

Public *versus* Private Natural Areas Management

The Case of the “Molina Waterfalls” Nature Reserve (VR)*

Francesco Marangon¹ and Tiziano Tempesta²

¹ Dipartimento di Scienze Economiche, Università di Udine, Via Tomadini 30/A, 33100 Udine, Italy.

² Dipartimento Territorio e Sistemi Agro-Forestali, Università di Padova, Agripolis, 35020 Legnaro (PD), Italy.

1. Introduction

At an international level many motivations have led to the setting up of natural parks and protected areas. In some cases -such as in the U.S.A., Canada and Russia, etc. - the aim was to preserve vast natural areas. In others, like England, rural areas have been protected that conserve within them elements of the traditional rural landscape. In yet other cases the main motivation was tourism (Rey, 1984).

In general, therefore, depending on regional economic development and the demand for recreational purposes, the main aims have been total protection of the natural processes, operations of controlled exploitation for recreational use or conservation measures of the rural area, combined with agro-forestry development.

In general, it currently appears to be more or less consolidated 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 respecting the environment that 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 large numbers of visitors. Besides, when the benefits to the

* 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.

local economy derive from the tourists payment of fees, 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, permits equal to the carrying capacity are granted. 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 a payment 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 non-monetary instruments, monetary ones have the advantage of reducing management costs and, at the same time, favour a spontaneous reduction in visitor numbers. All those who judge the charges too high in respect to the benefits that they can draw 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 acts 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 instruments of control and development can have different outcomes and a greater or lesser efficacy in the pursuing of the above-mentioned objectives and may therefore strongly 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, as stated above, 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

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.

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 hectares), allows it to be verified whether private management of an environmental good can be compatible with pursuing public interest aims.

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 the marginal areas (especially mountain and hill). Pivotal to this was analysis of the recreational demand for the MWNR. Using a contingent valuation approach (CVM) it was possible to estimate the recreational value and the benefits to the local economy under alternative management hypotheses. This allowed, amongst other things, to verify the operational potentials of CVM in this field. In this way it was 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 many mills that operated there in the past thanks to the many torrents that flow down from the steep slopes supplying the necessary power to turn the mill wheels.

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

To make them accessible, since their discovery, paths and routes have been realised, that have been extended and widened over time with the voluntary contribution of the inhabitants. They can now be thoroughly visited within one and a half or two hours. For a long time the management was entrusted to a spontaneous committee in the complete absence of public interventions for their protection and development. Only on 30 January, 1990 was Regional Law no. 12 issued that set up 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 a visit to the waterfalls was without any control. 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 society, that does not benefit from any public contribution, is not an environmental association, nor is it related to any environmental groups. It is not even an enterprise relating to the "no profit" sector, instead, from a legal point of view it is in every way a commercial enterprise.

Since the beginning the company has 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:

² This includes all the families living in Molina.

Date of introduction	Full-priced ticket	Reduced ticket
From 8/8/93 to 31/12/93	1,032	0,516
From 1/1/94 to 29/2/96	1,549	1,032
From 1/3/96	2,065	1,549

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
1996	24,568	8,978	33,546
Means 1994-96	26,640	7,387	34,027

Excluding 1993, the year when the company's management began in August, there has been a progressive reduction in the number of visitors, due in particular 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 that, as can be seen, uniformly involves both categories of visitor. Most probably there has been a lowering of interest on the part of some categories of visitor who, after the first phase of reopening with the availability of the not-negligible novelty of the routes, 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 have 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 for the company that manages the reserve have increased progressively (Tab.2), passing from Lit.75.5 million in 1994 to Lit.109.4 million in 1996. The balance sheet data during the 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.

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.

Analysis of the balance sheet (Tab.2) also shows that the major increases in management costs relate to the payment of rangers (one full-time employee and a number of seasonal workers). It is also shown that, by just excluding the part-time employees, all other costs are in practice 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 does not seem to be geared towards the making of a profit but more towards job-creation and to benefit the local economy. In other words, the company has tried in it's early years 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

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 get information relating to 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:

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

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

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 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 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.

