walking and cycling. The level of satisfaction with site-specific facilities and features was moderate, whereas the knowledge about the Natura 2000 network was scarce. In the light of visitors' satisfaction with the site, some suggestions to improve the site were provided. In general, people required more tourist facilities (picnic areas with public services, parking), promotion, and touristic information about the site and its surroundings. The high visitation rate estimated suggests that the Middle Brenta area has the potential to further develop the tourism sector (keeping an eye on sustainability). The results obtained by this analysis are thus useful instruments to support future management decisions and facilitate the responsible use of the area.

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CHAPTER 1: INTRODUCTION

Society's demand for enjoyable recreational environments as a relief from solitude and stress and as an escape from everyday life is increasing (Kyle et al, 2006). This need has further gained importance after the recent Covid-19 pandemic, where restrictive measures to contain the infection have strongly modified society's habits, but at the same time made clear the need for outdoor experiences, practiced both in groups as well as individually. Nowadays, people look for many different experiences in natural areas including recreational activities and nature and landscape enjoyment (Kyle et al., 2006). Latest trends analysis in Europe pointed out that nature and natural resources rank third among the main reasons for choosing a destination where to spend holidays and first for getting back to the same place for vacation (Calderwood & Soshkin, 2019). However, during the last decades, humans have rapidly and intensely altered natural ecosystems, affecting their capacity to provide goods and services, including recreational opportunities. According to the MEA publication, cultural ecosystem services are particularly difficult to replace once the ecosystems are degraded (MA, 2005).

In this context, protected areas, because of their naturalness and biodiversity abundance, might represent a major source for recreational opportunities (Schirpke et al., 2018). On the other hand, recreational activities in protected areas are often considered a threat to biodiversity, because of their potential in degrading relevant habitats and disturbing wildlife (Pickering & Hill, 2007). That is why, usually, traditional conservative approaches in managing protected areas tend to exclude human activities. In order to safeguard European natural heritage, the European Community set up Natura 2000, an ecological network of sites built to protect natural habitats and threatened species of European-wide importance. Natura 2000 is not a system of strict protected areas from which all human activities would be excluded (EC, 2016). On the contrary, the approach to conservation and sustainable use of the sites is much wider; indeed, one of the objectives is to ensure both ecologically and economically sustainability in management, giving value to tourism as a source of cultural and monetary value. The network covers about 18% of the land area in Europe, providing relevant socio-economic benefits to local communities, mostly related to tourism and recreation (Gantioler et al., 2014). In Italy, there are 2 613 sites that cover 6 414 546 hectares of the national terrestrial surface (ISPRA, 2020). Different institutions and authorities such as regions, provinces and municipalities adopt different kinds of instruments to manage these natural areas. This large number of responsible bodies and instruments sometimes results in a bureaucratic burden hindering the attainment of conservation goals and reducing the potential of Natura 2000 sites for recreational use (Pellegrino, Schirpke, & Marino, 2017). In order to achieve the sustainable objectives just described, the European Union make use of a particular funding instrument for the environment and climate action (LIFE

Programme), which in the Natura 2000 network areas facilitates the integration of environmental issues into other policies. The present thesis is embedded in LIFE Brenta 2030, a project that aims mainly to increase biodiversity and improve the provision of water-related ecosystem services of river habitats, wetlands and agricultural areas of the Natura 2000 site "Grave e Zone Umide del Brenta" in Veneto Region. As expected, this project is co-financed by the LIFE Nature and Biodiversity sub-programme, the funding instruments just described, that was created to finance nature conservation projects contributing to the implementation of the European Community directives on biodiversity and the management of the Natura 2000 network. The main contribution of this study is to estimate in monetary terms the economic value of recreational services provided by the natural site "Grave e Zone Umide del Brenta" (that in this study would be often referred to as Middle Brenta area). The data obtained by this analysis would be significant not only to determine the monetary value of recreational ecosystem services, but also to strengthen recreational opportunities in the area and support the touristic promotion of the site.

1.1 Aim of the study

This thesis is embedded in the "Parco Fiume Brenta" initiative, which by means of the LIFE Brenta 2030 project, aims to improve the management of the Brenta River and its surrounding territory, by improving the coordination between institutions and local stakeholders and developing positive synergies between the territory and the river. This study contributes to the identification and the economic evaluation of the current and potential touristic and recreational offer of the Middle Brenta area, with the aim to collect useful data for the future promotion of the area and the recreational activities that here can be practiced. Starting from the analysis of Middle Brenta visitors' characteristics and their recreational demand, this study focused on the economic valuation of its recreational services through the application of the Travel Cost method: in this way, revenues coming from visits and the portion of these that benefit the local community were identified. The results obtained by this analysis are thus useful instruments to support future management decisions and facilitate the responsible use of the area.

1.2 Organization of the study

This thesis is structured as follows. After this brief introduction, Chapter 2 introduces the concepts of ecosystem and of ecosystem services; investigates, by analysing the relevant publications, the linkages between ecosystem services and human well-being. After that, the theory of environmental valuation will be introduced, concluding with a focus on the Consumer Surplus concept that is a central tenet of the methodology that here will be applied. Chapter 3 will be dedicated to the description of the study area, first by analysing its environmental and socio-economic characteristics and then by outlining its actual recreational offer. At the end of this chapter, Parco Fiume Brenta project, to which this thesis contributes, will be presented. Chapter 4 describes first the Travel Cost Method, the estimation method here implemented, providing also an insight on the limitations in its application. Secondly, it illustrates the application steps of both its two versions (zonal and individual) that have been applied in this case study. Next, Chapter 5 begins with an overview of the sampling strategy applied and explains how the survey for data collection was designed and then distributed to respondents. Lastly, Chapter 6 summarizes the main results of the study and Chapter 7 draws the conclusions and provides some suggestions to improve and manage the area. An example of the survey used in the analysis and an example of a data imputation table can be found in the Appendices.

CHAPTER 2: CONCEPTUAL FRAMEWORK

2.1 The need to study ecosystems

Although ecology and economics are words with a common root (*oikos* = home), they have been historically divergent and opposed mainly due to the prejudice that sees environmental protection as a brake on economic development. Only recently, these two disciplines undertook a communication process driven by the necessity for human population to shift current development paradigms to environmental and social sustainability. To ensure a proper dialogue between these two disciplines, their languages and study methods should be compatible. That is why the concept of *ecosystem* has been chosen as a touch point between the two.

The ecosystem notion is not recent as its original definition dates back to mid-1930s by Arthur Tansley (MA, 2005). However, its most famous definition today is the one provided by the Convention on Biological Diversity in 1992: *"An ecosystem is a dynamic complex of plant, animal and microorganism communities and the non-living environment, interacting as a functional unit"*. Ecosystems are varied in both size and, arguably, complexity, and may be nested one within another. Their knowledge is essential, as preserving their integrity could provide economic and ecological stability in the long run. However, due to their complexity, they are not easily evaluated or predictable but it is still possible to quantify the services they provide.

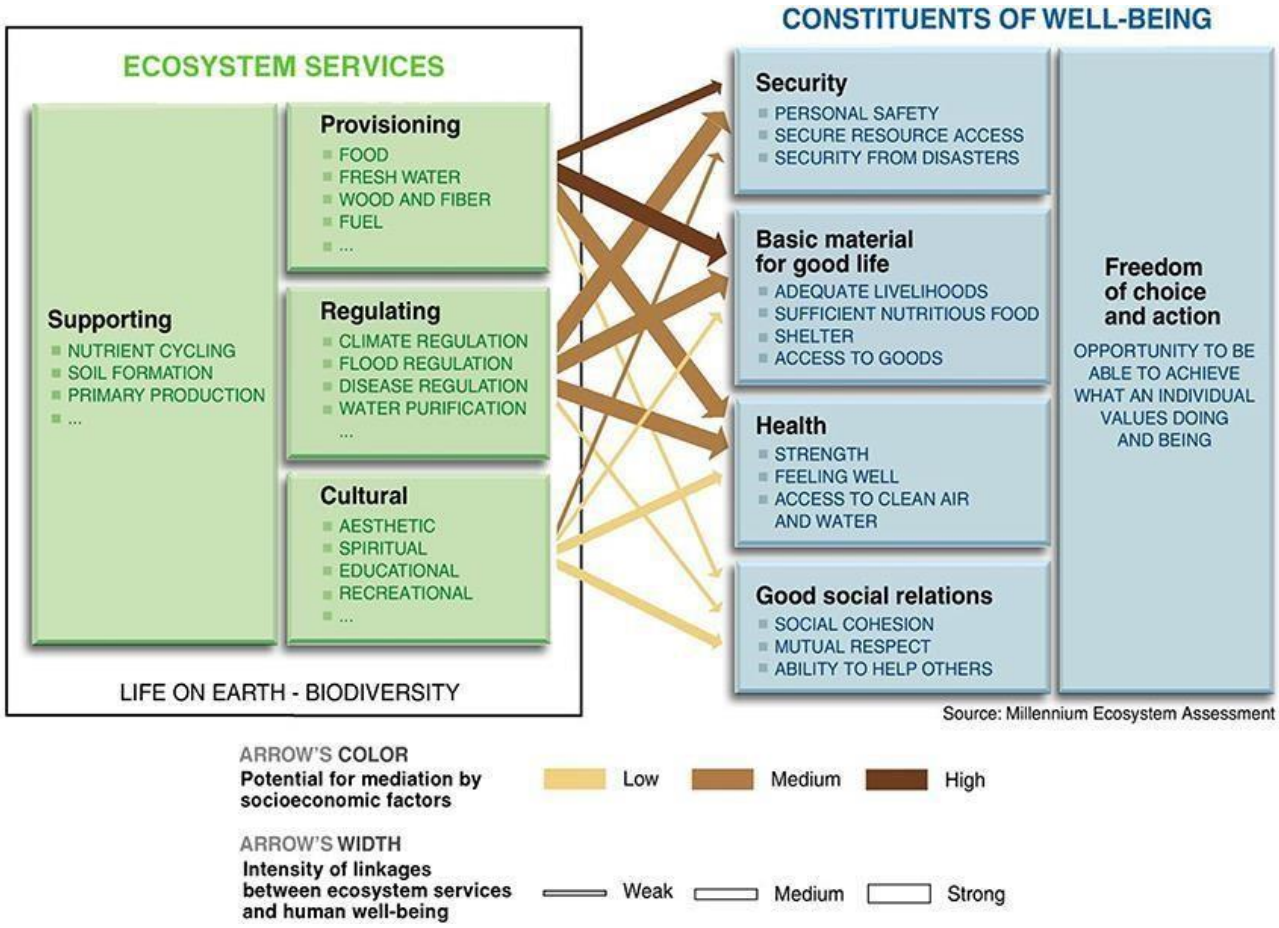
The Earth's ecosystems, as defined above, provide humanity with a wide range of benefits commonly known as *ecosystem services (ES)*. Despite some references can be found in some classical authors (Plato, Theophrastus), ecosystem services have gained increasing relevance only over the last 50 years. Gómez-Baggethun et al. (2010) pointed out that the origins of this concept dates back to late 1970s, when it was mostly used to increase public awareness on biodiversity conservation. Later, in the 1990s, the concept gained much more attention thanks to the proliferation of scientific contribution on the subject (Costanza and Daily, 1992) and the first attempts to estimate the economic value of ecosystem services (Costanza et al., 1997). Although there are many different definitions and classifications of ES, we typically refer to the definition provided by the Millennium Ecosystem Assessment (MA), which is considered the publication that finally defined and popularized the concept. According to this international work programme launched by the United Nations in 2001, ecosystem services are defined as "*the benefits people obtain from ecosystems*" (MA, 2005). Experts involved in the work agreed to categorize ES in four groups (Figure 1), all vital to human health and well-being:

- *Supporting services*: such as soil formation, photosynthesis, nutrient and water cycle: they enable the provision of all other types of ecosystem services.

- *Provisioning services*: they consist of all the goods and products that people obtain from ecosystems to satisfy their needs. They include food, fresh water, fuels but also more abstract products such as genetic resources.
- *Regulating services*: these are the benefits derived from the regulation of ecosystem processes such as water purification, pollination and the regulation of climate and air quality.
- *Cultural services*: these services share the common characteristic of being intangible (i.e. not tangible). They include services that contribute to human spiritual well-being, such as educational, aesthetic, cultural diversity, spiritual and religious values, inspiration, recreation and ecotourism.

The MA classification is the most popular and used in ecosystems' studies as it establishes specific categories: therefore, given a service, it is easy to understand which category it belongs to and the risk of assigning it to two or more categories is limited.

Figure 1: Linkages between Ecosystem Services and Human Wellbeing



Sources: Millennium Ecosystem Assessment, 2005

A key concept developed by MA study is that ecosystem services are closely linked to human well-being. The basic concept is that, in general, our well-being depends on the services provided by nature, As illustrated in Figure 1, ES directly influence the four basic constituents of huma well-being, which freedom of choice and action ultimately depend on, with varying intensity and potential for mediation by socioeconomic factors. According to this classification, freedom of choice and action is the necessary condition for other well-being aspects to occur: security, intended as the opportunity to live in a safe environment and areas protected from disasters; basic material for a good life intended as the ability to access to natural and monetary resources (i.e. food, clothing, shelters) to gain a livelihood; health, linked with the availability of a healthy environment with clean air and water, energy, etc.; and finally good social relations that refers to the abilities, associated with ecosystems, to express aesthetic, cultural or spiritual values in social contexts. As illustrated by the arrows' width, ecosystem services could affect well-being with different intensities. Furthermore, some of these linkages may be mediated by socioeconomic factors. The strength of the linkages and the potential for mediation differ in different ecosystems and regions (MA, 2005). Other factors, including economic, social, technological and cultural factors influence human well-being that, in turn, affect ecosystems.

