Impact Assessment of "*Voras*" Ski Center: An Application of Contingent Valuation Method

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Abstract
Ski activities in mountainous areas are an issue of prime concern, especially in developing countries. The main objective of this study is to assess some socioeconomic and environmental impacts of "Voras" ski center (Region of Central Macedonia, Prefecture of Pella). The study area is characterized, especially during the winter session, by intensive tourism activities. Although the majority of Contingent Valuation Method (CVM) studies have been restricted for environmental goods, the method can be applied to public goods in general. It was hypothesized that the satisfaction of consumers about ski services might influence their maximum Willingness to Pay (WTP). Accordingly, a Contingent Valuation study was planned in four separate rural districts (Panagitsa, Agios Athanasios, Zervi and Arnissa), around the "Voras "ski center. Several impacts were identified and an economic value was estimated for each. Parking abilities, hotel facilities, food services, ski ramps, road networks, entertainment, water supply, recreation, social impacts, environmental sequences and some more outputs were valued using the CVM. These values can assist managers and policy makers in making decisions regarding the opportunity costs of ski center projects, their management options and the project's alterations or preservations. These values are estimated under the assumption that all other ski projects in the region remain unchanged.

Key words: *Mountain Areas, Impacts, Contingent Valuation Method, Level of satisfaction, Ski Projects*

1. Introduction

Most of the elements that the natural landscape offer, such as land evocation, wind, snow and aesthetics, are not expressed in market prices. Up to a point, these elements are overlooked in decision making, partly because the social outputs are not recognized by private landowners. Consequently, a value of zero (or infinity) is often implicitly assigned to them. When development outputs are marketable and the opportunity costs of natural services are undervalued or not valued, decisions may be biased toward development (*Shabman and Batie, 1978*). When the values of non-market goods are unknown, as in the case of ski center projects, inefficient use of resources can be caused.

The main aim of this paper is to assess some socioeconomic and environmental impacts of "*Voras*" ski center as well as to provide information about it. The presentation of some evaluation methods and the promotion of a more efficient and effective management of the "*Voras*" ski center are also examined in this paper. The "*Voras*" ski center and their associated investment projects have been constructed within the borders of *Prefecture* of *Pella*.

The value of each output depends on personal perspective; there is no single, universal value measure. Ski projects, for example, can be valued from at least four perspectives leading to four types of values: owner, user, region, and society (*Leitch and Hovde, 1996*). Owner values derive from marketable ski products and services. Owner value is the market return (monetary or non-monetary) from ski' outputs along with the owner's personal values. User values capture the benefits from consumption or use of ski-related outputs. Net worth of a ski project is the amount users are willing to pay for the satisfaction provided by its products or services (i.e., outputs). Regional values (e.g., gross business volumes, employment) derive from ski-related business activity. Social value is the net value of a ski project's outputs to "society". Social value can be measured by aggregating user values and owner values (*Leitch and Hovde, 1996*). Social and owner values were estimated as one, since "*Voras*" ski project is publicly owned.

2. Evaluation methods

Economic values of ski projects have been discussed in detail and also estimated at many locations. Evaluation techniques are similar to those routinely used by resource and environmental economists for many non-market goods and services. The main disadvantage of natural resource valuation methods is often the physical, biological, and natural sciences' lack of data.

There are many examples of project valuation in the literature. For example, *Leitch et al. (1995)* evaluated the economic productivity of Florida's Gulf Coast blue crab fishery in relation to the availability and characteristics of the marsh's (i.e., wetland) acreage by using a bio-economic model. *Batie and Wilson (1978)* examined the economic value of Virginia's coastal wetlands in relation to oyster production by estimating a physical production function for oyster harvest in coastal wetlands in Virginia. *Gosselink et al. (1974)* estimated the monetary value of marsh on the Atlantic and Gulf coasts for production, aquaculture development, waste assimilation, and total "life support" as a value ranging from $2,000 to $82,000 per acre. Their methods included reviewing the dollar value of shell fisheries and sport fishing activities, evaluating the potential for aquaculture development by using dollar values and an income capitalization approach, and estimating the cost of the nest best alternative wastewater treatment option (*Gosselink et al., 1974*). Life support value of wetlands has been estimated using energy content per acre (*Shabman and Batie, 1978*). *Farber and Costanza (1978)* estimated the economic value of a water resource system in Terrebonne Parish, Louisiana to be from $0.44 to $590 per acre (1983 dollars) using a WTP approach for commercial fishing and trapping, recreation, and wind damage protection. *Bell (1989)* used marginal productivity theory to value Florida fisheries. The marginal value product of a Florida salt marsh was estimated to be $27.48 per acre.

