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Public versus private natural areas management. The case of the “Molina Waterfalls” nature reserve (VR)*

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1. Introduction

In an international context, natural parks and protected areas have been instituted for a variety of reasons. In some cases -such as in the U.S.A., Canada, Russia, etc. - the principal aim was to safeguard vast natural areas. In other cases, like England, the subject of protection has been rural areas that conserve within them elements of the traditional rural landscape. In yet other cases the main motivation has been tourism (Rey, 1984).

Therefore, depending on the regional economic development and demand for recreational purposes, the chief aims have been total protection of natural processes, controlled exploitation for recreational use, or conservation measures for rural areas, combined with development of the agro-forestry production.

It would now seem to be generally accepted that a park can and must aim at achieving a plurality of objectives, including the following:

- conservation of natural ecosystems;
- development of scientific research, aimed particularly at increasing knowledge on the functioning of these ecosystems;
- protection of historical landscapes;
- recreational exploitation of the territory;
- economic and social development of the communities living in the protected areas;
- search for forms of development which respect the environment but also allow improved earnings of the residents to be combined with the objectives of safeguarding the park.

The institution of parks and nature reserves therefore pursues a plurality of objectives that can in some cases be conflicting (Marangon, Rosato, 1995). For example, the need to preserve the ecosystems may be incompatible with high numbers of visitors. Furthermore, when the benefits to the local economy derive from tourists' payment of charges, the local (or regional) economic development may reduce the benefits that the visitors enjoy.

An important role in this is played by the management strategies adopted by the agency assigned to define conservation and development policies. The managing agency can, in general, adopt instruments of control and instruments of development of recreational activities.

For recreational and cultural use the control instruments can assume both a purely non-monetary or a monetary nature. Regarding this, the maximum carrying capacity of the different parts of the protected areas - that could in some cases be set at zero (constraint of non-use) - must first be defined. In the case of non-monetary instruments, charges equal to the carrying

* The research is the fruit of the combined reflections of the authors. In particular, Tiziano Tempesta took care of sections 1, 2 and 3, Francesco Marangon of sections 4 and 5.

capacity are granted. The granting of charges can be both direct and indirect¹. In both cases a structure must be set up to control visitor access and/or grant permits. In the case of monetary instruments, use will, in any case, be subject to paying a charge that may directly regard the resource or might also be of an indirect type (required payment for the use of complementary goods or services). Compared to the non-monetary instruments, the monetary ones have the advantage of reducing the management costs and, at the same time, favour a spontaneous reduction in visitor numbers. All those who judge the cost of charges too high with respect to the benefits they receive renounce the use of the resource. In this way, unlike the non-monetary instruments, the number of visitors spontaneously draws close to the carrying capacity and can even be lower.

There can be many forms of development, that range from the improvement of facilities (roads, guided routes, setting up of visitor centres, etc.) to various types of informational and teaching ventures.

The use of the instruments of control and of development can have different outcomes and a greater or lesser efficacy in the pursuing of the above-mentioned objectives and may therefore deeply modify both the management costs and the benefits of the area of natural and recreational interest. Where there are access barriers of any type (ticket payment, visitor number limits, etc.) the flow of social benefits can be lower than those that would be achieved without them.

The benefits produced by the institution of a protected area depends on the characteristics of the managing authorities and the aims they pursue. Although the setting up and management of the protected areas are usually assigned to public authorities, there is nothing, in principle, to forbid private organisations taking on both acts of nature protection and management of protected areas. On the other side, even a public agency can pursue aims of a strictly financial and private type such as maximising operating profits, or at least, balancing accounts. It cannot be ignored that, while the natural environment constitutes a pure public good, the areas suitable for recreation are intrinsically comparable to quasi public goods, i.e. goods for which a market can and does exist. Moreover, actions aimed exclusively at conserving the natural environment inevitably cause a redistribution of earnings as they re-orientate the demand for areas to be used for recreational and cultural purposes within the territory with not negligible effects on the local economy.

What has been described therefore justifies the adoption of a plurality of possible policies that can lead to the adoption of alternative management strategies e.g.: the introduction of user fees, or, more generally, other barriers to access, the adoption of true marketing policies and so on.

It can therefore be hypothesized that the objectives to be pursued are the following:

- a) maximisation of net social benefit;
- b) maximisation of benefits to the local (regional) economy;
- c) maximisation of managing agencies profits;
- d) balancing of management accounts;
- e) sustainable use of the environment (not exceeding the carrying capacity).

It can also be observed, from the purely theoretical point of view (Marangon, Tempesta 1998), that the number of visitors necessarily drops passing from a) to c).

The "Molina Waterfalls" Nature Reserve (MWNR) is a particularly interesting study case in terms of the reported problems, as it is the only nature reserve in the Veneto Region managed entirely by a private company. The MWNR, although covering a fairly small area (around 15

¹ Regarding the obligation of visits within the ambits of guided groups, the obligation of reaching the natural area by public transport alone, the concession of access only to those arrived first, etc. can also be cited.

hectares), is a case study of the debate on whether private management of an environmental good can be compatible with pursuing public interest goals.