First of all the interviewees were listed in order on the basis 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 the one below was thus obtained:

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.

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.

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	$CG_m = \sum_{j=m}^m G_j = G_m$

With:

$WTP_1 < WTP_2 < \dots < WTP_{m-1} < WTP_m$ 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

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

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

This function corresponds to the function of demand 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 specified that with the aim of obtaining estimates that are not overly influenced by very high values of WTP that do not correspond to reality (outliers), only the interviewees were considered who had declared a WTP of less than Lit.20,000 for full-priced tickets and 10,000 for reduced tickets. 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

The MWNR visitors come from within a range of around 200 km (Tab.4), although about 85% of those interviewed had travelled less than 100 km to visit it. It is therefore a natural area of recreational and cultural importance that goes beyond being regional⁸. 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), an 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 ticket. The close-ended method was used only for the former. The hypothesis was that the utility function would be linear and that the cumulated distribution of frequency function (cdf) would be a logit (Hanemann, 1984).

The surveyed data were used to estimate the following (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 ticket 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 enough 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 entrance ticket that supplies a sort of “implicit anchorage” to the offer made. It is also interesting that the correlation coefficient between price proposed with the close-ended method and the final bid obtained with the open-ended method

⁸ The user catchment 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.

resulted as statistically significant with 99.9% probability, even although assuming a low level (0.16). It could be observed that the dichotomous choice approach could also be biased. However, the correlation coefficient value of 0.19 shows that many other factors of a subjective nature go together to define the WTP of the interviewees. For example, Tab.4 shows that the WTP changes with different income levels and age and is also strongly influenced by education level.

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). Generally, in studies estimating the value of environmental goods, it is rarely taken into account that the WTP differs for persons belonging to the same family unit or that have different socio-economic characteristics. According to the indications given by those interviewed it therefore appears in many ways acceptable that the benefit to minors is considered lower than that of adults. The same forms of prices discrimination by many 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 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. It is, in fact, understood that 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 charged (p) would have to be determined in a way that makes the marginal management costs (C_m) and marginal benefits for the users (B_m) equal, i.e.: $C_m = B_m = p$, a condition that corresponds the equilibrium of perfectly competitive markets. 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 functions of demand 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:

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.

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 not negligible way the amount of benefits connected to the recreational use. In particular, as mentioned before, the management 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 problematics 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 (in restaurants and buying local products);
- 3) the total surplus of the visitors.

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

It is worth specifying 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

¹¹ It must be stressed that the estimate of visitor numbers 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 authority or that the latter manage the area directly.

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 maximum when the returns are. To analyse the behaviour of the company "Vivere Molina S.r.l." it is enough to know the curve of the total revenues.

In second place it is reasonable to suppose that the costs born by the company that manages the reserve as well as by restaurants and production and sale of typical local products translate mainly into earnings for other residents in the area. Besides, to formulate hypotheses on the impact on the 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 in restaurants 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 a minimum the possible source of distortion of the results attainable from the mathematical form assumed by the function of demand.

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 testifies to an at least partial passing from a no-profit approach to an attempt to create profit margins to be re-invested in activities of recreational tourism promotion and development. This behaviour wholly respects the theoretical assumption that if the re-investment of profits in activities of environmental development were able to determine an increasing 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).

¹² Note that the regional economic multiplier (defined as the ratio between total and direct economic effects) calculated at the current ticket prices was equal to 2.39 for the reduced ticket and 2.04 for the full ticket. These figures are very close to those proposed by Walsh (1986, p.380).

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 in restaurants and buying local products would be around Lit.175 million, compared to the current 131 million¹³.

However, taking the income from ticket sales and the spending in restaurants and buying local products together, 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 the company profit. The balancing of accounts could, within this context, represent a useful compromise solution between alternative needs. Besides, 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 mountain areas.

