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Catholicism and Conservation: The Potential of Sacred Natural Sites for Biodiversity Management in Central Italy

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Abstract The connection between religion, nature and conservation has become a prominent topic among scholars and conservation practitioners. Numerous studies have shown that spiritual beliefs have contributed to preserving important biodiversity in sacred areas around the world. In Western contexts, however, that link has been underexplored, perhaps due to a common view of Christianity as anti-naturalistic. Here, I rely on a literature review and first-hand observations to identify patterns and trends characterizing Catholic sacred sites in Central Italy. I show that a high proportion of the sites are located in natural areas, and that some types of sites and strands of Catholicism are associated with natural settings more frequently than others. Further, these natural sacred sites often display ecological features that highlight their important conservation role. Greater awareness and consideration of local spiritual heritages are recommended to guarantee more effective and integrated management of the sites.

Keywords Conservation · Sacred natural sites · Biodiversity · Religion and nature · Central Italy

Introduction

The last decade has witnessed an unprecedented rise of interest in the links between religion, nature, and biodiversity conservation. The relation between faith and nature has become a growing topic of inquiry and a promising avenue for the future of conservation (Wilson 2002; Palmer and Finlay 2003; Wild and McLeod 2008). Religion, it is argued, can contribute to environmental conservation in two fundamental ways: indirectly, by influencing the way people perceive and act towards it; and directly, by enforcing actual protection of areas that are set apart by virtue of their symbolic or spiritual value (Dudley *et al.* 2006; Bhagwat *et al.* 2011).

As human geographer Yi-Fu Tuan highlights, spatial concepts of apartness and enclosure are inherent to the very etymology and notion of "sacred" (Tuan 1978). Associations of sanctity with natural and geographical features have been documented among most religions (Dudley *et al.* 2006) and on every continent except for Antarctica (Bhagwat and Rutte 2006). Further, a growing body of research has demonstrated that those holy and revered places – commonly referred to as sacred natural sites (SNS) – have often contributed to preserving significant biodiversity in different regions of East Asia and Africa (reviewed in Ormsby and Bhagwat 2010; and Dudley *et al.* 2010), to the extent that they could be thought of as "the oldest method of habitat conservation" (Dudley *et al.* 2009).

This link between sacredness and natural areas has rightly been deemed to offer crucial opportunities. At the applied level, SNS form a "«shadow» conservation network" (Dudley *et al.* 2009) that can integrate and complement existing protected areas (PAs) by conserving habitats and species not represented in official conservation schemes (Bhagwat and Rutte 2006; Ormsby and Bhagwat 2010) and improving connectivity in agricultural landscapes (Bhagwat *et al.* 2005). Moreover, by being coherent with local practices and traditions, SNS are a paradigmatic example of community-based conservation (Ostrom 1990; Berkes and Folke 1998; Colding and Folke 2001; Berkes 2004; Borrini-Feyerabend *et al.* 2007; Rutte 2011) that relies upon local people's understanding and involvement and, as such, is less prone to many of the flaws and limitations of state-driven conservation efforts (Sinclair *et al.* 2000; Stern *et al.* 2001; Brown 2003). From a more theoretical angle, the presence of a symbolic link between spiritual beliefs and the environment confirms the global prominence of "intangible" values of nature not only as fundamental and effective drivers of conservation (Jepson and Canney 2003; McCauley 2006),

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but also as the possible ultimate source of a conservationist ethos (Ramakrishnan 2003).

Despite the universal relevance of similar insights, the empirical study of the relation between religion and environment has remained mostly confined to animistic beliefs and traditional cultures, and touched only peripherally on Christianity or Western contexts. Interest in that direction has been increasing in recent years, partly thanks to the work of the Delos Initiative, which was promoted by members of key environmental NGOs as a first explicit attempt to methodically investigate the role of SNS in Western countries (Mallarach and Papayannis 2006; Papayannis and Mallarach 2007; Mallarach *et al.* 2010).

In studies and contributions to date, an important link between Christianity and conservation has been documented in Ethiopia, where thousands of small forest fragments encircling Christian churches are important for the conservation of woody species and forest ecosystems (Aerts *et al.* 2006; Wassie *et al.* 2010; Cardelús *et al.* 2012). Within Europe, Greece's renowned sites of Meteora (Lyratzaki 2006) and Mount Athos (Papayannis 2006; Philippou and Kontos 2007) have been pointed out as instances of the bond between environmental values and Eastern Orthodox monasticism. Also in a Catholic context, the conservation of a few forests in France and Italy is said to have directly benefited from the presence of religious settlements (Nabhan 1993; Nolan and Nolan 1997), and saints such as Pope Celestine V (Golinelli 2006) and especially Francis of Assisi (Armstrong 1973; Nabhan 1993; and Kiser 2003), have often been associated with "proto-ecological" sensibilities. Finally, a close relation between Christian sites and biodiversity-rich PAs has been highlighted by several of the case studies of the Delos Initiative (Mallarach and Papayannis 2006; Papayannis and Mallarach 2007; Mallarach *et al.* 2010). Similar evidences, however, have remained scattered, and to my knowledge no survey, mapping, or quantitative study has yet attempted to systematically investigate the occurrence and possible contribution to conservation of SNS in Western Christian contexts.

In this study, I seek to begin filling that gap. I rely on an extensive survey of Catholic sites in Central Italy and first-hand observations collected during reconnaissance visits to sample SNS, to test the relationship between sacred places and natural landscapes, and analyse patterns and characters of SNS in the Roman Catholic tradition. I build my hypotheses upon three assumptions: (1) rare but significant occurrences of SNS have been recorded in Western Europe (as reviewed above); (2) environmental attitudes can vary considerably within Roman Catholicism itself (Binde 2001), with some strands – such as the one initiated by St. Francis of Assisi – displaying a more marked "ecological" sensibility than others (Armstrong 1973; Nabhan 1993); and (3) a connection with natural elements seems to be more common among more ancient religious sites, probably due to the influence of animistic cults from the pre-Christian era (Nolan and Nolan 1997). I then examine how frequently SNS are found in a Catholic context, and their distinctive traits. I interpret the results in light of Catholic history and discuss their possible significance for conservation, management, and future research.

Methods

Study Area and Religious Background

Central Italy includes six administrative regions: Tuscany, Marche, Umbria, Lazio, Abruzzi, and Molise, covering more than 70,000 km^2, and falling between 41°13′22.00″N – 44°28′41.90″N and 9°41′26.80″E – 14°46′58.80″E (Fig. 1). Land morphology is characterized by the prevalence of hills (62.4 %) and mountains (34.2 %), whereas plains are scarce (3.3 %) being limited to the coastline and a few valley-bottoms. The elevations in the region are part of the Apennine Range, which traverses the peninsula from the Po Plain in the north to the tip of Calabria in the south; the highest peak is Corno Grande (2,912 masl) in Abruzzi. Almost one quarter of the land surface is part of an official PA. National Parks – the oldest form of PA in modern Italy (Sievert 2000) – cover ca.5 % of the study area and include the Parks of Gran Sasso, Majella, Monti Sibillini, and the celebrated and long-established Park of Abruzzi, Lazio and Molise (Pratesi and Tassi 1998). Regional parks and other state-managed reserves account for an additional ca.7 % of protected land, while the remaining portion (ca. 11 %) is represented by areas more recently included in the Natura 2000 network (EU 1992), or regulated by international agreements such as the Ramsar Convention.

I chose this focus area as it is one of the most important biodiversity hotspots in Europe and in the Mediterranean biome (Myers *et al.* 2000; Olson and Dinerstein 2002), and due to its outstanding religious heritage.

Roman Catholic religious communities and institutes are organized in *orders*, which share common rules and discipline (Rapley 2005: 617–618). St Benedict of Nursia and St Francis of Assisi, both born in this area, are regarded as pivotal figures in the development of Catholicism, having founded the Benedictine and Franciscan orders, respectively. The Benedictine order, founded in the sixth century, was not the first monastic order in Western Christianity, but quickly became the most influential (Salvatorelli 1929; Dunn 2000). Its Rule prescribed (1) lifelong attachment to a single place, (2) separation from the outside world, and (3) self-sufficiency of the religious community (Sause 2003: 782; see also Wendebourg 2005: 628). Over the centuries, other orders were founded directly inspired by the Rule of St. Benedict, aimed at reforming monastic life, including the Camaldolese, Carthusians, Cistercians, and Celestines (Lawrence 1984; Leyser 1984).