The aim of the research was to verify if, and to what extent, a private company can realise objectives of development and environmental conservation that favour, at the same time, recreational use and the economic development of marginal areas (especially mountains and hills). An analysis of the recreational demand for the MWNR was an essential part of the project. Using a contingent valuation approach it was possible to estimate the recreational value and the benefits to the local economy under alternative management hypotheses. This permitted us to evaluate the operational potential of CVM in treating this type of problem. It was also possible to obtain information that, above and beyond a simple estimate of the value of an environmental good, goes some way towards meeting the requirements generally expressed by the managers of protected areas.

2. The study area

Molina is a village with 150 inhabitants that forms part of the municipality of Fumane in the province of Verona (North-East Italy). It is situated at 590 meters a.s.l. on the Lessini plateau. It's name comes from the fact that many mills once operated on the torrents flowing down from steep slopes supplying the power necessary to turn the mill wheels.

Although it is near an inhabited area, and has been frequented since pre-historic times, the waterfalls were only re-discovered in 1971. They are a system of falls of varying heights that cover a drop of around 190 meters.

Access paths and routes have since been realised, extended and widened by local volunteers so that the area can now be visited in one and a half or two hours. For years management was entrusted to a spontaneous committee in the complete absence of public interventions for the falls protection and development and finally on 30 January, 1990 Regional law no. 12 established the Regional Natural Park of Lessinia. Within the Park the waterfalls are classified as a Nature Reserve. Even after this date there was no public intervention to improve recreational use and visits to the waterfalls were not controlled. Visitors were asked only to make a donation to the local tourist board.

In 1993 the inhabitants of Molina decided to set up the company "Vivere Molina S.r.l." (a limited liability company) with 52 members² and a social capital of Lit.20 million. The corporation does not receive public contributions, is not an environmental association, nor is it related to any environmental groups. It is not even a "non-profit" company, instead, from a legal point of view it is in every way a commercial enterprise.

The company has always charged a regular entrance fee and has begun to make investments to improve access and visits to the waterfalls. In defining the entrance fee a third degree price discrimination was introduced (Varian, 1990): most visitors pay a full-priced ticket, while children of less than 12 years and school parties pay a reduced ticket. The cost of tickets has changed over the years:

| Date of introduction | Full-priced ticket | Reduced ticket |
|-------------------------|--------------------|----------------|
| from 8/8/93 to 31/12/93 | 2.000 | 1.000 |
| from 1/1/94 to 29/2/96 | 3.000 | 2.000 |
| from 1/3/96 | 4.000 | 3.000 |

² This includes all the families living in Molina.

At the same time the number of visitors has changed:

| Period | Full-priced ticket | Reduced ticket | Total |
|---------------|--------------------|----------------|---------------|
| 1993 | -10.470 | -1.636 | -12.106 |
| 1994 | -28.051 | -6.336 | -34.387 |
| 1995 | -27.300 | -6.847 | -34.147 |
| <u>1996</u> | <u>24.568</u> | <u>8.978</u> | <u>33.546</u> |
| Means 1994-96 | <u>26.640</u> | <u>7.387</u> | <u>34.027</u> |

Excluding 1993 (the company began in August of that year), there has been a progressive reduction in the number of visitors, due to a drop in those who pay the full-priced ticket, against a strong increase in visitors who benefit from the reduced price. These dynamics can only partly be traced back to the increase in ticket cost which uniformly involves both categories of visitor. Probably the novelty of the paths has now off end some visitor categories have reduced the number of trips, especially in the summer months. The big reduction in visitors who pay the full-priced ticket has been concentrated mainly in July and August. In some ways this is a positive phenomenon of redistribution of the visits throughout the year that could lead to lower environmental impact. As is shown in Tab.1, over 67% of the visits in 1996 were during June, July, August and September³. On Sundays in July the average number of visitors registered over the three years was 268 per day, with probable phenomena of congestion on the footpaths. The flow of schoolchildren increases between March and June, testifying to the educational and cultural importance of the area.

Despite the reduction in visitor numbers, earnings have increased progressively (Tab.2), passing from Lit.75.5 million in 1994 to Lit.109.4 million in 1996. The balance sheet data over three years show that: the company has practically balanced income and expenditure since the year of opening and that the modest profit in 1995 has been re-invested, major increases in management costs derive from the payment of rangers (one full-time employee and a number of seasonal workers); excluding part-time employees, all other costs are independent of visitor numbers. An increase can also be noted in the amortizations figures as proof of an increase in investments. Around an annual Lit.10 million have been spent on renting private land adjoining the Reserve.

The management of the company seems to be geared towards job-creation and benefitting the local economy rather than profit-making. In other words, the company has tried to combine the aim of conservation and exploitation of an environmental resource with that of encouraging a flow of earnings for the residents of Molina. The economic impact for the local economy go beyond the earnings of the company employees and the rent paid for using a part of the land which makes up the Reserve (direct effects). Through surveys (see sect.3), it has been possible to verify that 15% of those interviewed have eaten in a village restaurant and 10% have bought typical local produce (cheese, wine, cherries), generating a flow of spending of Lit.91 and 47 million, respectively⁴ (indirect effects).

3. The survey

³ It should be stressed that the strong seasonal nature of the visits is not connected to tourist influxes. The research has shown that almost all visitors began their trip from their own home.

⁴ The interviewees average expenditure in restaurant is about Lit.2,700 per visit, and the purchase of local farm product is about Lit.1,400 per visit.

