political level. Although the restoration of an ideal earlier 'natural ecosystem' is widely accepted, the idea of restoring a cultural landscape finds many more difficulties, although the first is a much more undefined goal compared to the second.

This is a view that brings together very different situations across the world as shown by the chapter by Nancy Langston for the USA (Chapter 11), stressing the limited success of such policies, and bringing up the matter of the views that forest managers apply to forest management, creating a direct parallel with EU forest strategies. A rethinking of traditional preservation approaches is however underway, as documented by the experience illustrated by the Marsh–Billings–Rockefeller Park, a small but significant place for management approaches, and also by the chapter by Blank (Chapter 10), addressing the widespread problem of parks in the neighbourhoods of urban areas.

This also brings up the matter of the economic aspect of landscape restoration, an activity proposing an alternative to the globalization also affecting countryside, contributing to the sustainable development also of less favoured areas. The importance of this concept is presented by Angelstam (Chapter 8), describing the crucial moment for Eastern European countries recently joining the EU and waiting to develop their economies. This process risks destroying their landscape, with the help of economic incentives for agriculture and strategies for agriculture and nature conservation. This is the case presented by Montiel Molina for Spain (Chapter 14), but could actually be applied to all the EU countries, where widely used subsidies to carry out afforestation projects often damaged landscapes. This occurred because of the initial absence of specific indications in this respect; therefore, after a couple of decades, the effects and conflicts provoked in regions where landscape is a valuable resource are evident. On the other hand, these trends are also favoured by the way sustainability is interpreted and applied by important international processes like certification standards. Anderson (Chapter 12) is considering them in forestry, but the same problem can be seen for eco-certification in agriculture, denying any important role played by cultural values, or the links between food quality and landscape. The lack of specific criteria and indicators are obviously affecting management approaches based on them, which will affect cultural landscapes when applied. The hope is that initiatives like the European Landscape Convention, described by Weizenegger and Schenk in Chapter 13, will be able to affect this problem, although nothing can be done without a growth of social sensibility about this matter. However, the Convention is willing to promote an approach favouring the recognition of all landscapes, independent of their value.

5 The Project for the Rural Landscape Park in Moscheta (Tuscany, Italy)

M. Agnoletti, V. Marinai and S. Paoletti
Department of Environmental Forestry Science and Technology, University of Florence, Florence, Italy

Introduction

Moscheta is one of the 13 study areas covered during the project for Tuscany reported in Chapter 1. In this case the HCEA methodology has been applied to the problem of defining the management criteria for the creation of a landscape park. The study addresses two main problems referring to the conservation of cultural landscapes and the development of marginal rural areas, but also to the long-term analysis of landscape dynamics. For the first problem we hope to offer a contribution to the definitions of cultural landscapes, according to the criteria indicated by UNESCO for the World Heritage List, making this concept less opaque and vague (Fowler, 2003). The development of rural regions, especially those located in mountain environments, is one of the most important issues at world level, addressed by several international directives. Marginal territories, especially those once intensively cultivated and now abandoned, represent a problem not only in developing countries, but also in Western societies. Also, for this reason the Mountain Community of the Mugello valley, the administrative body managing the mountain districts where the study area of Moscheta is located, promoted and supported this study, trying to tackle the lack of any real policy at regional, national and European Union level favouring the conservation of cultural landscape in rural development or nature conservation. Moreover, none of them offer a chance to create a network of landscape parks, as happened with the NATURA 2000 network of protected areas, creating a situation particularly problematic for countries like those in the Mediterranean area, where cultural landscape represents an important resource.

Site and History

The Moscheta study area is located in a small mountain valley on the right side of the Santerno River basin, flowing from the eastern side of the Tuscan Apennines towards the Emilia-Romagna region. It extends for 901 ha and includes the bottom of the valley and the mountains around it, presenting an average altitude of 680 m above sea level (Plates 5 and 6). The main geological formations include the Marnoso-Arenacea formation and the Caotic Complex of the Ligurian Units. The first has all the characteristics of a deep sedimentary basin: sandstones and silt in rythmic sequences. The second refers to an olistostrome sequence: distorted claystones, marlstones

or shales, stratified packets, a few metres to several hundred metres in length, and masses of breccia. From a vegetation point of view Moscheta is situated in the cold and warm zones of Castanetum, according to the phyto-climatic classification of Pavari (1916), between the hill belt of hop hornbeam and deciduous oak woods, and the mountain belt of beech forests, according to Ozenda (1975). Historically, the valley is characterized by the presence of an abbey, founded in the year 1034 by Saint Giovanni Gualberto, a monk of the Benedictine order, on a piece of land donated by the Ubaldini family having the same extension as our study area. The monks started to carry out farming activities and in two centuries the abbey became one of the most important in Tuscany. In a 17th century drawing (Fig. 5.1) the abbey is surrounded by pastures and woods made of beech and fir, the latter reflecting a distinctive attitude of the Benedictine monks, who liked to plant fir around their abbeys, managing them with clear-cuts and selling the timber (Agnoletti and Paci, 2001). In the 18th century the abbey lost its importance and was suppressed during the reforms introduced by the Lorena, the Austrian dynasty replacing the Medici family as the rulers of Tuscany at the beginning of the 19th century. The new owners organized the area as a rural estate, according to the share-crop system, where each farmer shares the crops produced with the owner. This structure is the one we find at the beginning of the 19th century when our investigation begins, when the estate appears to be divided into holdings, 'poderi', each one with a stone house for the farmer.

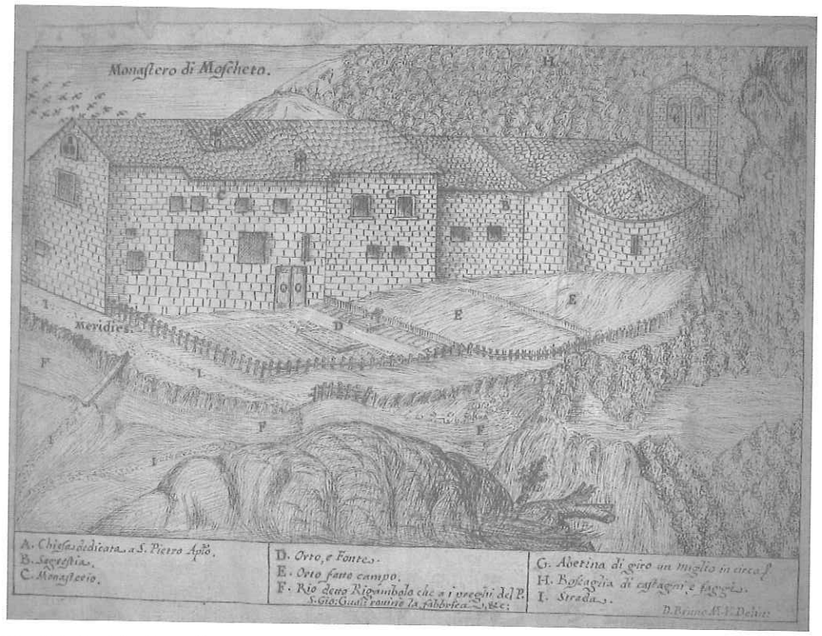

Fig. 5.1. The Moscheta abbey in a drawing of the 17th century. The land uses listed below the abbey describe the presence of fir, which can be clearly seen on the right side of the picture, together with chestnut and beech.