Fig. 1 Central Italy includes six administrative regions: Tuscany, Marche, Umbria, Lazio, Abruzzi, and Molise

The teachings of St. Francis were also largely directed at reforming what was perceived as the spreading decadence of monasticism. Franciscan brethren symbolically gave up all forms of property, accepting only charity for a living (Robson 2006). This came to be one of the fundamental distinctions between the new institutions, known as *mendicant orders,* and traditional monastic communities, which achieved self-sufficiency through land ownership and manual labor. Franciscans and Dominicans, founded in the thirteenth century by Francis of Assisi and Dominic Guzman respectively, were the first mendicant orders, but others followed, including Augustinians, Servites, and, later, Discalced Carmelites (Boyle 2003).

The thriving activities of religious institutions in Italy came to a halt in the nineteenth century due to the radical program of secularization pushed forward by the newly formed Italian state. In particular, with the "suppression laws" of 1866 and 1867 most religious goods and ecclesiastic estates were expropriated and became state properties or were sold to private purchasers (Romanato 2007). In the following decades, despite efforts to reorganize and regain lost properties, the importance and size of religious orders and the extent of their possessions never reached levels comparable to those prior to the suppression laws.

In addition to the considerable historical influence of the monastic orders, Central Italy is also dotted with pre-Christian popular beliefs and devotions which have survived and mingled with the broader religious context, giving rise to local reinterpretations of Catholic traditions. Such folk beliefs are often related to memories of local hermits and holy persons who, especially in the Middle Ages, lived as hermits, outside of the official orders, and gained reputations among local people for holiness and performing miracles. Although the Church openly discouraged this sparse army of "grassroots" ascetics and their veneration (Merlo 1989b; Dal Pino 2004; Kleinberg 2005), it never fully succeeded in uprooting the phenomenon, and occasionally was even forced by popular pressure to formalize local devotions in the worship of new saints (Geary 1986). In other cases, folk beliefs have remained more obviously associated

with natural features, the cycle of seasons, and the rhythms of agricultural life (e.g., Micati 2007; De Waal 2012). Whatever their source, local folk beliefs have always represented an important religious element in all regions of Central Italy, and constitute a second fundamental source of spiritual life, sometimes integrated with, sometimes independent from the activity of the monastic orders and ecclesiastical authorities.

Data Collection and Sacred Sites Inventorying and Classification

Between May and June 2010, I systematically searched public libraries and book vendors for bibliographical references to Catholic sacred sites in the study area. I was able to identify a total of nine suitable publications, mostly consisting of travel guidebooks of general character and different inspiration (Romanò 1990; Bosi 1992; Gottardo and Gamba 1994; Cuccini and Giorgi 2000; Grasselli and Tarallo 2000; Feo 2001; Farnedi 2006; Micati 2007; Antinori 2009). These sources provided a total of 539 locations, which I inventoried and classified along 15 variables designed as to provide essential information on geographic location, site type, religious affiliation, chronology of religious history, and environmental setting (Table 1).

Location Geographic location of the sites was recorded according to the basic territorial subdivisions of the Italian state: administrative region, district, and municipality.

Religious Affiliation Religious affiliation was defined as the recorded presence of one of the Catholic orders. A total of 14 main orders were identified in the sources and used as levels in the classification: Augustinians, Basilians, Benedictines, Camaldolese, Canons Regular, Carmelites, Carthusians, Celestines, Cistercians, Dominicans, Franciscans, Lay Clergy, Passionists, Salesians, and Servites. Spurious occurrences of other orders were aggregated under "Others". Up to two orders were recorded for each site, although in numerous instances even more were known to have alternated at the same location. In such cases, the two more representative were selected (e.g., those credited with the foundation of the site or the longest occupation).

Site Type Site type was defined as a binary combination of four levels: convent, hermitage, monastery, and shrine. *Shrine* "refers to a place, usually the object of pilgrimages, where a relic, miraculous statue or picture, or other holy object receives special veneration" (Gillett 2003: 88); *monastery* and *convent*, although used interchangeably in common speech, literally denote the residences of monastic and mendicant communities respectively (Ryan and Espelage 2003: 231; Sause 2003: 782); *hermitage* loosely indicates the dwelling of "persons who have retired into solitude to lead the religious life" (Donahue 2003: 799) - understandably, hermitages are frequently located in deserted and remote areas. Finally, residence sites of consecrated communities can also be identified as shrines if a relic is venerated there. My classification accounted for such instances by producing combinations e.g., "convent-shrine".

Chronology of Religious Presence An overview of the documented religious activity was recorded through four distinct variables. The binomial variable *pre-Christian site* indicated whether a site had also been used for religious purposes in pre-Christian times: only explicit archaeological evidence, and no indirect assumptions (such as the survival of unusual traditions or pre-Christian festival dates), were taken as a positive indication. *Time Catholic*, instead, referred to the period (generally the year, but often approximated to decade or century) in which Catholic presence started at each site, as reported in the sources. The binomial variable *currently active* reported whether a site is currently used or has lost its religious function: convents, hermitages, and monasteries are considered active if a community dwells there, shrines if they are foci of worship and visits. *Time abandoned*, finally, specified the period (year or closest approximation available) when religious abandonment of a site began.

Environmental Setting Altitude above sea level and land-cover type were used to offer a snapshot of the environment found at each site. Land-covers were classified as binary combinations of the six following levels, drawn from site descriptions in the sources: agrarian, city centre, city periphery, forest, forest traces and mountain. Use of binary combinations was motivated by the need to account for heterogeneity in land-cover around numerous sites (e.g., cultivated areas situated at the borders of urban settlements, categorized as "city periphery-agrarian"). In case of

Table 1 List and grouping of the variables used for sacred sites inventorying

Site characterization				
Location	Site type and denomination	Religious affiliation	Religious chronology	Environmental setting
1. Region	4. Site type 1	7. Order 1	9. Pre-Christian site	13. Land-cover type 1
2. District	5. Site type 2	8. Order 2	10. Time Catholic	14. Land-cover type 2
3. Location	6. Site name		11. Currently active	15. Altitude
			12. Time abandoned	

homogenous land-covers, a single factor was employed. Remote sensing imagery (Google EarthTM) was used to double-check and confirm land-covers around each site, and estimate altitude in case it was not reported in the sources. Successively, all combinations of land-cover type were organized in three meta-categories ordered along a built-natural continuum and coarsely defining environment type: built, semi-natural, and natural (Table 2). Admittedly, "natural" is a slippery term (for example, Poviltis 2002; and Ridder 2007), and even more so when applied to the highly anthropogenic landscapes of Western Europe. Here, it is loosely used as an umbrella label to indicate: (1) the prominence of vegetation cover like forests and mountain shrubs or grasslands; and (2) the absence or near absence of more intrusive land-uses, such as built areas and intensive agriculture.

Following this inventorying phase, reconnaissance visits were conducted at 100 sample SNS, if possible accompanied by local people. The visits took place between June 2010 and March 2011, and were aimed at acquiring a sense for the form, size, and range of diversity of SNS in the area. For that purpose, I broadly considered as SNS all religious settlements found in natural surroundings, independently of whether natural features are explicit foci of veneration at those sites. Although this might represent a relatively loose definition, it is coherent with existing literature on SNS in Europe (Papayannis and Mallarach 2007), and the observation that natural patches surrounding religious buildings are protected in many faiths, and therefore valuable for conservation potential (Dudley *et al.* 2009). During the reconnaissance, basic environmental traits were recorded, including dominant vegetation assemblages, and presence of old-growth trees or other prominent features (e.g., water, grotto). Indications of the size of the natural patch around sacred sites were derived from extant information (e.g., information panels, oral communications with local community members) whenever possible. Alternatively, they were estimated by walking through the patches and marking distances with a handheld GPS device.

Table 2 Classification of land-cover and environment types

Environment Type	Land-cover type 1	Land-cover type 2
Built	City center	
	City periphery	
Semi-natural	Agrarian	
	Agrarian	Forest traces
	City periphery	Agrarian
	City periphery	Forest
	City periphery	Forest traces
Natural	Agrarian	Forest
	Forest	
	Mountain	
	Mountain	Forest

Observations on the size and architecture of built heritage and visible anthropogenic pressures were also noted.