The 2005 MA report highlighted how, over the past 50 years, humans have altered ecosystems more rapidly and intensely than any other time in human history. Approximately 60% of the ecosystem services assessed in this report are still in decline or used unsustainably. While this has generally increased human well-being and positively affected economic development by meeting the world's growing need for food, fresh water and energy sources, it has also negatively affected the capacity of ecosystems to provide these services to humanity. This process has also increased the poverty level of some sectors of the population, exacerbating already existing social and economic gaps. Furthermore, the degradation of ecosystem services is an obstacle in achieving Millennium Development Goals.

2.2 The theory of environmental valuation

Individuals may derive value from environmental goods in many other ways than through direct consumption. If we wish to value environmental resources and the services they provide properly, a much broader definition of value should be employed. That is why the economic theory has developed the concept of Total Economic Value (TEV), defined as the aggregate of goods and services that a given ecosystem can produce in support of human well-being. TEV recognises two primary sources of value that individuals derive from the environment: 'use value' and 'non-use value'. As might be expected, tangibility decreases from the first to the second group.

Use value: it depends on the possibility to get a personal benefit through a physical – direct or indirect- interaction with the environmental resource. The use value includes:

- **Direct use value (Dv):** it refers to all the benefits of current, expected or possible consumption of an environmental resource. Even within this class is useful to distinguish two further categories:
    - Consumptive value: as the word suggests, it refers to environmental goods that are consumed in the act of using them. Taking wetlands as an example, it would include many provisioning services such as drinking water and timber.
    - Non-consumptive value: such value arises from activities that are not necessarily consumptive to the environment and might include for example the pleasure that individuals may derive from watching documentaries or reading articles on wetlands or for using them for recreational purposes.
- **Indirect use value (Iv)**: it includes all the services that individuals indirectly - i.e. not intentionally - benefit from nature. Examples could be regulating services such as climate regulation and hydrogeological stability.
- **Option value (Ov)**: it represents the value placed on possible future uses or applications of the resource. Individuals do not currently use the resource, but are willing to pay a certain amount to ensure its future use. An example is the value placed on a naturalistic area for future recreational purposes. This value arises only where there is incomplete knowledge of future conditions.

Non-use value: it refers to the benefits an individual may derive from a resource without ever physically interacting (directly or indirectly) with it or indeed ever even intending to use it. It includes:

- **Existence value (Ev)**: it is based on the awareness that an individual may derive from knowing that a certain environmental resource continues to exist, even if it has never been used or experienced and never will be in the future. This concept is strictly linked to the

intrinsic value of an environmental resource.

- **Altruistic value (Av)**: it arises from a concern for human contemporaries. Even if an individual does not value a particular environmental good, they may nevertheless value the satisfaction that other people obtain from using the resource.
- **Bequest value (Bv)**: it represents the value that people place on knowing that future generations will have the opportunity to enjoy (directly or indirectly) the environmental good.

Therefore, TEV is given by the sum of all of its components and can formally be expressed as follow:

$$TEV = Dv + Iv + Ov + Ev + Av + Bv$$

Intuitively, it becomes more and more complex to assign an economic value as we move from use values to non-use values. Of course, for any particular project and for particular individuals, some or all of the components of TEV may be zero.

The valuation of ecosystem services is a complex procedure because both services to be valued and the methods available for their valuation are complex. Over the years, numerous valuation techniques have been developed to achieve a monetary value of TEV. From an operational point of view, the identification of the most suitable method depends on the type of service being valued, the purpose of the valuation, and the qualitative and quantitative availability of data and information.

Generally, we distinguish between two different approaches to which different methodologies can be attributed.

The first brings together methods based on the analysis of reference market values. In this case, it is possible to use the monetary value of goods or services equal or similar to those considered. This occurs for some provisioning services such as food and timber. For example, the value of mushrooms in a forest that are harvested and consumed directly by residents can be quantified by their market value, i.e., the expense that residents themselves would incur to purchase them. When there is no direct market to refer to, methods can be used based on the revenues that the producer of the services receives or the costs that he incurs to secure those services.

The second approach brings together methods based on hypothetical markets where it is simulated what the behavior of consumers might be when the availability and price of the good changes. These are applied in cases where there is no real market of reference. Depending on whether the value attributed to the good is directly asked of users or whether it is deduced from their real behavior, we distinguish between methods based on expressed preferences (direct methods) and those based on revealed preferences (indirect methods).

Direct methods aim to directly collect preferences - in terms of willingness to pay for a given service - through interviews and questionnaires. For example, the contingent valuation method uses questionnaires to simulate a hypothetical market where stakeholders are asked how much they would be willing to pay to continue to use the asset being valued or, alternatively, how much they would be willing to accept to forego it. An example of an indirect method is instead the travel cost method (that here will be applied), widely used to estimate the value of recreational and tourist services offered by protected natural areas starting from the costs incurred by visitors to reach it and eventually stay there.

2.3 The concept of Consumer Surplus

The concept of consumer surplus (CS) is a central tenet of the travel cost method. The importance of CS in the TCM lies in the fact that it actually represents how much a visitor values a trip or visit to a recreational site. So invariably, the CS represents the recreational use value attached to a recreational site. According to Sohngen et al. (1999), the consumer's surplus is the additive value above travel cost that individuals get by visiting a recreation site each season. In ordinary economics terms, the consumer surplus is given by the difference between the actual price that an individual pay to benefit of certain good or service and the maximum amount that he would have been willing to pay for it other than do without it (Ndichia, 2007). Alfred Marshall, a famous English economist, provided more insights about it by saying that "*The price which a person has to pay for a thing can never and seldom comes up to that which he would be willing to pay rather than go without it, so that the satisfaction he gets from its purchase generally exceeds that which he gives up in paying away its price; and he thus derives from the purchase a surplus satisfaction. The excess of price which he would be willing to pay rather than go without the thing, over that which he actually does pay, is the economic measure of this surplus satisfaction. It may be called consumer's surplus*" (Ndichia, 2007). In the context of the TCM theory and in the light of this foregoing definition by Ndichia and the succinct explanation by Marshall, it can then be stated intuitively that the CS is the difference between the total travel costs or expenses incurred by a visitor to a recreational site and the maximum amount that the individual was (or would be) willing to spend in order to make the visit or the trip.

CHAPTER 3: STUDY AREA

Veneto region is a land rich in water. In the heart of this region, runs the Brenta River, an important Italian river that has its source in the Brenta Dolomites (450 m a.s.l.), between the lakes of Levico and Caldonazzo in Trentino-Alto Adige. Its basin has an extension of about 2 280 km^2, which about 1 120 km^2 is in Veneto region, with a maximum elevation of 2 332.5 m a.s.l. The river flows initially in a W-E direction, then, with a wide curve, it heads south; it covers about 70 km within the mountains' slopes up to Bassano del Grappa (VI), then it crosses the whole Venetian plain, touching Padua to the east and flowing into the Adriatic Sea near Chioggia (VE), after another 104 km. With its 174 km, it is the thirteenth longest river in Italy, and one of the main flowing in the northern part of the Adriatic sea. As most of the Venetian rivers, it has two opposite geological, morphological and consequently hydraulic conditions, deriving from the presence of a mount section, that starting from the sources closes at the end of Valsugana valley, immediately at north of Bassano del Grappa, and of a plain section. Here, its bed is composed of coarse debris, a condition that remains even in the territories between Cartigliano and Friola, where its bed expands up to over a kilometer. The main branch is mostly supplied with water all year long, while the secondary ones are active only in the periods of greater flow rate. The vegetation, which tends to invade the riverbed, is formed mainly by plants that grow and reproduce very quickly, a necessary characteristic for life in such a changeable environment. As we move south, the riverbed tends to narrow and the ramifications decrease in number, until, near Carturo, the Brenta compacts into a single channel. Here, its grain size is more refined, and is characterized by silts and clays.

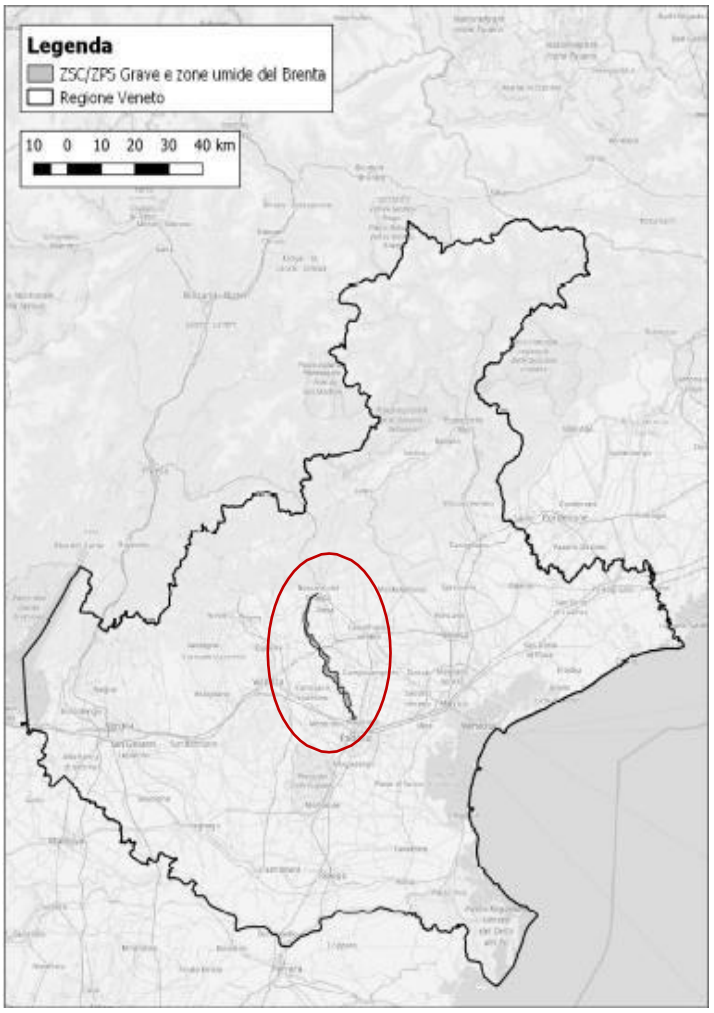
3.1 The Middle Brenta area

The Middle Brenta area extends along the Brenta river between the municipalities of Bassano del Grappa (in Vicenza province) and Padua. This area is recognized at the European level and it is included in the Natura 2000 network due to its environmental and cultural relevance. Natura 2000 was established by the European Union to protect and maintain Europe's most valuable and threatened species and habitats. The sites within this network are designated under the Birds and Habitats Directives. The site located in this area is called 'ZSC/ZPS IT3260018 Grave e Zone Umide del Brenta' (Figure 2**Errore. L'origine riferimento non è stata trovata.**). This site is included in the provinces of Padua and Vicenza within the municipalities of Bassano del Grappa, Campo San Martino, Carmignano di Brenta, Cartigliano,

Cittadella, Curtarolo, Fontaniva, Grantorto, Limena, Nove, Padova, Piazzola sul Brenta, Pozzoleone, San Giorgio in Bosco, Tezze sul Brenta e Vigodarzere. It is a very narrow and long site of 3 862 hectares and 64 kilometres. The site is located in an area with high population density, with approximately 509 inhabitants/km^2, in which inhabited centres, industrial areas and intensively cultivated agricultural areas succeed each other, with a low presence of natural areas. This contributes to its critical importance for local species existence. The territory is divided as follows:

- 42.7 % agricultural land
- 34.5% wooded and natural area
- 13.5% hydric body
- 8.6% urbanized and industrial zones
- 0.6% humid areas.

Figure 2: Map of the region location of the ZSC-ZPS.



Source: Natura 2000 – Standard Data Form.

The climate of the area is characterized by an average annual temperature of about 13°C and an average annual precipitation that varies from 850mm/year in Padua to about 1200mm/year in Bassano (Costantini et al. 2002, Buggin 2012) The rainfall pattern is equinoctial with a maximum in spring. The environment (Figure 3) is characterized by riverbanks, floodplains, dried-up lake basins (that are the results of previous excavations), abandoned meanders and wetlands with riparian vegetation. Within this area were found 836 taxa of vascular entities (Masin et al. 2011). This number is relatively important if we consider the characteristics of a plain and little diversified territory from the environmental point of view. As evidence of the strength of the anthropic disturbance, there are 166 species of algae, about 20% of the total flora. In this context, the middle course of the Brenta River performs the important function of green and blue infrastructure (water and green spaces) for the population and their activities and, moreover, it represents a fundamental ecological corridor, offering a refuge for many species of animals. The complex of habitats that can be found here are important nesting and wintering places for rare ornithic species.

Figure 3: Aerial photograph of the Brenta River in the municipality of Pozzoleone (VI)

Source: Parco Fiume Brenta webpage.

The presence of wet environments and water resources makes this area an attractive tourist destination, especially in the summer when people come to have a bath. Unfortunately, this entails a number of critical issues regarding the preservation of biodiversity. The absence of a managing strategy for the area leads to a major disruption of the habitats of the species that here are living.

