

Article

The Economic Value of Forest Bathing: An Example Case of the Italian Alps

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Abstract: In the mid-1980s, forest bathing was established in Japan to improve citizens' physical and mental health. In the literature, many studies have investigated the role of forest bathing in decreasing people's stress and anxiety as well as in reducing hypertension and coronary artery disease. Forest bathing is also a practice with important social and economic implications at a local level. This study investigated the economic value of forest bathing in a case study in northern Italy (i.e., the Parco del Respiro, in Trentino-Alto Adige) using the Zonal Travel Cost Method. To achieve this aim, 243 forest bathers in the study area were interviewed in the summer of 2022. The findings highlighted that an actively managed forest with an average-low amount of deadwood and clean open areas is the scenario preferred by participants. In addition, the results of the Zonal Travel Cost Method showed a relevant annual consumer surplus of EUR 8700 for the forest bathing activity in the study area, corresponding to EUR 35.80 per visit per person.

Keywords: Shinrin-yoku; human well-being; travel cost method; monetary value; social perception; questionnaire survey; Parco del Respiro (Italy)

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1. Introduction

Forest bathing—also known as “Shinrin-yoku”—is a practice established in Japan in the early 1980s to increase relaxation and to relieve stress and anxiety of the urban population [1,2]. In 1982, the Japanese Forest Agency and the Ministry of Health, Labor, and Welfare introduced this holistic practice to stimulate interaction between urbanized people and natural environments [3]. Subsequently, forest bathing—which can be considered part of the broader concept of forest therapy [4]—was first introduced in Asian countries (i.e., Japan, China, Taiwan, and South Korea) and then throughout the world. In 2004, the Association of Therapeutic Effects of Forests was established, and the Therapeutic Effects of Forests program was started in Japan to scientifically study the benefits of Shinrin-yoku on human health [5]. Currently, several forest bathing and therapy associations have been instituted and recognized in many countries (e.g., Canada, Germany, Italy, Lithuania, and the United States) to spread this practice among citizens [4,6]. Recently, certification criteria and indicators for therapeutic forests have been developed hand in hand with professional training courses for forest bathing guides [7].

Forest bathing consists of walking in a forest at a regular non-tiring pace, stopping to perform breathing and meditative exercises, and contemplating the surrounding natural environment [8]. More specifically, forest bathing is a guided walk using mindful awareness where all five senses are stimulated (i.e., touch, sight, hearing, smell, and taste) through the different forest elements (e.g., leaves, branches, deadwood, blooms, scents, etc.) and infrastructure to facilitate the activity (e.g., a barefooting path and tree-hugging

structure). Several studies have shown that forest bathing has positive psychological impacts, reducing negative symptoms such as distress and anxiety [9–11], and physical impacts, such as increasing natural killer cells and preventing cancer [12,13]. The positive effects of the forest environment are related to the presence of volatile substances, i.e., phytoncides (wood essential oils), which are antimicrobial volatile organic compounds (VOCs) emitted by trees and shrubs in different quantities based on the species [14]. VOCs have many positive biological effects, such as reducing pulse rate and cortisol levels and improving immune system health [15]. The stress reduction effect is related to the positive emotions generated by being in a natural environment, which reduces anxiety and stress, as the Stress Reduction Theory states [16]. The importance of forest bathing for citizens' health, quality of life, and well-being has further increased after the COVID-19 pandemic in 2020, highlighting nature's role in relieving stress, anxiety, and depression [4]. Roviello et al. [17] emphasized that VOCs could be used in the prevention and/or treatment of COVID-19 due to their antiviral properties, while other authors investigated the role of natural environments in the psychological well-being of people during the COVID-19 lockdowns [18–21]. Therefore, there are many studies in the international literature on the positive physical and mental effects of forest bathing on human health, both in ordinary and extraordinary conditions (e.g., during the COVID-19 pandemic) [22]. However, there are still only a few studies that have been conducted to investigate the suitable characteristics of forest sites to optimize the positive effects of forest bathing on participants. Among those studies, Takayama et al. [23] analyzed the influence of slight thinning in an 80-year-old Japanese larch (*Larix kaempferi* (Lamb.) Carr.) forest on the psychological restorative effect on forest bathers. Those authors showed that slight thinning, by reducing the stand density and basal area, does not influence the psychological restorative effect. In another study in Japan, Saito et al. [24] analyzed how restoration from a stress stimulus is affected by forest management, distinguishing between managed and unmanaged forests. Recently, Doimo et al. [25] explored, through a literature review, the relationship between stand characteristics and individual preferences and health conditions. Those authors showed that visitors prefer managed forests characterized by multiple tree species (i.e., mixed forests) and an irregular structure (i.e., uneven-aged forests) [25]. Conversely, studies on the monetary valuation of the forest bathing practice have been neglected by the scientific literature in terms of economic impact or job opportunities (e.g., for forest bathing guides). In fact, only one study has been found that deals with the topic from a monetary point of view. Gail and Uyan [26] adopted the Contingent Valuation (CV) method to estimate visitors' willingness to pay entrance fees for a forest bathing site in the Philippines.