Statistical Analyses

Frequency distributions and descriptive statistics for relevant variables were extrapolated from the database of sacred sites compiled at the beginning of the study. To further test the hypotheses that environmental settings vary in accordance to specific orders and periods of site foundation, I produced contingency tables for each pair of variables and performed Pearson's χ^2-test of independence. Data manipulations and statistical analyses were carried out with the software R v. 2.12.2 (R Core Team 2011).

Scope and Limitations

The inventory of sacred sites compiled and used in this study is not a complete census of all Catholic settlements in Central Italy, nor was it intended as such. Rather, it was designed to offer an analytical snapshot of patterns and trends characterizing the relation between Catholicism and environment in the area.

Complete site characterization was not always possible, due to gaps and uncertainties in the documented history of the sites. In particular, evidences of pre-Christian worship depended on the uneven quality and availability of local studies and archaeological investigations. Similarly, indications on the age of Catholic activity were not available in 38 instances (i.e., ca. 7 % of all sites), and approximated to century in another 200 cases.

Finally, systematic estimation of the size of SNS was often problematic due to uncertain property rights and lack of demarcated borders at SNS. As SNS in the area are frequently set in larger natural landscapes (e.g., forests, mountain grasslands) and not delimited by evident boundaries, in numerous cases it was impossible to clearly distinguish the area pertaining to or influenced by the sacred site from the wider natural cover through remote sensing imagery alone. Observation of certain ecological patterns (e.g., change in forest structure or species assemblages) during reconnaissance visits could occasionally hint at a border between SNS and broader landscape: when feasible, crude estimates of SNS size were collected this way.

Results

Sacred Sites Inventory and Statistical Analyses

Of the 539 sacred sites identified in the study area, 307, were located in natural or semi-natural landscapes, whereas the remaining 232 fell within urban centres or predominantly

built areas (Fig. 2). "City centre" was the most common land-cover type (31 % of all cases), followed by "forest" (18 %), "agrarian" (14 %), "city periphery" (12 %), and "mountain" (5 %). Only a minority of sites were located in mixed land-covers.

The distribution of sacred places across environment types varied significantly for different orders (Pearson's χ^2 test of independence: χ^2=90.10, *df*=32, *n*=671, p<0.0001; Fig. 3). Camaldolese were the most likely order to occur in natural areas (ca. 60 %), followed by Canons Regular (40 %), Carthusians (38 %), Celestines (37 %), Cistercians (34 %), Passionists (33 %), and Franciscans (33 %). Furthermore, natural locations were very frequent (54 % of cases) for sacred places not explicitly affiliated with any of the orders. Institutions such as the Dominicans and Salesians were mainly confined to built environments (78 % and 80 % respectively).

The distribution of environment types also varied significantly across periods of site foundation (Pearson's χ^2 test of independence: χ^2=63.08, *df*=12, *n*=501, p<0.0001; Fig. 4). The proportion of natural and semi-natural settings was notably high (≥ 60 %) for sacred sites founded during the early and High Middle Ages (i.e., 700 through 1,300), while it dramatically decreased in the following periods: less than 20 % of the settlements founded since the Renaissance were in natural locations. Also, natural and semi-natural sites were more likely to have been abandoned as religious centres (31 % and 29 % respectively), while only a very few urban sites (3 %) were found to be abandoned (Table 3). The highest rates of abandonment affected hermitages and monasteries set in peripheral locations, while shrines lost their religious significance in the smallest proportion (3 %) and only if located in remote areas: no shrines in urban or semi-natural contexts had been abandoned.

Finally, archaeological evidence of pre-Christian worship was found at only 23 sites (ca. 4 % of the total; Table 4). A higher proportion of natural sites had pre-Christian associations than built and semi-natural ones (8 %, against 5 % and 4 % respectively), and such evidence was substantially more frequent at shrines than other site types.

Reconnaissance and Qualitative Appraisal of SNS

The sample of visited SNS spanned from a single hermit cave to dozens of hectares of forested estate, and varied greatly also in relation to the presence and extent of historic buildings and the prominence of natural features. Site type generally was a poor predictor of those variations although it accounted for a few regularities.

Residence settlements such as convents and monasteries invariably consisted of relatively large buildings. Parcels used for subsistence agriculture and different amounts of forested estate surrounding the structures also constituted a very common feature of most residence sites (Fig. 5a). No systematic architectural patterns, however, appeared to be

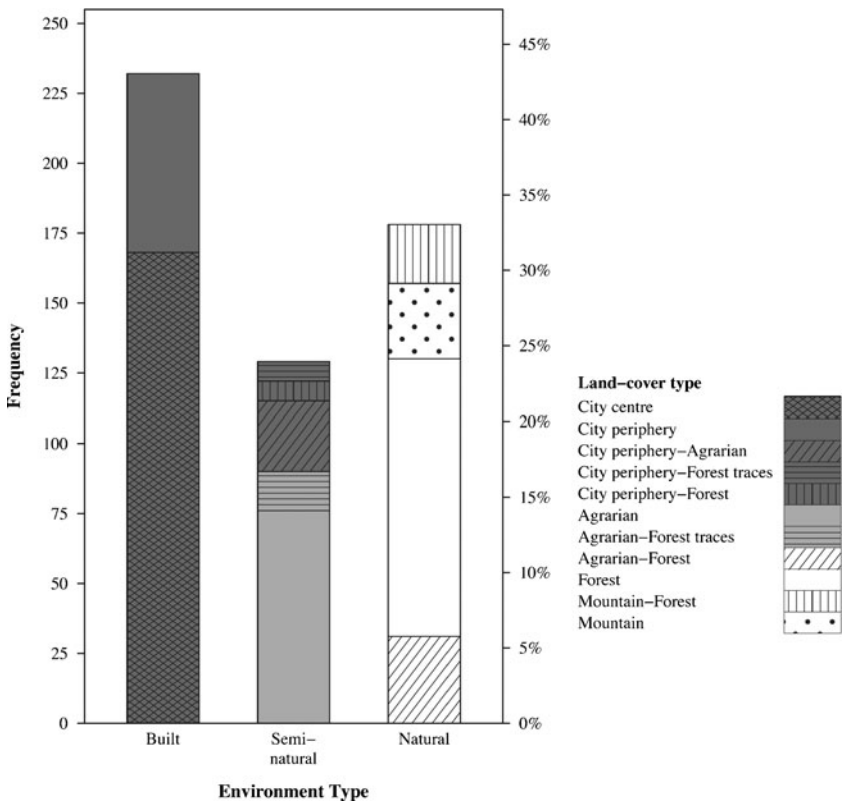

Fig. 2 Absolute and proportional distribution of sacred sites across environment and land-cover types

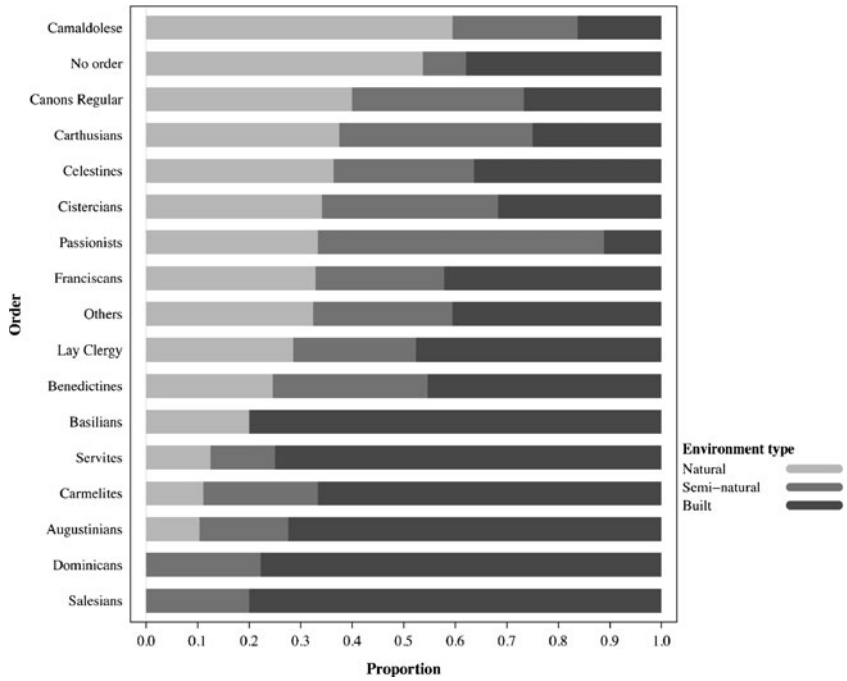

Fig. 3 Proportion of settlements located in the three different types of environment for each religious order. *Note.* Pearson's χ^2 test of independence for the relative contingency table: $\chi^2=90.10$, $df=32$, $n=671$, $p<0.0001$

associated with either type: rupestral constructions dramatically leaning on steep rock faces, for example, were found in connection to both site types (Fig. 5b, c). Distinctive architecture, rather, was generally (although not necessarily) related to different orders: for example, Camaldolese monasteries, Charterhouses (residences of the Carthusian order), and early Franciscan settlements of brick and stone. The terms *hermitage* and *shrine* proved to be even more vague,