3.2 Recreational offer mapping

The recreational activities that can be practiced in the Middle Brenta area are countless and attract different kinds of visitors. During the internship at Etifor[1], it was possible to collect data about the touristic-recreational offer of the area and the main tourist attractions located there. These services were then geo-referenced and, thanks to several elaborations through a GIS software, they were used to create an interactive map [2]of the Middle Brenta area. This map is available in the Parco Fiume Brenta webpage and is a useful tool for potential visitors who might want to explore the river and to know more about the culture of the area. An extract of the map is showed in Figure 4. If we observe the map, we can see that the 'Grave e zone umide del Brenta' site is characterized by the presence of many agritourisms (30) and educational farms (13). Furthermore, there are many horse riding schools (13), mostly located in the northern part of the area, where the river is wider and wild. Equestrian tourism, intended as a practice of daily excursion, is an activity that is broadly practiced in Veneto, since many of the rivers that cross this region are real natural routes, which allow horses and riders to move around safely (Caron, 2016). In order to develop the connections that already exist, the

[1] www.etifor.com/en/

[2] www.parcofiumebrenta.it/en/explore-the-river/

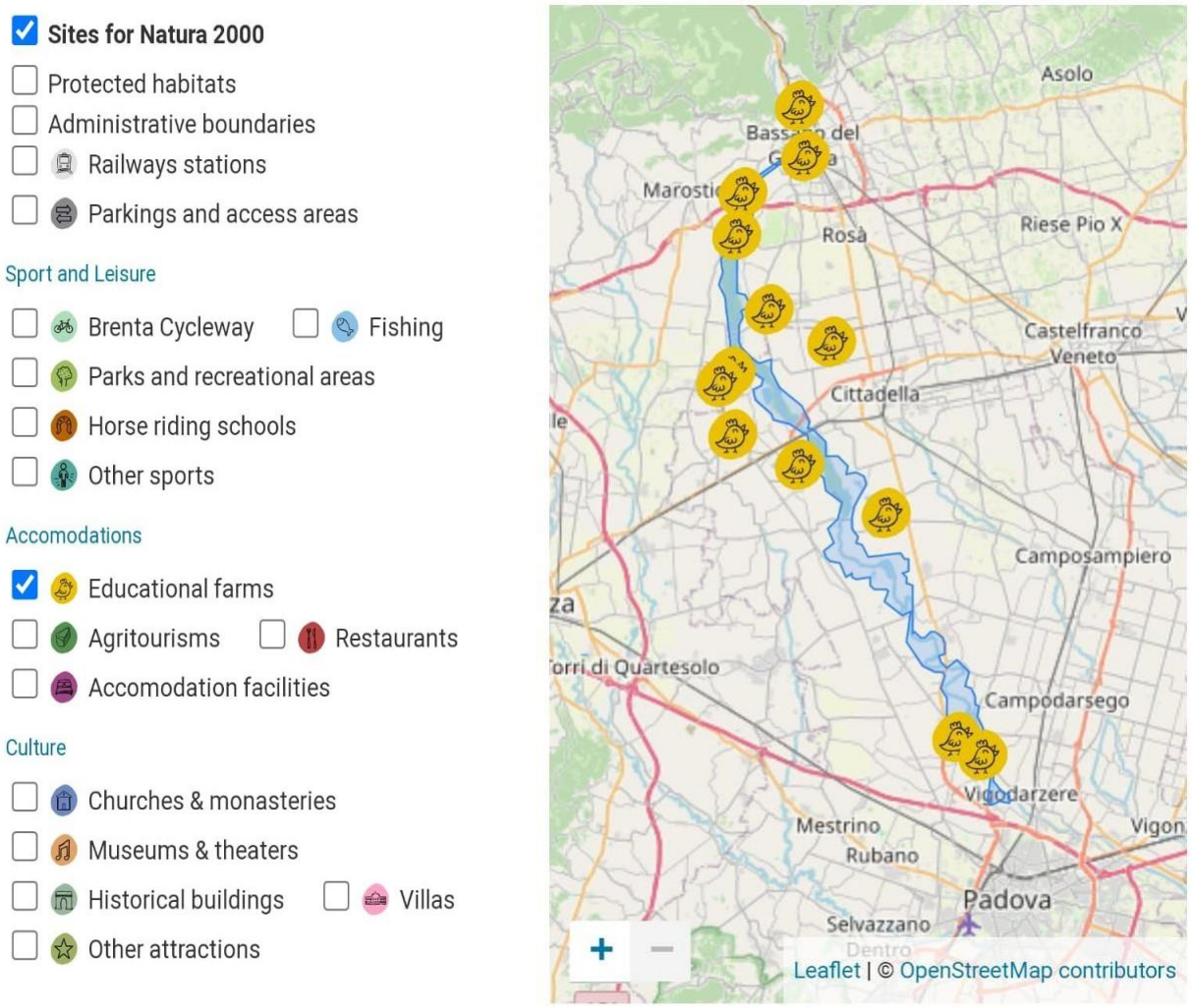
Province of Padua, in collaboration with some municipal administrations and local associations, has created a network of horseback riding paths that cover the Padua territory. Six different routes have been created: one of them (Ippovia n.1) follows the natural course of the river and extends from Vigonza to Carmignano di Brenta.

Throughout history, the Brenta River has always represented a fundamental communication route between the north and south of the region, between the mountains, the plains and the Adriatic Sea. It is not surprising, therefore, that the course of the Brenta River and in particular that of the Middle Brenta is scattered with historical testimonies capable of recounting the life of the community living along the Brenta in all its different historical eras. Distributed along the course of the river, the historical villas of the Middle Brenta are part of this historical and artistic heritage. During the mapping phase, 26 villas were identified, including the majestic *Villa Contarini* in Piazzola sul Brenta and *Villa Morosini Cappello* in Cartigliano. Many of the villas are open to visitors. Another historical building that is worth mentioning is the *Certosa di Vigodarzere*. This is a Carthusian monastery located on the outskirts of Padua that has been in a state of decay for years and is not open to visitors. Over the last decades, proposals for the renovation of the building have been put forward both by administrations and by associations for cultural (and commercial) purposes, but given the high cost involved, the initiatives have never been followed.

Another way to discover the local beauty is by cycling along the *Ciclovia del Medio Brenta* which extends from Padua to Carmignano di Brenta; unfortunately, the part that connects Carmignano to Bassano del Grappa is missing. This cycle path is part of the larger Ciclopista del Brenta, which extends for 180 kilometres and connects Venice to Trento. One of its strengths is that it can be integrated with the Padua-Trento rail line, thus giving greater freedom to cyclists to move along it. Another activity that is widely practiced among locals is angling. Indeed, in the area there are several angling lakes, which are the result of former gravel excavations that occurred in the area. Hiking is also an activity that can be done along the river. As a matter of fact, the Middle Brenta area is crossed by a famous international pilgrimage route: the *Via Romea Germanica*. This is a route which stretches from the German city of Stade to Rome, running almost 2200 kilometres, and passing through 3 countries: Germany, Austria and Italy.

Overall, tourist facilities are located in the closest historical towns; from the map we can see that there are a large number of restaurants and accommodations in the proximity of Bassano del Grappa, Cittadella, Piazzola sul Brenta, Padua and along the road that connects these cities.

Figure 4: Middle Brenta interactive map interface



Source: Own elaboration in Parco Fiume Brenta webpage.

CHAPTER 4: METHODS

This study employed the travel cost method (TCM) to estimate the recreational value of the study area. Under the notions of TCM, both zonal travel cost method (ZTCM) and individual travel cost method (ITCM) were applied to predict consumer surplus, representing economic value of recreational services of the Middle Brenta area for both domestic residents and possible tourists.

4.1 The Travel Cost Method

The travel cost method is widely used as a well-established approach to estimate the value of natural resources such as natural parks and wildlife reserves, and in particular, of the recreational services they provide. This method is commonly applied in cost-benefit analyses and in natural resource damage assessments where recreation values play a role (Parsons, 2003). TCM studies may be found in many contexts of the environmental policy, ranging from forest and wetland recreation (Ezebilo, 2016) to angling (Curtis and Stanley, 2016) and birdwatching. Furthermore, among the set of environmental goods evaluation techniques, it is considered the most robust for benefit transfer studies in the context of recreation (Zandersen and Tol, 2009).

The TCM model is credited to Harold Hotelling, a noted Harvard economist, who in the late 1940s suggested this method to measure the benefits of recreation in the United States national parks. Hotelling conceptualized that the costs incurred while travelling to a recreation site effectively represent the price of the visit for that visitor. The price of a visit increases as travel costs to reach the site increase, consequently, the number of trips taken to the site will theoretically decrease as this implicit price increases. Consequently, the relationship between the number of visits and their corresponding prices could be estimated. (Hotelling, 1947). This concept represents an important starting point as it connects the value of a non-market good (with implicit value) to the consumption of market goods (with explicit value).

This concept was subsequently developed until it found a precise theoretical-applicative definition with Clawson and Knetsch (1966). The two authors further improved the method by taking into account additional factors –beside distance from the recreational site- that can affect the demand, such as income and employment status of visitors, both of which can affect the opportunity cost of time spent travelling and recreating. Since then, numerous studies have adopted a methodology based on this approach. Nowadays, studies applying this method mainly focus on the valuation of consumer

surplus with the intention of supporting decision-making processes regarding the management of natural areas (Font, 2000).

The TCM is referred to as a *revealed-preference* valuation technique, because it uses actual visitors' behaviour and choices to infer values, thus peoples' preferences are revealed by their choices and a demand curve for recreation could be derived. The rationale behind using TCM is that it provides reliable estimates based on real behaviours, it is therefore the preferred approach to model use-values of recreational resources. This model is an application of 'weak complementarity', an assumption that states that 'if the site is too expensive and no trips are made, then changes in condition and availability of the site do not affect utility' (Pearson, 2009).

In TCM, the main intuition is that costs sustained by visitors may approximate the value of their recreational experience. In this context, the quantity of recreation is valued as the number of trips tourists undertake in a given time period, or days spent in the destination, while the associated unit cost is represented by the travel cost sustained for the round trip. People are thus assumed to be travel cost-sensitive, meaning that people living closer to the destination will undertake more visits compared to people travelling a long distance to get to the site, because the unit cost for a trip is lower than for the others. This hypothesis is consistent with microeconomic theory, for which higher prices for goods lead to lower quantity consumed. Using this utility maximization approach, in the basic travel cost model, individual demand for recreation to a specific natural site may be described by the following utility function:

$$u = \max(x, r, q)$$

subject to:

$$m + wt_w = x + cr$$

Individuals maximize their utility (u) that is determined by the consumption of a composite commodity (x), the number of visits made to a recreational site (r), along with the quality of the site (q) subject to a budget constraint. Non laboratory income is m, w is the individual's wage rate, t_w is the time spent working and c is the round-trip cost to visit the site. Since time spent visiting the recreational site is time away from work, it can be seen that there is also a time constraint given by:

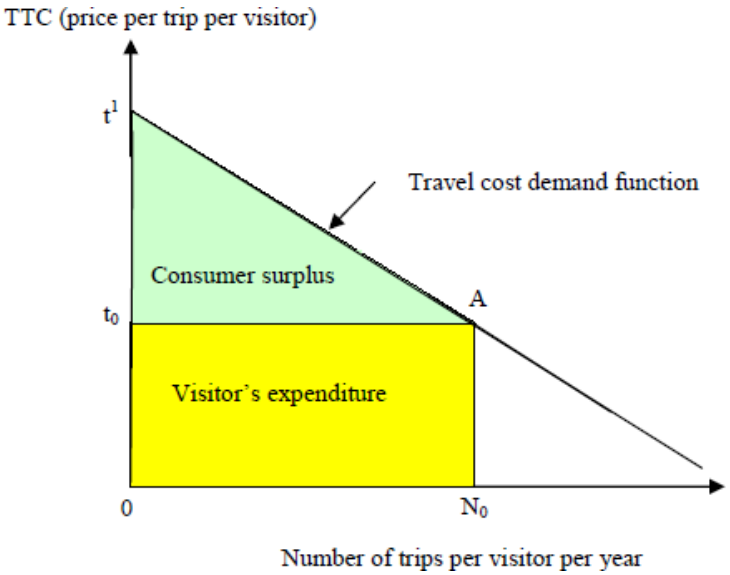
$$t = t_w + t_r r$$

where t is total time available and t_r is time required for a return trip to the site. From these equations, it is possible to establish a relationship between the number of days and the cost of each days, i.e. the demand curve for the number of trips that is given by:

$$r = r(m, w, p, q)$$

The demand curve (Figure 5) is thus estimable since the variation in individuals' distances from the site guarantees that t_r and hence p (the 'price' of the trip) varies across the sample. Integrating the demand curve between the limits corresponding to the current price (that in the case study corresponds to 0 €) and the 'choke' price (determined by the price at which the number of trips is driven to zero) yields an estimate of the individuals' consumer surplus arising from the recreational value of the site, which is the typical welfare measure that is used to approximate the recreational value of the site (Bateman and Turner, 1993). In the case study, since there is no entrance fee to access the Middle Brenta area, the entire area underlying the demand curve is assumed to be the consumer surplus (CS).

Figure 5: Travel Cost demand function and Consumer Surplus.



Source: Adapted from Sohngen et al. (1999)

On a conceptual and operational level, the travel cost method can be applied in two ways: zonal (Zonal Travel Cost Method, ZTCM) or individual (Individual Travel Cost Method, ITCM). In the case study, both versions were applied in order to obtain a more robust estimate of the value of the consumer surplus.