The introduction of tickets of entry involves a big reduction in benefits to the 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 it 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 tackled a subject that has not previously been studied in detail in Italy in the field of environmental economy. While many studies have estimated the recreational or cultural value of the areas of natural interest, the problems connected

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.

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 undoubted that the imposition of a charge involves a reduction in the social benefits connected to the recreational and cultural use, it has been verified that the entity of the phenomenon is modest if it is considered that it mainly 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 global 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 statement, obviously, cannot assume a generalised validity because, in the absence of an adequate control and if the link that exists between the natural environment and the recreational use is not very clear, the private action 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 be aware that there must be an equilibrium between tourist-recreational exploitation and resource quality. If this is overreached the worsening quality of the environment will lead to a reduction in its income. Obviously this awareness can in some way be “produced” by introducing limits to the type of practicable actions. In order to have private management it is also necessary that the good in question assumes the nature of a quasi public good, and it is possible to profitably impose charges. From this point of view the Molina Waterfalls Nature Reserve is undoubtedly in a privileged position but this, in many ways, is similar to that of other areas of natural interest.

The spread of no-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, that can 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 arrive not only at an estimate of the function of demand of the environmental goods, the limits of which are by now widely known, but also the operative potential (Bishop, Romano, 1998; Mitchell, Carson, 1989). While a single estimate of the value of an environmental good is sometimes of scarce interest for operational purposes, an analysis of the 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.

Tab.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

Tab. 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	543,84	1192,54	1063,86	1960,84
Service Costs	8012,15	12885,62	9866,68	10412,14
Costs for the use of goods of third parties	3395,56	5776,67	5387,42	5480,95
Personnel costs		6581,18	16276,07	29847,90
Amortization	730,14	2384,05	2653,69	2861,79
Other management expenses	315,15	9239,72	4199,58	6328,56
TOTAL COSTS	12996,84	38059,77	39447,30	56892,18

ECONOMIC SITUATION	1993	1994	1995	1996
PRODUCTION VALUE	9,792.38	38,994.16	41,623,09	56,496.42
- PRODUCTION COSTS	-12,996.84	-38,059.77	-39,447.30	-56,892.18
+/- FINANCIAL RETURNS & OUTLAYS	159.91	37.65	304.86	-258.11
+/- SPECIAL RETURNS & OUTLAYS		-402.11	77.43	-28.82
- TAXES ON MANAGEMENT INCOME	0.00	-1,232.15	-1,266.74	0.00
MANAGEMENT PROFIT (LOSS)	-3,044.55	-662.23	1,291.34	-682.69

Tab. 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					

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

Distance from home or hotel	Mean WTP	Interviewees		
		no.	%	cum. %
Km	Lire			
≤ 20	7,659	41	4.3	4.3
21 – 30	8,222	63	6.6	10.9
31 – 40	8,209	344	36.1	47.0
41 – 50	7,473	74	7.8	54.8
51 – 60	8,257	70	7.4	62.2
61 – 70	8,124	85	8.9	71.1
71 – 80	8,300	60	6.3	77.4
81- 90	8,426	34	3.6	81.0
91-100	8,229	48	5.0	86.0
101 – 110	8,286	14	1.5	87.5
111 – 120	8,379	58	6.1	93.6
121 –130	6,905	21	2.2	95.8
131 – 140	7,857	7	0.7	96.5
141 – 150	8,333	9	0.9	97.4
151 – 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		
		no.	%	cum. %
	Lire			
< 20	12,167	6	0.6	0.6
20 – 29	8,506	236	24.8	25.4
30 – 39	8,244	362	38.0	63.4
40 – 49	7,606	231	24.3	87.7
≥ 50	7,692	117	12.3	100.0
Total	8,111	952	100.0	

Tab.4 (continue)