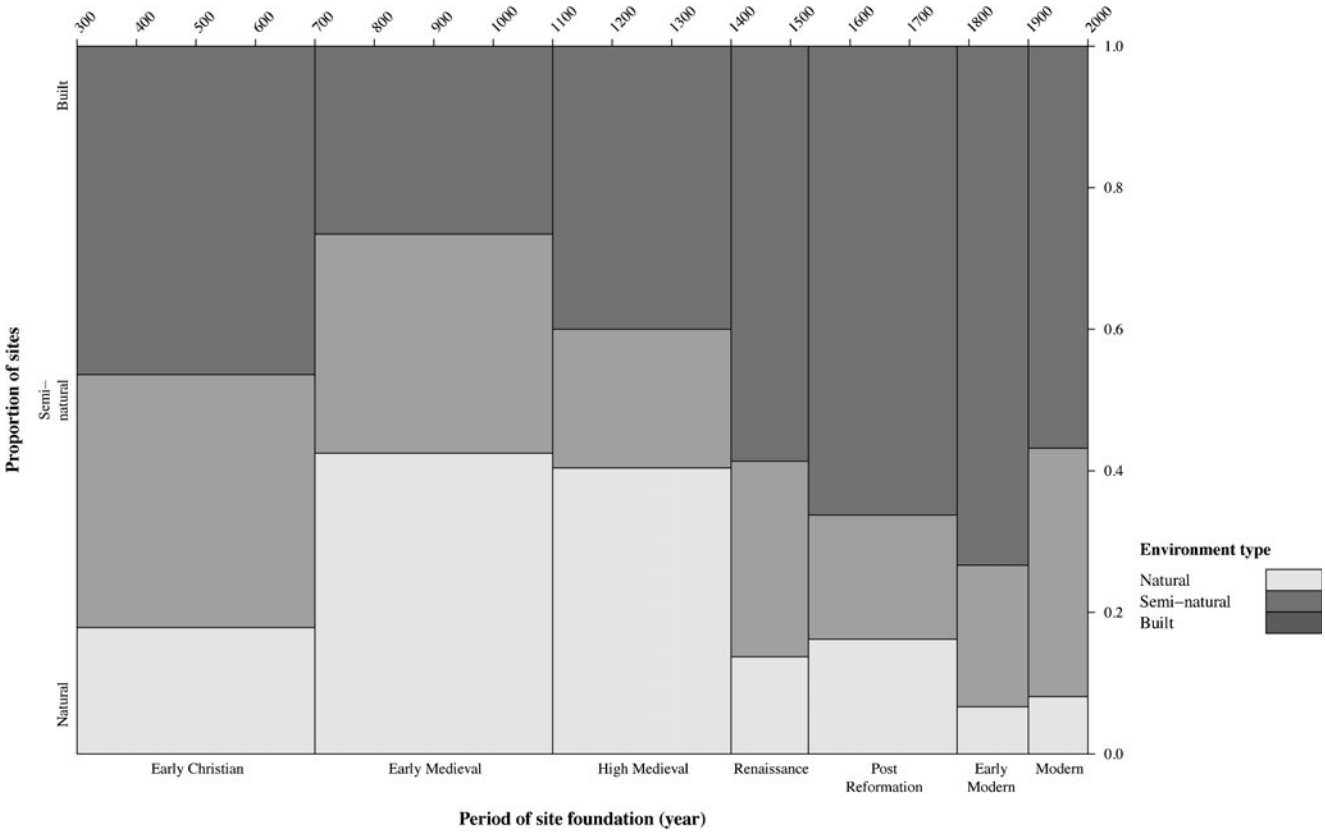

Fig. 4 Proportion of sacred sites located in each environment type by period of site foundation. *Note.* Pearson's χ^2 test of independence: $\chi^2=63.08$, $df=12$, $n=501$, $p<0.0001$

Table 3 Abandonment of sacred sites

Site type[a]	Environment type[a]			Total[b]
	Built	Semi-natural	Natural	
Convent	1	1	1	3
	2 %	4 %	6 %	4 %
Hermitage	0	4	37	41
	-	67 %	54 %	55 %
Monastery	6	32	12	50
	7 %	56 %	40 %	30 %
Shrine	0	0	6	6
	0 %	0 %	10 %	3 %
Total[c]	7	37	56	100
	3 %	29 %	31 %	19 %

[a] Percentage of abandoned sites in each combination of site type and environment type

[b] Percentage of abandoned sites in each site type

[c] Percentage of abandoned sites in each type of environment

as they were found in a wider spectrum of sites: they could be variously an unadorned cave (Fig. 6a), modest buildings embedded in caves or in forested or mountainous surroundings (Fig. 6b-c), or monumental structures accommodating hundreds of pilgrims or supporting dozens of monks and ascetics (Fig. 6d-e).

Natural features were explicit objects of worship and devotion at nearly 30 % of the visited SNS. These included: grottos venerated after an apparition of the Archangel Michael, or for having been the dwelling of a saint (e.g., St. Benedict at Sacro Speco in Subiaco, and St. Francis in numerous sites across the study area); particular rock formations endowed with therapeutic powers; holy water springs; and individual trees of various species (e.g., *Quercus ilex*, *Quercus pubescens*). Even when natural elements of these sorts constituted a main focus of devotion, however, historic buildings predominated, as chapels or larger structures were progressively built around or beside the original sacred feature (Figs. 5b-c, 6b-c). The only site where no building whatsoever was found was the Leccio delle Ripe, Tuscany, where an eight-century old *Quercus ilex*, sacred for having offered respite to St. Francis during one of his journeys, is venerated as a shrine: it remains a destination of pilgrimages, annual processions, and prayers, and vows are hung in its branches or placed at its roots in the form of small wooden crosses (Fig. 7a).

Table 4 Evidences of pre-Christian worships at sacred sites

Site type[a]	Environment type[a]			Total[b]
	Built	Semi-natural	Natural	
Convent	0	1	1	2
	0 %	4 %	6 %	2 %
Hermitage	-	0	1	1
	-	0 %	1 %	1 %
Monastery	1	2	1	4
	1 %	4 %	3 %	3 %
Shrine	6	2	8	16
	6 %	5 %	13 %	12 %
Total[c]	7	5	11	23
	5 %	4 %	8 %	4 %

[a] Percentage of sites with a documented presence of pre-Christian worships in each combination of site type and environment type

[b] Percentage of sites with a documented presence of pre-Christian worships in each site type

[c] Percentage of sites with a documented presence of pre-Christian worships in each type of environment

As indicated by the quantitative analyses above, forests were the most common type of environment found in connection with SNS. Most frequently, SNS forests were dominated by species native to the Italian sclerophyllus and semideciduous forests ecoregion (Olson and Dinerstein 2002): *Quercus ilex*, or assemblages of *Quercus pubescens*, *Ostrya carpinifolia* and *Fraxinus ornus*, were especially common. *Fagus sylvatica* occurred more rarely, and was generally found above 1,000 masl and in association with *Acer opalus*. Evergreen species were seldom encountered at SNS, although large covers of silver fir (*Abies alba*) were renowned for providing the basis to the sustainable forestry practices of the Camaldolese (Romano 2010), and indeed were found in connection with that order at the settlements of Camaldoli and Monte Corona.