4.1.1 Critiques and limitations of the Travel Cost Method

The travel cost method can be fairly simple and it is not viewed as being terribly controversial since it has the appeal of being based on actual behaviour. However, its application is based on a series of assumptions, making it difficult to implement in a satisfactory manner. The first and main assumption

for its application is that the willingness to pay or the cost incurred by the consumer to reach the site is in fact equivalent to the economic value of the site for that consumer. Furthermore, the TCM assumes that individuals react to changes in travel costs in the same way they would react to changes in an admission fee. The biggest single problem, from an environmentalist's perspective, is that, as other revealed-preference techniques, it is incapable of measuring non-use values (Graves, 2013). Employing data from actual users ignores the values that individuals might have for the option to use, as well as bequest values, along with the passive preservation or existence values that could be of great importance for particular sites.

A perfect application of this method should consider in the demand curve, among other things, the price of all substitute recreational sites. However, implementing this solution requires first identifying which sites serve as substitutes: thus, TCM applications do not always deal adequately with the substitute issues (Pearson, 2009). A further problem concerns multi-purpose trips. Indeed, the method assumes that a trip is for a single purpose, but this is often not the case. Very often, a visit to a site forms part of a larger route and is therefore not the sole objective of the trip: it then becomes difficult to determine and estimate the travel cost associated with the single purpose trip. At present, there is no generally accepted solution to this problem: in the case study, in case of overnight stay, the preceding difficulty has been addressed by using only the travel cost from the stop prior to the site in question. This strategy is often used in the TCM literature (Smith, 1971).

As previously discussed, perhaps the greatest problem in the travel cost method application involves determining an appropriate value for the opportunity cost of travel time. The opportunity cost of travel time is the value of the best alternative activity that a person might engage in (e.g., working, playing a sport, etc.) instead of spending the time on a recreational trip. What this indicates is that the cost of the activity being valued ought to comprise not just the cost of the trip itself, but also the opportunity cost of the time utilized and alternative uses of time. Consequently, not considering the value of time implies that the consumer surplus will be underestimated. If the opportunity cost of all individuals is the same then the estimated price will be accurate. If, however, the opportunity cost of individuals accessing the site varies, which is more likely, then the measure will be inaccurate. The incorporation of the value of travel time in the TCM studies has been a source of concern since the earliest applications of this method (e.g., Clawson and Knetsch 1966). Researchers disagree not only about

how much the travel time is worth but also whether it should be included it in the model at all. Consequently, the choice of whether to consider it or not is arbitrary. Similarly, the time invested in a trip may occasionally represent not a cost, but a benefit. This would be the case when a person chooses a specific route in order to enjoy the landscape, making the trip itself one more part of the recreational experience (Walsh et al., 1990). In the case study, due to the lack of consistent data, we opted not to consider the opportunity cost of travel time as one of the variables of the analysis model.

In conclusion, a perfect application of TCM would simultaneously require sufficient variation in travel costs (i.e., differentiation in visitors' provenance) and sufficient numbers of visitors from each area: this is a condition that rarely occurs (Marinelli, 2009).

4.2 Zonal Travel Cost Method

The most basic empirical variant of the TCM is the zonal travel cost model (ZTCM) that, as can be understood from what stated above, also consists of its first historical application. In the ZTCM, visitors are divided according to their place of origin and the frequency rate is calculated by dividing the number of visits arising from each zone and the total population of that zone. Although this approach cannot easily value a change in quality for a recreation site, it is preferred because of its simple implementation and many application options: for example, it is suitable with occasional visits and when visitor origin areas are symmetrically distributed with respect to the recreational site (Signorello, 1998). Furthermore, when data are limited, the zonal model can provide a useful approximation (Parsons, 2003).

The easiest way to explain the ZTC model is by going through the steps involved in its application. First, a visitors 'catchment' area is defined and is divided in a set of zones (z) surrounding the recreational site of interest. The subdivision in zones is an important operation that requires care and precision, since it strongly influences the final result. The ideal approach would imply the division in as many zones as possible so that more robust estimates can be carried out (Tempesta, 2011). Zones may be defined by geographic criteria (according to the administrative boundaries of the territory, i.e. provinces, regions, states, etc.) or by a kilometric distance criteria (all zones of similar or progressively increasing dimensions). Several subdivisions were attempted in the case study, applying both criteria, in order to find the one that best suited our specific situation; eight different zones were eventually defined. Once the visitor zones of origin were identified, the following were defined for each:

- total number of visitors from the zone (V_h)
- total population living in the zone (P_h)

The total number of visitors for each zone was calculated by multiplying the number of interviewees for each zone by a specific coefficient (see chapter 5.2 for an explanation of the method used to obtain these coefficients). As regard the population, it is important to mention that it was not considered the entire population living in the zones, rather the population living in the municipalities from which the visitors came from. This does not alter the final estimate assuming that the ratio of visitors on resident population is the same in all the municipalities for each zone (Tempesta, 2011).
As a population data source, *ISTAT*[3] data on resident population by municipality was used. Next step was to calculate the average round-trip distance to the site for each zone and then calculate the

[3] www.istat.it/it/dati-analisi-e-prodotti/contenuti-interattivi/popolazione-residente

average visitor cost per round-trip (c_h). As regards this step, it is important to point out that, although we had information on the real travel distance travelled by each respondent, we chose not to use these data. In fact, respondents coming from the same municipality claimed to have travelled significantly different distances from one another to reach the site. This occurred because the site is spatially vast and there are several recreational areas that are worth visiting but that are distant from one another. Furthermore, the interviews were conducted at various locations on the site that were geographically far apart. To overcome this problem, we chose to calculate, for each respondent, the kilometric distance travelled from the centre of his or her town to the closest point of access to the recreational site. This strategy avoided inconsistencies in the application of the zonal method.

Moving on, the total travel costs C_h and the frequency rate (k_h) were calculated for each zone. C_h is given by the product of the total number of visitors of each zone (V_h) and the average visitor cost per round-trip (c_h). The sum of the total costs of each area yields to an economic indication of the recreational value of the Middle Brenta area. The frequency rate is given by the ratio between the number of visitors coming from a given zone and the number of total residents in that zone, that is often expressed as the number of visits/1000 inhabitants in each zone.

$$k_h = \frac{V_h}{P_h} * 100$$

From these data, using regression analysis, the function that relates the frequency rate to the average cost per round trip is thus estimated, and is expressed by the following equation:

$$k_h = \alpha * \ln c_h + \beta$$

This function allows to construct a hypothetical demand function for visits to the site. Thanks to this function, the impact on arrivals of a hypothetical entrance fee will be estimated by calculating the number of visitors that would reach the site facing gradually increasing costs. The first point on the demand curve is the total visitors to the site at current access costs (that is equal to 0 €, since there is no entry fee to access the site). The other points are found by estimating the number of visitors with different hypothetical entrance fees (assuming that an entrance fee is viewed in the same way as travel costs) up to the cost at which there would be no more visitors.

By integrating this curve from zero to the maximum number of visits, the Marshallian surplus of visitors can be calculated. See paragraph 6.2 for results on the analysis carried out with the ZTCM.

4.3 Individual Travel Cost Method

The individual travel cost model (ITCM) is similar to the zonal approach but uses survey data from individual visitors in the statistical analysis rather than data from each zone. The ITCM has some advantages over the ZTCM, starting with the possibility to refer to a larger number of statistical units and therefore obtaining more robust estimates. In addition to this, this method offers specific information on visitors and their choices: in fact, it allows to include and take into account some socio-economic characteristics such as age, gender, income and education levels to obtain true estimates of the impact of price on individual's quantity of trips. It also has some limitations: this approach can only be used when a single user visits the site several times in the time period considered. In addition, it will more easily contain errors in the estimation of the frequency rate, especially when the number of trips made is very high. Overall, this version requires more data collection and slightly more complicated analysis, but will lead to more accurate results. ITCM has become more popular over the past two decades and nowadays most valuation studies about recreational sites make use of this approach (Blackwell, 2007). In the case of the ITCM, the frequency rate is represented by the number of trips made by each interviewee in a given time period (usually one year) to the area under study. By correlating the frequency rate to the total cost of the visit it is possible to obtain a demand curve similar to the one described in the ZTC application.

From an operational point of view, in the case study we proceeded as follows: the contribution of the entire sample (509 interviewees) was considered. For each interviewee, the total cost of a visit was identified which, as mentioned above, is given by the sum of the travel cost and any possible overnight and daily expenses on site. Each contribution was considered individually. This means that the contribution of the entire group with which the individual visited the area was not considered. Next, the total number of visits made in the site by each respondent during 2019 was identified; in the case of no visits for 2019, a value of 1 was given by referring to the current visit. After sorting the number of visits by the cost incurred, those having the same cost have been summed up. Consequently, it was possible to graph a demand curve described from the following equation:

$$C_h = \alpha * \ln v_h + \beta$$

Where $C_h$is the price that corresponds to a certain number of visits v_h.

The same procedure was then applied by considering travel cost contribution only: by replacing total costs with travel costs, we will obtain a similar graph with lower values with respect the previous one, described by a logarithmic equation of the same type. Next, the two areas below the demand curves were calculated by integrating both functions between point *a* (lower limit) with *x* equal to zero and point *b* (upper limit) with *x* equal to the maximum number of visits estimated. The two

values thus obtained represent , in the case of the total cost function, consumer demand, while in the case of the travel cost function, the visitors' total cost to reach the site.

The difference between the two demand curves (i.e., the two values obtained) is an indication of the local consumers' surplus. See paragraph 6.2 for results on the analysis carried out with the ITCM.

CHAPTER 5: ON-SITE SURVEY AND SAMPLING STRATEGY

This chapter describes in detail the sampling methodology applied in this study and explains how the survey was designed for collecting data necessary to construct the model variables.

5.1 Survey population and sampling strategy

As described above, to estimate the recreational value of the Middle Brenta area, an application of the Travel Cost Method was carried out and a strategy was developed to sample the users and potential users of the site. On-site sampling was used for data collection. In this case study recreationists were intercepted directly at the site and asked to fill in a written survey.

This sampling method is generally preferred as it offers a number of advantages: first, it has the advantage of hitting the target population directly while ensuring that the questionnaire is fully completed. Second, the interviewer may give all the clarifications needed to fully understand the questions. However, there are a number of issues to be aware of when using on-site samples. First, people who do not visit the site are missed. This implies a sample with no observations taking zero trips; the accuracy of the estimated demand function is thus compromised, since it happens to extrapolate outside the range of the observed data. Second, on-site sampling will also over sample more frequent users of the site. Third, on site samples can be difficult to conduct in such a way that a random sample of users is obtained (Parsons, 2003). For this reason, an appropriate sampling strategy must be devised. In this case study, a stratified random sampling method has been applied. This method involves dividing the entire population into homogeneous groups and allows to obtain a sample population that best represents the entire population being studied. Therefore, the population was divided according to the day of the visit (weekday or weekend) and the kind of activity carried out during the day.

The surveys took place during winter and spring 2021. A total of 18 days were sampled during February, March, April and May in six different strategic points located alongside the Brenta River. Sampling shifts at each site were planned so that the interviewer would stay for half a day during weekends and for a full day during weekdays. Furthermore, variable weather days (sunny, cloudy, and windy) were specifically selected to broaden the sample as much as possible. As can be seen in Figure 6, each sampling station consisted of a Parco Fiume Brenta project rollup and a small table with some project brochures and a touristic map of the area; these materials undoubtedly facilitated the questionnaire administration. As said, in the selected days, visitors were approached randomly and interviewed or asked to fill out the questionnaire at six strategic sites (close to clear entry points or gates). The locations (Figure 7) were identified based on the experience of the interviewer and

on the analysis of recreational services of the Middle Brenta area previously conducted and described in Section 3.3. Clearly, these are some of the major touristic attractions of the area. The sampling stations were distributed uniformly with respect to the site, trying to cover both sides of the river evenly and, according to their fruition mode, they were divided into two groups:

- Parks and recreational areas: Oasi di Crosara in Nove, Parco dell'Amicizia in Tezze sul Brenta, Laghetto di Camazzole in Carmignano di Brenta.
- Spot alongside the cycle pathway that crosses the site, commonly known as '*Ciclovia del Brenta*' in Piazzola sul Brenta, Limena and Vigodarzere.

Although the locations have been carefully chosen in order to interview all user categories, some were more easily detected than others. For example, it is more complex to interview people who practice sports in specific and isolated places, such as hunters and anglers, while people that visit the place to relax, take a walk or go for a bike ride are more easily sampled. Therefore, the percentage of activities practiced in the area will result slightly biased. Where possible, people were asked to fill in the questionnaire at the time when they departed. This has the advantage that respondents know more about the actual recreation experience and thus are able to provide more concrete answers. Furthermore, catching respondents at an opportune time with minimum disruption helps response rate and extend people common courtesy (Parsons, 2003).

Figure 6: Sampling station with Parco Fiume Brenta project materials

Source: Own picture (April 2021)

Figure 7: Location of the six sampling stations in the Middle Brenta area.

Source: Own QGIS elaboration

5.2 Survey design and implementation

The survey design for data collection is crucial when conducting a local analysis. The survey layout, its length and the questions wording and order may have a major impact on the way in which the respondents answer, producing bias up to 25% (Parsons, 2003). One of the most significant decisions that can affect how people answer questions is whether the question is posed as an open-ended question, where respondents provide a response in their own words, or a closed-ended question, where they are asked to choose from a list of answer choices. In this case study, in order to facilitate self-compilation, surveys were designed clearly, with simple wording and mostly closed-ended questions (16 out of 17). One of the goals during the design process was to keep it as short as possible, so that it could also fit in one sheet. The questionnaire was prepared in Italian and translated into English to target also foreign tourists; the compilation of the questionnaire was individual and, on average, it took about 6 minutes. See Appendix A for an example. The questionnaire was thus designed to identify first which are the main categories of users, what are the activities that these people carry out in the area and what do they perceive as strengths and weaknesses of the area.