Earning classes	Mean WTP		Interviewees		
	Millions lire	Lire	no.	%	cum. %
< 10	7,571	14	1.5	1.5	
10 – 19	7,559	118	12.4	13.9	
20 – 29	7,948	281	29.5	43.4	
30 – 39	8,127	237	24.9	68.3	
40 - 49	8,274	137	14.4	82.7	
50 – 59	8,780	100	10.5	93.2	
60 – 69	8,540	50	5.3	98.5	
≥ 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	

Tab.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	11030	0	45221268	45221268	43186311
1000	9621	9621127	39446620	49067746	32860958
2000	8213	16425352	33671972	50097324	23944057
3000	7763	23290368	31830170	55120538	16108962
3500	6310	22085694	25871813	47957507	13193865
4000	6259	25036827	25662748	50699575	10070948
5000	4946	24730878	20279320	45010198	5317671
5500	1644	9044618	6742351	15786969	2873246
6000	1632	9790368	6690085	16480453	2042494
7000	1211	8477337	4965297	13442635	485725
8000	1007	8056657	4129037	12185694	-
10000	612	6118980	2508782	8627762	-

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

Tab.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	31923	0	130885349	130885349	219105266
1000	29598	29597674	121350465	150948140	188344801
2000	27272	54544186	111815581	166359767	159909917
3000	24947	74839535	102280698	177120233	133800615
4000	24479	97914510	100362373	198276883	109274921
4500	22676	102042963	92972477	195015441	98678130
5000	22633	113167345	92797223	205964568	87383391
5500	17219	94705074	70598328	165303402	77914597
6000	17169	103015411	70393864	173409276	69288413
6500	14491	94188572	59411253	153599826	59578356
7000	14441	101084763	59206790	160291553	52307808
7500	12681	95107589	51992149	147099738	44390928
8000	9995	79961617	40980329	120941945	35763148
9000	9967	89700349	40863492	130563841	25755545
10000	9874	98740913	40483774	139224687	15838737
11000	2244	24685228	9200858	33886086	5036945
11500	2230	25643428	9142440	34785868	3896863
12000	2201	26416400	9025603	35442003	2759867
12500	1909	23865949	7828031	31693981	1558935
13000	1888	24542745	7740404	32283149	606207
14000	1824	25533004	7477523	33010526	
15000	1810	27143065	7419104	34562169	
16000	1126	18009887	4615033	22624920	
20000	1090	21799942	4468988	26268930	

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

References

- Bernetti I. Romano S. (1996) *La valutazione dei progetti di sviluppo turistico nei parchi naturali* "Genio Rurale" n. 4 pp.31-43.
- Bishop R Romano D. eds. (1998) *Environmental Resource Valuation. Application of the Contingent Valuation Method in Italy* Kluwer Norwell.
- Boyle K.J. Bishop C. (1988) *Welfare measurements using contingent valuation: a comparison of techniques* "American Journal of Agricultural Economics" 70(1) pp.20-27.
- Boyle K.J. Bishop C. Welsh M.P. (1985) *Starting Point Bias In Contingent Valuation Bidding Games* "Land Economics" 61(2) pp.188-194.
- Boyle K. Johnson R. McCollum D. Desvougues W. Dunford W. Hudson S. (1996) *Valuing Public Goods : Discrete versus Continuous Contingent-Valuation Responses* "Land Economics" 72(3) pp.381-96.
- Carson R.T. Wright J. Alberini A. Carson N. (1994) *A Bibliography of Contingent Valuation Studies and Papers* Natural Resource Damage Assessment Inc. La Jolla CA.
- Cherchi A. (1997) *Oasi del verde bilancio in rosso* "Il Sole-24 ore" n.109 p.3.
- Chuang-Zong Li (1996) *Semiparametric Estimation of the Binary Choice Model for Contingent Valuation* "Land Economics" 72(4) pp.462-473.
- Cummings R.G. Brookshire D.S. Schulze W.D. eds. (1986) *Valuing Environmental Goods an Assessment of the Contingent Valuation Method* Rowman and Allenheld Totowa.
- Dixon J.A. Sherman P.B. (1990) *Economics of Protected Areas. A New Look at Benefits and Costs* Island Press Washington DC.
- Garrod G. Willis K. (1991) *Some empirical estimate of forest amenity value* ESRC Countryside Change Initiative Working Paper 13.
- Hanemann W.M. (1984) *Welfare evaluation in contingent valuation experiments with discrete responses* "American Journal of Agricultural Economics" Vol.66(3) pp.332-341.
- Harris C.C. Driver B.L. Mc Laughlin W.J. (1989) *Improving the Contingent Valuation Method: a Psychological Perspective* "Journal of Environmental Economics and Management" 17 pp.213-229.
- Johansson P. Kristrom B. (1992) *Sweden* in Navrud S. ed. *Pricing the European Environment* Scandinavian University Press Oslo.
- Kahneman D. Tversky A. (1979) *Prospect Theory: an Analysis of Decision under Risk* "Econometrica" 47(2) pp.263-291.