Another distinctive association between tree species and religious orders was noted with regards to *Quercus ilex* and Franciscans. In several instances, Franciscan sites (such as Greccio, Fig. 5b) were found to have maintained the only populations of *Quercus ilex* recognizable at the landscape level. Rare vegetation assemblages were also recorded around other SNS. These included one of the few relic parcels of beech woodland below 800 masl (hermitage of St. Maria Valdisasso) and floodplain forest (hermitage Frati Bianchi) left in the entire Marche region. In several other instances, SNS were associated with trees of notably large diameter, ranging from substantial patches of old-growth beech forest (e.g., Sanctuary Madonna del Canneto, Fig. 6d) to individual monumental specimens, such as Leccio delle Ripe mentioned above (Fig. 7a). In at least one case, forest conservation at Catholic SNS was continuous from pre-Christian times: the Franciscan convent of Monteluco di Spoleto, Umbria, lies beside an ancient holm-oak grove that was protected as a sacred site in Roman times (Fig. 7c).

In addition to similar floristic traits, an element that often characterized the ecology of SNS was the presence of a water

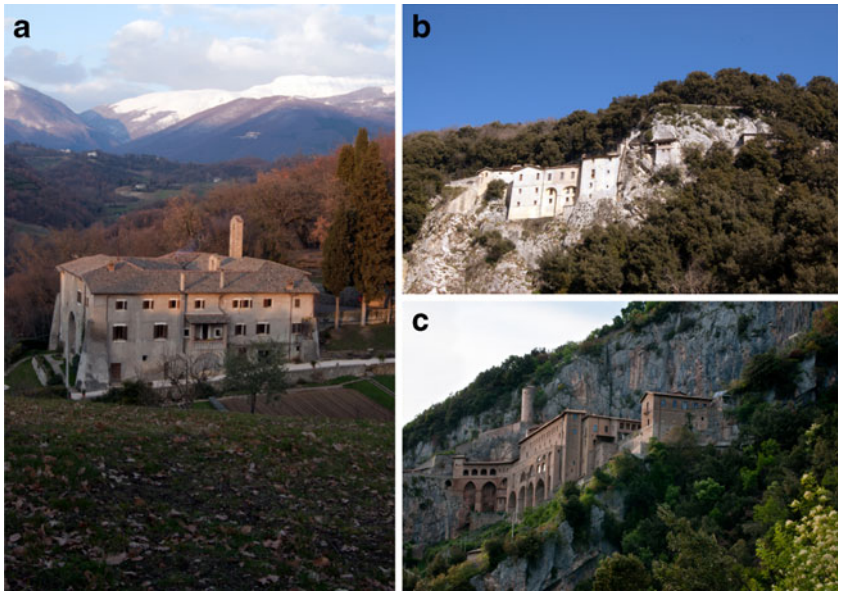

Fig. 5 Convents and monasteries are often found in natural settings. Clockwise from left: (**a**) Franciscan convent La Foresta; (**b**) Franciscan convent-sanctuary of Greccio; (**c**) Benedictine monastery Sacro Speco in Subiaco. No distinctive traits seem specifically associated with either type: agricultural parcels for sustenance agriculture (**a**) are common for both, and both monasteries and convents can consist of rupestral architectures carved into the rock (**b-c**). It is frequent, finally, that these major residences of religious communities were built around an original natural feature (i.e., grotto), sacred to a founding father such as St. Benedict (**b**) or St. Francis (**c**)

source: karstic phenomena and percolation through calcareous rocks (Fig. 7b); water wells (as found in the courtyard of all Franciscan settlements); above ground watercourses; and mountain springs (Fig. 6b). Above ground flowing water sustained substantial patches of riparian vegetation near the sacred site.

In a majority of cases sacred sites were associated with official PAs. Of the SNS reviewed, 21 were located within the borders of National Parks (but 13 of these were hermitages and shrines found in the Majella Park alone), 10 inside regional parks and other state reserves, and 26 coincided with areas included in the Natura 2000 network. No spatial relation with official PAs was found for the other 43 visited SNS.

Finally, the size of SNS ranged from one hectare to just a fraction of a hectare for the more remote and less important shrines and hermitages (nearly 50 % of cases), while the estates and areas of influence of residence sites (nearly one third of visited sites) amounted to several hectares. Only in a minority of instances did the area of SNS extend beyond 7 ha, or up to the 100 ha of *Quercus ilex* forest around the hermitage of Carceri in Assisi, and the 500 ha of mixed

Fig. 6 Hermitages and shrines, which account for nearly 75 % of SNS in Central Italy, can refer to very different realities. Clockwise from top left: (**a**) a simple cave carved into the stone (hermitage St. Giovanni all'Orfento); (**b**) a small chapel built around a holy water spring (Water St. Franco) or (**c**) inside a sacred grotto (hermitage St. Angelo in Palombaro); (**d**) an imposing church visited by thousands of pilgrims a year (sanctuary Madonna del Canneto); (**e**) a large but isolated building designed to host dozens of monks and ascetics (hermitage Fonte Avellana)

Fig. 7 Natural features have been foci of devotion and ritual practices at numerous SNS in Central Italy. From left to right: (**a**) the giant holm-oak Leccio delle Ripe, associated with St. Francis, is a target of vows and pilgrimages; (**b**) the water that percolates in the grotto of St. Michael, Liscia, is collected by the believers who consider it therapeutic; (**c**) the holm-oak grove of Monteluco di Spoleto was considered sacred already in Roman times, and has been associated to the nearby hermit caves and Franciscan convent since the Middle Ages

agrarian and forested land surrounding the Benedictine monastery of Monte Oliveto Maggiore.

Discussion

While the links between religious beliefs, SNS, and biodiversity conservation have received recognition in a number of traditional contexts, they remain underexplored in the Western world. A growing body of contributions from the developing field of "ecotheology" has started to reconsider the role of the environment within the doctrines of different Christian confessions (e.g., Northcott 1996; Hessel and Radford Ruether 2000; Berry 2006; Hart 2006), but this has seldom translated into empirical investigations as to whether and how Christianity may have contributed to biodiversity conservation at specific sites. This restricted focus might have been dictated in part by perceived ecological priorities, as most of the areas recognized as biodiversity hotspots are in the tropics (Myers *et al.* 2000: 855). It is likely, however, that ethnographic bias (Latour 1993; Herzfeld 2001) and a perception of Christianity as inherently anti-naturalistic (White 1967) may also be responsible (see also Mallarach and Papayannis 2010: 198–199).

The evidence presented here, although not conclusive, outlines a more nuanced picture of the relationship between Roman Catholicism and biodiversity conservation. In the first place, the very high proportion of natural and partly natural locations inventoried (Fig. 2) strongly suggests that the association between Catholicism and natural settings might be much more structural than commonly thought. This proportion is probably a conservative estimate as it relates to current land-cover around each sacred place and is likely an underestimate of originally natural locations

that were later turned to different uses. Secondly, my observations indicated the potentially high conservation value of the sample locations and the frequent spiritual prominence of natural heritage within certain strands of Roman Catholicism.

The observation that "there is no single Roman Catholic view of nature, but several" is not new (Binde 2001: 16). Interpreting the environmental distribution of the inventoried Catholic settlements as an indicator of the broader relationship with nature seems to lead to a similar conclusion. A connection with natural surroundings is substantially more pronounced for certain orders and nearly non-existent for others in the study area (Fig. 3). Further, almost 30% of all SNS appear not to be connected to any order, and no reliable chronological records are available for about half of such sites. This suggests a significant association of SNS with forms of spirituality which have remained often marginal to official doctrine and religious institutions, being rather rooted in local cults and folk beliefs.

The enduring relation of SNS to folk beliefs has been taken as evidence of syncretism between paganism and Christianity (Byrne 2010; De Waal 2012). A high degree of continuity and layering of Christian sites with previous settlements is often taken for granted (Jerris 2002). It is thus surprising how low a proportion of sacred sites (4 %, Table 4) have archaeological evidence indicating pre-Christian religious use. This is, however, consistent with Nolan and Nolan's (1989,1997) findings in their census of shrines all over Europe that only 3 % of all Italian sites – less than in all other parts of Europe – had documented associations with pre-Christian cults (1989; 1997). The authors hypothesized that here more than elsewhere "early churchmen were successful in uprooting loyalty to the sacred sites of the pagans" (1989: 302). Nonetheless, a more careful look at the data presented here reveals that the proportion of pre-Christian associations, while low for the whole pool of sacred sites, is higher for natural sacred sites (8 %), and much higher for shrines located in natural settings (13 %). This figure would seem to suggest that these "numinous sites" (Byrne 2010), once established, are less likely to lose their appeal across faiths and belief systems. Also, one or more natural features were found to constitute explicit objects of veneration at nearly all of the shrines visited, which could be additional confirmation of the particular endurance of pre-Christian traditions at natural shrines. Of the 212 shrines occurring in the inventory, only six located in natural surroundings were no longer centres of worship.