In summary, two knowledge gaps in the literature on forest bathing have been identified: the first concerns the site and stand characteristics for carrying out forest bathing activities; the second is related to the economic value of this practice. Starting from these considerations, the present study aims to investigate the economic value of forest bathing in a case study in the Italian Alps. Since there is no market price for recreational activities such as forest bathing, it is rather difficult to determine their monetary value [27]. For this reason, the Travel Cost Method (TCM) was selected, which coming under the category of revealed preference methods, is based on the revelation of the demand for a non-market good (e.g., environmental goods and services) through the purchase of market goods (e.g., transports) necessary to enjoy the service under investigation [28]. According to the knowledge of the authors, the TCM has never been tested for the evaluation of forest bathing. The selected study area is the Parco del Respiro in the Trentino-Alto Adige region. The Parco del Respiro has been set up for forest bathing activities since 2019, and previous research has quantified a high concentration of total volatile organic compounds (TVOCs) suitable for producing positive effects on human health within the park [29,30]. For these reasons, the Parco del Respiro is chosen as a representative site for forest bathing, where it would be effective to experiment with the

application of an economic method (i.e., TCM) yet to be adopted for the estimation of the forest bathing value.

The rest of this paper is organized as follows. The Materials and Methods section describes the study area, the main steps developed in the research framework, and the economic valuation method adopted (i.e., the Zonal Travel Cost Method). Then, the main findings are summarized and examined in the Results section. The Discussion section comprises some reflections on the results of the case study compared with the international literature and is followed by the conclusion.

2. Materials and Methods

2.1. Study Area

The study area is the Parco del Respiro (46°10'33.25" N; 11°4'39.98" E) in the Fai della Paganella municipality (939 inhabitants in 2023; population density of 77.4 inh./km²) located in the Italian Alps (Figure 1). The study area is mainly covered by forests and is characterized by water streams and waterfalls, flat terrain, and contained slopes. The forest types are mainly European beech (*Fagus sylvatica* L.)-dominant forests and mixed Norway spruce (*Picea abies* (L.) H. Karst.) and European beech forests [31]. The forest area of the Parco del Respiro is managed for recreational purposes with the active maintenance of paths, the removal of standing dead trees and lying deadwood for safety reasons, and the cleaning of grasslands. In addition, Meneguzzo and Zabini [30] highlighted that this forest site has an average VOC concentration of 38 parts per billion (ppb) and a maximum VOC concentration of 108 ppb. These values are quite high compared to other sites studied by those same authors [30]: Ligonchio in the Apennines (i.e., average VOC 10 ppb with a peak of 20 ppb); Fonte del Borbotto near the Foreste Casentinesi Park, Tuscany (i.e., average VOC 15 ppb with a peak of 30 ppb); and Villa Vogel urban park in Florence city, Tuscany (i.e., average VOC 15 ppb with a peak of 56 ppb).

The altitude of the study area ranges between 900 and 1000 masl. The average annual temperature is 8.0 °C, and the average annual rainfall is 1545 mm. The hottest month is July, with an average monthly temperature of 17.6 °C, while the coldest is January, with an average monthly temperature of −2.9 °C. The highest rainfall is in July, with an average of 216 mm, while the month with the lowest rainfall is January, with an average of 50 mm.

The Parco del Respiro was set up in 2019 to carry out forest bathing activities, with a professional guide or independently. From 2019 to today, the Parco del Respiro has been equipped with a set of infrastructures to facilitate forest bathing activities, such as a barefooting path; a tree-hugging structure; a meditation net anchored to trees; open space in the forest for yoga activities; explanatory signs of forest bathing activities to be carried out (Figure 2). The Parco del Respiro was one of the first sites in Italy set up for forest bathing activities after the Bosco del Sorriso started in 2012 in the Oasi Zegna (Piedmont region) and the Forest Therapy Station was established in 2015 in the Natisone Valleys (Friuli-Venezia Giulia region). After 2020, the sites set up and used for forest care initiatives have grown rapidly in all Italian regions, as emphasized by Doimo et al. [32].

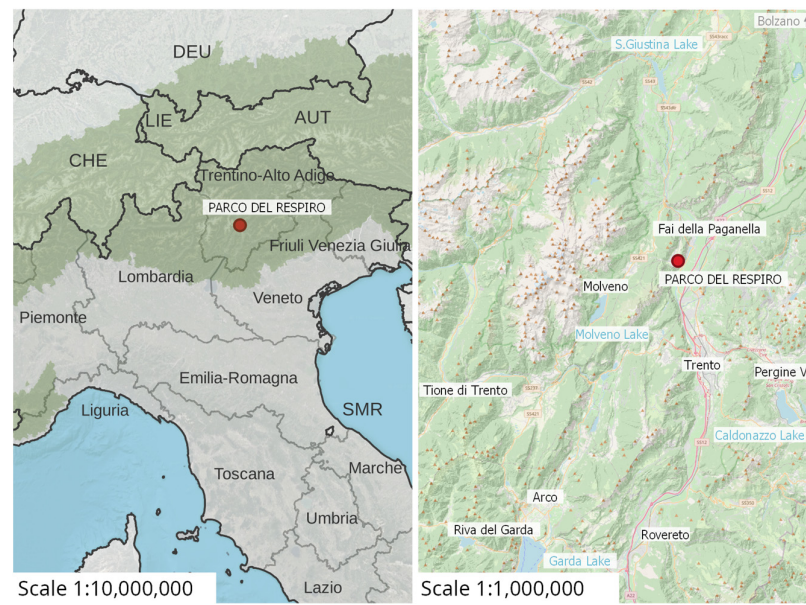


Figure 1. Location of the study area (Parco del Respiro) in Trentino-Alto Adige region, Italy. In the left image, the green area represents the Alps, according to the Alpine Convention 2018. The red point indicates the Parco del Respiro in both images.