To provide a framework for the recreational and cultural demand for the MWNR, 952 visitors were interviewed. Through analysis of the daily and monthly visitor patterns, a stratified sampling plan was made, hypothesising that demand differs throughout the year. The surveys were made between March and September, 1997 by a single interviewer⁵ to guarantee interview uniformity.

As the visitors often came in groups, it was possible to gather information from 3,439 people, (10.2% of the total), of whom 2,712 paid the full-priced ticket (11.0%) and 706 the reduced ticket (7.8%).

The questionnaire was split into three sections: in the first information was collected on the trip (participants, km covered, duration, length of time in the reserve, expenditures, etc.); in the second, a contingent market was proposed; in the third, the socio-economic characteristics of the interviewee (age, income, occupation sector, place of residence, etc.) were surveyed.

The contingent market was defined in the following way:

Since 1993 the "Molina Waterfalls" Nature Reserve has been managed by the company "Vivere Molina S.r.l." that guarantees the opening to the public and a safe use of the area through work such as: replacing the footpaths and the mule-track that lead to the entrance and cleaning the park. It is a company formed by a group of young people for the conservation, protection and development of this natural area.

The management costs destined for personnel, maintenance and creating new footpaths are constantly rising because of increasing market costs. The company receives no regional, national or EU funding, the only income deriving from the sale of entry tickets (Lit.4,000 full-price and 3,000 reduced).

Without the intervention of the company "Vivere Molina S.r.l." the reserve would, in a short time, become unusable for most members of the public. To avoid closure, the only possibility would be to raise the ticket cost.

In this case, would you be willing to pay for a full-priced ticket if it were at least Lit XXXX ?

YES NO

Please indicate the maximum you would be prepared to pay for a ticket of entry without reducing the number of times you make the trip annually to avoid closure of the Nature Reserve to the public

Would you be prepared to pay the same amount for your child?

YES NO (specify how much) _____

If you are unwilling to pay a higher ticket cost than the present one, could you please state the reason? _____

Two formats were therefore used to identify willingness to pay (WTP). In the first place reference was made to the close-ended method, asking the interviewee only if he was willing to pay a fixed sum. For this 56 values were proposed, from a minimum of Lit.4,500 to a maximum of Lit.32,000⁶. Once the affirmative or negative response had been obtained, the interviewee was asked to state his own WTP. This identified both the absence of the "yea saying" phenomenon (Ready et al., 1996), and any possible protest responses. It also allowed an estimate of the individual WTP, with a successive identification of the function of demand. From the latter, when the interviewee was accompanied by persons who pay the reduced-price

⁵ Surveys were made and case study informations were gathered by Dr. Annamaria Marcon, Dipartimento di Scienze Economiche, Università di Udine, Italy.

⁶ Initially it was hypothesized to propose Lit.50,000 as maximum value. However, pre testing the questionnaire it was seen that above Lit.30,000 the replies were systematically negative. It was therefore decided to reduce the maximum bid.

ticket, he was also asked to express a WTP for them⁷. In this way the open-ended format was used. The data relating to the declared WTP were then used to estimate the function of demand of those who had paid a full-priced ticket and those who had paid the reduced ticket. Interviewees were listed in order of declared WTP and the number of visits (or trips) G_j made by those interviewed for each value of WTP_j were calculated a table like obtaining following:

| Declared WTP values | Trips made by the interviewees who declared the amount WTP_j | Trips made by the interviewees who declared a WTP higher or equal to WTP_j |
|---------------------|--|--|
| WTP_1 | G_1 | $CG_1 = \sum_{j=1}^m G_j$ |
| WTP_2 | G_2 | $CG_2 = \sum_{j=2}^m G_j$ |
| ... | ... | ... |
| WTP_j | G_j | $CG_j = \sum_{j=j}^m G_j$ |
| ... | ... | ... |
| WTP_{m-1} | G_{m-1} | $CG_{m-1} = \sum_{j=m-1}^m G_j$ |
| WTP_m | G_m | $CG_m = \sum_{j=m}^m G_j = G_m$ |

Where $WTP_1 < WTP_2 < \dots < WTP_{m-1} < WTP_m$ and CG_j equal to the number of trips made by those who declared a $WTP \geq WTP_j$.

The function below can then be estimated

$$WTP_j = w(CG_j) \quad [1]$$

expressing the relationship between ticket cost and number of trips to be established.

This corresponds to the demand function when the user has as his only alternative the use or non-use of the good or else when he uses it just once during the considered period.

Interpolation of [1] allowed the formulation of some hypotheses relating to the number of visitors there might be in the absence of an entrance ticket and, therefore, to verify the effect on the recreational benefit due to the imposition of the barrier to access. It should be noted that in order to obtain estimates that are not overly influenced by unrealistically high values of WTP (outliers), only those interviewees who had declared a WTP of less than Lit.20,000 for full-priced tickets and 10,000 for reduced tickets were considered. As shown in Tab.3, 0.8% of interviewees were excluded in the case of full-priced tickets and 1.4% in the case of reduced tickets.

4. Recreational benefits

⁷ Very often minors accompanying the interviewee form part of the same family unit and it therefore appears logical that it is the latter that defines the WTP of those who paid the reduced-price ticket.