Each survey consisted of 17 questions, divided into 4 thematic sections:

A. ACTIVITIES: this first section gathered information about recreational activities practised in the area and the behaviour of visitors (frequency and seasonality of returning visitors); furthermore, through a specific question, the most popular recreational areas and cycle paths were identified.

B. DAILY EXPENSES: in the second section, respondents were asked about expenditure linked to their visit. More precisely, expenditure questions referred to daily expenses at the site or surroundings (food and drinks, toll costs, parking, etc.), and, in the case of overnight stay, expenses for accommodation (kind of accommodation, average expenses per night, duration of stay). Furthermore, travel costs were indirectly enquired by asking which means of transport they used to get to the site, the party size and the distance to the place of residence or accommodation in the case of overnight stay.

C. SITE EVALUATION: this section asked respondents how they got information about the site, the level of knowledge and the awareness to be in a Natura 2000 protected area, and, finally, the satisfaction with certain site-specific facilities and features and the chance to provide some suggestions to improve it;

D. GENERAL PROFILE: the final section contained the typical socio-demographic questions about gender, age, provenance and the level of education; this section also asked respondents if they were members of several sports or environmental conservation associations. As a matter of fact, membership might be an indication of a person's environmental awareness, interest, and revealed WTP for wildlife and environmental quality.

It is important to point out that, given the COVID-19 pandemic occurred during 2020, which seriously limited trips within the study area, question 1.2 regarding returning visitors (section A) has been reframed considering year 2019 instead of 2020. This might represent a source of bias and a criticism in the implementation of the method, since the majority of people tended to give hypothetical values and overestimate the number of actual visits. Besides the questions, the questionnaire included an introductive section that defined what the study area was and explained the aim of the research. In addition, at the bottom of the page, a small section let respondents leave their email address to subscribe to the *Parco Fiume Brenta newsletter* and thus receive the results of the study.

Interviews (Figure 8) usually started with an introduction of the interviewer and her affiliation, explaining what was the purpose of the study and providing assurances to keep respondents interested, e.g. "*the survey is short and will only take a few minutes to be filled in*" and "*the questionnaire is anonymous and the responses are confidential".*

Figure 8: On-site sampling in the Middle Brenta area

Source: Own picture (March 2021)

Next, it was explained what the study area was and, depending on the respondent's level of interest, some specific information on the Parco Fiume Brenta initiative[4] was provided. Although the surprise of many in being interviewed in such a setting, most of the visitors gladly agreed to be interviewed. This is justified by the high percentage of locals among the respondents who, being very fond of the place, provided passionate suggestions to improve the area. In addition, thanks to the project's rollup and brochures, many curious people voluntarily stopped by to ask for information. Many people declared to be familiar with the project; however, just few of them knew what concrete actions it consists of.

In total, 509 visitors participated in the survey. As described above, the sample of respondents was randomly pulled from the population of visitors (4 820) and corresponds to its 11%. Although the survey was designed to facilitate self-completion, 90% was conducted by the interviewer. As a matter of fact, most of the visitors opted that the questions were read to them and in fact it was the most workable means of administering the questionnaires since it allowed all questions to be answered and eventually provide succinct explanations regarding the questions of the visitors. Furthermore, it reduced possible bias that might have resulted from the wrong interpretation of the questions by the respondents. From Table 1 it is apparent that interviews have been uniformly collected for all considered months; however, there is a reduction in the month of April, both during weekends and during weekdays. This is due to a series of days of bad weather, which made it necessary to modify the original sampling plan.

The data generated from the survey were then uploaded into an Excel file. In this phase, accuracy was required: in fact, coherence between the answers provided by the same respondent was verified and, if necessary, unreliable data was modified. For example, many declared to have travelled unrealistic distances to reach the site. As we knew the town of residence of each respondent, it was possible to check and adjust any inconsistencies by calculating the effective distances with *Google Maps*.

Table 1: Number of collected questionnaires by month and day of the week

	February	**March**	**April**	**May**	Total
Weekday	60	97	50	83	290
Weekend	54	67	18	80	219
Total	114	164	68	163	**509**

Source: Own elaboration

[4] www.parcofiumebrenta.it/en

As mentioned above, during the survey phase, it was not possible to get a correct number of the total visitor population of the area for the months considered in the analysis (from February until April 2021). In order to get an estimate of this data, we multiply the number of respondents (considering also people coming in the same group, if any) by a coefficient that took into account the day of the week in which the visit took place (weekday or weekend), as well as the month and the kind of activity that this person was carrying out. Each coefficient was calculated by the following equation:

$$coefficient_n = \frac{100}{\frac{n.interviews_n}{n.visits_n}}$$

These coefficients then represent the ratio of the number of interviews on the total number of visits recorded for each category, month and day of the week. The results of this analysis are set out in Table 2, the main activities carried out in the area are those reported in the table below. As can be observed there are significant differences between these coefficients. Whereas coefficients related to *walking* tend to have lower values, those related to *cycling* and *jogging* are significantly higher. This is easily explained by the fact that it was more convenient (and easy) to approach people who were walking in the area than it was to stop those who were cycling or jogging. Therefore, as can be predicted, high coefficient values correspond to few interviews on many visitors. The opposite is valid for low coefficient values.

Table 2: Coefficients used to calculate total visitors to the Middle Brenta area for winter and spring months

		Walking	Cycling	Jogging	Horseback riding	Fishing	Birdwatching
February	weekday	7,2	11,2	30,0	0,0	0,0	0,0
	weekend	7,1	15,8	0,0	0,0	1,5	3,0
March	weekday	4,4	7,5	15,0	1,5	0,0	1,5
	weekend	11,3	23,5	83,0	12,0	3,0	1,5
April	weekday	4,2	7,6	9,5	0,0	0,0	1,0
	weekend	6,0	12,9	1,5	2,0	2,0	0,0
May	weekday	5,1	10,4	6,3	0,0	0,0	0,0
	weekend	14,5	28,9	16,3	0,0	2,0	0,0

Source: Own elaboration

CHAPTER 6: RESULTS DISCUSSION

This chapter presents the result of the analysis on Middle Brenta area visitors' characteristics and behaviours as well as the application of the travel cost method in both its versions, as previously described in Chapter 4.

Before describing the results in detail, it is worth making a few general comments on the analysis carried out. First, locals (that represent almost the entire sample taken into consideration) were considered as tourists living nearby the site and with a high frequency of visits. Second, it is worth explaining the difference between travel costs and total costs, as these two terms will be broadly used in the following paragraphs; total costs are given by the sum of travel costs and any accommodation or on-site expenses, which include: food and drinks expenses, toll costs, transport tickets, the purchase or rental of equipment or parking expenses. Travel costs correspond instead to the expenses incurred to get to the site: in this case, we considered only motorized vehicles such as cars, motorcycles and trains. In the case of private cars or motorbikes, travel expenses were calculated by multiplying by 2 the kilometric distance travelled in order to have the contribution of the round trip. This value was then multiplied by an average cost per kilometre (0.30 €/km) and divided by the party size. The average cost per kilometre was based on the tables on Italian automobile club [5] for reimbursement of private car use for business travels. For public transports, such as trains, we considered the ticket price indicated by the respondents. Travel costs of visitors staying overnight considered only those from the accommodation to the site. Later, it will be outlined that, in the zonal approach, only travel costs were considered, whereas while applying the individual version a first estimate was made with total costs and a second one with travel costs.

Once data imputation was completed, we analysed the information collected by using some Microsoft Excel tools: data were aggregated and isolated according to multiple criteria. Correlations were analysed by using the X^2 and t-student statistical tests, considering a statistical significance level of 5%.

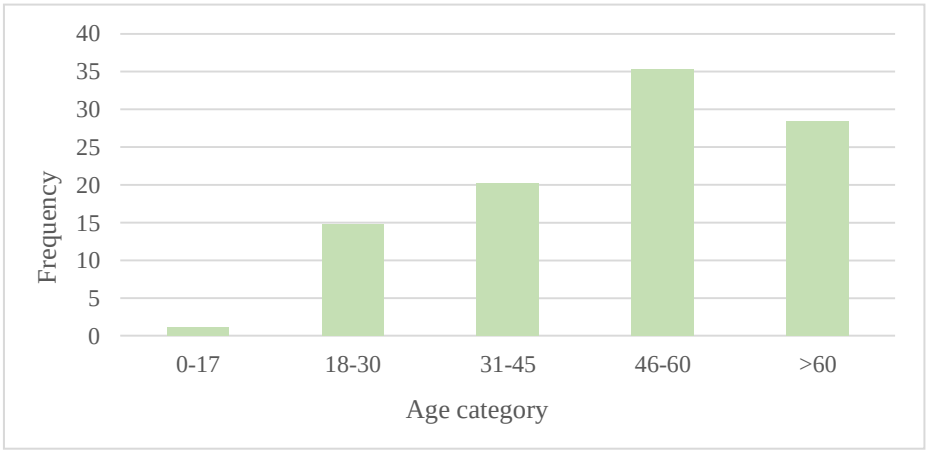
[5] www.aci.it

6.1 Characteristics and behaviours of Middle Brenta area visitors

A total of 509 surveys were collected in six different strategic sites located alongside the Brenta River from February to May 2021. This period is not considered peak recreation season, however it may provide interesting data regarding recreational activities carried out mainly during winter and spring months. The result of the estimated visitor arrivals in the Middle Brenta area for the four months considered (February, March, April, and May) is of 9117 visitors. As previously described, this value was obtained by multiplying the actual number of respondents by a coefficient that took into account the day of the week in which the visit took place (weekday or weekend), as well as the month and the kind of activity that the visitor was carrying out.

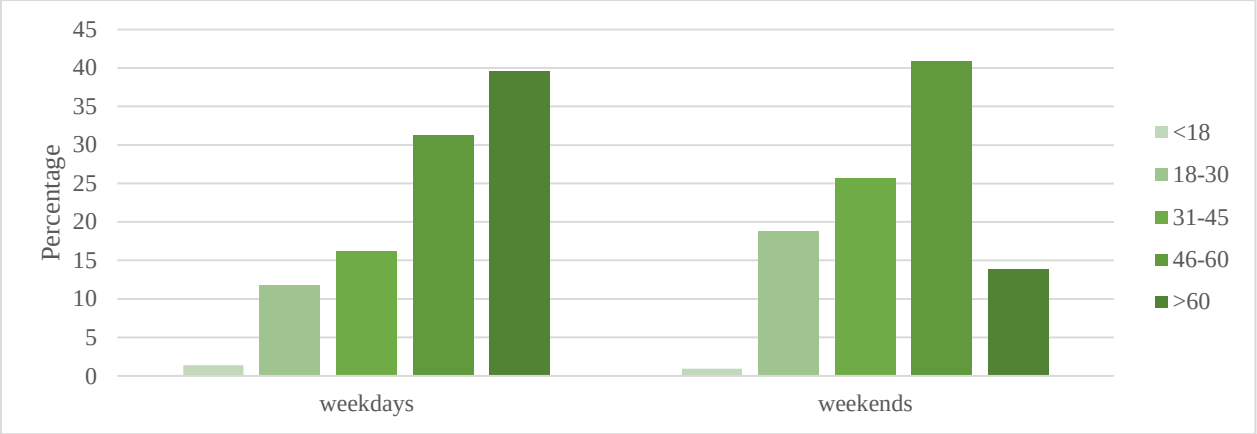
Overall, male respondents (54.1%) slightly prevailed over female respondents (45.9%) and more respondents were middle aged. From Figure 9 it is clear that the most represented age category is 46-60 (35.3%), followed by over 60 seniors (28.5%) and adults between 31-45 (20.2%). Young people between 18-30 represent a significant percentage (14.7%) while teenagers under 17 are a very small percentage of the total (1.1%). However, it is worth mentioning that the age ranges that are here most represented are also the ones that were most easily interviewed. Overall, this age distribution appears coherent given the season and the recreational activities that could be done in the area. Interesting to point out how the age categories are distributed with respect to the day of the visit (Figure 10). In fact, there is a correlation between over 60s and weekday visits (p-value = 0.003), while the presence of the elderly decreases significantly during weekends, where the age distribution appears more heterogeneous. This can be explained by the fact that most of these visitors are retired and have a plenty of free time to spend in the area even during the week; the other age groups instead, having work and school commitments, are more frequently encountered during the weekends.

Figure 9: Percent distribution of respondents by age



Source: Own elaboration

Figure 10: Visits distribution by age and day of the visit.



Source: Own elaboration

Taking into account the age ranges observed, the level of education is slightly above average. Indeed, by comparing this sample with the Italian national average (*ISTAT 2020, Popolazione 15 anni e oltre per il titolo di studio*), we notice that the percentages are just above the national ones. Over half of the sample (52%) have a high school degree and 20% a university degree (8% have a bachelor degree, while 12% a master degree). About a quarter of respondents attended middle school or elementary school, while just a small portion (2%) have a post-graduate specialization. Furthermore, 20% of them declared to be part in a sport associations and 6% to be member of environmental associations as WWF[6], LIPU[7], Legambiente[8].