Figure 2. Infrastructures to facilitate forest bathing activities in the Parco del Respiro: barefooting path (to the left) and tree-hugging structure (to the right).

2.2. Questionnaire Survey

This research work aimed to investigate the preferences of participants for forest bathing and to estimate the economic value of the activity in the following three steps. First of all, a semi-structured questionnaire was developed and pre-tested. Secondly, a face-to-face survey with a sample of forest bathers was conducted in the case study area. Lastly, data were processed to understand the participants' preferences toward site characteristics and to estimate the economic value of forest bathing.

In the first step, the research team developed a preliminary version of the questionnaire between March and April 2022. Subsequently, the preliminary version was pre-tested with ten forest bathers to understand its feasibility and difficulties (May 2022). After that, one question was added, and two more were simplified because they were considered too complex by respondents. The final version of the questionnaire consisted of a set of closed-ended questions divided into three thematic sections. The first thematic section focused on the number of times the respondent practiced forest bathing in the last year at the Parco del Respiro and in other locations; the reasons that led him/her to practice forest bathing; the sources of knowledge about forest bathing in the Parco del Respiro. In the last question of this section, the respondents rated their degree of satisfaction/dissatisfaction through a 5-point Likert scale (i.e., from 1—very dissatisfied to 5—very satisfied) both for the forest bathing activity in general and for the following specific aspects related to the activity carried out in the Parco del Respiro on the day of the interview: (i) maintenance of forest paths; (ii) presence of lying deadwood; (iii) presence of open areas (i.e., grasslands); (iv) presence of water streams; (v) sensory contact with nature; (vi) meditation. The information collected in the second thematic section was used for the economic valuation of forest bathing through the zonal version of the TCM. First of all, respondents were asked if they were (i) tourists (stay longer than 24 h); (ii) hikers (stay of less than 24 h); (iii) residents in the municipality of Fai della Paganella. Only those who had declared to be tourists were asked about the total duration of the trip and time devoted to other destinations beyond the Parco del Respiro. The remaining questions addressed to the whole sample concerned the following points:

- Whether the forest bathing activity was experienced with or without a guide;
- Number of visits to Parco del Respiro in the last 12 months;
- Number of people with whom the Parco del Respiro was visited in the current visit;
- Duration of the current visit (i.e., all day, a few hours, or less than an hour);
- Time dedicated to forest bathing and other activities undertaken during the same day;
- Vehicle used and kilometers travelled;
- Categories of cost incurred for the forest bathing activity in the Parco del Respiro (i.e., travel, meals, accommodation (only for tourists), and other expenses).

Specifically, the following questions were asked to participants regarding four categories of cost incurred:

For Travel:

- How far did you travel from your home to Parco del Respiro (km)?
- How did you reach Parco del Respiro? (Car; Motorbike; On foot; Bicycle; Camper; Bus, Other means)
- What expenses did you incur for the trip? (Fuel___ EUR; Toll/highway___ EUR; Other expenses, e.g., parking___ EUR)
- If you used a car, camper, or motorbike, how many people BESIDES you were in the same vehicle (number)?

For Meals:

- Where did/will you have lunch today? (Restaurant; Refuge; Packed lunch; Other)
- How much did you spend per person for meals (EUR per person)?

For Accommodation:

- Did you sleep in a tourist facility (hotel/B&B/other)? (YES; NO)
- If YES, for how many nights?
- If YES, with how many people?
- If YES, what was the total expense (EUR)?
- For Guide:
- Did you do the forest bathing activity with a guide? (YES; NO)
- If YES, what was the expense of the guide (EUR)?

The last thematic section of the questionnaire considered the socio-demographic characteristics of respondents, such as gender; age (i.e., year of birth); level of education; net income; membership in environmental associations; municipality and country of residence.

In the second step, the final version of the questionnaire was administered face-to-face to the forest bathers in the Parco del Respiro from July to August 2022 (i.e., two months), alternating between a working day and a weekend day. During the survey period, all forest bathers (i.e., with and without a guide) who arrived at the site were counted, while the number of visitors who carried out the guided forest bathing activity during the entire season (i.e., five months from the end of April to the end of September) were provided by the guides. As there are no official statistics, the data collected in the field were used to estimate the total number of forest bathing participants at the site. It should also be considered that almost all of the forest bathers attended between early May and late September. The questionnaire was administered in two ways, considering whether the activity had been carried out with or without a guide. In the first case, at the end of the activity, the professional guide asked the participants if they were willing to participate in the survey. In the second case, participants were stopped near the park exit (1st sampling point) and the parking lot (2nd sampling point), to ask if they were willing to participate in the survey. In both cases, the respondents filled out the questionnaire after the activity, supported by two interviewers in case of doubts and questions.

The collected data were processed to produce the main descriptive statistics of the visitors' attitudes and preferences and to implement the Zonal TCM.