The MWNR visitors live within a range of around 200 km (Tab.4), although about 85% of those interviewed had travelled less than 100 km to visit it. This means that the Reserve is of recreational and cultural importance that goes beyond the Region in which it is situated⁸. As has been verified in other studies (Tempesta, 1996; Marangon, Tempesta, 1998), the visitors of the MWNR have a high level of education (Tab.4), a high average income, and an age range between 20 and 50 years. They are often employees, mainly occupied in the services sector. The visit, in 88% of cases, was the only destination of the trip and generally took up an entire half-day. Phenomena of complementarity with the use of other environmental goods can therefore be excluded.

An estimate of the recreational benefit was made, as already mentioned, using two different contingent valuation formats for those who had paid for a full-priced ticket and only one format for those who had paid a reduced-price tickets. The close-ended method was used only for the former. The hypothesis was that the utility function would be linear and that the c.d.f. would be a logit (Hanemann, 1984).

The surveyed data were used to estimate the following cumulated frequency distribution function (cdf):

$$\text{ProbSi} = [1 + \exp(-3.1098 + 0.0004 \text{ WTP})]^{-1}$$

$$\chi^2 = 392.83$$

Percentage of variability explained = 90.23%.

The median WTP was estimated at Lit.7,774/trip, while the average was Lit.7,883/trip⁹.

It should be noted that, because of the formulation of the contingent market, these figures include the ticket price, so the real surplus per trip of the consumers would be Lit.4,000 less. The recreational benefit is in good part appropriated by the managing company by means of the tickets payment.

The values of average WTP obtained with the open-ended method are almost always lower than Lit.10,000/trip (Tab.4), with an average value of Lit.8,111/trip, close to that calculated by the close-ended method. In some ways this could be motivated by the absence of strategic behaviour but, more probably, it is due to the presence of the ticket that supplies a sort of "implicit anchorage" to the offer made. It's interesting to note that the correlation coefficient between price proposed with the close-ended method and the final bid obtained with the open-ended method resulted as statistically significant with 99.9% probability, although the value is relatively low (0.16). It should be observed that the dichotomous choice approach could be biased. However, a low correlation coefficient (0,19) suggests that other factors are important, such as income level, age and education level (see Table 4).

The average WTP indicated for reduced tickets was much lower (Lit.5,200/trip), being in almost every case lower than Lit.8,000 (Tab.3). In studies of this type it is rarely taken into account that the WTP differs for persons even belonging to the same family unit. In the present study it appears that the benefit to minors is lower than that of adults. Infact price discrimination by managing bodies of environmental and cultural goods is motivated by an effective differentiation in demand. To have ignored this aspect would have led to an over-estimate of around 10% of the recreational value of the MWNR.

Making the prudent assumption that future visitors could amount to 33,500 (of whom 24,500 pay the full-priced ticket and the rest pay the reduced ticket), the social benefits would amount

⁸ The users basin area of the MWNR is wider than that of other areas of natural interest in Veneto and Friuli-Venezia Giulia (Tempesta, 1996; Marangon, Tempesta 1998).

⁹ The formula proposed by Hanemann (1984) was used to estimate the average WTP because, given the form taken by the cdf there was no problem of truncation as this assumed a fairly unitary value for the higher values of the offers made during the interviews.

to about Lit.245 million/annum, around half of which, however, would go to the managing company in ticket payments.

The presence of access barriers, though, means that this sum cannot be taken as the real flow of recreational benefits. In the case of pure public goods the exclusion of even one subject from the use leads to a reduction in social well-being (Randall, 1987). In the case of quasi public goods the payment of a ticket is justified by the presence of variable costs. In this case the price of charge (p) would have to be determined in a way that sets the marginal management costs (Cm) equa to marginal benefits for the users (Bm) ($C_m = B_m = p$). Where $C_m = 0$ the charge would also be zero.

Elimination of the charge would achieve a higher number of visitors and, therefore, increase the social benefits that derive from the recreational use of the area. To give an estimate of the number of visitors if there were no entry tickets, the demand functions of those who pay a full-priced or reduced ticket were interpolated. To obtain prudent values, recourse was made to linear functions, that demonstrated good interpolating capacity¹⁰. The following functions were obtained:

Reduced tickets

$$\text{WTP} = 7,831 - 0.71 \text{ TRIPS} \quad [2]$$
$$\text{Adjusted } R^2 = 0.87$$

Full-priced tickets

$$\text{WTP} = 13,727 - 0.43 \text{ TRIPS} \quad [3]$$
$$\text{Adjusted } R^2 = 0.90$$

Tables 5 and 6 show that according to these models around 43,000 visits would be made, in the absence of barriers, 11,000 of which would be by individuals who pay the reduced ticket. The recreational benefits would amount to about Lit.262 million/annum, that would all be in the visitors' favour¹¹.

As can be seen, over and above the income distribution problems which will be mentioned below, the increase in social benefit would be slight, being around 7% of that obtained with the current ticket prices. The management strategies can therefore influence in a non-negligible way the amount of benefits connected to the recreational use. In particular, as mentioned before, management policy can be aimed at maximising: a) the profits of the company; b) earnings for the residents in the area; c) benefits to the visitors.

In order to better clarify these issues with reference to the study area, Table 5 and 6 report, for the various ticket prices, estimates relating to:

- 1) the revenue for the company that manages the area;
- 2) the induced income for the local economy coming from the visitors expenditures (restaurant meals and sales of local products);
- 3) the total surplus of the visitors.