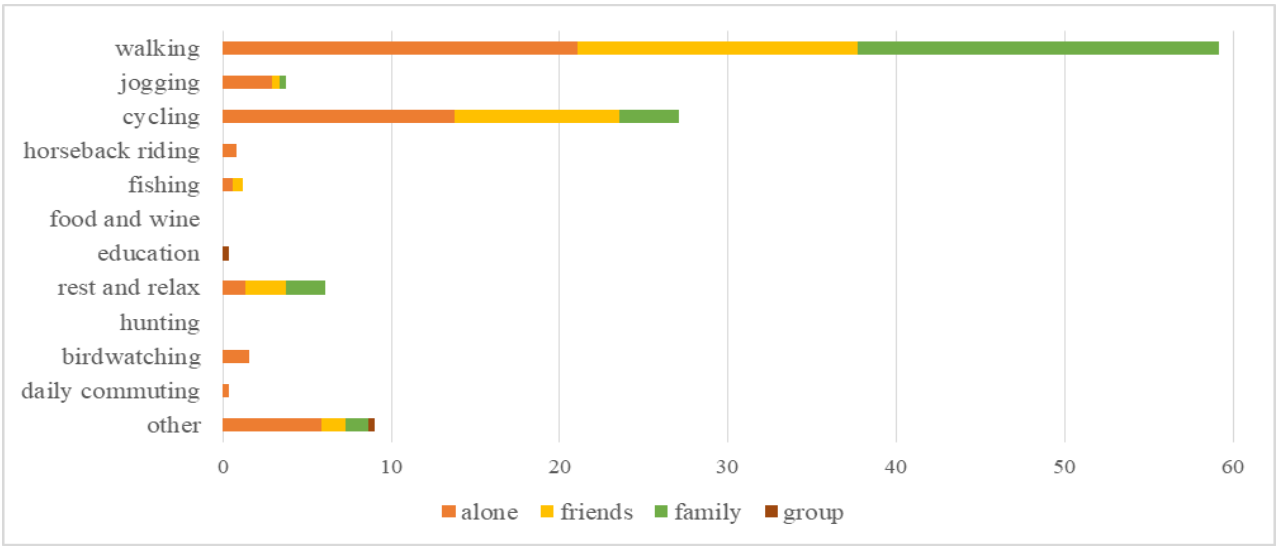
The analysis of visitors' provenance provides an interesting and relevant indication for the purpose of the study. More than half of respondents live in the province of Padua (56%) while 38% are residents in municipalities of the province of Vicenza, some closer than others to the study area. As described in detail before, the Natura 2000 site in analysis is located in these two provinces. From this data, it is clear that the sample is homogeneous and is represented by people living pretty close to the site. The remaining very small portion is divided into 5% from other provinces in the Veneto region (Treviso, Venice and Verona) and only 1% from outside the region. An interesting correlation with months was found in visitors' provenance. In fact, it emerges that visits from the most distant municipalities (outside Vicenza and Padua provinces) were recorded mainly during the weekends of May.

As showed in Figure 11, the main recreational activities practiced in the area are walking (59%) and cycling (27%). Following: rest and relaxing (6%), jogging (5%), birdwatching (1.6%) fishing (1.2%)

[6] www.wwf.it/
[7] www.lipu.it/live/
[8] www.legambiente.it/

and horseback riding (1%). Other activities (9%) than those listed in the questionnaire included wildlife photography, mushrooms and wild herbs picking and the maintenance of public parks and recreational areas. Despite many agritourisms and educational farms nearby the area, few respondents came to enjoy food and wine or to spend a day in educational activities. One reason for this is certainly that, due to Covid-19 restrictive measures to limit the pandemic, restaurants, agritourisms and other businesses activities were closed for some months (that corresponded to some of those in which the survey took place). No hunters were interviewed; however, we are aware of their presence since there are some hunting areas. The same is true for anglers. These two categories of users were particularly difficult to interview because they carry out their activities in isolated places, thus difficult to reach. Overall, 44% of activities were performed alone, while friends (29%) or family members (27%) accompanied the remaining part of visitors. On average, groups are small, ranging from a minimum of two and a maximum of four people. If we examine the activities, considerable differences are visible. Walking is equally practiced either in group, with friends or relatives, or alone. Similarly, rest and relaxing is one of the activities that is most practiced in groups. This category includes picnic in public areas or sunbathing close to riverbanks. Cycling is a popular activity especially among men (75%) over 45 years old. Among the activities performed alone, birdwatching and horseback riding were most often mentioned. It might be interesting to say a few words to profile the visitors who engage in these activities; starting from birdwatchers, the sample is homogeneous and is composed of adult males only. They are individuals with a very high level of education (60% have at least a master degree) and are members of several environmental associations for the conservation and protection of avifauna. On average, they are willing to travel quite long distances to reach the site (42 km one-way), also from other provinces and regions.

Figure 11: Main recreational activities practiced in the Middle Brenta area by party size



Source: Own elboration

80% of birdwatchers were interviewed in the proximity of the Laghetto di Camazzole, as it is a particularly suitable area for this kind of activity. As regards horse riders, three-quarters are over 60 male, coming from the main cities nearby (Vicenza and Padua).

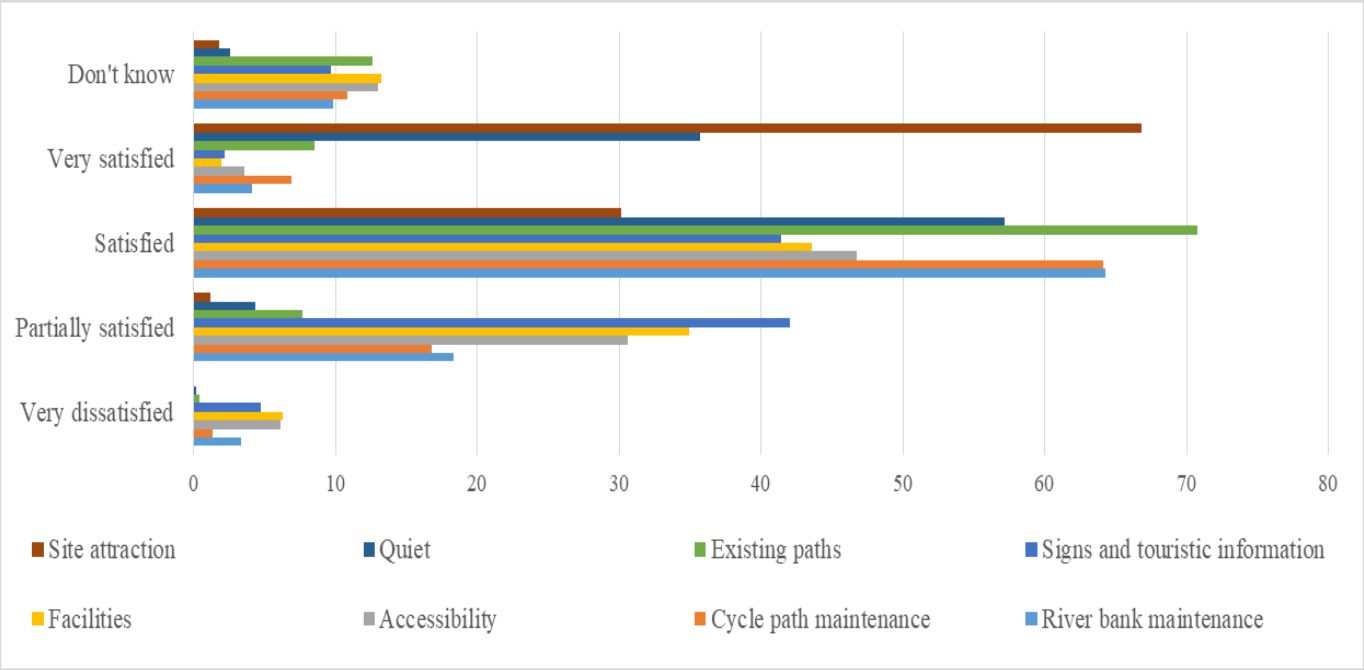
Most respondents (77%) had never heard of Natura 2000 before, 14% of all visitors have heard about it but did not know the details, whereas only 9% specified that they knew it very well. Those who report some knowledge of Natura 2000 are predominantly adult men, with a good educational level. These results are comparable to the findings obtained by Flash Eurobarometer 379 (2013), which conducted a survey on behalf of the European Commission to analyse, among other aspects, the knowledge of Natura 2000 in the European states. 73% stated that they have never heard of it before. A similar correlation can be observed with the socio-economic characteristics of these people: again, they were mainly male adults.

At the site or the surroundings, visitors spent money mainly on food and drinks (17%), with a mean daily expense per visitor of 5.60 €. This amount includes a wide range, taking into consideration who has had expenses of 1 € for example to take a coffee, to those who had expenses of 30 € to have lunch in the area. No additional significant expenses were observed other than travel costs. To reach the site, 51% of all visitors travelled by car, followed by bicycle (24%) and by foot (23%). The mean distance from the site to the place of residence or accommodation was of 7.6 km and the average travel cost was 1.50 €. These findings confirm again the characteristics of the average Middle Brenta visitor: a person who live in close proximity to the site and does not have to travel much to get there. About 98% of the visitors did day trips and only 2% stayed one or more nights in proximity to the site, with an average cost per night of 25 €. Overall, it is clear that visitors tend to spend small amounts to benefit from the area.

One of the most important sections of the questionnaire is the one related to the evaluation of certain site-specific services. Many visitors, aware of the fact that their responses may affect the future management of the area, provided thoughtful responses. Results are showed in Figure 12. On average, the majority of services were evaluated as satisfying, except for a few that will now be analysed in detail. The best evaluation was obtained as regards the site attraction, which referred to both environmental and cultural aspects of the area. 66% of the respondents declared to be very satisfied, proving to be fascinated and deeply attached to the landscapes of this area. 'Quiet' was also rated positively. Visitors consider it as one of the best features of the site and a quality that should be preserved. However, many stated that it is difficult to find it during weekends, especially when the site becomes crowded in the summer. A comparable rating can be observed as regards the existing paths, the cycle path maintenance and the riverbank maintenance. Overall, visitors were satisfied with these features, stating that they find an abundance of paths even if they are poorly

maintained. Further comments will be provided on this in the next section.

Figure 12: Facilities evaluation



Source: Own elboration

Accessibility and parking availability received a rather low rating. As a matter of fact, 31% of respondents felt partially satisfied. A significant correlation was observed with people interviewed in the surroundings of the Laghetto di Camazzole (p-value =0,0029), where majority of respondents complained about the lack of parking lots. Next, facilities as pic-nic areas, waste bins, benches and drinking fountains were evaluated quite poorly. As will be shown below, many respondents believe that these facilities must be improved to ensure a proper site experience. Finally, with 42% of respondents considering themselves partially satisfied, we find signs and touristic information. Apart from the one described above, no significant differences in the evaluation were found when comparing different visitors' characteristics.

As already pointed out, many visitors provided suggestions to improve the site. Note that correlations were observed between user category and the suggestions that they provided. The suggestions can be grouped as follows; the order in which they are presented reflects the amount of suggestions received:

- Most of the suggestions relate to the creation of pic-nic areas equipped with touristic facilities that are lacking or totally absent in the area. More in detail: garbage bins, drinking fountains, public toilets and benches. Furthermore, many said that they would appreciate the presence of snack bars, especially along the cycle path.
- Overall in the area, there is a significant amount of uncollected waste that can have dangerous consequences on the environment and wildlife. People complain about lack of cleaning,

especially during the summer when the area is frequently used for picnics and barbecues. Therefore, respondents suggested to increase collection points and educate people to respect the area through some environmental awareness events or some bans.

- A large number of suggestions referred to the cycle path (Ciclovia del Medio Brenta). People complained mainly about its incompleteness (indeed, the part connecting Carmignano di Brenta to Bassano del Grappa is missing). Others have pointed out that the pavement in some parts is not suited for city bikes, thus potentially dangerous. In general, people required more maintenance. As regards the cycle path, many cyclists have shown interest in introducing services like: bike rentals, bicigrill and assistance points along the way.
- As shown before, signs and touristic information were rated poorly by visitors, both to access the site and to follow paths within it. In fact, many said they got lost walking along the paths and cycling and that they were forced to use google maps in order to find their bearings. Therefore, many suggested to improve signs and to introduce touristic boards, also for educational purposes. In addition, they said it would be nice if the main tourist attractions were properly signposted.
- Parking availability is seen as a major problem. Indeed parking lots are limited (both in number and in capacity) and poorly signposted. In fact, most of them are difficult to reach by just following road signs, and can be reached only if one knows the area well. Moreover, the people interviewed in Tezze sul Brenta complained about the excessive price of the parking close to Parco dell'Amicizia.
- Many respondents argued that they would prefer the site to be maintained as it is and continue to be protected, to preserve its characteristics and wild aspects. They discourage, therefore, promoting initiatives of the area. This attitude is primarily reflected on residents who visit the area daily.
- Many do not feel safe in visiting the area on their own and suggested a surveillance service to control more the area. Others also suggested to increase the lighting.
- As opposed to what stated above, people visiting the area for the first time suggested to promote the area with public events and initiatives. A correlation to this suggestion was also seen with people coming with their families, who also suggested to make the area more child friendly.
- Particular requests came from birdwatchers: many complained of excessive crowding (especially around Laghetto di Camazzole) during the weekends, which makes it difficult to practice the activity; therefore, they suggested to limit the public access during these days.

They also suggested the introduction of birdwatching towers or wildlife viewpoints in the area and to limit as much as possible the maintenance of the riverbanks.