The Landscape in 1832

In 1832 the Moscheta estate was organized into eight farms, each farmhouse hosting more than one family of farmers and owned by the Martini family of Florence. In this period, 254 people were registered as residents in the 'Community of Moscheta', including also neighbouring small communities. Cereals and chestnut flour were the main crops, but the income of the farms, according to the account books, was mostly coming from livestock and timber production. The landscape in 1832 was made up of 89 different land uses (see Plate 8), representing a higher degree of diversity compared to better farming areas at lower altitudes in Tuscany and also had a high level of spatial diversity (Baudry and Baudry-Burel, 1982). More than 40% of this variety of land uses was given by wooded pastures (see Fig. 5.2), as only one land use was described by the cadastre as simple pastureland, confirming the role of wood pasture in the landscape of Tuscany, a technique of crucial importance for cattle breeding in many parts of Europe from north to south (Fuentes Sanchez, 1994; Rotherham and Jones, 2000). Pasture represents the most important land use, covering 55% of the territory, located not only on the high part of the mountains, but also in the bottom of the valley regardless of slope or altitude. Pastures with beech make up 18.6% of the total, while 'pastures with small woods of beech' make up 15%, indicating an interesting feature of the landscape in terms of patterns, but also that beech is the dominating element in 43% of pastureland. About 17% of the land is covered by different qualities of meadows (included pasturelands in our reclassified land use), which are all wooded as well.

Forests represent 22.4% of the landscape with a list of 20 different categories; six of them described as pastured woods, five as chestnut orchards, including also five mixed woods with chestnut, beech and oak. The most common species represented is beech, making up 19% of the total, while oak covers 2.8%. Most of the beech forest was used for charcoal production, as testified by the terraced charcoal burning sites still existing, but also for fodder and acorn production to feed livestock. Chestnut orchards make up 20% of the woodlands. They represent an essential factor for the survival of farmers integrating low cereal production with chestnut flour. Each family had one plot of chestnuts, even if far away from the house. There is no trace in the cadastre of the fir forest appearing in Fig. 5.1, which indicated an extent of 21 ha. The most extensive wood category is instead 'woodlands with beech and pastures', covering almost 110 ha, showing once again the prevailing role of pastures in the landscape, followed by beech forest. Sowable land represents 16% of the land uses. Even in this case only one category is described as without trees. The most extensive category is simple sowable land, with more than 20 ha, followed by 'mixed sowable land with pastures and trees', making 5 ha. The contribution of the land uses listed, in terms of extension, is not proportional to their number, as pastures are covering 55% of the territory, woods 39% and sowable land 5.3% (Fig. 5.2). However, considering only the number of land uses named in the cadastre, the highest frequency concerns pastures and sowable land. Trees in the field and in pastures are actually a very important feature of this landscape, confirming the functions and the role described for most traditional rural societies in the world, both in developed and developing countries (Arnold, 1995; Rackham, 1995; Sereni, 1997). The frequency of tree species, in the land uses naming them, presents the following hierarchy: turkey oak 32%, beech 24%, chestnut 23%, white oak 13%, hornbeam 5%, and walnut 2.6%. A few descriptions report shrubs like juniper and heather, as well as some mulberries as trees on boundaries between fields. The prevalence of beech and turkey oak reflect the climatic distribution of these species, while chestnut has mostly been planted. The estate has a nursery where chestnut is the most important species produced, together with maple and poplar used for mixed cultivations, as well as fruit and olive trees.

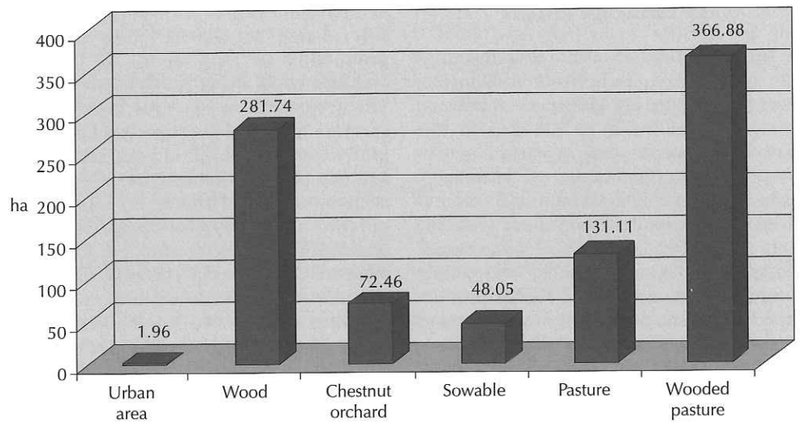

Fig. 5.2. Extent of the main land uses in 1832.

The Landscape between 1832 and 1954

The situation in 1954 (Figs 5.3 and 5.4 and Plate 9) shows a much more simplified structure, with only nine categories of land use remaining of the former 89. This problem is partly due also to the different quality of the source, since the aerial photographs are coming from flights at high altitude in black and white, but they surely show a reduced fragmentation. Woodlands are now covering 64% of the landscapes, with an increase in their extension from 354 ha to 581 ha, pastureland makes up 16% and sowable land 19%. An interesting change is the presence of a greater amount of sowable land in the bottom of the valley, greatly increasing the total amount existing in 1832 and contributing to the total reduction of pastureland (–73%). Particularly strong is the reduction of wood pasture from 366 to 24 ha.

The general dynamics indicated in Fig. 5.4 show the importance of forestation (32%), followed by intensification due to new agricultural areas, indicating a change in farm activities. Most of the new woodlands are clearly growing on former wooded pastures (55%) and only 15% on simple pastures following a successional pattern already observed in other Italian areas after abandonment (Salbitano, 1987; Agnoletti and Paci, 1998). Some new chestnuts are also growing on former pastures, while 42% of the new sowable land is placed on former pastures, 29% on former wood pasture and 11% on woodlands, according to the different degree of difficulty in turning these different land uses into cultivated land (Table 5.1). All these changes have obvious effects on the aesthetic of the local landscape. The mountain slopes are now covered with woodlands, rarely interrupted by pastures, while cultivated areas can be seen in the bottom of the valley (Plate 5). This also confirms a peculiar inverse tendency in the area for its rural population, which has not yet abandoned this part of the Apennine Mountains as is more generally reported in other areas (Agnoletti, 2002b) – in fact 223 people are still resident in the community.