This information allowed the economic and social effects of alternative pricing policies to be simulated.

¹⁰ The direct linear functions of demand have the advantage of a lower intercept than the other mathematical forms normally used, such as semi-logarithmic and logarithmic.

¹¹ It must be stressed that the estimate of visitors number that could be achieved without tickets of entry refers to the hypothesis that the area is managed as currently, but that the management costs would be covered by the public authorities. In other words, without the operations of environmental management presently carried out by the company "Vivere Molina S.r.l.", the area would be accessible only to expert excursionists. The hypothesis of eliminating the obligation to buy a ticket therefore refers to a situation where the management costs of the company are paid for by the State or some other public agency or that the latter manage the area directly.

It should be noted that, to make a proper comparison between the objectives outlined, it would be necessary to calculate the profits of the economic activities connected to the recreational activities or at least arrive at an estimate of the portion of the revenue that translates into earnings for the residents.

It can, however, be observed that where the costs are almost exclusively fixed (as in the case of the company that manages the MWNR) the company's profit is maximised when returns are maximised. To analyse the behaviour of the company "Vivere Molina S.r.l." it is sufficient to estimate the total revenues curve.

In the second place, it is reasonable to suppose that the costs born by the company that manages the reserve as well as by restaurants and producers and retailers of typical local products translate mainly into earnings for other residents in the area. To formulate alternative hypotheses on the impact on local economy of the MWNR related tourism would in any case be complex and could lead to other possible errors in the simulations. It was therefore preferred to estimate the revenue by simply multiplying the average spending for restaurant lunching plus the purchase of local products by the number of visits, and to consider this amount plus earnings from ticket sales as benefits to the local economy¹². The number of visits that would be made depending on different ticket costs was obtained by analysing the WTP declared by the interviewees, and the functions [2] and [3] were estimated only for the amounts less than the current ones (Lit.4,000 for full-priced tickets and Lit.3,000 for reduced tickets). In this way it was attempted to reduce to the minimum the possible source of distortion of the results attainable from the mathematical form assumed by the demand function.

The data in Tables 5 and 6 demonstrate that the company which manages the reserve has not followed a typical strategy of a private business, i.e. maximising profits. It can be seen that the increase in ticket price could give an increased earnings margin and therefore profits. Increasing the price of both full and reduced-price tickets by Lit.1,000 would give an earnings increase of around Lit.17 million. Considering that production costs in the three years examined were between Lit.73 and 110 million, and that the costs equal the revenues, a fairly high profit margin could be derived (around 15%). However, the increase in ticket price would indicate a movement from a non-profit approach to an attempt to create profit margins (the latter to be re-invested in activities of recreational tourism promotion and development). This behaviour supports the theoretical assumption that if re-investment of profits in environmental development were able to determine an increased future influx of social benefits, it would be worth increasing the ticket cost with respect to the optimum definable within a purely static point of view (Marangon, Tempesta, 1988).

With reference to the indirect economic effects, given the calculation methods, this amount is directly proportional to the number of trips and, therefore, inversely proportional to ticket price. Obviously the amount would be highest in the absence of entrance fees. In this situation it is estimated that the spending on restaurant lunching and local products buying would be around Lit.175 million, compared to the current 131 million¹³.

¹² Note that the regional economic multiplier (defined as the ratio between total and direct economic effects) calculated at the actual ticket prices equal to 2,39 for the reduced ticket paying and 2,04 for the full ticket paying. These figures are very closed to those proposed by Walsh (1986, p.380).

¹³ As seen before, this amount was around Lit.138 million in 1996. The difference from the reported value can be ascribed firstly to the fact that in the simulation reference was prudently made to a lower number of visitors than that of 1996. Moreover, for the reduced-price tickets some interviewees declared a WTP lower than the price paid. It does not seem appropriate to correct this possible inconsistency in the estimate of the function of demand considering that the visitors gave their opinion on the just ticket price to pay or that they would have agreed to pay if they had previously known the characteristics of the good.

However, considering all 3 forms of income, it is observed that the current ticket prices tend to maximise the latter economic aggregate more than the profit. In other words it would appear that the managing company has tried to maximise the global benefits for the local economy (direct and indirect) more than company profits. The balancing of accounts could, within this context, represent a useful compromise solution between alternative needs. Furthermore, this behaviour appears to be well motivated given that the company "Vivere Molina S.r.l." is made up of the families living in the village, who formed it with the aim of improving the local economy. It is worth stressing that careful management of a natural good can have relevant economic effects on the local economy, especially in hilly and mountainous areas.

Of course, the introduction of entry tickets reduces in benefits to visitors. This is due both to the reduction in number of visits (-24% with current prices) and, even more so, to the transfer of financial resources, through these tickets, from the users to the managing company. More than half the benefits that the visitors could potentially enjoy are transferred to the managing company through ticket payment. The surplus reduction of the consumers due to the current ticket prices is estimated at around Lit.137 million. Of these, however, only 17 million can be attributed to fewer visits, while for the other 120 million is just a transfer that mainly serves to repay the services provided by the company "Vivere Molina S.r.l." in terms of conservation of the natural inheritance and improvement of its exploitation.