Lack of information about the start of Catholic presence at numerous sites, and gaps in archaeological records, made it hard to offer a reliable answer to the question of whether SNS are generally more ancient than other sacred places, as Nolan and Nolan suggested (1997). The data are sufficient, however, for indicating a progressive loss of importance of SNS within the Catholic tradition. This is evident from the fewer associations with natural surroundings of Catholic settlements founded from the late Middle Ages onwards (Fig. 4), and is likely related to the decreasing importance of ascetic monasticism relative to the city-based mendicant orders (Lawrence 1994). The trend is further confirmed by the higher proportions of abandoned sacred sites located in peripheral settings compared to urban ones, and abandoned monastic settlements compared to mendicant convents (Table 3).

Although lacking definitive quantitative evidence, my observations at sample SNS suggest that they have been important for biodiversity conservation in Central Italy in at least three ways: (1) preserving relic habitats and vegetation assemblages; (2) protecting old-growth forest or individual specimens (giant trees); and (3) maintaining greater habitat heterogeneity due to the presence of multiple features such as grottos, water sources, rock outcrops, forest cover, etc. Whether such ecological traits could be related to the presence of an official PA (as found at 57 of the 100 visited sites) rather than the influence of a religious centre is an open and stimulating question that deserves more attention. For the present, two considerations suggest the answer to be negative more often than not. First, although this is rarely acknowledged in historical accounts of nature conservation in Italy (Sievert 2000), the practices of religious communities often anticipated a modern conservation ethos (Romano 2010), and several important PAs have been created from centuries-old monastic estates (see below). Secondly, almost half of the protected SNS coincide with areas that have been added to the Natura 2000 network over the last 20 years, i.e., too recently to explain all the biodiversity patterns encountered at the sites in question. In similar instances, it could be claimed that the presence of religious heritages offer a chance for reinforcing the governance of Natura 2000 areas, which are too often prone to threats and disruptions if not supported by local actors and institutions (Petrosillo *et al.* 2009). In the future, it would be desirable if specific ecological studies could assess the specific conservation potential of SNS at different spatial scales, and further test and confirm these preliminary observations (cf. Byers *et al.* 2001; O'Neal Campbell 2004, 2005; Wadley and Colfer 2004; Anderson *et al.* 2005; Bhagwat *et al.* 2005; Salick *et al.* 2007).

Given the differences between various types of SNS and their land-use and management histories, a more careful insight into the dynamics by which sacred sites have benefited conservation, and how they can influence future strategies, is also required. Table 5 offers a first overview in that direction: the SNS reviewed are subdivided into three general categories – religious estates, shrines, and abandoned sites – and an outline of the basic traits, relevant stakeholders, and management challenges is presented for each (Table 5). While this is only a preliminary assessment, it can be useful for assessing fruitful directions for future research in the field.

In some instances property and management rights over religious estates have remained with the orders (as at the Franciscan hermitage Carceri in Assisi). More often, religious lands were at least temporarily seized by the state in the nineteenth century, with consequent changes in management

Table 5 Synthetic overview of basic traits, relevant stakeholders, and management challenges for three different categories of SNS

SNS category	Types of SNS included	Ownership	Approx. size range	Historical conservation agents	Current conservation agents	Threats and criticalities
Religious estates	Active convents, monasteries, hermitages, or shrines administered by a religious order	Religious community, state	5+ ha. and up to 500 ha.	Religious orders	Religious orders, PA	Overcrowding; trampling of spiritual values; religious communities' scarce awareness of ecological values; poor collaboration between religious communities and PA managers
Shrines	Active shrines, usually not administered by religious orders	Diocese, parish, municipality, state	< 1 ha, but up to 10 ha ca.	Local people, local parish	Local people, local parish, PA	Tourist development; erosion of traditional beliefs, practices, and social structure; scarce awareness of sites' ecological values; poor collaboration between site custodians and PA managers
Abandoned sites	Abandoned sites of all types	Municipality, state; more rarely ecclesiastic entity	< 1 ha, but up to 6 ha.	Religious orders, local people	None, PA	Scarce awareness of ecological values; tourist exploitation; lack of relevant stakeholders for development of bottom-up conservation strategies

regimes. In some cases this resulted in dramatic disruptions, such as at the Camaldolese hermitage of Monte Corona, where 2,233 centuries-old silver firs were felled over just 1 year (Antinori 2009). Today, it is not unusual for such sites to be co-managed, at least to some extent, by state institutions (such as the forestry department) and the religious communities who newly inhabit them. In other instances, state managed reserves have been established on expropriated estates of high conservation value: religious orders currently live there but no longer have ownership and management rights.

A significant increase in religious and secular tourism to religious sites has had negative impacts in a number of places, such as the monasteries of Vallombrosa, Chiaravalle di Fiastra, and Camaldoli, and the convent of La Verna, which are also part of important parks or state reserves (see also Pungetti *et al.* 2007; Mallarach and Papayannis 2010). In other cases the religious communities themselves appear scarcely aware of the ecological value of the sites they inhabit, and to accord all prominence to their spiritual and artistic heritages. Further research, therefore, should explore the attitudes towards nature and environmental stewardship of the different orders, and attempt to establish partnerships between religious communities and conservationists.

Shrines constitute a rather different case than religious estates with regards to management and conservation (Table 5). Generally, shrines are not inhabited or constantly tended by religious communities, and clear borders or property rights demarcating the sacred ground around each shrine are absent or unclear. They tend to be smaller (a fraction of a hectare) than religious estates, and the local communities rather than religious orders are the major stakeholders in their management. Conservation at shrines, therefore, has relied mostly on local populations' attitudes of respect and devotional practices, possibly codified into nature-related rituals and taboos. In general, the shrines seemed to be less prone to the negative impacts recorded at other SNS and signs of overcrowding were evident in only one case, Madonna del Canneto near Setterfrati, Lazio. However, there are signs that also the cultural mechanisms that have favoured conservation at these sites are undergoing considerable erosion. While the nature-based rituals and devotions that have long characterized many shrines are still vigorous and deeply rooted in some contexts (De Waal 2012), they appear on the wane in many others (Antinori 2009; Micati 2007). Also, new construction has been underway at several shrines for the last decades. Together with the loss of traditional ecological knowledge in the study area (Idolo *et al.* 2010), these factors could severely undermine the cultural mechanisms that have likely favoured ecological conservation at SNS of this kind. While it might be impossible to radically intervene to reverse such trends, explicit involvement with local communities would still be a priority. This would have the goal both to document traditional beliefs and practices that constitute a rapidly disappearing legacy of biocultural diversity, and raise

awareness of the desirability for sensible ecological management of SNS.

Finally, a number of abandoned sites have remained prominent landmarks in certain landscapes, or acquired the status of monuments and tourist destinations. Of the 56 abandoned SNS censused, 12 ceased to be religious centres following the nineteenth-century expropriations, and the other 44 even earlier, although no clear dates are available. The imprint of the former religious settlements on the surrounding ecology is apparent at numerous sites, as also found in comparable contexts (Dambrine *et al.* 2007). In some instances, this special character has been recognized, and abandoned SNS have become an important part of official PAs, such as the many hermitages in the Majella National Park, or the Camaldolese settlement Frati Bianchi in Cupra Montanta. In other cases, however, they have remained outside official conservation schemes, although field observations suggested that they might also have played a significant role for local biodiversity. Assessing their ecological biodiversity and establishing whether and how they could enrich the existing PAs network would be a desirable step.

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References

Aerts, R., Van Overtveld, K., Haile, M., Hermy, M., Deckers, J., and Muys, B. (2006). Species Composition and Diversity of Small Afromontane Forest Fragments in Northern Ethiopia. Plant Ecology 187(1): 127–142.

Anderson, D. M., Salick, J., Moseley, R. K., and Xiaokun, O. (2005). Conserving the Sacred Medicine Mountains: A Vegetation Analysis of Tibetan Sacred Sites in Northwest Yunnan. Biodiversity and Conservation 14(13): 3065–3091.