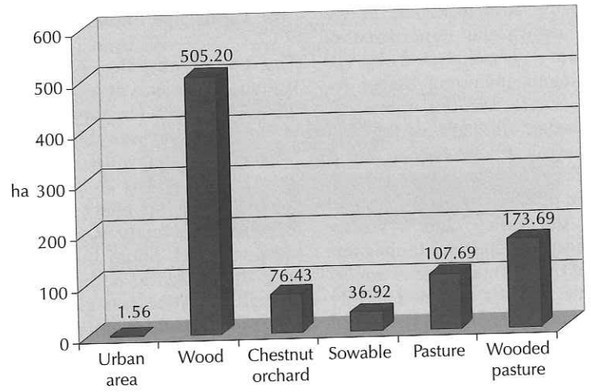

Fig. 5.3. Extent of the main land uses in 1954.

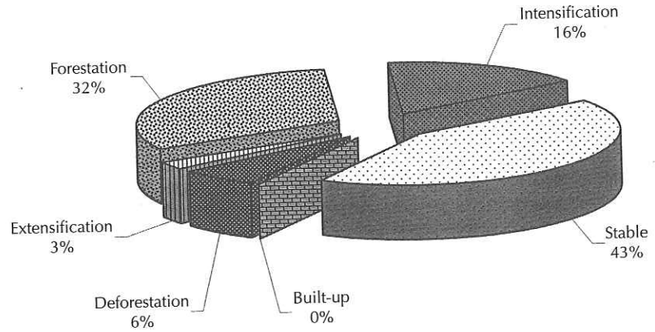

Fig. 5.4. Main landscape dynamics 1832–1954.

Table 5.1. Cross-tabulation 1832–1954.

	Extent in ha	1954						
		Anthropic	High stand	Chestnut orchard	Pasture	Wooded pasture	Sowable	Total
1832	Anthropic	0.61	0.53		0.57	0.00	0.24	1.96
	Woodland	0.13	226.07	2.67	6.56	27.13	19.18	281.73
	Chestnut orchard	0.28	9.69	58.53	0.95	1.80	1.22	72.46
	Sowable	0.13	7.21	2.88	0.78	7.94	29.10	48.05
	Pasture	0.01	34.50	5.09	4.35	13.46	73.70	131.11
	Wooded pasture	0.41	227.84	7.26	23.72	57.41	50.25	366.88
	Total	1.56	505.84	76.43	36.92	107.75	173.69	902.18

The life of the farm described in the account books shows the importance of wood production, demonstrated by 16 different assortments including timber for building, poles, staves, bundles, fuelwood, charcoal and cinder, although all the production decreases towards the Second World War. On the agricultural side there is a strong increase in cereal production, an effect of the new fields in the valley, and a steady decrease of chestnut flour and chestnut production, confirming the decreased importance of chestnut orchards as a food supply for farmers, accompanied by the cutting of many chestnut trees to utilize bark for tannin, turning the chestnut woods into coppice for poles (Agnoletti, 2002a). Although the period after the war saw the sale of the Moscheta farm to the state, the landscape of the 1950s still represented a part of the traditional agrosilvopastoral economy, where the marginalization of unfavourable areas had not yet fully expressed its influence, but the signs of a process affecting the Italian mountains were already there.

The Landscape between 1954 and 2000

The decades after the war confirm the continuous expansion of woodlands, now covering 79% of the territory, followed by 20% of pastures, but sowable land has disappeared from the valley. In terms of land uses, there are now 28 categories, 19 more than in 1954, an effect partly due to the more accurate analysis, allowing also field work to check photo interpretation. However, it is worth noting that landscape diversity in 1954 was given by eight land use types, of which only two were associated with woodlands, while in the year 2000, 21 types out of 28 are woodlands (see Plate 10 and Fig. 5.5). This shows how the local landscape is more and more dominated by the absence of open spaces and characterized by a continuous forest cover. The main dynamics are confirming a large amount of territory remaining unchanged (61%), while 16% of extensification is due to sowable land turned into pastures, and afforestation (8%) is the new element of the

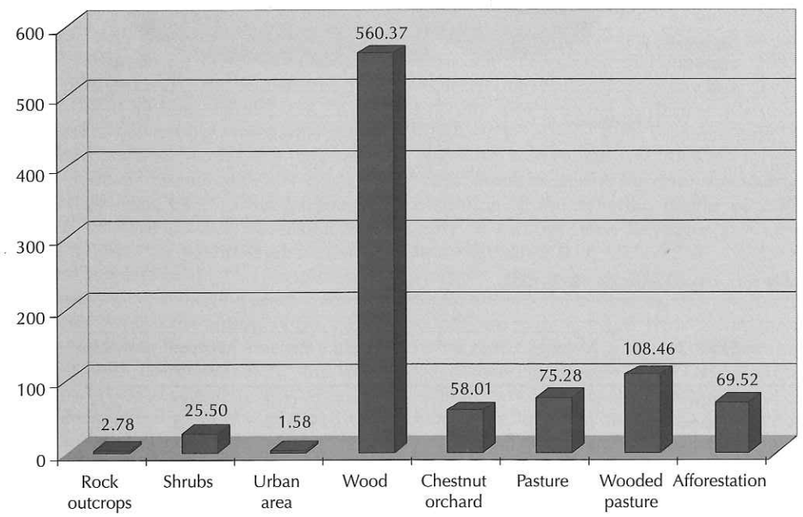

Fig. 5.5. Land use in the year 2000.

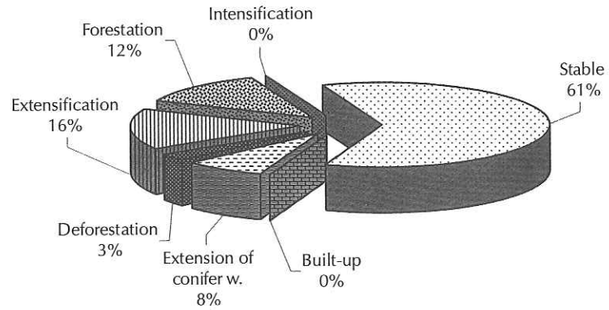

Fig. 5.6. Main landscape dynamics 1954–2000.

landscape (Fig. 5.6). As for the other areas analysed in the project, once again it is confirmed how the first period (1832–1954) is the most important one for landscape changes. The analysis presented in the cross-tabulation of 1954–2000 (Table 5.2) shows that 124 ha of agricultural land is now turned into wood pasture, but another interesting thing is afforestation. As already explained in Chapter 1 about Tuscany, afforestation by the state in Italy started soon after the unification (Agnoletti, 2002b), but a real programme in the study area started only after the sale of the farm to the state and continued after the organization of the Italian state into regions in 1974, when the area passed under the control of the Region of Tuscany (Freschi and Hermanin, 2000).