The market price method uses the prices of goods and services that are bought and sold in commercial markets to determine the value of an ecosystem service. This method values changes in either quantity or quality of a good or service. By measuring the change in producer and consumer surplus after the application of a change in production or price, the value can be determined. To determine a producer and consumer surplus, a demand function must be estimated and then the standard market price must be

subtracted from the level demanded. This concrete method uses the producers' and consumers' actual willingness to pay that is demonstrated through the price or a good or service purchased in the market (*Kahn, 1998*). However, this method only takes into account use-values and marketed goods or services that have an actual price. It does not consider services such as the value of water purification and soil fertility and does not typically work well on a large scale.

The productivity method measures the contribution that a non-market ecosystem service has on a marketed commodity. This method is most useful in cases where a resource is a perfect substitute for another input for production and in cases where the producers are the only ones to benefit from changes in quantity or quality of the resource, and consumers are not affected. Changes in the quality or the quantity of the ecosystem services will change the cost of the inputs and alter the production function of the commodity. The changes can be seen through shifts in the consumer or producer surplus.

The hedonic pricing method estimates the non-market values for ecosystem characteristics and services by comparing the market prices of two goods or services that only differ by the ecosystem characteristics and services (*de Groot et al, 2002*). If the only difference between the goods or services is the ecosystem characteristic, then it is extrapolated that the difference in the prices must be the value of that ecosystem characteristic or service.

The hedonic pricing model was one valuation method used in a study by *Wilson et al.* (*1999*). The study was designed to determine the value of freshwater ecosystem services in the United States. Two properties were identified that were identical with the exception of the water quality for wetlands, rivers, stream, and lakes. The differences in property vales were logged for each one, with value differences ranging from $101 to $1439 per unit measured. Thus it was determined that the value of water quality also fell within that range for each specific freshwater ecosystem type that was observed.

The hedonic pricing method is a concretely observable valuation method, but it has some weaknesses as well. It is very difficult to find two sites that are exactly the same except for the single specific ecosystem characteristic. Ecosystem services often overlap with each one affecting the other, so it may not be possible to isolate a single characteristic. For example, in the case of water quality, a factor such as PH could also affect soil fertility. Decreased soil fertility would decrease the property value, but it would be difficult, if not impossible to distinguish between the values of the two ecosystem services with the hedonic pricing method alone. A combination of two or three valuation methods would be more appropriate for a case such as this one.

The hedonic wage method is used to value an ecosystem based on the differences in wage rates that people are willing to accept based on an ecosystem attribute or service. This applies to choosing between jobs with wage differences in two cities or in different locations within a city. If two jobs are the same with the exception of the wage rate and an ecosystem attribute, then this method can be used.

The travel cost method determines the value of an ecosystem based on the amount of money spent to reach the particular destination. It is used to value sites that are used for recreation purposes. It can estimate the benefits or costs associated with changes in entrance fees to recreational areas, removing an existing site or adding a new site, or changes in environmental quality at a site. The amount of money spent travelling to the site, including money spent on transportation whether it be a plane, train, or bus ticket, or gas expenses and wear for a personal automobile, and time spent en route to the site - although this can difficult to put a price on and may require other methods of valuation.

3. Contingent valuation method

The Contingent Valuation Method, a survey method, was used to assess people's preferences for non-market, water resources (*Mitchell and Carson, 1989*). Net benefits were estimated by asking people directly how much they value non-market goods. CVM, a stated preference method, is an alternative to other indirect valuation methods which estimate the value of resources by using market data (i.e., revealed preference methods) (*Scodari, 1990*).

The CVM, first conceived in the 1940s and brought into wide use in the 1970s and in the1980s, has been used by economists to value a wide variety of non-market goods and services, especially those with public good and non-use characteristics. *Mitchell and Carson (1989)* noted that over 5,000 contingent valuation studies have been performed. These studies have employed either Willingness-to-Pay (WTP) or Willingness-to-Accept (WTA) measures (in some cases both) to elicit valuation measures. In this paper, we derive WTP contingent value estimates for the impacts of the construction and function of *"Voras"* ski project.