5. Conclusions

The research on the Molina Waterfalls Nature Reserve addressed an issue that has not previously been studied in detail in Italy. While many studies have estimated the recreational or cultural value of the areas of natural interest, the problems connected with their management have rarely been discussed (Dixon J.A., Sherman, 1990; Marangon, Tempesta, 1998; Walsh, 1986).

The research has demonstrated the existence of a precise link between the objectives pursued by the management of natural areas and the social benefits they are capable of determining. While it is clear that the imposition of the payment of a charge involves a reduction in the social benefits connected to the recreational and cultural use, it has been verified that in this case it assumes the nature of a transfer from the users to the management agency of the nature reserve. This phenomenon is surely positive when, as in the study case, it translates into the creation of jobs that essentially benefit the local communities, without determining the economic and environmental imbalances often connected with mass tourism.

The study case also highlights how the intervention of private companies can allow integrated policies of economic development and nature conservation to be pursued. In fact, before the founding of the company "Vivere Molina S.r.l." the management was by volunteers, in the absence of a comprehensive project of cultural and recreational development of the waterfalls, that kept visitor numbers low because of the lack of suitable structures (prepared paths, stopping places, etc.).

This conclusion can not be generalised because, in the absence of adequate control and a clear link between the natural environment and the recreational use private ownership could have a totally negative outcome. The private management of an environmental good will only have a positive outcome under specific conditions.

Firstly, the private company must acknowledge the necessity of an equilibrium between tourist-recreational exploitation and resource quality. If the former prevails the worsening quality of the environment will lead to a reduction in income. Obviously this awareness can in some way be "produced" by introducing limits to the type of practicable actions. For private management to work, it is also necessary that the good in question assumes the nature of a quasi public

good, and that it is possible to profitably impose charges. From this point of view the "Molina Waterfalls Nature Reserve" is undoubtedly in a privileged but not unique position. The spread of non-profit companies that explicitly propose to tackle problems of development of the local economy within the framework of a substantial balancing of accounts appears to be particularly important. The case analysed demonstrates how, starting with a modest capital investment, a local community can trigger development processes centred on a correct use of the natural resources that can have important effects on the economic development of the territory.

Last but not least, the importance of economic analyses must be stressed, as they provide useful information for clarifying the management objectives and the outcomes that alternative management strategies could have. The techniques of contingent valuation developed during the last twenty years can be extremely useful for this. The experience gained in this sector of economic-environmental research provides a methodology to estimate both the demand function for environmental goods (the limits of which are by now widely known) and the operative potential (Bishop, Romano, 1998; Mitchell, Carson, 1989). While a single estimate of the value of an environmental good is of scarce interest for operational purposes, the analysis of demand can provide important indications for those who wish to manage an area of environmental interest for recreational and cultural purposes, bearing in mind the need to improve the living conditions of the local population.

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Table.1 - Distribution of the visits during 1996.

| | Full-priced ticket | Reduced ticket | Total |
|-----|--------------------|----------------|--------|
| JAN | 90 | 13 | 103 |
| FEB | 79 | 14 | 93 |
| MAR | 915 | 185 | 1,100 |
| APR | 3,566 | 644 | 4,210 |
| MAY | 2,153 | 1,535 | 3,688 |
| JUN | 4,134 | 963 | 5,097 |
| JUL | 3,817 | 2,744 | 6,561 |
| AUG | 5,970 | 1,699 | 7,669 |
| SEP | 2,627 | 816 | 3,443 |
| OCT | 778 | 238 | 1,016 |
| NOV | 369 | 122 | 491 |
| DEC | 70 | 5 | 75 |
| TOT | 24,568 | 8,978 | 33,546 |

Table. 2 The Vivere Molina S.r.l. company balance sheet from 1993 to 1996.

| PRODUCTION COSTS | 1993 | 1994 | 1995 | 1996 |
|---|-------------------|-------------------|-------------------|--------------------|
| Costs for primary & subsidiary materials of consumption | 1.053.565 | 2.310.259 | 2.060.978 | 3.798.650 |
| Service Costs | 15.521.609 | 24.962.793 | 19.114.319 | 20.171.020 |
| Costs for the use of goods of third parties | 6.578.082 | 11.190.903 | 10.436.835 | 10.618.034 |
| Personnel costs | - | 12.749.459 | 31.530.984 | 57.823.142 |
| Amortization | 1.414.471 | 4.618.517 | 5.140.882 | 5.544.023 |
| Other management expenses | 610.530 | 17.899.742 | 8.135.681 | 12.260.070 |
| TOTAL COSTS | 25.178.257 | 73.731.673 | 76.419.679 | 110.214.939 |

| ECONOMIC SITUATION | 1993 | 1994 | 1995 | 1996 |
|---------------------------------|-------------------|-------------------|------------------|-------------------|
| PRODUCTION VALUE | 18.970.393 | 75.541.822 | 80.634.756 | 109.448.247 |
| - PRODUCTION COSTS | -25.178.257 | -73.731.673 | -76.419.679 | -110.214.939 |
| +/- FINANCIAL RETURNS & OUTLAYS | 309.781 | 72.941 | 590.594 | -500.030 |
| +/- SPECIAL RETURNS & OUTLAYS | 0 | -779.000 | 150.000 | -55.834 |
| - TAXES ON MANAGEMENT | 0 | -2.387.000 | -2.454.000 | 0 |
| INCOME | | | | |
| MANAGEMENT PROFIT (LOSS) | -5.898.083 | -1.282.910 | 2.501.671 | -1.322.556 |