As clearly shown by Table 5.2, 36% of the plantations occurred on former sowable land, 25% on wooded pastures, 20% on chestnut orchards and 14% on high stands. Looking at the distribution of afforestation on the land-use map, it is clear that there was no real intention to recover degraded areas for soil protection, since very few denuded ridges or high slopes are afforested. The will to extend conifers is instead quite clear, replacing beech and chestnuts that were considered not sufficiently productive. After 50 years the results are insignificant for timber production, dominated in Italy and Tuscany by international markets, but are surely considerable for the landscape, now affected by plantations often having little to do with the cultural landscape of the area, not

Table 5.2. Cross-tabulation 1954–2000.

		2000								
	Extent in ha	Rock outcrops	Shrubs	Anthropic	Woodland	Chestnut orchard	Pasture	Wooded pasture	Afforestation	Total
1954	Anthropic			0.48	0.57	0.23	0.16	0.01	0.13	1.56
	High stand	0.65	5.26		453.47	12.21	3.57	19.37	10.67	505.20
	Chestnut orchard	0.01			19.61	41.66	0.54	0.43	14.18	76.43
	Pasture		4.36	0.22	14.42	0.98	2.41	12.80	1.73	36.92
	Wooded pasture	2.11	12.96	0.20	53.75	1.73	1.01	18.42	17.50	107.69
	Sowable		2.92	0.69	18.54	1.20	67.60	57.43	25.32	173.69
	Total	2.78	25.50	1.58	560.36	58.01	75.28	108.46	69.52	901.49

positively affected from an aesthetic point of view. This at least is the case shown in Plate 7, which needs few words, presenting a problem already posed to Italian foresters in the early 1960s. However, we must also consider that the monks had a fir plantation at the back of the abbey (see Fig. 5.1), presenting a historical and cultural link which accounts for the conservation of a portion of the conifer forests. On the other hand, in the dark internal landscape of the even aged Douglas fir plantation, covered by a layer of dead needles (with no grass or regeneration) one can still see dead stumps, trunks, and the stone huts for drying chestnuts of the pre-existing chestnut grove. The reduction by 23% of chestnut orchards is in line with the pattern observed for Tuscany as a whole, as indicated in Chapter 1, and it is described in terms of dynamics due to natural and human factors by several authors (Cronon, 1983; Vos and Stortelder, 1992; Agnoletti, 2005). This new conifer forest is the clear sign of the absence of farmers and shepherds in the area, replaced by a possible landscape for loggers of lumber companies, but is also a sign of a more widespread European trend (Johann *et al.*, 2004). The population in the year 2000 is now reduced to 15 people in the whole community, but the return of pasture land in the lower part of the valley is due to the activity of the farm 'Le Lame', where horse breeding is now taking place. Pastures in the form of simple pasture, wooded pasture and also pastured woods are still there; in fact a detailed study made on the 'Le Lame' farm shows that 68% of its landscape has not changed since 1832, presenting also a rare example of pastured wood inside a turkey oak stand.

A Synthesis of the Changes 1832–2000

Looking at the changes that took place from 1832, the enormous increase of woodlands is evident, increasing from 353 to 688 ha in the year 2000, a trend already noted in many rural areas submitted to abandonment (Foster *et al.*, 1998). It must also be reported that the period between the 18th and early 19th century is probably the one where we have the lowest extension of forest land, as also noted (although with some local variations) for Europe (Watkins and Kirby, 1998; Agnoletti and Anderson, 2000). A fundamental aspect related to this tendency in Moscheta is the dramatic reduction of landscape diversity, reflecting huge changes from all points of view: social, economic, environmental.

Table 5.3 shows the strong reduction in the number of land uses and patches forming the landscape mosaic, accompanied by the significant increase in their average size and Hill's diversity number, a good example of the transformation from a fine-grained to coarse-grained landscape, an important process also in terms of habitats (McArthur and Levins, 1964; Southwood, 1977). The dominance index is reduced because of the absence of the large patches of pastureland existing in 1832. The diminution of 67% of the land uses and the increase of the average extension of patches by 54% shows the decrease of the complexity of landscape mosaic, since there are no parts of the area presenting fine-grained structure any more. The analysis of the index of Sharpe clearly indicates the existence of two different tendencies for the periods 1832–1954 and 1954–2000 (Fig. 5.7). The first one is characterized by the reduction of wooded pasture

Table 5.3. Indices of landscape ecology for the three years.

	1832	1954	2000
Dominance index	1.03	0.86	0.71
Hill's diversity number	31.85	3.81	14.27
Number of land uses	89	9	29
Average extent of patches	3.39	6.13	5.25
Number of patches	266	147	172

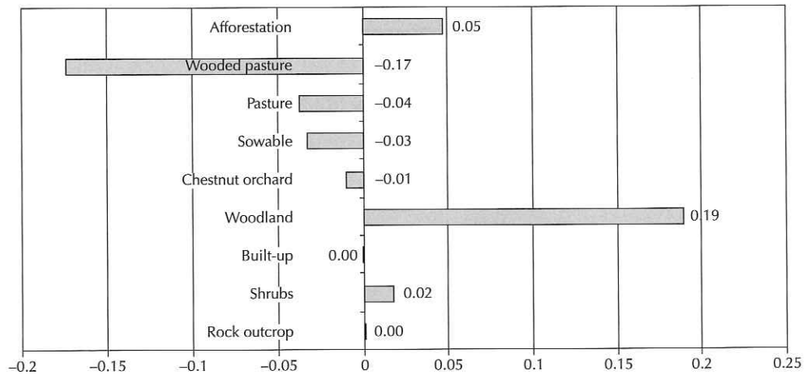

Fig. 5.7. Index of Sharpe. On the left the land uses affected by a reduction, on the right the land uses affected by an increase, the numbers indicating the intensity of the trend.