Antinori, A. (2009). I Sentieri del Silenzio: Guida agli Eremi Rupestri ed alle Abbazie dell'Appennino Umbro-Marchigiano, IIth ed. Società Editrice Ricerche, Folignano.

Armstrong, E. A. (1973). Saint Francis, Nature Mystic: The Derivation and Significance of the Nature Stories in the Franciscan Legend. University of California Press, Berkeley.

Berkes, F. (2004). Rethinking Community-Based Conservation. Conservation Biology 18(3): 621–630.

Berkes, F., and Folke, C. (eds.) (1998). Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience. University Press, Cambridge.

Berry, R. J. (ed.) (2006). Environmental Stewardship: Critical Perspectives, Past and Present. T&T Clark, London.

Bhagwat, S., and Rutte, C. (2006). Sacred Groves: Potential for Biodiversity Management. Frontiers in Ecology and the Environment 4(10): 519–524.

Bhagwat, S., Kushalappa, C. G., Williams, P. H., and Brown, N. D. (2005). A Landscape Approach to Biodiversity Conservation of Sacred groves in the Wesern Ghats of India. Conservation Biology 19(6): 1853–1862.

Bhagwat, S., Ormsby, A. A., and Rutte, C. (2011). The role of Religion in Linking Conservation and Development: Challenges and Opportunities. Journal for the Study of Religion, Nature and Culture 5(1): 39–60.

Binde, P. (2001). Nature in Roman Catholic tradition. Anthropological Quarterly 74(1): 15–27.

Borrini-Feyerabend, G., Pimbert, M., Farvar, M. T., Kothari, A., and Renard, Y. (2007). Sharing Power: Learning-by-doing in Co-management of Natural Resources throughout the World. Earthscan, London.

Bosi, R. (1992). Monasteri Italiani. Calderini, Bologna.

Boyle, L. E. (2003). Mendicant Orders. In Marthaler, B. L. (ed.), New Catholic Encyclopedia, Mab-Mor, vol. 9, 2nd ed. Thomson/Gale, Detroit, p. 491.

Brown, K. (2003). Three Challenges for a Real People-Centred Conservation. Global Ecology and Biogeography 12(2): 89–92.

Byers, B. A., Cunliffe, R. N., and Hudak, A. T. (2001). Linking the Conservation of Culture and Nature: A Case Study of Sacred Forests in Zimbabwe. Human Ecology 29(2): 187–218.

Byrne, D. (2010). The Enchanted Earth: Numinous Sacred Sites. In Verschuuren, B., Wild, R., McNeeley, J., and Oviedo, G. (eds.), Sacred Natural Sites: Conserving Nature and Culture. Earthscan, London, pp. 53–61.

Cardelús, C. L., Lowman, M. D., and Eshete, A. W. (2012). Uniting Church and Science for Conservation. Science 335: 915–916.

Colding, J., and Folke, C. (2001). Social Taboos: 'Invisible' Systems of Local Resource Management and Biological Conservation. Ecological Applications 11(2): 584–600.

Cuccini, G., and Giorgi, A. (2000). Monaci ed Eremiti in Umbria: Itinerario Romualdino e Benedettino. Chiesa San Severo a Porta Sole, Perugia.

Dal Pino, F. A. (2004). "Eremitismo libero e organizzato nel secolo della grande crisi". In Picasso, G., and Tagliabue, M. (eds.), Il Monachesimo Italiano nel Secolo della Grande Crisi. Proceedings of the V Congress of Historical Studies on Italian Benedictines, Monte Oliveto Maggiore, September 2–5 1998. Badia di Santa Maria del Monte, Cesena, pp. 377–431.

Dambrine, E., Dupouey, J.-L., Laüt, L., Humbert, L., Thinon, M., Beaufils, T., and Richard, H. (2007). Present Forest Biodiversity Patterns in France Related to Former Roman Agriculture. Ecology 88(6): 1430–1439.

De Waal, V. (2012). The Cultural and Spiritual Sites of the Parco Nazionale della Majella, Italy. In Mallarach, J. M., Papayannis, T., and Väisänen, R. (eds.), The Diversity of Sacred Lands in Europe: Proceedings of the Third Workshop of the Delos Initiative, Inari/Aanaar 2010. IUCN, Gland, pp. 111–123.

Donahue, A. (2003). Hermits. In Marthaler, B. L. (ed.), New Catholic Encyclopedia, Fri-Hoh, vol. 6, 2nd ed. Thomson/Gale, Detroit, pp. 799–800.

Dudley, N., Higgins-Zogib, L., and Mansourian, S. (eds.) (2006). Beyond Belief: Linking Faiths and Protected Areas to Support Biodiversity Conservation. WWF and ARC, Gland.

Dudley, N., Higgins-Zogib, L., and Mansourian, S. (2009). The links between protected areas, faiths, and sacred natural sites. Conservation Biology 23(3): 568–577.

Dudley, N., Bhagwat, S., Higgins-Zogib, L., Lassen, B., Verschuuren, B., and Wild, R. (2010). Conservation of Biodiversity in Sacred Natural Sites in Asia and Africa: a Review of the Scientific Literature. In Verschuuren, B., Wild, R., McNeeley, J., and Oviedo, G. (eds.),