Table. 3 Interviewees by declared class of WTP for full-priced and reduced tickets.

| Classes of WTP | Full-priced tickets | | | Classes of WTP | Reduced tickets | | |
|----------------|---------------------|-------|-------------|----------------|-----------------|-------|-------------|
| | lire | no. | % % cum. | | lire | No. | % % cum. |
| ≤ 5.000 | 256 | 26,9 | 26,9 | ≤ 4.000 | 130 | 37,6 | 37,6 |
| 5.001-6.000 | 125 | 13,1 | 40,0 | 4.001-5.000 | 128 | 37,0 | 74,6 |
| 6.001-7.000 | 57 | 6,0 | 46,0 | 5.001-6.000 | 26 | 7,5 | 82,1 |
| 7.001-8.000 | 122 | 12,8 | 58,8 | 6.001-8.000 | 30 | 8,7 | 90,8 |
| 8.001-10.000 | 314 | 33,0 | 91,8 | 8.001-10.000 | 27 | 7,8 | 98,6 |
| 10.001-15.000 | 56 | 5,9 | 97,7 | > 10.000 | 5 | 1,4 | 100,0 |
| 15.001-20.000 | 14 | 1,5 | 99,2 | Total | 346 | 100,0 | |
| > 20.000 | 8 | 0,8 | 100,0 | | | | |
| Total | 952 | 100,0 | | | | | |

Table.4 - Average willingness to pay and characteristics of the interviewees

| Distance from home or hotel Km | Mean WTP | Interviewees | | |
|-----------------------------------|----------|--------------|-------|--------|
| | Lire | no. | % | % cum. |
| From 0 to 20 | 7.659 | 41 | 4,3 | 4,3 |
| From 21 to 30 | 8.222 | 63 | 6,6 | 10,9 |
| From 31 to 40 | 8.209 | 344 | 36,1 | 47,0 |
| From 41 to 50 | 7.473 | 74 | 7,8 | 54,8 |
| From 51 to 60 | 8.257 | 70 | 7,4 | 62,2 |
| From 61 to 70 | 8.124 | 85 | 8,9 | 71,1 |
| From 71 to 80 | 8.300 | 60 | 6,3 | 77,4 |
| From 81to 90 | 8.426 | 34 | 3,6 | 81,0 |
| From 91to100 | 8.229 | 48 | 5,0 | 86,0 |
| From 101 to 110 | 8.286 | 14 | 1,5 | 87,5 |
| From 111 to 120 | 8.379 | 58 | 6,1 | 93,6 |
| From 121 to130 | 6.905 | 21 | 2,2 | 95,8 |
| From 131 to 140 | 7.857 | 7 | 0,7 | 96,5 |
| From 141 to 150 | 8.333 | 9 | 0,9 | 97,4 |
| From 151 to 200 | 7.800 | 15 | 1,6 | 99,0 |
| > 200 | 7.889 | 9 | 1,0 | 94,9 |
| Total | 8.111 | 952 | 100,0 | |

| Age classes | Mean WTP | Interviewees | | |
|---------------|----------|--------------|-------|--------|
| | Lire | no. | % | % cum. |
| Below 20 | 12.167 | 6 | 0,6 | 0,6 |
| From 20 to 29 | 8.506 | 236 | 24,8 | 25,4 |
| From 30 to 39 | 8.244 | 362 | 38,0 | 63,4 |
| From 40 to 49 | 7.606 | 231 | 24,3 | 87,7 |
| Over 50 | 7.692 | 117 | 12,3 | 100,0 |
| Total | 8.111 | 952 | 100,0 | |

Table.4 (continue)

| Earning classes | Mean WTP | | Interviewees | | |
|-----------------|---------------|------|--------------|-------|--------|
| | Millions lire | Lire | no. | % | % cum. |
| Below 10 | 7.571 | | 14 | 1,5 | 1,5 |
| From 10 to 20 | 7.559 | | 118 | 12,4 | 13,9 |
| From 20 to 30 | 7.948 | | 281 | 29,5 | 43,4 |
| From 30 to 40 | 8.127 | | 237 | 24,9 | 68,3 |
| From 40 to 50 | 8.274 | | 137 | 14,4 | 82,7 |
| From 50 to 60 | 8.780 | | 100 | 10,5 | 93,2 |
| From 60 to 70 | 8.540 | | 50 | 5,3 | 98,5 |
| Above 70 | 8.400 | | 15 | 1,5 | 100,0 |
| Total | 8.111 | | 952 | 100,0 | |

| Level of Education | Mean WTP | | Interviewees | |
|--------------------|----------|-----|--------------|--------|
| | Lire | no. | % | % cum. |
| Elementary school | 6.000 | 24 | 2,5 | 2,5 |
| Lower school. | 7.870 | 246 | 25,9 | 28,4 |
| High school. | 8.223 | 539 | 56,6 | 85,0 |
| Degree | 8.462 | 143 | 15,0 | 100,0 |
| Total | 8.111 | 952 | 100,0 | |

| Month | Mean WTP | | Interviewees | |
|-----------|----------|-----|--------------|--------|
| | lire | no. | % | % cum. |
| March | 8.736 | 91 | 9,6 | 9,6 |
| April | 8.635 | 63 | 6,6 | 16,2 |
| May | 8.264 | 121 | 12,7 | 28,9 |
| June | 8.325 | 114 | 12,0 | 40,9 |
| July | 8.301 | 231 | 24,3 | 65,2 |
| August | 7.481 | 260 | 27,3 | 92,5 |
| September | 7.938 | 72 | 7,5 | 100,0 |
| Total | 8.111 | 952 | 100,0 | |