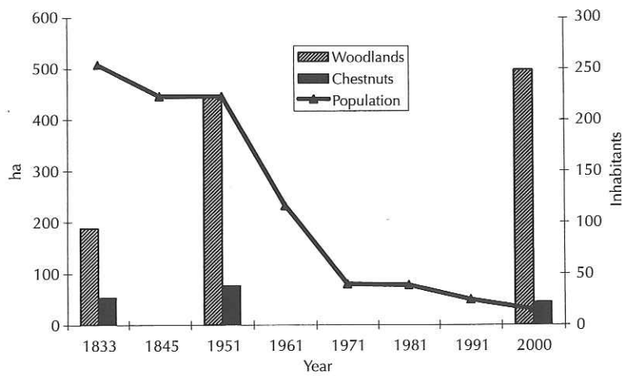

Fig. 5.8. Population and woodlands in Moscheta.

and the increase of woodlands and sowable land, while the second presents the continuous increase of woodlands and afforestation, as well as the decrease of sowable land and wood pasture. It must also be observed that the second period, although not characterized by great changes in terms of surfaces, indicates significant tendencies in a much shorter time period. All these changes are happening because of one single main driving force: the action of man. Figure 5.8 presents the relationship between decrease in population, increase of woodlands and the reduction of chestnut orchards, according to a typical pattern for traditional rural societies where changes in population affect local resources. The map of the landscape dynamics (Fig. 5.9) shows the distribution of changes in the territory, which looks like it is being transformed in most of its parts, with none of the differences due to altitudinal belts.

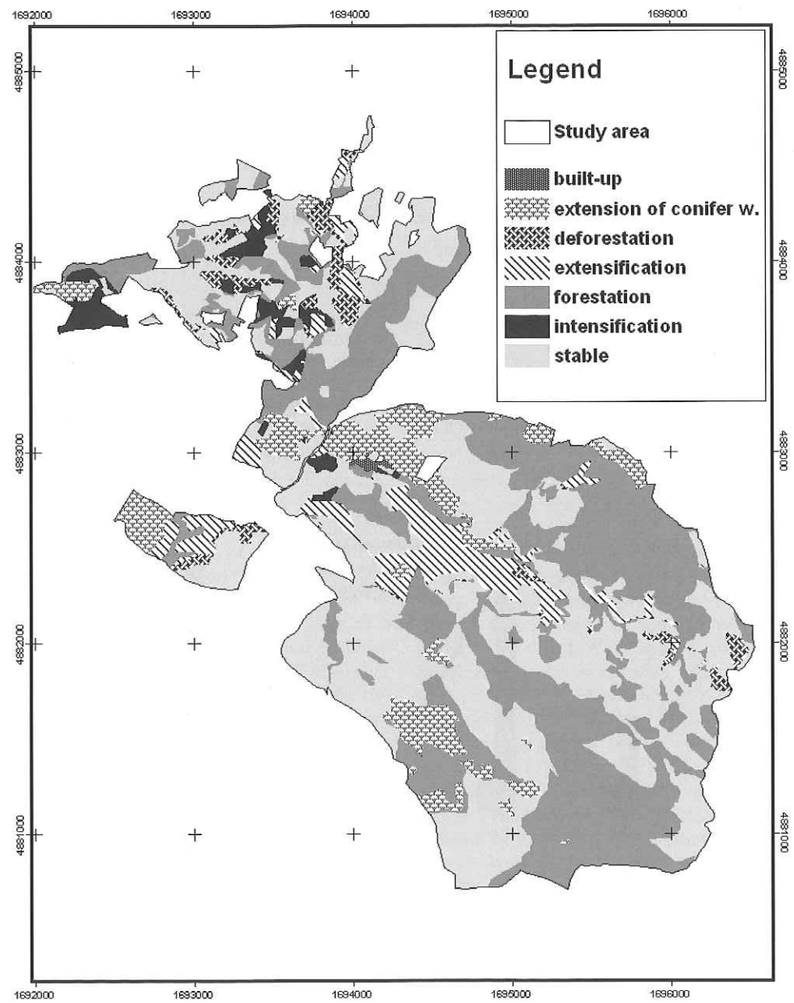

Fig. 5.9. Map of landscape dynamics 1832–2000.

Most of the sampling forays made during the field work were to analyse the dynamics of vegetation in abandoned fields. There is no space here to present the results; however, current successions are dominated by shrubs with *Rosa canina*, *Prunus spinosa* and *Juniperus* entering in former pastureland, showing the prevalence of *Juniperus* in most of the situations according to well-known successional patterns (Peterken, 1981). One study area was the historical chestnut orchard existing on the slopes at the back of the abbey, with an extension of 400 m^2, where there are only four ancient trees left with a diameter of 110, 130, 100 and 90 cm, and height of between 15 and 20 m. The bad health of the trees, with many dead branches and stems, will soon lead to the disappearance of this remnant of the historical landscape (Fig. 5.12), a problem quite widespread all over Tuscany and reported for other areas (Agnoletti, 2005). This orchard is related also to a study conducted on the relationships between land uses and soil during the project. The study has collected eight samples of soils, 50 cm deep, located in chestnut orchards (two samples) and pastures (six samples), including different conditions related to areas classified as stable and slide and under erosion, by the geologists carrying out the study. The pastures are located in the bottom of the valley, at the foot of the slope where the chestnut orchards are. Almost all the soils show the prevalence of a clay matrix, with acidity (pH) between 6.90 and 7.42. Considering also the geological and morphological features, the results of the investigation show the absence of any direct relation between soil quality and land use, confirming that the presence of pastures or chestnuts was only due to the choice of farmers and the owner in order to meet the needs of the estate. In other words, no ecological conditions justify the presence of the two land uses in the area where they are today; the chestnuts could instead have been planted in the valley and the pastures have been placed on the slopes.

The Historical Index

In the case of Moscheta, the historical index (Agnoletti and Maggiari, 2004) was applied also to gather indications for the landscape management plan. The index is used to assess the value of a cultural landscape analysing the changes in time and space of any single land use or patch, creating a hierarchy in which every element has a ranking according to the value of the index. The index requires the definition of a *spatial scale* expressed in ha (Sr), and a *temporal scale* expressed in years (Tr) representing the limits in which the index is applied. Other variables are the *historical geographic distribution* (Hgd), that is the past extension of the land uses at the beginning of the period considered, and the *present geographic distribution* (Pgd), that is the present extension of the land uses, both expressed in ha. The other element of the index is the *historical persistence* (Hp), the number of years of presence of a given land use in the Tr considered, and its value will vary from 0 to 1. After choosing the Sr and Tr, the algorithm to calculate the Hi is the following:

$$Hi = Hp\ (Hgd/Pgd)$$

The index attributes a higher value (Hi) to those elements with a long historical persistence (Hp), but a present geographical distribution (Pgd) smaller than the one of the past. Using the database created with GIS, every land use can be analysed, considering its historical persistence (Hp) and the variation in the extension (Hgd–Pgd). The data resulting not only create a hierarchy that can be referred to single or groups of land uses, but can be represented in maps of the area studied. The maps created can refer to the 'general' Hi and the 'topographical' Hi. In the first case the different colours of the map indicate a single land use or a group of land uses that have different values of the index. In the case of Moscheta this means that any land use existing today has a value, according to the result of the calculation, regardless of the fact that its location today is the same as that of 1832. The highest values indicate an emergency, given the fact that land uses with a long persistence have strongly reduced their extension. This means that management should operate to protect or to restore these land uses, particularly important not only

for the cultural landscape, but also as habitats that are going to disappear. The topographical Hi map instead indicates and classifies only the land uses that are still present in the same exact location as that of 1832, attributing a greater value to them, as they are not separated from their original topographic position.