2.3. Economic Valuation

Non-market monetary valuation methods are employed in several situations to support managers of natural resources [33]. Among the different economic evaluation methods recognized by the international literature, the Travel Cost Method (TCM), initially proposed by Hotelling [34], was chosen in this study to evaluate forest bathing. First of all, the TCM is a revealed preference method based on the assumption that the value of a site reflects the costs incurred in visiting the site itself [28] and that the frequency of visits to the site decreases as the costs incurred increase [35]. In fact, visitors have to spend money to enjoy a recreational activity, especially when it concerns the natural environment located at a certain distance from the urban areas from which most visitors usually derive [36]. In particular, costs such as travel expenses (e.g., fuel, tolls, and parking) and other expenses related to the activity (e.g., accommodation, food, entrance fees, and guided tours) should be taken into account [27]. The TCM allows for the estimation of a demand curve for the site by observing the actual behavior of visitors. This method has been extensively used to estimate nature-based recreational activities [37–40] and is the most widely used methodology for assessing cultural ecosystem services [41]. There are two main approaches to the TCM: the Individual TCM and the Zonal TCM. The Individual TCM calculates travel costs for each individual, while the Zonal TCM estimates the travel cost for different zones. In this study, after an initial screening of the results, it was found that the number of visits made by participants annually was relatively low. Therefore, it was chosen to use the zonal version of the TCM, as it is considered more suitable for recreational sites that receive few visits by the same individual [40,42–45].

The Zonal TCM, first applied to forest recreation activities by Clawson and Knetsch [46], was implemented according to the following steps. Above all, the method considers the visits to the site undertaken by the population of a particular zone as the dependent variable and the travel cost per zone as the independent variable.

First, the annual frequency of visits to the Parco del Respiro was estimated. Since the available information and the number of visitors who annually carry out forest bathing autonomously or with a guide differ significantly, it was decided to estimate the annual frequencies for the two subgroups separately.

For the first subgroup, the annual frequency was estimated considering the number of autonomous visitors sampled ($n = 194$) during the sampling months (i.e., two, July and August) in proportion to the number of months during which the Parco del Respiro offered forest bathing activities in 2022 (i.e., five, from the end of April to the end of September). For the second subgroup, the annual frequency of guided visitors was calculated by combining the number of guided visitors sampled ($n = 49$) with the information provided by the local Tourist Promotion Agency. According to the information provided, 90% of forest bathers without a guide are concentrated between early April and late September, and the remaining 10% between early October and late March. Finally, the total annual frequency estimation was calculated as the sum of the frequency of the two subgroups.

After that, the zones of visitors' origin were defined. In particular, the zones were delimited according to the distance travelled from their residence to the destination, namely, the Parco del Respiro. Initially, Clawson and Knetsch [46] used concentric circles to define such zones, but later, it was preferred to adopt administrative boundaries that allowed for the use of official censuses of the resident population [33]. For this reason, in this study, the areas of origin were represented using administrative boundaries (i.e., countries and Italian regions), as suggested in the current literature [47–49].

As a following step, the population (i.e., the number of inhabitants) and the number of sampled visitors were recorded for each zone. The next step was to estimate the annual visit frequency per zone by multiplying the percentage of sampled visitors per zone by the estimated overall frequency for the Parco del Respiro (annual visitors with and without a guide). Afterward, the visitation rate (i.e., the number of visits per zone per 1000 inhabitants) was calculated according to Equation (3):

$$VR_i = \frac{AV_i}{P_i} \times 1000 \quad (1)$$

where VR_i is the visitation rate for the i -th zone, AV_i is the number of annual visitors for the i -th zone, and P_i is the population of the i -th zone.

A recurring problem in the application of the TCM is the presence of a multi-destination or multi-purpose trip, for which travel costs must be allocated among more than one site and activity, otherwise this leads to an overestimation [50,51]. This situation has also occurred in this case study, where visitors who enjoy forest bathing in the Parco del Respiro often add this activity to a broader itinerary. Although several alternatives have been proposed in the literature, there still needs to be a unified and shared strategy to solve the problem of multi-destination and multi-purpose trips in the TCM [27,52]. Otherwise, among the most objective strategies is to divide the total cost for the different places visited or activities undertaken proportionally to the time devoted to each place or activity [53]. This measure was adopted in this study.

Another challenging aspect to consider in the application of the TCM is the treatment of the opportunity cost of travel time [52], which is crucial in the analysis of recreation demand [54]. In the literature, there is a wide variety of studies debating the preferred method for estimating the opportunity cost of travel time and these methods can be grouped into the following three main categories: (i) adopt a fixed wage fraction; (ii) estimate a fixed wage fraction based on the socio-demographic characteristics of visitors; (iii) estimate multiple wage fractions based on multiple factors. Most studies treat the opportunity cost of travel as a fixed fraction of wages, usually between a quarter and a half [55–

57]. In the present study, the opportunity cost of travel time was calculated as one-third of the individual's wage rate, assuming an average travel speed of 70 km/h to compute travel time, as suggested by Phaneuf et al. [56]. The wage was estimated considering the individual annual income declared by the respondents, an average number of 240 working days per year, and an average number of 8 working hours per day.

After calculating the average travel cost for each zone (i.e., the independent variable), it was possible to relate it to the visitation rates previously determined for the different zones (i.e., the dependent variable). According to Pirikiya et al. [58], Parsons [59], and Leh et al. [27], all expenses incurred by visitors were considered in the average travel cost—i.e., travel, accommodation, meals, and other costs (e.g., professional guide)—and not only transportation costs.