The travel cost, contingent valuation, and hedonic pricing methods are the ecosystem valuation methods most commonly used. There are different strengths and weaknesses for each method and specific applications where one is more useful than the others. The travel cost is most effective in valuing recreational areas, contingent valuation is most valuable for public goods, and hedonic is most useful for valuing specific attributes of environmental quality between two sites. A study by *Wilson et al. (1999)* of freshwater ecosystem services compared the three methods of valuation. Their research reports that the travel cost method and hedonic pricing method are most effective for private goods and services. The contingent valuation method is effective since the nature of the survey allows for many different scenarios to be presented for valuation. All of the methods are somewhat limited because the public has a difficult time placing a value on economic services that they do not clearly understand or recognize.

4. Field research

Accordingly, a Contingent Valuation study was planned in four separate rural districts (*Panagitsa, Agios Athanasios, Zervi and Arnissa*), around the "*Voras* "ski center. Field research was conducted, based upon interviews with a random sample of 520 questionnaires, during February 2004. The questionnaire was organized in such a way to (1) familiarize respondents with the location of the *"Voras"* ski project; (2) pose WTP questions regarding the research outputs; (3) pose behavioural questions about ski service supply and (4) to define personal characteristics of the respondents. The evaluated outputs of the *"Voras"* ski project, that represent the total WTP, are divided

in ten separate categories: seven positive (Parking abilities, hotel facilities, food services, ski ramps, road networks, recreation, entertainment) and three negative ones (water supply, social impacts and environmental sequences).

5. Value estimation

Values for each one of the selected outputs are estimated independently with the assumption that all other conditions remain unchanged. Values are more likely to change over time, as other landscapes are modified.

5.1. PARKING ABILITIES

The study area characterized, especially during the winter session, by limited supply for parking purposes. The current supply satisfies only the 30 percent of the total needs. After the construction and working of the *"Voras" ski* project, the supply expected to fully satisfy the total needs for parking purposes.

Survey participants were asked "if *Voras* ski project was managed primarily for parking purposes, what would you willing to pay through an annual use?" In response to this "use value" question, most respondents (62.1 percent) stated €1 to €25 annually, followed by 20.9 percent stating €0 (nothing), 10.1 percent saying from €26 to €50, and 6.9 percent willing to pay more than €50. The average willingness to pay in this case has been estimated €14.3 (standard deviation is equal to 10.2) in a year basis. This value reflects the difference between costs of parking supply from the project and from alternate sources.

Respondents chose €0 (nothing) primary because they do not believe the hypothesis above "*Voras* ski project will be managed primarily for parking purposes" (70.1 percent). 12.8 percent stated that "I would not care about parking supply", 9.9 percent stated that "parking supply does not have any value to me", and finally 7.2 percent appealed "low income" reasons.

Negative values were not provided as choices on the questionnaire, although some respondents might have chosen a negative euro amount for use, option, or existence value(s).

5.2. HOTEL FACILITIES

There are many hotels and room facilities in the study area. Although, the project characterized by insignificant room supply, for visitors, especially during the full ski season. The current project room supply satisfies only the 25 percent of the total needs. After the construction and working of the *"Voras" ski* project, the room supply expected to fully satisfy the total visitor's needs.

Survey participants were asked "if *Voras ski* project was managed primarily for room facilities purposes, what would you willing to pay through an annual use?" In response to this "use value" question, most respondents (42.3 percent) stated €75 to €100 annually, followed by 30.8 percent saying from €50 to €75, 19.3 percent willing to pay more than €100, and 5.0 percent stating €0 (nothing). The average willingness to pay in this case has been estimated €41.6 (standard deviation is equal to 32.5) in a year basis.

This value reflects the difference between costs of room supply from the project and from alternate sources (other areas around the project).

Respondents chose €0 (nothing) appealed primary "low income" reasons (51.4 percent). 32.8 percent noticed that they do not believe the hypothesis above "*Voras* ski project will be managed primarily for room facilities purposes", and finally 15.8 percent stated that "room supply does not have any value to me".

5.3. FOOD SERVICES

The project area characterized, especially during the winter session, by increased food service needs to satisfy the significant tourism activities. The current food service supply satisfies only the 40 percent of the total tourism needs. After the construction and working of the *Voras* ski project, the food supply expected to fully satisfy the total tourism needs.