The study made for Moscheta shows the values indicated in Fig. 5.10, where the highest level of the index is found for the wooded pastures, followed by pastureland, chestnut orchards and urban areas. The general Hi shows that the land uses with the highest values are concentrated in the bottom of the valley (Fig. 5.11), along the 'Fosso di Moscheta' stream, and in some areas of Mount Acuto, while the topographic Hi shows that land uses with the same locations and high values are also located there, but with a much smaller extension. These areas have the most important meaning for the conservation of the cultural landscape of Moscheta. The present structure of the index is quite simple, but leaves several matters unsolved, a problem currently under investigation through the elaboration of a new index using a 'decision tree' model with disaggregate information, trying to solve the matter of the lack of information in between the Trs chosen. However, the index has already been applied in the guidelines for the environmental impact assessment of wind farms for Tuscany.

The Survey of Social Perception and Economic Value

The creation of a park, as well as any other kind of planning, must include the participation of the public in the process. Therefore, a team interviewed 100 people chosen among residents and tourists, asking their opinion about the landscape and also investigating their willingness to pay a tax for its protection, a very important element to create a credible scenario, supporting the questionnaire with photographic documentation. The methodology used was derived from the open-ended contingent valuation method (Mitchell and Carson, 1989; Loomis, 1990), with a list of questions meant to ascertain the knowledge of the landscape and a maximum or a minimum amount to pay in relation to specific measures to protect the landscape. The list of questions was quite specific regarding the land uses and less focused on more general aspects often investigated in similar studies (Phipps, 1996). Concerning the age classes, 39% of the people interviewed had an age between 31 and 45, a category representative of both the highest productive capacity and income level. The cultural level was another important factor affecting the test: 42% of the people had a university degree, 34% had finished high school, while a smaller percentage (7%) had only attended junior high school and 10% primary school.[1] Concerning origins, 74% came

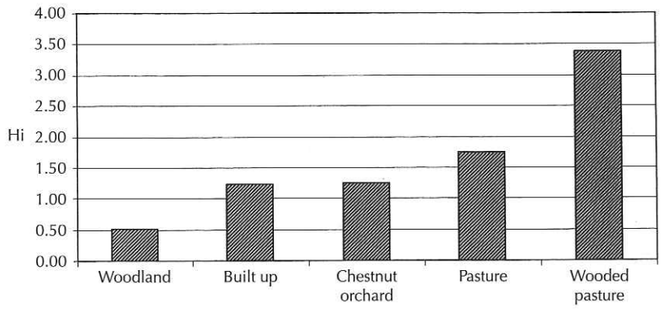

Fig. 5.10. Values of the historical index for Moscheta.

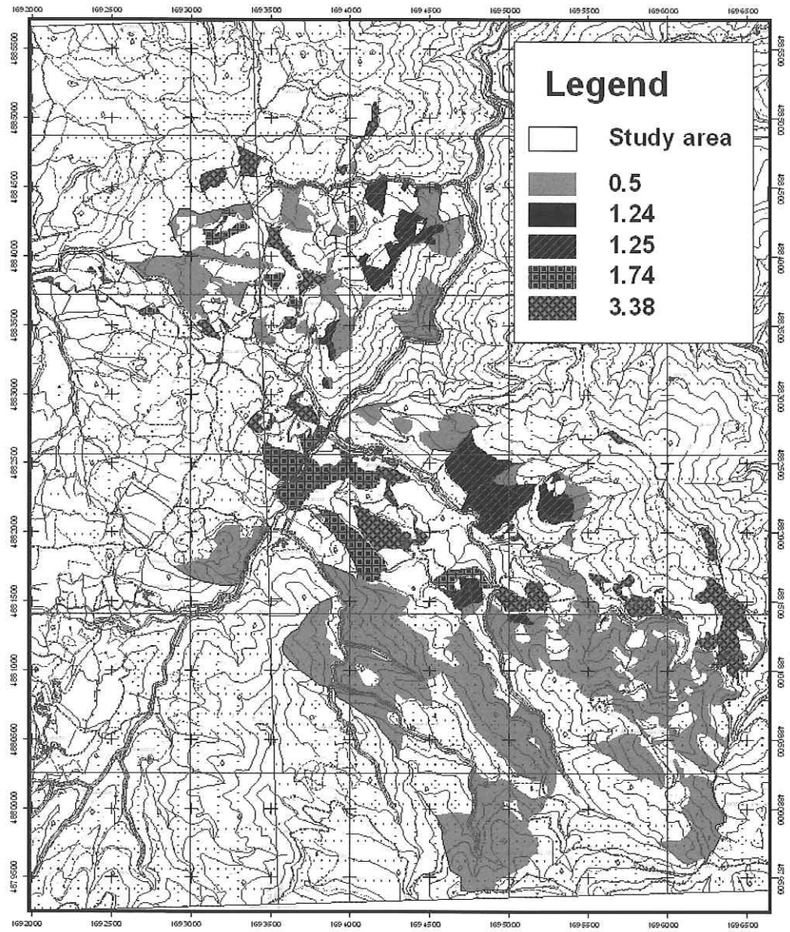

Fig. 5.11. Map of the historical index.

from Tuscany, a common trend since a high percentage of the inhabitants enjoy spending their holidays or free time in the region. Regarding working activities, 35% were private entrepreneurs, 27% were employees, 15% retired people, 6% housewives and 7% students. As for the questions about landscape changes, 55% of those interviewed did not think the landscape had changed in the last decades, while 45% indicated that some changes had occurred, also indicating the reasons.

Most of the people (92%) recognized a positive role of agriculture and silviculture for the landscape, 3% indicated a negative role and 5% did not answer. Abandonment

Table 5.4. Indications coming from interviews. Numbers rating importance are ranked with lowest numbers being most 'important' (i.e. chestnut orchards).