The general form of the demand function for the Zonal TCM is shown by Equation (1):

$$VR_i = f(TC_i) \quad (2)$$

where VR_i is the visitation rate of the i -th zone, and TC_i is the travel cost for the i -th zone. A regression was performed to obtain the specific function for the present case study. In the literature, several different functional forms are used in the TCM to estimate recreational values [60]. The log-linear function (Equation (3)) used in this study is among the most used functional forms:

$$\ln(VR_i) = \alpha + \beta TC_i + \varepsilon \quad (3)$$

where α is the constant term, β is the coefficient of the independent variable (i.e., the travel cost), and ε is the random term.

Equation (3) can be solved by Equation (4):

$$VR_i = e^{\alpha + \beta TC_i + \varepsilon} \quad (4)$$

Adding hypothetical increases in the price of the recreational experience to the average travel costs per zone makes it possible to draw the demand curve for the recreational activity under evaluation. The demand curve allows us to identify the additional cost which no visitor is willing to pay (i.e., zero visits), the so-called choke price. Then, to estimate the consumer surplus (CS), which represents the monetary measure of the perceived utility of the recreational activity (i.e., forest bathing in the Parco del Respiro) for the visitors [39], the area under the demand curve was calculated by integrating the demand function with the travel cost [61], as shown in Equation (5):

$$CS_i = \int_{TC_i}^{TC_m} VR_i \quad (5)$$

where TC_m is the maximum travel cost or the choke price.

3. Results

3.1. Socio-Demographic Characteristics of Respondents

At the end of the survey period, data were collected from 243 respondents and 268 visitors contacted (the non-response rate was 9.1%). Among the respondents, 49 (20.2%) carried out the forest bathing activity with a professional guide, while 194 (79.8%) did so without a guide. The respondents were mainly Italian (97.9%), with only 2.1% of visitors coming from abroad. Most respondents were females (59.2%) and middle-aged people. Specifically, people over 59 years old represented almost 20.8% of respondents; people in their 50s represented 29.0%; people in their 40s around 26.9%; people in their 30s around 14.3%; the remaining 9.0% were born after 1993. Regarding the level of education, most respondents (53.9%) had a university or post-university degree (Bachelor's 13%, Master's 38%, and Ph.D. 2.9%), 40.0% had a high school degree, while only 6.1% of respondents had an elementary or technical school degree. Many respondents had an annual individual net income less than EUR 20,000 (59.2%), while 35.5% earned between EUR 20,000 and

EUR 39,999, and only 5.3% earned more than EUR 40,000. Importantly, the sample was made up of 64.1% of tourists from other Italian regions or countries, 32.2% of hikers from neighboring municipalities, and 3.7% of residents in the Fai della Paganella municipality. In addition, 13.1% of respondents were members of environmental associations, while the remaining 86.9% were not.

3.2. Visitors' Attitudes and Preferences

The majority of respondents (71.8%) had practiced forest bathing for the first time on the day of the interview, while 21.6% had practiced this activity two to three times previously, and only 6.5% had practiced forest bathing more than three times previously. In addition, 13.5% of total respondents enjoyed forest bathing at the Parco del Respiro many times, averaging five times in the last year. In addition, 18.4% of the total sample practiced forest bathing in other locations in Italy (e.g., Sentiero dei Giganti in the Trentino-Alto Adige region, and Oasi Zegna in the Piedmont region).

When asked about the information sources, 29.4% of the respondents reported that they had heard about forest bathing at the Parco del Respiro mainly through the internet/blogs/social networks, 24.5% by friends/acquaintances, and 22% by informative material of the Parco del Respiro. Leisure and well-being were the main reasons for forest bathing in the Parco del Respiro, as shown in Figure 3.

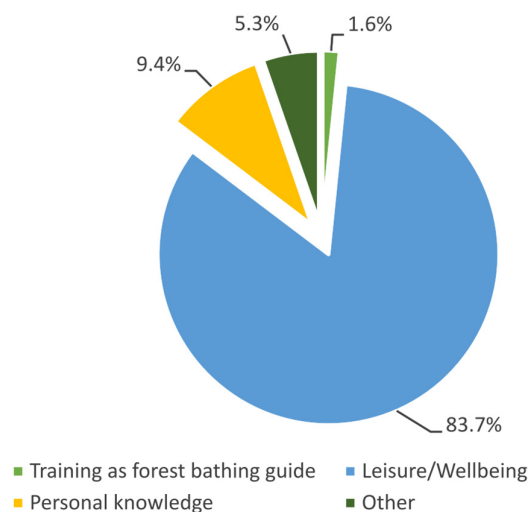


Figure 3. Frequency distribution (%) of the main reasons for forest bathing in the Parco del Respiro (n = 243).