- Layman R.C. Boyce J.R. Criddle K.R. (1996) *Economic Valuation of the Chinook Salmon Sport Fishery of the Gulkana River Alaska under Current and Alternate Management Plans* "Land Economics" 72(1) pp.113-128.
- Loomis J. Brown T. Lucero B. Peterson G. (1996) *Improving Validity Experiments of Contingent Valuation Methods: Results of Efforts to Reduce the Disparity of Hypothetical and Actual Willingness to Pay* "Land Economics" 72(4) pp.450-461.
- Marangon F. Rosato P. (1995) *L'Analisi Multi Criteri nella gestione delle risorse naturali. Il caso delle risorse agroambientali* "Economia delle fonti di energia e dell'ambiente" n.2 pp.45-89.
- Marangon F. Tempesta T. (1997) *Pianificazione e gestione delle aree naturali protette. Le zone umide costiere* Atti della 18^a Conferenza Italiana di Scienze Regionali Europa e Mediterraneo Siracusa 8-11 ottobre 1997 Vol.3 pp.221-245.
- Marangon F. Tempesta T. (1998) *La gestione economica delle aree protette tra pubblico e privato. Il caso di una zona umida costiera di Marano Lagunare (UD)* FORUM Udine.
- Mitchell R.C. Carson R.T. (1989) *Using Survey to Value Public Goods: the Contingent Valuation Method* Resources for Future Washington DC.
- Moore T.A. Averil J.R. Stevens T.H. (1996) *Values and Economics in Environmental Management: A Perspective and Critique* "Journal of Environmental Management" 48 pp.397-409.
- Randall A. (1987) *Resource Economics* John Wiley and Sons New York.
- Ready R.C. Buzby J.C. Dayuan Hu (1996) *Differences between Continuous and Discrete Contingent Valuation Estimates* "Land Economics" 72(3) pp.397-411.
- Rey M. (1984) *La gestione dei parchi naturali* in Muraro G. ed. *Criteri di efficienza per la politica ambientale* Franco Angeli Milano.
- Signorello G. (1990) *La stima dei benefici di tutela di un'area naturale: un'applicazione della "contingent valuation"* "Genio Rurale" n.9 pp.59-66.
- Tempesta T. (1995) *La stima del valore ricreativo del territorio: un'analisi comparata delle principali metodologie* "Genio Rurale" n.12 pp.15-34.
- Tempesta T. (1996) *Criteri e metodi di analisi del valore ricreativo del territorio* Unipress Padova.
- Turner R. K. Bateman I. D.W. Pearce (1992) *United Kingdom* in Navrud S. (editors) *Pricing the European Environment* Scandinavian University Press Oslo.
- Varian H. R. (1990) *Microeconomia* Cafoscarina Venezia.
- Walsh R.G. (1986) *Recreation economics decision: comparing benefits and costs* Venture Publishing Inc. State College Pennsylvania.
- WWF Italia (1994) *Dossier Economia & Parchi* Promopress Roma.