Reason for changes in the landscape (%)		Importance of some elements in the landscape		Indications for public incentives (%)	
Abandonment	43	Chestnut orchards	4	Agriculture	21
Infrastructures	35	Pastures	7	Chestnut orchards	20
Human action	10	Mixed woods	7	Tree rows	11
Lack of mixed cultivations	3	Mixed cultivations	8	Terraces	10
More forests	3	Wooded pastures	8	Coppices	9
More wildlife	3	Fir forests	8	Mixed cultivations	8
Polluted rivers	3	Pine woods	8	Pastures	8
		Tree rows	8	Pine woods	7
		Sowable	9	Wood pastures	6
		Terraces	9		
		Coppice woodland	9		

was clearly indicated as the most important reason for landscape changes (Table 5.4), confirming the result of the historical analysis, while the infrastructures probably refer also to the works for the new railway connecting Bologna and Florence, having a very strong impact on landscape and environment. All the minor aspects indicated, however, represent effective elements of the landscape dynamics occurring in the area. Particularly interesting is the wildlife problem; in fact, the increase of woodlands and also the policy undertaken in recent years of reintroducing animals like wild boar, deer and wolves has favoured a strong increase in their number and in the number of other small mammals. Unfortunately, their high number and the lack of open spaces are contributing to their abnormal increase, allowing them to come closer and closer to the villages and farms, a common problem also in many parks and protected areas in Italy (Filacorda, 1999). The importance given to chestnut orchards also confirms the value given to the role of man and the significance of them as a key element for the cultural identity of the area, although the hierarchy produced by the interviews does not exactly reflect the 'emergencies' revealed by the historical index.

Responding to the need to detect the willingness to pay, the questionnaire proposed some forms of conservation measures, asking which one was considered more important to support. Almost all those interviewed (85%) indicated the need for more than one policy, but the two most important were those to support agriculture and chestnut orchards, while minimum importance was given to the recovery of wooded pastures, which are the element that has nearly disappeared in the landscape. Interviewees were also asked to specify the maximum amount of money acceptable as a form of yearly tax to support these measures. Sixty percent of the people indicated no intention to pay at all, while the rest specified the amount. The resulting average annual amount was 24 euros. Put into context with the social features, it shows that a higher amount was accepted by those having reached only a high-school level education, while those having attended university were prepared to pay 30% less. Concerning working activities, the highest amount was indicated by private entrepreneurs, obviously those with higher availability of income, followed by employees. Another interesting element concerned the reasons for being there, including tourism (25%), recreation (25%), the quality of mountain landscape (11%) and a visit to the small museum in the abbey (12%). In general, the survey showed important attention given to the elements making up the landscape of the area and the role of agriculture and forestry, but also an inverse relationship existing between the cultural level and the will to pay, which was quite surprising.

Back to the Historical Landscape: the Restoration Project

The information collected in the investigation has been elaborated to prepare a plan for the park, which at this stage represents the proposal on which the local authorities will make their final decision concerning the creation of the park. Despite some uncertainties expressed by several studies on what is good or bad concerning grain size in landscape for biodiversity (Angelstam, 1997; Farina, 1998), or the fitness of patch interpretation for the concept of habitat (Mitchell and Powell, 2003), we think that for ecological, cultural and economic reasons it is recommended to recover at least a part of the diversity existing in the past, reducing the process of forestation. A theoretical previous 'non-human-impacted' condition, besides the difficulties in its identification, surely does not correspond to the cultural identity of the area, represented by the period with the deepest links between the people and the land. Nor can one be sure whether this can really be considered the best condition for the health of an ecosystem (Vogt *et al.*, 1997).

It must be pointed out that a project like this, like the forest management plans, must have a long time-period perspective, whose results will only be seen by future generations. In the following paragraphs we are not going to consider other activities related to the inventorying and conservation of a lot of material evidence existing in the territory (dry walls, charcoal places, huts, etc.), as well as the promotion of traditional practices, but rather the intervention needed for the management of the park. In order to create the park there is the need not only to indicate the measures to protect some portions of the territory, but also to 'restore' some of the ancient landscapes. In fact, the simplification of the landscape mosaic occurring in the last two centuries requires a reduction of the amount of certain land-use categories and an increase of others, redistributing them in the territory.

There are several problems connected to this vision. From a technical point of view the actions have been focused on a reduced portion of the territory, in order to find a reasonable size for economic and management reasons. The latter also presents important problems. Official forestry has neglected to incorporate traditional practices in its texts; therefore, even well-known books do not mention them, while others may refer briefly to the existence of traditional silvicultural systems such as wood pastures without detailed information (Perrin, 1954). The other problem is due not only to the lack of any law allowing such a park (in fact only natural parks are foreseen), but also the existence of a regional forest law forbidding the reduction of the extension of woodlands, even in places previously cultivated. This is possible only by doing a compensatory afforestation, or paying an equal amount of money for an afforestation that has to be made somewhere else. Despite special permissions for study and research, this is a problem affecting not only any restoration of former rural mosaics, but even the creation of panoramic sites. Tuscany has hundreds of roads potentially offering outstanding scenery and views of landscapes, but most of them are darkened by trees growing at the sides of these roads, protected by law. Therefore, although this landscape park might find a way to be created, the wider problem of landscape restoration still has a long way to go.

The selection of interventions at landscape scale

The project team prepared a list of potential interventions attributing to each one of them an identification number shown on a map of 'potential interventions', where 193 of them were selected. To each one of them has been allocated an index of 'restoration complexity', classifying them into three categories: (i) low complexity; (ii) medium complexity; and (iii) high complexity.

These categories consider the technical aspects, time and cost of interventions. The main goal of the work has been to recover a fairly good amount of past land uses, considering the historical value, with the aim of increasing the diversity of the landscape and selecting the areas also according to how the future landscape is going to look. The only ecological concern has been the evaluation of the hydro-geological risk concerned with the effects of some of the interventions.

The interventions indicated cover 28% of the total area. The recalculation of the historical index, including the new data resulting from the inclusion of ancient landscape forms, shows the decrease of the value of the index for the categories most threatened and also the inclusion of a category (sowable land) deleted from the area, supporting the effectiveness of the planning (Table 5.5).

Table 5.6 shows the amount of the main land-use categories of 1832 recovered with the percentage of each one of the total area. More details are given in the following paragraph. About 16.2% of the proposed interventions will affect the present surface area occupied by woodlands, and 5.6% will affect afforestation. The map in Plate 11 shows how the new land uses will be distributed in the land, representing the future landscape of the area.

The interventions

The space available does not allow us to provide details of all the categories recovered and their technical descriptions, as in a real management plan, therefore only some general information will be reported for each main land-use type.