- It has also been suggested to limit access of motorised vehicles, specifically for motocross bikes.
- A significant number of people interviewed in Vigodarzere expressed their interest in the restoration of the historical 'Certosa di Vigodarzere', a valuable Carthusian monastery that for years has been in decay and not open to visitors.

6.2 The economic value of recreational services in the Middle Brenta area

Before describing in detail the results obtained from the application of the Travel Cost Method in both its versions, it is crucial to examine the provenances of visitors who travelled to the Natura 2000 site. As mentioned earlier, the sample is rather homogeneous, whit 99% of visitors living in Veneto region. 94 % of the sample live in the provinces of Padua and Vicenza. Regular visitors are therefore those living in the municipalities surrounding the site. Visitors coming from other Veneto provinces are mainly from Treviso, Verona and municipalities in the province of Venice. Beyond these, few extra-regional arrivals were observed from Trentino Alto Adige, Campania and Lombardy. The only foreign arrival is from Austria. This suggests that there are predominantly local Italian visitors, who tend to visit the area frequently.

Zonal travel cost method results

As already pointed out, when applying the zonal approach, the first step involves the identification of a visitors' catchment area and its subdivision in a set of zones surrounding the recreational site of interest. After several tries, in which both geographic and kilometric distance criteria were applied, the subdivision that best suited the characteristics of the area was identified. Eight zones were thus defined, as shown in Table 3. This subdivision was considered the most appropriate for resulting R^2 of the interpolation function, that is equal to 0,68. Here below Table 4 that summarises calculations made for each zone as regards travel costs, average distance travelled, estimated number of visitors, total population and the frequency rate k_h, taking into account that this value is expressed as the number of visits/1000 inhabitants of each zone. By correlating k_h to the average travel cost, we obtain the graph in Figure 13. The interpolating logarithmic function is given by:

$$y = -1{,}678 \ln(x) + 7{,}737$$

This function, as predicted by the model, has a decreasing trend. However, it is evident that some points in the graph are not perfectly consistent with the function. Indeed, high travel cost values (above 100 €) correspond to negative k_h values. This inaccuracy is related to the fact that arrivals are not evenly distributed throughout the visitors' catchment area; actually, visitors coming from very far away tend not to be easily integrated in the function, as can also be seen from the graph. This is one of the main criticisms of the zonal travel cost application and it may be complex to overcome. As a result, it is difficult to obtain values of k_h that follow a perfectly decreasing trend as distances to reach the site increase.

Table 3: Subdivision in zones and corresponding Municipalities.

Km 2 ways	Municipalities
0-7 km	Campo San Martino, Limena, Curtarolo, Cartigliano, Vigodarzere, Nove, Fontaniva, Tezze sul Brenta, Carmignano di Brenta, Grantorto, Piazzola sul Brenta, Pozzoleone, Bassano del Grappa
8-15 km	Cadoneghe, Villafranca Padovana, Gazzo Padovano, San Giorgio in Bosco, Cittadella, Marostica, Campodarsego, Rosà, San Pietro in Gu, Schiavon, Pianezze*, Romano D'Ezzelino
16-25 km	Padova, Vigonza, Villa del Conte, RossanoVeneto, Rubano, Solagna, Camisano Vicentino, Cassola, Colceresa, Galliera Veneta, Sandrigo, Borso del Grappa, Campodoro, Mussolente, Ponte San Nicolò, Tombolo, Villanova di Camposampiero, Noventa Padovana
26-40 km	Bolzano Vicentino, San Martino di Lupari, Breganze, Camposampiero, Monticello Conte Otto, Grisignano di Zocco, Loria, Vigonovo, Grumolo delle Abbadesse, Selvazzano Dentro, Abano Terme, Dueville, Santa Maria di Sala, Castelfranco Veneto, Dolo, Saccolongo*, Torri di Quartesolo
41-60 km	Polverara*, Camponogara*, Thiene, Vicenza, Longare, Torreglia, Noale, Zanè, Vedelago*, Arcugnano, Isola Vicentina, Mira, Altavilla Vicentina
61-100 km	Monselice, Conselve, Mestre, Grigno, Treviso
101-200 km	Caldiero, Verona, Trento
201 km	Lienz, Salerno

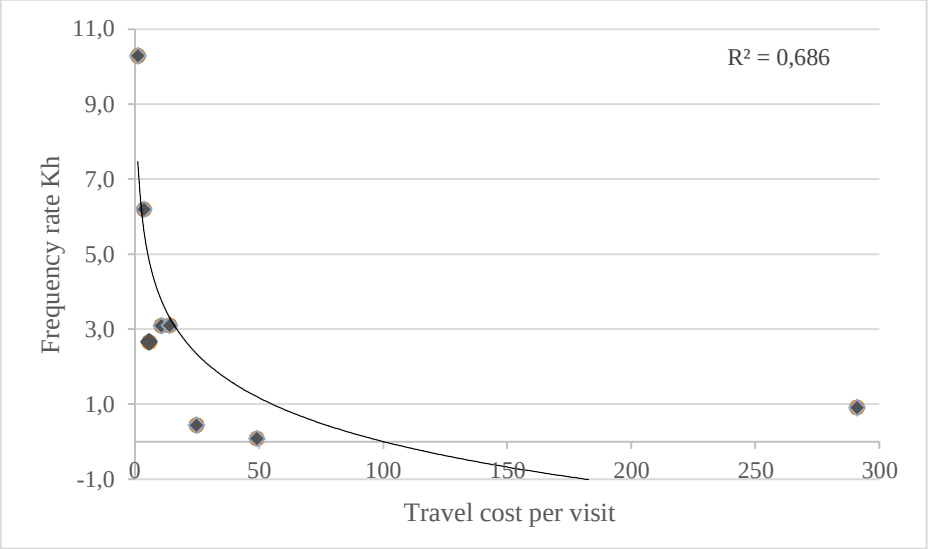
Source: Own elaboration

Table 4: Average distance, travel cost, estimated number of visits, total population, frequency rate and total costs for each zone.

Zone	Average distance (km)	Travel Cost (€)	Number of visits	Total population	Kh	Total cost (€)
1-7 km	4	1	1 357	131 954	10,3	1 595
8-15 km	12	4	755	122 052	6,2	2 739
16-25 km	19	6	912	342 982	2,7	5 194
26-40 km	35	10	652	210 766	3,1	6 831
41-60 km	46	14	733	236 375	3,1	10 189
61-100 km	82	25	89	203 615	0,4	2 210
101-200 km	163	49	35	387 592	0,1	1 691
>201 km	970	291	130	143 600	0,9	37 948
Total			**4 664**	1 778 936		**68 397**

Source: Own elaboration

*Figure 13: Frequency rate **kh** in relation to average travel cost per visit.*



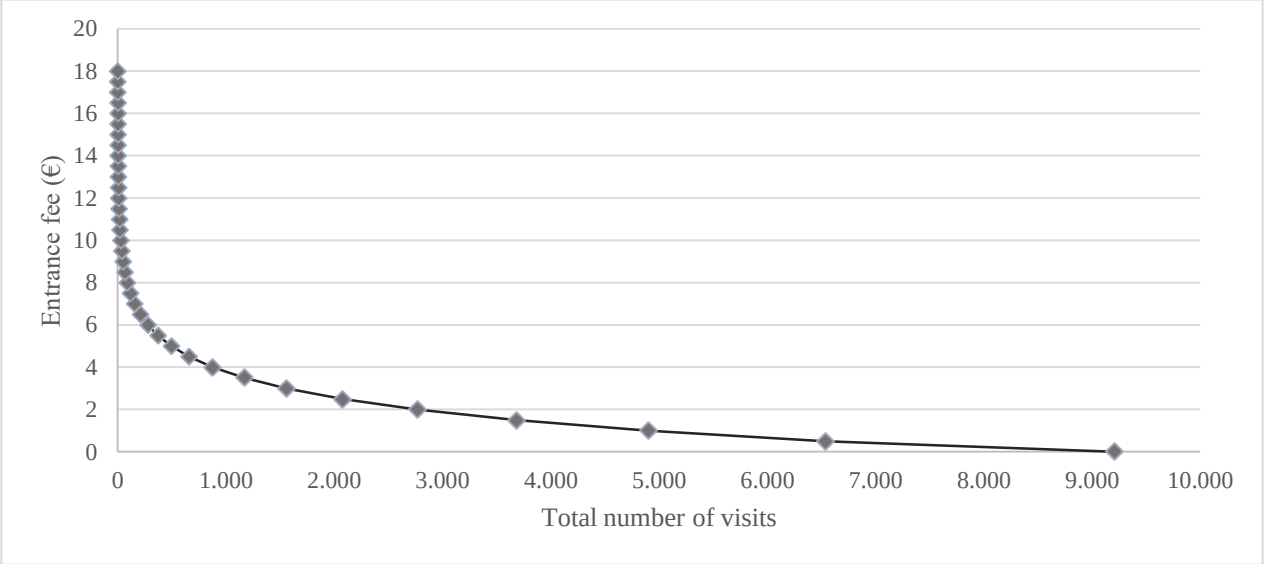
Source: Own elaboration

The travel cost out of the total number of visits is 68 397 €: this amount represents the economic value of the site. Moreover, the total number of visits considered in the application of the zonal approach is of 4 664 individuals, a figure that is not consistent with the number of visits previously estimated (9 117). Indeed, in applying the method, we decided to consider as inputs only those visitors that, during the interview, stated to have been travelling by motorized vehicles (car, motorcycle, train) and to exclude those who came by foot or by bicycle, since using these means of transport do not imply costs. This expedient was appropriate and, as will be demonstrated, resulted in a value that well approximate the estimate made with the individual method.

Next, we used the equation to predict visitation rates with different hypothetical cost to visit the area. This impact was considered by introducing a hypothetical entrance fee, considering a progression of 0.50 € upwards from the current cost per visit (which, now, is equal to 0 €). The result can be seen in Figure 14. Before describing the results, it is important to point out that the number of visits previously estimated (4 664) is significantly different from the one predicted by the model (9 209). These two figures are different because, as explained above, the logarithmic function does not perfectly approximate the points in the graph.

If we overcome this inaccuracy and consider the estimate given by the function (9 209), we may notice that even a minimal increase in costs would have a significant effect on the number of visits; indeed, 0,50 € additional costs (for example of an entrance ticket), would result in a massive decrease in visits (from 9209 to 6 532 visits), where arrivals from the provinces of Vicenza, Padua and Treviso

Figure 14: Visitation rate with different hypothetical entrance fees.



Source: Own elaboration

would be mostly affected. According to the model, from the farthest zones (over 60 km of distance) nobody would arrive anymore. The number of visitors would then decrease along with the increase of the hypothetical entrance fee; for example, at 1 € entry fee would correspond 53% of the initial number, at 2 € the 30% and if the ticket would cost 7 € only 1% of initial visitors would visit the Middle Brenta area. Moreover, if the price were more than 9 €, there would be no more visitors. This result suggests that the majority of visitors would be willing to pay a very low price to visit the area.

Individual travel cost method results

As anticipated, in order to have a comparison between the two approaches, the individual method was also applied. By using the methodology described in chapter 4.3, we obtained two functions that, approximately, describe the demand for recreation (corresponding to the total costs) and the travel costs.

Table 5 Table 5: Functions describing the application of the individual travel cost method.shows these functions, with the corresponding R^2, the integrals derived from them, the lower limit (a) with x equal to zero and the upper limit (b) with x equal to the maximum number of visits estimated. The last row of the table shows the resulting values. Figure 15instead illustrates the demand curves obtained, which describe the variation in the number of visits to the site according to the additional costs to visit it. Finally, through a simple subtraction between total costs and travel costs, the value of the local surplus (S) was calculated, which is equal to:

$$S = 78\,314{,}08\,€ - 64\,301{,}44\,€ = 14\,012{,}64€$$

The results of this analysis suggest that visitors tend not to spend large budgets at the site, given that travel costs account for 82% of total expenses. It is clear that the majority of the money spent to visit the area are collected by parties such as fuel station owners (mostly local and regional considering the provenances of the interviewees). A lower share benefits also other local subjects which, considering the characteristics of the visitors and how they use the site, can be identified in restaurateurs and café owners. The result obtained in the calculation of the total expenses was then divided by the number of trips considered (25 434), thus obtaining an average value per trip of 3 €. Again, the impact of a possible introduction of a Payment for Ecosystem Services (as an entrance fee) has been taken into account and the potential effect on the number of visits was thus estimated. Starting from the total costs function, we can notice that if a 1 € ticket were introduced, there would be a 27% reduction in visits whereas if the ticket price were 2 €, there would be a 47% reduction. It is therefore evident that, by introducing a very low-priced ticket, half of the current visits would be lost. Carrying on, with a 10 € ticket, almost all visitors would be lost (95%). In this analysis, we did not consider higher costs since they are not likely to be met in reality.