Table.5 - Effect of different reduced ticket costs on the local economy and on recreational benefits.

| Ticket cost | Trips | Managing company revenue | Other local economic activities | Full local Benefits | Consumer surplus |
|--------------|--------------|--------------------------|---------------------------------|---------------------|-------------------|
| 0 | 11.030 | 0 | 45.221.268 | 45.221.268 | 43.186.311 |
| 1.000 | 9.621 | 9.621.127 | 39.446.620 | 49.067.746 | 32.860.958 |
| 2.000 | 8.213 | 16.425.352 | 33.671.972 | 50.097.324 | 23.944.057 |
| 3.000 | 7.763 | 23.290.368 | 31.830.170 | 55.120.538 | 16.108.962 |
| 3.500 | 6.310 | 22.085.694 | 25.871.813 | 47.957.507 | 13.193.865 |
| 4.000 | 6.259 | 25.036.827 | 25.662.748 | 50.699.575 | 10.070.948 |
| 5.000 | 4.946 | 24.730.878 | 20.279.320 | 45.010.198 | 5.317.671 |
| 5.500 | 1.644 | 9.044.618 | 6.742.351 | 15.786.969 | 2.873.246 |
| 6.000 | 1.632 | 9.790.368 | 6.690.085 | 16.480.453 | 2.042.494 |
| 7.000 | 1.211 | 8.477.337 | 4.965.297 | 13.442.635 | 485.725 |
| 8.000 | 1.007 | 8.056.657 | 4.129.037 | 12.185.694 | - |
| 10.000 | 612 | 6.118.980 | 2.508.782 | 8.627.762 | - |

Estimated values in grey. Values referring to the current situation are underlined.

Table.6 Effect of different full-priced ticket costs on the local economy and on recreational benefits.

| Ticket cost | Trips | Managing company revenue | Other local economic activities | Full local Benefits | Consumer surplus |
|--------------|---------------|--------------------------|---------------------------------|---------------------|--------------------|
| 0 | 31.923 | 0 | 130.885.349 | 130.885.349 | 219.105.266 |
| 1.000 | 29.598 | 29.597.674 | 121.350.465 | 150.948.140 | 188.344.801 |
| 2.000 | 27.272 | 54.544.186 | 111.815.581 | 166.359.767 | 159.909.917 |
| 3.000 | 24.947 | 74.839.535 | 102.280.698 | 177.120.233 | 133.800.615 |
| 4.000 | 24.479 | 97.914.510 | 100.362.373 | 198.276.883 | 109.274.921 |
| 4.500 | 22.676 | 102.042.963 | 92.972.477 | 195.015.441 | 98.678.130 |
| 5.000 | 22.633 | 113.167.345 | 92.797.223 | 205.964.568 | 87.383.391 |
| 5.500 | 17.219 | 94.705.074 | 70.598.328 | 165.303.402 | 77.914.597 |
| 6.000 | 17.169 | 103.015.411 | 70.393.864 | 173.409.276 | 69.288.413 |
| 6.500 | 14.491 | 94.188.572 | 59.411.253 | 153.599.826 | 59.578.356 |
| 7.000 | 14.441 | 101.084.763 | 59.206.790 | 160.291.553 | 52.307.808 |
| 7.500 | 12.681 | 95.107.589 | 51.992.149 | 147.099.738 | 44.390.928 |
| 8.000 | 9.995 | 79.961.617 | 40.980.329 | 120.941.945 | 35.763.148 |
| 9.000 | 9.967 | 89.700.349 | 40.863.492 | 130.563.841 | 25.755.545 |
| 10.000 | 9.874 | 98.740.913 | 40.483.774 | 139.224.687 | 15.838.737 |
| 11.000 | 2.244 | 24.685.228 | 9.200.858 | 33.886.086 | 5.036.945 |
| 11.500 | 2.230 | 25.643.428 | 9.142.440 | 34.785.868 | 3.896.863 |
| 12.000 | 2.201 | 26.416.400 | 9.025.603 | 35.442.003 | 2.759.867 |
| 12.500 | 1.909 | 23.865.949 | 7.828.031 | 31.693.981 | 1.558.935 |
| 13.000 | 1.888 | 24.542.745 | 7.740.404 | 32.283.149 | 606.207 |
| 14.000 | 1.824 | 25.533.004 | 7.477.523 | 33.010.526 | |
| 15.000 | 1.810 | 27.143.065 | 7.419.104 | 34.562.169 | |
| 16.000 | 1.126 | 18.009.887 | 4.615.033 | 22.624.920 | |
| 20.000 | 1.090 | 21.799.942 | 4.468.988 | 26.268.930 | |

Estimated values in grey. Values referring to the current situation are underlined.