The restoration of *woodlands* in six cases shows the recovery of one unit of pastured woods from a high stand of oak; an oak wood unit from a transitory high stand of oak; a beech wood and pastures unit from a conifer stand; beech woods from mixed conifer stands; and beech woods from a transitory beech stand. The substitution of conifers with beech, which will take some time and will necessitate gradual substitution, constitutes the most difficult problem. An important aspect will be the danger for the young seedlings due to browsing by ungulates, today also affecting regular regeneration in beech forests.

Table 5.5. Historical index before and after restoration of the ancient landscape.

Land uses	Hi before	Hi after	Variation
Built up	1.24	1.24	0.00
Woodland	0.50	0.61	0.11
Chestnut orchard	1.25	0.95	–0.27
Sowable land		3.91	3.91
Pasture	1.74	1.21	–0.38
Wooded pasture	3.38	1.87	–1.51

Table 5.6. List of the main land-use categories recovered from the landscape of 1832 and their extent.

Main land uses of 1832 recovered	Area (ha)	% of the total area
Woodlands	50.52	5.60
Chestnut orchards	41.65	4.61
Sowable land	12.30	1.36
Pastures	33.50	3.71
Wooded pastures	114.02	12.63
Total	252.02	27.91

Fig. 5.12. The ancient chestnut orchard near the abbey.

The restoration of *cultivated* patches concerns 13 interventions creating very interesting units, from a cultural and natural point of view, bringing back into this landscape elements that no longer exist. Sowable land with chestnuts, but also with hazelnuts, mulberry trees, walnuts, oaks, as well as kitchen gardens, all represent an opportunity to increase biodiversity, recovering fruit trees usually not considered in the list of endangered species and therefore not protected, but disappearing from this cultural landscape. Cultivated areas were often alternated with pasture land and put close to farmhouses and the abbey, where still today they could present an interesting option for small-scale landscape units, providing typical food for the little local restaurant. All the patches possible to recover are presently occupied by forest trees, such as Douglas fir, oak, beech and some chestnuts. For all of them a gradual removal has been planned.

The restoration of *chestnut* typologies is referred to in seven interventions to recreate ancient patches. The most extended pattern suggested for restoration is the 'mixed chestnut and pasture', presently occupied by partly abandoned chestnut orchards (20 ha), and a Douglas fir stand (12.4 ha) (see Fig. 5.12 for the ancient chestnut orchard and Fig. 5.13 as an illustration of use of the whole tree). For the chestnuts, it is simply a matter of reintroducing grazing, as farmers did to keep the soil clean, while the Douglas firs must be removed and replaced by new chestnut trees. The easiest intervention among those listed is the one related to the conversion of chestnut coppice to 'high stand of chestnut with pastures', although big trees will take several decades to grow, while a moderate

Fig. 5.13. The traditional use of forest trees concerned the whole tree. In this photograph of the Garfagnana valley (1923), the chestnut leaves are harvested and transported with the 'cavagnada' and then put on the floor of the stable (Regione Toscana, 1997).

complexity is given to the realization of mixed chestnut/beech stand.

The restoration of *pastureland* represents a much more complex problem considering how much of this land use has been removed from this landscape and the 62 different interventions foreseen. The possibility to recover pastureland is also linked to the possibility of having animals graze in the area, an opportunity already given by horse breeding and included in the future economic plan for the area, although this has not always worked as expected (Laycock, 1991). It is also relatively more difficult to go back to a pasture compared to developing a wood pasture (Filacorda, 1999); however, these formations can be submitted to a management plan as still occurs in Spain, in order to replace trees. The easiest situations are those related to the transformation of pastures with shrubs into simple pastureland, while the most difficult situations are those considering the restoration of pastures from dense woodlands. In this case, after the removal of trees and their root systems, it is important to facilitate the fast growth of a grass layer to protect the soil from erosion. This intervention has been excluded from steep slopes in order to reduce the danger of erosion.

Conclusions

The research in Moscheta has clearly shown that traditional knowledge was able to create very complex landscape mosaics, richer in biodiversity and cultural values than those existing today after the abandonment of traditional farming activities. From this point of view this study can be considered a sort of regressive long-term experiment on biodiversity, as suggested many years ago (Platt, 1964), but more recently considered impossible (Christiansen *et al*,. 1996). Today the local ecosystem incorporates history, with all the effects of economic, social and environmental factors that acted over this time period that must be considered in future management, as ecologists have also acknowledged (Allen and Hoekstra, 1994; Kay and Schneider, 1994). The real emergency, even at an ecosystem level, seems to be the dramatic reduction of the diversity of spaces, considering also that a healthy ecosystem is not necessarily one with a specific composition and functional organization that is comparable to the natural ecosystems in the same geographic region (Karr and Dudley, 1981). This clearly suggests the introduction of a landscape approach, which the Regional Government of Tuscany has promoted also for the management of protected areas (Agnoletti, 2005), considering that the values reflected by the protected areas, now covering almost 18% of the territory, are basically better expressed by the concept of landscape.[2]

Although the area has been submitted to huge changes, it still shows some evidence of the ancient landscape, in the form of cultural and ecological values expressed by the landscape mosaic, as for many cultural landscapes (Mitchell and Buggey, 2000), presenting also outstanding beauty and aesthetic values. The landscape of Moscheta can be restored, protected and improved. This can be done not by excluding it from present social and economic conditions, but by integrating it into a rural development plan, utilizing both internal and external resources as for other marginal areas (Bartos *et al.*, 1999), taking advantage of the growing importance of services in rural development (Cox *et al.*, 1994), especially those related to landscape (as with agritourism) (Chang *et al.*, 1997–1998; Casini, 2000). The project is surely an ambitious proposal, especially considering the way forestry, environmental protection and rural development is today conceived and applied. Besides the inevitable difficulties there is also the need for such projects in order to generate a debate, hoping that new ideas and visions can develop; but surely something must be changed in the way we are interpreting both environmental changes and sustainable development. However, although the 'context' of the project can be quite different from other situations, we believe that in many other countries, also in developing ones, there is the need to develop such an approach, especially keeping a close link between local people, traditional knowledge and the landscape they have created (Sardjono and Samsoedin, 2001). The recognition, conservation and sustainable management of landscape systems facing economic and cultural globalization seems to be a better way of interpreting sustainable development, rather than the application of paradigmatic views on nature conservation. The degradation of cultural landscapes is not inevitable, as is often suggested. They are a significant resource that needs to be understood, preserved and allowed to evolve.

Notes

1. In the Italian school system children attend 5 years of primary school starting at the age of 5, then 3 years of middle school, 5 years of high school and 5 years of university. The new system has changed university studies according to the Bologna process.
2. Mauro Agnoletti is the author of the project for the guidelines on the conservation and development of landscape resources in the network of protected areas in Tuscany, not yet published.

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