Survey participants were asked "if *Voras* ski project was managed primarily for food service purposes, what would you willing to pay through an annual use?" In response to this "use value" question, most respondents (80.4 percent) stated €0 (nothing). 15.3 percent stating €1 to €25 annually, followed by 2.8 percent saying from €25 to €50, and 1.5 percent willing to pay more than €50. The average willingness to pay in this case has been estimated €5.8 (standard deviation is equal to 3.2) in a year basis. This value reflects the difference between costs of food service supply from the project and from alternate sources (other areas around the project).

Respondents chose €0 (nothing) stated primary that "food service supply for tourism purposes does not have any value to me" (70.5 percent). 20.5 percent appealed "low income" reasons, and finally 9.0 percent noticed that they do not believe the hypothesis above "*Voras* ski project will be managed primarily for food service purposes".

5.4 SKI RAMPS AND LIFTS

Although, the "*Voras"* ski project characterized by marvelous racing ski ramps and lifts, there are not suitable for young skiers and children. The current project ramp and lift supply satisfies only the 25 percent of the total needs (young skiers, children and special visitors). After the construction and working of the *"Voras" ski* project, the ski ramp and lift supply expected to fully satisfy the total visitors' needs.

Survey participants were asked directly how much they value the ski ramp and lift supply change in a year basis. In response to this "value" question, most respondents (48.4 percent) stated €0 (nothing). 25.3 percent stating €25 to €50 annually, followed by 22.8 percent saying from €1 to €25, and 3.5 percent willing to pay €50 or more. The average willingness to pay in this case has been estimated €11.4 (standard deviation is equal to 8.9) in a year basis. This value reflects the ski ramp and lift supply change before and after the construction and working of the "*Voras"* ski project.

Respondents chose €0 (nothing) stated primary that "ski ramp and lift supply change does not have any value to me" (62.2 percent). 31.8 percent appealed "low income" reasons, and finally 6.0 percent noticed that they do not believe the hypothesis above "*Voras* ski project will be change the ski ramp and lift supply characteristics".

5.5. ROAD NETWORKS

The project area characterized, especially during the winter session, by increased traffic due to the significant tourism activities. The current road network satisfies only the 50 percent of the total needs. After the construction and working of the *Voras* ski project, the new road network expected to fully satisfy the total visitor's needs.

Survey participants were asked "if *Voras* ski project was managed primarily for road network purposes, what would you willing to pay through an annual use?" In response to this "use value" question, most respondents (49.0 percent) stated €100 to €125 annually, followed by 22.3 percent saying from €50 to €75, 12.4 percent willing to pay more than €125, and only 3.0 percent stating €0 (nothing). The average willingness to pay in this case has been estimated €89.2 (standard deviation is equal to 44.3) in a year basis. This value reflects the road networks change before and after the construction and working of the "*Voras"* ski project.

5.6 RECREATION AND ENTERTAINMENT

Recreational values of ski projects are often the most readily recognized values (*Coreil, 1993*). Recreational uses may include sightseeing, photography, wildlife observation, bird-watching, nature walks and picnicking (*Bardecki, 1984*). The operation of the ski project can enhance tourism. Entertainment activities are also a goal of comprehensive basin planning and development utilizing ski projects that are regulated to provide a vital role in realizing regional and national economic benefits.

Survey participants were asked directly how much they value (negative or positive) recreation, entertainment and aesthetics goods in a year basis. In response to this "value" question, most respondents (39.4 percent) stated €50 or more annually, followed by 28.6 percent saying from €25 to €50, 17.3 percent stating €0 (nothing) and 14.7 percent willing to pay from €1 to €25. The average willingness to pay in this case has been estimated €28.2 (standard deviation is equal to 31.1) in a year basis. This value reflects the recreational and entertainment value change before and after the construction and working of the "*Voras"* ski project. None of the respondents choose a negative euro amount for the recreation and aesthetics change.

Respondents chose €0 (nothing) noticed primary that they do not believe the hypothesis above "*Voras* ski project will be produce recreation and tourism activities" (62.8 percent). 19.2 percent stated that "recreation does not have any value to me", 12.1 percent appealed "low income" reasons, and finally 9.0 percent stated that "I do not care about *Voras* ski project".

5.7 WATER SUPPLY

The study area characterized, especially during the winter session, by limited water supply for irrigation, household and municipal purposes. The current water supply satisfies only the 80 percent of the total needs. After the construction and working of the *Voras* ski project, the water supply expected to fully satisfy less than 70 percent of the total needs for irrigation, household and municipal purposes (due to the increased tourism water needs).