Most respondents indicated that they stayed at the Parco del Respiro for about two hours (68.2%), 27.3% for half a day, 4.1% for the whole day, and only 0.4% for the whole weekend. These results show that the Parco del Respiro is just one of the destinations of a more comprehensive itinerary. In fact, 78.8% of respondents carried out other activities during the day of the visit, while 21.2% dedicated the day exclusively to forest bathing in the Parco del Respiro. The latter percentage of respondents includes only Fai della Paganella municipality residents or local hikers. The percentage of time indicated for the forest bathing activity in the Parco del Respiro (average value 40.7%) was used to estimate the travel costs attributable to only this activity. Regarding the time spent during the visit to the Parco del Respiro for different activities (Figure 4), the most practiced activities after that of forest bathing were trekking followed by relaxing in the Molveno Lake, a well-known tourist destination 20 min (15 km) by car from the Parco del Respiro (15.2%).

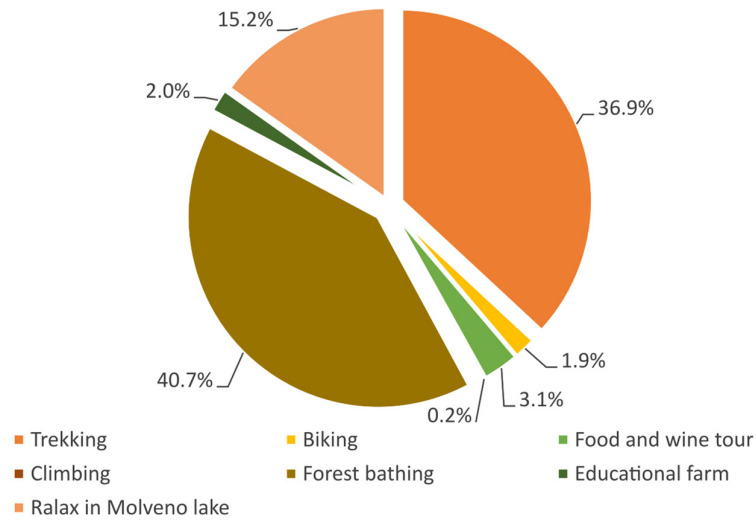


Figure 4. Frequency distribution (%) of the time dedicated to activities carried out by the respondents during the day of the visit to the Parco del Respiro (n = 238).

Overall, the results highlight high satisfaction with the forest bathing activity at the Parco del Respiro: 63.3% of participants were very satisfied, 33.9% were satisfied, and only 0.8% were unsatisfied. Notably, a high satisfaction level was reported for all aspects related to the site characteristics and management of the Parco del Respiro (see Figure 5). Regarding the forest bathing activity, the highest levels of satisfaction were recorded for sensory contact with nature (mean value of 4.59 ± 1.42 on a 5-point Likert scale), followed by meditation (4.20 ± 0.92). Most respondents were highly satisfied with the forest site characteristics, especially the presence of lying deadwood (4.07 ± 0.90) and open areas (4.08 ± 0.88). The lowest satisfaction values were found for the presence of water streams (3.59 ± 0.59).

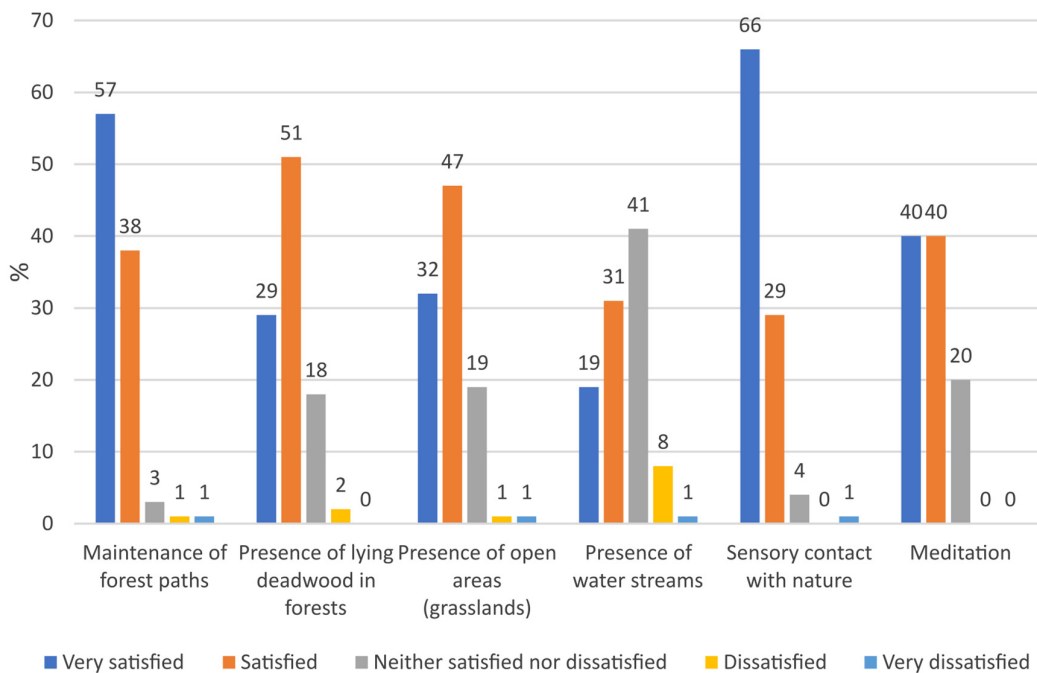


Figure 5. Frequency distribution (%) of the level of satisfaction for six aspects related to the site characteristics and the management of the Parco del Respiro (n = 243).