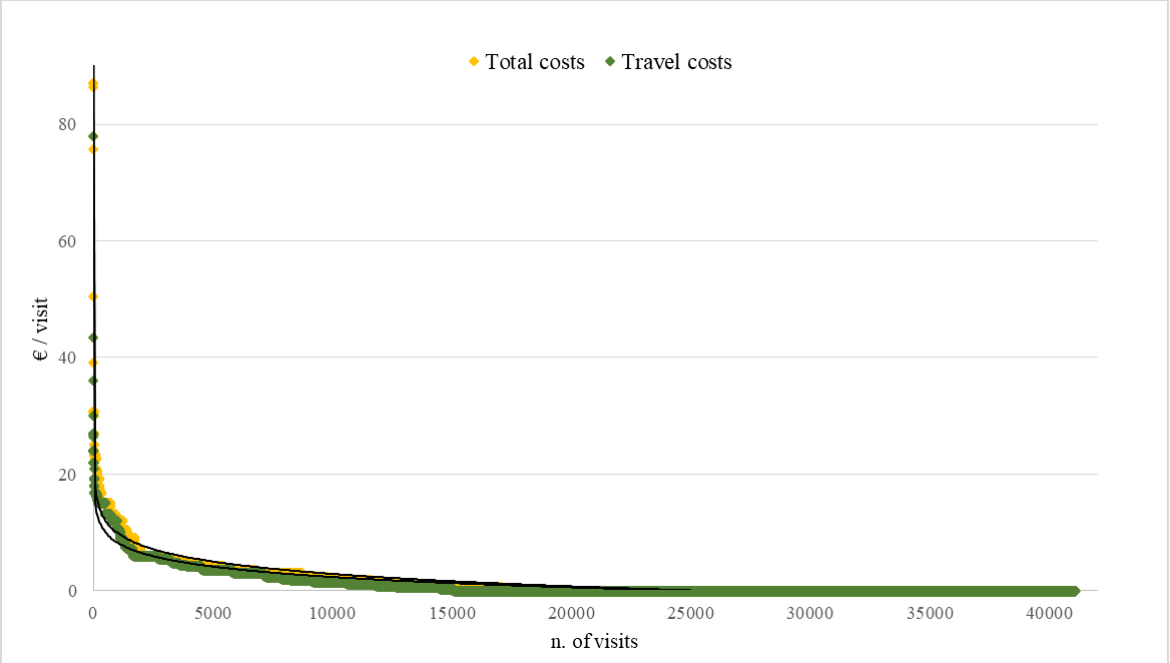
Likewise, the same analysis was carried out taking into account the travel cost function. The variation in the number of visits follows the same trend as above: total visitors drop as the price goes up, but the impacts are slightly more consistent considering that here costs are lower: 1 € entrance fee would cause a decrease of 32% on total visits, 2 € entrance fee would result in a 54% decrease, while one of 10 € would result in an almost total loss of visitors (97%). By comparison, it is clear that in the individual application of the method, visitors would be less affected by a hypothetical introduction of an entrance fee in the area than what has been observed with the zonal version of the method.

Table 5: Functions describing the application of the individual travel cost method.

	Travel Costs	**Total Costs**
$f(x)$	$y = -2{,}582\ln(x) + 26{,}137$	$y = -3{,}079\ln(x) + 31{,}233$
R^2	0,8855	0,8743
$\int f(x) = F(x)$	$y = x(28{,}719 - 2{,}582\ln(x))$	$y = x(34{,}312 - 3{,}079\ln(x))$
a	0	0
$F(a)$	0	0
b	24 903	25 434
$F(b)$	64 301,44	78 314,08
$F(b) - F(a)$	**64 301,44**	**78 314,08**

Source: Own elaboration

Figure 15: Comparison between the travel costs function and the total costs function in the ITCM



Source: Own elaboration

A series of considerations emerge when comparing the results obtained by the application of the two methods. First, the individual version seems to fit better with the variability of visitors' provenances: the zonal method turned out to be ineffective in interpreting each person's expenditure contribution correctly, whereas a case-by-case analysis was able to account for that contribution. Moving on to the estimates, it is clear that the application of the two methods results in different values, that, however are quite comparable. According to Signorello (1998), this is a scenario that occurs often in the literature. In the zonal version, the economic value of the area, given only by travel expenses, is of 68 397 €, slightly higher than the equivalent estimate (considering only travel costs) of the individual version that is equal to 64 301 €. This finding confirms Zandersen and Tol (2009) theory regarding the fact that the individual method tends to result in higher values with respect to the zonal method. In view of all that has been mentioned so far, the estimate obtained from the individual method is preferred. However, we should keep in mind that, since the sampling refers only to some winter and spring months, the value obtained is almost certainly underestimated.

CHAPTER 7: CONCLUSIONS AND RECOMMENDATIONS

This study highlighted the general dimensions of visitors benefitting from recreational ecosystem services related to the Natura 2000 site 'Grave e zone umide del Brenta', underlying different visitors' behaviour and preferences. This analysis has revealed some positive aspects as well as some critical issues, in relation to which some operational proposals are formulated and presented below.

By considering socio-demographic data and the expenditure of respondents, this thesis has identified the profile of the average visitor of the Middle Brenta area that is an over 45 local recreationist with an average level of education and predominantly from the same province as the Natura 2000 site. The main activities that he carries out in the area are walking (either alone or in a small group of friends and relatives), cycling, rest and relaxing, which are typical activities related to nature-based outdoor recreation (Kyle et al., 2006). As this type usually does day trip, the expenses for accommodations are absent. The main expenses at the site or surroundings are in food and drinks, with a mean daily expense of 5.60 €. Furthermore, given the short distances from the site, this kind of visitor often travel there by foot or by bicycle. Therefore, travel expenses to reach the site are quite low and, on average, are around 1.50 € per person.

From this analysis, several issues may be addressed in order to increase the recreational quality along with the biodiversity conservation of the area. To enhance recreational opportunities, touristic facilities, that at the moment are almost inexistent, should be improved. This refers specifically to picnic areas with drinking fountains, public toilets, garbage bins and benches. Furthermore, cycle tourism, which is a popular form of tourism in the area, could benefit from the creation of a few snack bars along the cycle path (bicigrill). These services may also increase economic benefits from visitors' expenditure at the local level. In general, the area needs to be promoted both through social channels and through signs and touristic panels, which at the moment are very poor. Interventions are also desirable with regard the availability of parking; as regards the means of transport, it has emerged that public transport are poorly used: strengthening the network of trains and public buses could help the increase of arrivals and thus create a source of revenues for the local community. Promoting accommodation facilities close to the site may attract more people to stay overnight, and consequently, strengthen the local economy.

Overall, the survey allowed to collect a significant number of suggestions to improve the site in terms of the best match with the expectations of the visitors, thus attracting more people. However, considering the main mission of protected areas that is preserving biodiversity, this should not be the sole objective. Since the general lack of knowledge of the Natura 2000 network, it is important to

make more effective information about this (for example with the creation of information panels, brochure or through websites), which may help to raise awareness about conservation values.

Coming back to the results of the Travel Cost Method, the recreational value obtained (78 314 €) is deemed reasonable given the limited willingness to pay of the visitors of the area. Furthermore, the introduction of an entrance fee does not appear necessary to guarantee the usability of the resource. According to the findings of the application of the individual method, the hypothetical entrance fee should be no more expensive than 1 €, otherwise the number of visits would drop considerably. Moreover, it is likely that the introduction of an entrance fee will have repercussions on consumption expenses on site, which are already very low.

The presented findings provide useful insights for the management of this Natura 2000 site and related recreational ecosystem services, as well as providing useful data for guiding the management of its visitors. However, this thesis should be regarded, at the moment, only as a first contribution to the subject: further research and additional evidence are needed to support and strengthen the conclusions drawn above.

References:

Bateman, I.J. (1993). Valuation of the environment, methods and techniques: revealed preference methods. In: Turner, K. (Ed.), Sustainable Environmental Economics and Management. *Belhaven Press*.

Blackwell, B. (2007). The value of a recreational beach visit: an application to the Mooloolaba Beach and comparisons with other outdoor recreation sites. *Economic Analysis & Policy*, 37(1): 77-98.

Buggin, A. (2012). Piano di gestione per il sito della Rete Natura 2000 ZPS IT3260018 Grave e zone umide del Brenta. Regione del Veneto. Provincia di Padova. Provincia di Vicenza URL: www.provincia.pd.it.

Calderwood, L. U., Soshkin, M. (2019). *The Travel & Tourism Competitiveness Report 2019: Travel and Tourism at a Tipping Point.* Geneva: World Economic Forum

Clawson, M. & Knetsch, J. L. (1966). *Economics of Outdoor Recreation*, Routledge.

Costantini, D., Rocca, P., Treu, A. (2002) Piano Territoriale di Settore. Medio Corso del Brenta. Provincia di Padova. URL: www.provincia.padova.it/ambiente/pianobrenta/

Costanza, R., & Daly, H. (1992). Natural capital and sustainable development. *Conservation Biology* n. 6, 37-46.

Costanza, R., d'Arge, R., de Groot, R., Farber, S., Grasso, M., Hannon, B., Van der Belt, M. (1997). The value of the world's ecosystem services and natural capital. *Nature n. 387*, 253-260.

EC (European Commission) (2016). Natura 2000 Barometer. ⟨http://ec.europa.eu/environment/nature/natura2000/barometer/index_en.htm⟩. (Accessed 18 June 2021).

Font, A. R. (2000) 'Mass tourism and the demand for protected natural areas: A travel cost approach', *Journal of Environmental Economics and Management*, 39(1), pp. 97–116. doi: 10.1006/jeem.1999.1094.

Flash Eurobarometer 379 (2013). *Attitudes towards biodiversity*. European Commission.

Gantioler, S., Rayment, M., ten Brink, P., McConville, A., Kettunen, M., & Bassi, S. (2014). The costs and socio-economic benefits associated with the Natura 2000 network. *International Journal of Sustainable Society*, 6(1–2), 135–157.

Google Maps (2021). URL: https://www.google.it/maps

Graves, P. (2013) Chapter 15: Environmental Valuation: The Travel Cost Method

Hotelling, H. (1947). *The Economics of Public Recreation,* Washington, National Parks Service.

ISPRA (2020). *Annuario dei dati ambientali*. URL: https://annuario.isprambiente.it/. Accessed 20 June 2021.

ISTAT (2019). *Popolazione 15 anni e oltre per il titolo di studio.* URL: http://dati.istat.it/Index.aspx?DataSetCode=DCCV_POPTIT1

MA (Millennium Ecosystem Assessment). (2003). *Ecosystems and Human Well-Being: A Framework for Assessment*. Island Press, Washington, DC

Marinelli, A., (2009). Estimo Forestale ed uso multiplo del bosco. In: *Aestimum17*.

Masin, R. R., Scortegagna, S. (2011). Flora vascolare del corso planiziale del Brenta tra il Ponte di Bassano e il Ponte di Limena (Veneto-NE Italy). *Natura Vicentina* 14: 5-41.

McKean, J. R., et al. "Valuing Time in Travel Cost Demand Analysis: An Empirical Investigation." *Land Economics*, vol. 71, no. 1, 1995, pp. 96–105. *JSTOR*, www.jstor.org/stable/3146761. Accessed 14 June 2021.

Ndichia, G. C. (2007). *Advanced micro-economic theory* (4th ed.), Bamenda: Maryland Publishers.

Kyle, G. T., Absher, J. D., Hammitt, W. E., & Cavin, J. (2006). An examination of the motivation—involvement relationship. *Leisure Sciences*, 28, 467–485.

Parco Fiume Brenta (2021). URL: https://www.parcofiumebrenta.it/en/

Parsons, G.R. (2003). The Travel Cost Model. In: Champ, P. A., Boyle, K., Brown, T. C. (eds) *A Primer on Nonmarket Valuation.* pp. 187-233. doi: 10.1007/978-94-007-0826-6_9

Perman, R., Ma, Y., Common, M., Maddison, D., Mcgilvray, J. (2011). *Natural Resource and Environmental Economics.* Fourth Edition, Pearson.

Pellegrino, D., Schirpke, U., & Marino, M. (2017). How to support the effective management of Natura 2000 sites? *Journal of Environmental Planning and Management*, 60(3), 383–398. http://dx.doi.org/10.1080/09640568.2016.1159183.

Pickering, C. M., & Hill, W. (2007). Impacts of recreation and tourism on plant biodiversity and vegetation in protected areas in Australia. *The Journal of Environmental Management*, 85, 791–800. http://dx.doi.org/10.1016/j.jenvman.2006.11.021.

Signorello *G.* (1986), La valutazione economica dei beni ambientali, *Genio Rurale* IL(9): l-35

Signorello, G. (1998). _Un confronto empirico tra la versione zonale e la versione individuale del metodo del costo del viaggio. *Tec. Agric.* 4.

Schirpke, U., Scolozzi, R., Da Re, R., Masiero, M., Pellegrino, D., Marino, D. (2018). Recreational ecosystem services in protected areas: A survey of visitors to Natura 2000 sites in Italy. *Journal of Outdoor recreation and tourism.* 21, 39–50. https://doi.org/10.1016/j.jort.2018.01.003

Smith, V., & Desvousges, W. (1985). The Generalized Travel Cost Model and Water Quality Benefits: A Reconsideration. *Southern Economic Journal, 52*(2), 371-381. doi:10.2307/1059623

Sohngen, B., Lichtkoppler, F., Bielen, M., (1999). *The Value of Day Trips to Lake Erie Beaches.* Technical Bulletin OHSU. Ohio Sea Grant College Program, Columbus, Ohio.

Tempesta, T. (2011). *Appunti di estimo rurale e ambientale*. Second Edition, Padova: Cleup.

Walsh, R. G., Sanders, L.D. & Mckean J.R. (1990). The Consumptive Value of Travel Time on Recreation Trips. *Journal of Travel Research.* 29, pp. 17-24

Zandersen, Marianne e Richard S. J. Tol (2009). _A meta-analysis of forest recreation values in Europe_. In: Journal of Forest Economics 15.1, pp. 109_130.