Survey participants were asked directly how much they value water constraint impacts in a year basis. In response to this "use value" question, most respondents (80.8 percent) stated €1 to €25 annually, followed by 10.2 percent stating €0 (nothing), 4.5 percent saying from €26 to €50, and 4.5 percent willing to pay more than €50. The average willingness to pay in this case has been estimated €17.9 (standard deviation is equal to 12.1) in a year basis. This value reflects the difference between cost of water supply constraint before and after the construction of the "*Voras"* ski project.

Respondents chose €0 (nothing) primary because they do not believe the hypothesis above "*Voras* ski project will be reduce the water supply for irrigation, household and municipal purposes" (50.8 percent). 19.2 percent stated that "I would not care about water supply", 15.7 percent stated that "water supply does not have any value to me", and finally 14.3 percent appealed "low income" reasons.

Negative values were not provided as choices on the questionnaire, although some respondents might have chosen a negative euro amount for use, option, or existence value(s).

5.8 SOCIAL IMPACTS

The social impacts of ski projects are an integral part of their performance record. The impacts on people displaced from their homes and livelihoods, indigenous peoples, gender and cultural heritage are some of the social impacts may caused by ski project construction and working.

Survey participants were asked directly how much they value social impacts in a year basis. In response to this "value" question, most respondents (88.8 percent) stated €0 (nothing). 4.2 percent stating €0.1 to €5 annually, followed by 4.0 percent saying from €5 to €10, and 3.0 percent willing to pay more than €10. The average willingness to pay in this case has been estimated €3.1 (standard deviation is equal to 1.2) in a year basis. This value reflects the estimated negative social impacts caused by the construction and working of the "*Voras"* ski project.

Respondents chose €0 (nothing) primary because they do not believe the hypothesis above "*Voras* ski project will be cause negative social impacts" (94.5 percent). 4.0 percent stated that "I would not care about social impacts", and finally 1.5 percent appealed "low income" reasons.

5.9 ENVIRONMENTAL IMPACTS

The construction and working of a ski project and the resulting environmental impacts are not limited to the opportunity cost of land. Large ski projects may degrade water quality, water quantity and the forest environment, with consequent effects on biodiversity. Ski projects also have terrestrial atmospheric impacts as well, as they involve the loss of land and its associated recourses and environmental services.

Survey participants were asked directly how much they value environmental impacts in a year basis. In response to this "value" question, most respondents (70.2 percent) stated €0 (nothing). 20.9 percent stating €0 to €5 annually, followed by 5.9 percent saying from €5 to €10, and 3.0 percent willing to pay more than €10. The average willingness

to pay in this case has been estimated €4.8 (standard deviation is equal to 3.6) in a year basis. This value reflects the estimated negative environmental impacts caused by the construction and working of the "*Voras"* ski project.

Respondents chose €0 (nothing) primary because they do not believe the hypothesis above "*Voras* ski project will be cause negative environmental impacts" (80.4 percent). 14.4 percent stated that "I would not care about environment", 3.6 percent stated that "environmental change does not have any value to me", and finally 2.6 percent appealed "low income" reasons.

6. Conclusions

Even though the results of this study are first approximations and rest on some bold assumptions, on the one hand, they can provide useful tools for ski project managers and, on the other hand, they can encourage others to develop better estimates. Assumptions are made to develop plausible estimates and to provide approximate economic value estimation for the various outputs of the "*Voras"* ski project. It is difficult to evaluate the ski projects outputs of controlled areas. "*Voras"* ski project is managed primarily for sport and entertainment purposes, a fact that makes it extremely difficult to separate from the other project contribution.

Although not all projects are the same, and the outputs vary according to physical characteristics (i.e., landscape, vegetation, climate) and to demographic characteristics of the population, this paper in combination with the applied techniques should assist other researchers in future project valuation studies. This research should also aid project managers to make better decisions regarding project schedules and the effects on habitat, environment, society and tourism.

One implication of this study is that ski projects might have negative outputs, which need to be analyzed along with the positive ones in order to extract a comprehensive net social value.

This was a static valuation study. Changes in environmental factors, management decisions, demographics or social values may affect the estimates of economic values of this area. The estimated economic values may also change if the total number of ski projects increases or decreases or if the quality of ski projects changes. Additional ski project valuation studies are needed to provide a broader sample of locations, specific site characteristics, and project types in order to develop better valuation methods.

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