3.3. Costs Incurred for the Forest Bathing Activity

Costs incurred for the forest bathing activity at the Parco del Respiro can be divided into the following main categories: transportation, accommodation, meals, and other costs (including the cost of the forest bathing guide).

The average distance from the respondents' residence to the Parco del Respiro was 138.8 km. This value is quite significant, but it should be considered that 64.1% of the sample is represented by tourists from other Italian regions or from abroad and that 78.8% of the sample stated to have dedicated only a certain percentage of the trip to forest bathing at the Parco del Respiro (i.e., multi-destination or multi-purpose trip). Regarding the travel costs, the average value, considering the percentage of the time devoted to the forest bathing activity only, was EUR 6.7. In addition, 93.1% of respondents reached the Parco del Respiro by car, followed by those who arrived by bus (3.7%), on foot (1.6%), and by motorbike (0.8%). Among those who arrived by car, the average number of people per vehicle was 1.87. It is also interesting to highlight that 64.8% of resident hikers visited the Parco del Respiro with family members and 35.2% with friends, while 91.7% of tourists visited the study area with family members and only 8.3% with friends.

The accommodation costs were estimated considering the number of nights spent in tourist accommodation, the cost per night, and the number of people sharing the room. Additionally, only the percentage of the time dedicated to forest bathing at the Parco del Respiro by tourists (24.8%) was considered to estimate the costs of accommodation facilities. The average cost was EUR 26.8 per night per person.

Regarding the cost of meals, most participants had a packed lunch during the day of the forest bathing activity (33.5% of total respondents), while 21.2% had lunch at a restaurant and 6.5% in a mountain refuge. It is important to underline that 38.8% of respondents choose "other," indicating mainly two options: lunch at the hotel and lunch at home. Overall, the average cost per person for lunch was EUR 13.1.

Finally, other costs were also indicated, particularly for those who carried out the forest bathing activity with a guide. An average cost of EUR 20.8 per person was estimated for the 49 respondents who carried out the forest bathing activity with a guide.

Regarding the Zonal TCM results, three zones of origin were established. The first zone is represented by the area of Trentino-Alto Adige, where the Parco del Respiro is located. The second zone comprises the immediately adjacent regions of Friuli-Venezia Giulia, Lombardy, Piedmont, Veneto, and Liguria, to which Switzerland was added. Finally, the most distant Italian regions (i.e., Abruzzo, Emilia Romagna, Lazio, Marche, Umbria, Tuscany, Puglia, and Sicily) and countries (i.e., Belgium and Germany) are assigned to the third zone. Table 1 shows the collected data for the different zones.

Table 1. Information on the zones of origin for evaluating the economic value of forest bathing activities in the Parco del Respiro through the Zonal Travel Cost Method.

Zone	Population	Sample Visitors	Visitation Rate	Average Travel Costs Per Visit (EUR)
1	1,075,317	72	0.0670	9.40
2	30,537,246	106	0.0035	102.00
3	50,250,520	65	0.0013	142.70

A curve that interpolates the sample points in the best possible way was obtained by linking the visitation rates (i.e., the number of visits per 1000 inhabitants) and the average costs per visit calculated for the three different zones. A regression of the selected exponential curve obtained was performed according to Equation (6) derived from Equation (4):

$$VR_i = 0.0851e^{-0.037C_i} \quad (R^2 = 0.99) \quad (6)$$

An annual CS of EUR 8700 was estimated for the forest bathing activity in the Parco del Respiro by calculating the area under the demand curve. The total CS per visit per person is thus EUR 35.80.

4. Discussion

The present study highlighted that forest bathing assumes a relevant economic value related to the increase in the recreational attractiveness of the site, in addition to the physical and mental benefits demonstrated by many studies in the international literature [3,10–13]. The monetary value of recreation is an important parameter when developing policies that take into account not only the values generated by forest market products (e.g., timber and non-wood forest products) but also the values of non-market services (e.g., landscape and recreation) [36].

The main results of this study show that the forest bathing activity at the Parco del Respiro has a considerable monetary value estimated as an annual CS of about EUR 8700, corresponding to a CS of EUR 35.80 per person per visit. In the literature, the TCM has been applied in several studies to estimate the monetary value of forest sites from a recreational point of view. In particular, 462 studies focusing on the economic evaluation of recreational sites in general (keywords: “travel cost method” AND “recreation”) and 125 of forest sites in particular (keywords: “travel cost method” AND “forest”) were identified in the Scopus database (timeframe: from 1984 to 2023). However, 33 studies have adopted the Zonal TCM to assign a monetary value to natural resources (from 1995 to 2023). Considering the CS of studies that focused on recreational activities in forest sites, the average values are lower than those estimated in this study. To mention a few, Zandersen and Tol [62] performed a meta-analysis of forest recreation based on TCM studies covering twenty-five studies in nine European countries. Those authors found a CS between USD 0.72 (EUR 0.66) and USD 122 (EUR 112.24) with a median of USD 4.90 (EUR 4.51). Similarly, Grilli et al. [63] estimated an average CS equal to EUR 14.13 per visit (a median of EUR 5.72 per visit) for forest-based recreational activities in Alpine forests. Ezebilo [39] estimated the economic value of nature-based recreational activities at USD 16 (EUR 14.72) for a trip to a natural area in Sweden, while Mayor et al. [64] estimated for Irish forests an average CS of approximately EUR 8. Recently, Paletto et al. [65], using the Individual TCM, estimated a CS between EUR 7.33 and EUR 17.37 per visit in three Italian forest recreational sites. Regarding forest bathing, Gail and Uyan [26] used the CV method to estimate this activity at a site in the Philippines. Those authors estimated an average WTP of USD 15 (EUR 13.87) and a median of USD 10 (EUR 9.24). Their value is lower than that found in this study for two main reasons: differences in the sites investigated and the methods adopted (CV vs. TCM). Therefore, further investigation will be required to estimate the influence of the site characteristics and the choice of method on the economic value assigned to the forest bathing activity.

Additionally, Paletto et al. [65] pointed out that tree species composition and forest management were two key variables influencing the monetary value of the site. The results of the present study also confirm that forest management is the key variable for its valorization for recreational purposes. In fact, it was observed that a low amount of deadwood, maintained paths, and clean open areas, as found in the Parco del Respiro, are forest features that visitors prefer when enjoying recreation activities in general and forest bathing in particular. For these reasons, the economic value of the Parco del Respiro was found to be slightly higher than those reported in the international literature for outdoor recreational activities (e.g., trekking or relaxation in nature) in forests. Even if forest bathing is part of a more comprehensive series of recreational activities, it is highly important in attracting first-time and long-term forest bathers—and diversifying the offer of a site destination. In this way, the presence of forest bathing activities can give rise to positive economic effects on all actors of the tourism chain (e.g., hoteliers and restaurateurs) and create local job opportunities (e.g., professional guides of forest bathing).

As previously mentioned, forest site characteristics (i.e., tree species composition, deadwood, and water streams) are key aspects to consider, according to the forest bathing participants' opinions [66]. As highlighted by Kil et al. [16], forest managers should consider the distribution of flora and fauna species (e.g., tree species composition, and the presence of fragrant and/or intensely colorful plants) and natural terrain features (e.g., slope, roughness, and characteristics of water streams) in the selection of areas suitable for forest bathing. Therefore, forest bathers' opinions and preferences are important for managers to better address the choice of forest bathing sites. Particularly, in this study, respondents positively emphasized some characteristics of the Parco del Respiro, such as a low amount of lying deadwood and a high presence of clean open areas (i.e., grasslands). In this sense, deadwood on the ground hinders forest bathing activities despite being a key component of biodiversity in forests [67]. In fact, a high amount of deadwood lying on the trails is an obstacle to walking and a risk to the safety of the participants. However, large logs at different decomposition levels are important to stimulate three senses: visual, tactile, and olfactory. Visually, large logs are esthetically pleasing to many visitors, as highlighted by many studies [68,69], while heavily decomposed logs stimulate the sense of smell [70], and they can be an important tactile stimulus during the forest bathing experience. Regarding the presence of water elements, Ulrich et al. [71] demonstrated that natural settings (e.g., water streams and trees) influence physiological stress reduction responses. In another study, Howley [72] showed that water elements are dominant in visual landscape preference because they are associated with natural processes and a high level of naturalness. Other authors have confirmed people's preferences for more natural landscapes characterized by forests and water elements [73,74]. Therefore, a forest landscape with small water streams is ideal esthetically and visually and for creating barefoot paths [75]. However, this study found that despite the presence of water streams and waterfalls in the Parco del Respiro, respondents were dissatisfied with the water elements. In fact, the forest bathing paths do not pass nearby the water elements. This is an important indication for the area managers, who will therefore have to enhance the water streams by offering more glimpses of them. Finally, small open areas in the forests (e.g., grassland and drylands) are widely recognized as improving people's landscape perception [76,77]. At the same time, they are the ideal place to perform yoga and meditation activities. In summary, it can be asserted that a forest site suitable for forest bathing activities should have these main characteristics: broadleaved-conifer mixed forests; the presence of small water streams and grasslands; a small number of logs, preferably large and in an advanced stage of decomposition to stimulate the olfactory and tactile senses.

5. Conclusions

In conclusion, this study aims to assess the economic value of the forest bathing activity through the TCM in a case study area in northern Italy (i.e., the Parco del Respiro). The estimated CS highlights the importance that visitors assign to forest bathing from an economic point of view as well as for individual well-being. Moreover, these findings will be of interest to the managers of these areas and those who deal with the proposals of recreational activities (e.g., forest bathing guides).

From a methodological point of view, the strength of this study is that it provides one of the first indications in the literature of the economic value of forest bathing based on the costs incurred by the participants. On the contrary, the main weakness is that for most of the participants in the forest bathing activity, the Parco del Respiro is only one stage of a more comprehensive itinerary. To consider this aspect, participants were asked to indicate the time spent at the Parco del Respiro compared to other destinations on the trip. Future findings will need to delve deeper into the application of the TCM in other forest bathing sites in northern Italy to understand how the type and characteristics of the site influence CS. Regardless, the present study's outcomes do not compromise the general consideration of the economic as well as social relevance of this activity in a territorial context.

This study can represent a starting point on the theme of forest bathing from an economic point of view, thus bridging the gap in the current literature on this relevant topic. Future studies should examine the economic value of forest bathing using different methods (e.g., the Contingent Valuation Method or the Discrete Choice Experiments) and consider different contexts, such as production forests or protected areas.

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