Sacred Natural Sites: Conserving Nature and Culture. Earthscan, London, pp. 19–32.
Dunn, M. (2000). The Emergence of Monasticism: From the Desert Fathers to the Early Middle Ages. Blackwell, Malden.
European Commission (EU) (1992). Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. EU, Luxemburg.
Farnedi, G. (2006). Guida ai Santuari d'Italia: Oltre 450 Mete Turistico-Religiose. Piemme, Casale Monferrato.
Feo, G. (2001). Eremiti e Romitori di Maremma. Laurum, Pitigliano.
Geary, P. (1986). Sacred Commodities: the Circulation of Medieval Relics. In Appadurai, A. (ed.), The Social Life of Things: Commodities in Cultural Perspective. University Press, Cambridge, pp. 169–191.
Gillett, H. M. (2003). Shrines. In Marthaler, B. L. (ed.), New Catholic Encyclopedia, Seq-The, vol. 13, 2nd ed. Thomson/Gale, Detroit, pp. 88–95.
Golinelli, P. (2006). Celestino V: Il Papa Contadino. Ugo Mursia Editore, Milano.
Gottardo, G., and Gamba, U. (1994). Monasteri e Santuari d'Italia: Un Viaggio alla Ricerca dei più Bei Monumenti Sacri del Nostro Paese Sorti in Epoche Diverse e nei Luoghi più Suggestivi. Newton Compton, Roma.
Grasselli, G. M., and Tarallo, P. (2000). Guida ai Monasteri d'Italia 2000: Oltre 500 Luoghi di Antica Spiritualità, XIIth ed. Piemme, Casale Monferrato.
Hart, J. (2006). Sacramental Commons: Christian Ecological Ethics. Rowman & Littlefield, Lanham.
Herzfeld, M. (2001). Anthropology: Theoretical Practice in Culture and Society. Wiley-Blackwell, Malden.
Hessel, D. T., and Radford Ruether, R. (eds.) (2000). Christianity and Ecology: Seeking the Well-Being of Earth and Humans. Harvard University Center for the Study of Religion, Cambridge.
Idolo, M., Motti, R., and Mazzoleni, S. (2010). Ethnobotanical and Phytomedicinal Knowledge in a Long-History Protected Area, the Abruzzo, Lazio and Molise National Park (Italian Apennines). Journal of Ethnopharmacology 127: 379–395.
Jepson, P., and Canney, S. (2003). Values-led Conservation. Global Ecology and Biogeography 12: 271–274.
Jerris, R. (2002). Cult lines and Hellish Mountains: the Development of Sacred Landscape in the Early Medieval Alps. Journal of Medieval and Early Modern Studies 32(1): 85–108.
Kiser, L. J. (2003). The garden of St. Francis: Plants, Landscape, and Economy in Thirteenth-Century Italy. Environmental History 8(2): 229–245.
Kleinberg, A. M. (2005). Histoires de Saints: Leur Rôle dans la Formation de l'Occident. Gallimard, Paris.
Latour, B. (1993). We Have Never Been Modern. University Press, Cambridge.
Lawrence, C. H. (1984). Medieval Monasticism: Forms of Religious Life in Western Europe in the Middle Ages. Longman, New York.
Lawrence, C. H. (1994). The Friars: The Impact of the Early Mendicant Movement on Western Society. Longman, London.
Leyser, H. (1984). Hermits and the New Monasticism: A Study of Religious Communities in Western Europe 1000–1150. Macmillan Press, London.
Lyratzaki, I. (2006). Meteora World Heritage Site, Thessaly, Greece. In Mallarach, J. M., and Papayannis, T. (eds.), Protected Areas and Spirituality: Proceedings of the First Workshop of the Delos Initiative, Montserrat 2006. IUCN, Gland, pp. 250–261.
Mallarach, J. M., and Papayannis, T. (eds.) (2006). Protected Areas and Spirituality: Proceedings of the First Workshop of the Delos Initiative, Montserrat 2006. IUCN, Gland.
Mallarach, J. M., and Papayannis, T. (2010). Sacred Natural Sites in Technologically Developed Countries: Reflections from the Experience of the Delos Initiative. In Verschuuren, B., Wild, R., McNeeley, J., and Oviedo, G. (eds.), Sacred Natural Sites: Conserving Nature and Culture. Earthscan, London, pp. 198–208.
Mallarach, J. M., Papayannis, T., and Väisänen, R. (2010). The Diversity of Sacred Lands in Europe: Proceedings of the Third Workshop of the Delos Initiative, Inari/Aanaar 2010. IUCN, Gland.
McCauley, D. J. (2006). Selling Out on Nature. Nature 443(7): 27–28.
Merlo, G. G. (1989b). "Eremitismo nel francescanesimo medievale". In Eremitismo nel Francescanesimo Medievale. Proceedings of the XVII International Congress, Assisi, October 12–14. Centro di Studi Francescani, Perugia, pp. 27–50.
Micati, E. (2007). Eremi d'Abruzzo: Guida ai Luoghi di Culto Rupestri. Carsa, Pescara.
Myers, N., Mittermeier, N. A., Mittermeier, C. G., da Fonseca, G. A. B., and Kent, J. (2000). Biodiversity Hotspots for Conservation Priorities. Nature 403(24): 853–858.
Nabhan, G. P. (1993). Songbirds, Truffles, and Wolves: An American Naturalist in Italy. Penguin, New York.
Nolan, M. L., and Nolan, S. (1989). Christian Pilgrimage in Modern Western Europe. University of North Carolina Press, Chapel Hill.
Nolan, M. L., and Nolan, S. (1997). Regional Variations in Europe's Roman Catholic Pilgrimage Tradition. In Stoddard, R. H., and Morinis, A. (eds.), Sacred Places, Sacred Spaces: The Geography of Pilgrimages. Geoscience Publications, Baton Rouge, pp. 61–93.
Northcott, M. S. (1996). The Environment and Christian Ethics. University Press, Cambridge.
Olson, D. M., and Dinerstein, E. (2002). Priority Ecoregions for Global Conservation. Annals of the Missouri Botanical Garden 89(2): 199–224.
O'Neal Campbell, M. (2004). Traditional Forest Protection and Woodlots in the Coastal Savannah of Ghana. Environmental Conservation 31(3): 225–232.
O'Neal Campbell, M. (2005). Sacred Groves for Forest Conservation in Ghana's Coastal Savannas: Assessing Ecological and Social Dimensions. Singapore Journal of Tropical Geography 26(2): 151–169.
Ormsby, A. A., and Bhagwat, S. (2010). Sacred Forests of India: A Strong Tradition of Community-Based Natural Resource Management. Environmental Conservation 37: 320–326.
Ostrom, E. (1990). Governing the Commons: The Evolution of Institutions for Collective Action. University Press, Cambridge.
Palmer, M., and Finlay, V. (2003). Faith in Conservation. World Bank, Washington, DC.
Papayannis, T. (2006). Mount Athos, Greece. In Mallarach, J. M., and Papayannis, T. (eds.), Protected Areas and Spirituality: Proceedings of the First Workshop of the Delos Initiative, Montserrat 2006. IUCN, Gland, pp. 262–277.
Papayannis, T., and Mallarach, J. M. (eds.) (2007). The Sacred Dimension of Protected Areas: Proceedings of the Second Workshop of the Delos Initiative, Ouranoupolis 2007. IUCN, Gland.
Petrosillo, I., Zaccarelli, N., Semerano, T., and Zurlini, G. (2009). The effectiveness of different conservation policies on the security of natural capital. Landscape and Urban Planning: 49–56.
Philippou, I., and Kontos, K. (2007). The protected Area of the Peninsula of the Athos Holy Mountain, Halkidiki, Greece. In Papayannis, T., and Mallarach, J. M. (eds.), The Sacred Dimension of Protected Areas: Proceedings of the Second Workshop of the Delos Initiative, Ouranoupolis 2007. IUCN, Gland, pp. 107–125.
Poviltis, T. (2002). What is a natural area? Natural Areas Journal 22(1): 70–74.
Pratesi, F., and Tassi, F. (eds.) (1998). Parco Nazionale d'Abruzzo: Alla scoperta del Parco piu` Antico d'Italia. Carsa Edizioni, Pescara.
Pungetti, G., Locatelli, F., and Father Hughes, P. (2007). The National Park of the Casentinese Forests, Italy. In Papayannis, T., and Mallarach, J. M. (eds.), The Sacred Dimension of Protected Areas: Proceedings of the Second Workshop of The Delos Initiative, Ouranoupolis 2007. IUCN, Gland, pp. 60–65.

Ramakrishnan, P. S. (2003). Conserving the Sacred: the Protective Impulse and the Origins of Modern Protected Areas. In Harmon, D., and Putney, A. D. (eds.), The Full Value of Parks: From Economics to the Intangible. Rowman & Littlefield, Lanham, pp. 27–41.

Rapley, E. (2005). Religious Orders and Congregations: Roman Catholic. In Fahlbusch, E., Lochman, J. M., Mbiti, J., Pelikan, J., and Vischer, L. (eds.), The Encyclopedia of Christianity, P-Sh, vol. 4. William B. Eerdmans Publishing Company, Grand Rapids, pp. 617–628.

R Core Team. (2012). R: A Language and Environment for Statistical Computing. R Foundation for Statistical Computing, Vienna.

Ridder, B. (2007). The naturalness versus wildness debate: Ambiguity, inconsistency, and unattainable objectivity. Restoration Ecology 15(1): 8–12.

Robson, M. (2006). The Franciscans in the Middle Ages. Boydell Press, Woodbridge.

Romanato, G. (2007). Le Leggi Antiecclesiastiche Negli Anni dell'unificazione Italiana. Studi storici dell'Ordine dei Servi di Maria 56–57: 1–120.

Romanò, C. (1990). Guida ai Conventi in Italia. Mondadori, Milano.

Romano, R. (ed.) (2010). Codice Forestale Camaldolese: Le Radici della Sostenibilità. INEA, Roma.

Rutte, C. (2011). The Sacred Commons: Conflicts and Solutions of Resource Management in Sacred Natural Sites. Biological Conservation 144(10): 2387–2394.

Ryan, W. B., and Espelage, A. (2003). Convent. In Marthaler, B. L. (ed.), New Catholic Encyclopedia, Com-Dyn, vol. 4, 2nd ed. Thomson/Gale, Detroit, p. 231.

Salick, J., Amend, A., Anderson, D. M., Hoffmeister, K., Gunn, B., and Zhendong, F. (2007). Tibetan Sacred Sites Conserve Old Growth Trees and Cover in the Eastern Himalayas. Biodiversity and Conservation 16(3): 693–706.

Salvatorelli, L. (1929). San Benedetto e l'Italia del Suo Tempo. Laterza, Bari.

Sause, B. A. (2003). Monastery. In Marthaler, B. L. (ed.), New Catholic Encyclopedia, Mab-Mor, vol. 9, 2nd ed. Thomson/Gale, Detroit, pp. 782–784.

Sievert, J. (2000). The Origins of Nature Conservation in Italy. Lang, Bern.

Sinclair, A. R. E., Ludwig, D., and Clark, C. W. (2000). Conservation in the Real World. Science 289(5486): 1875.

Stern, M., Bhagwat, S., Brown, N., Evans, T., Jennings, S., and Savill, P. (2001). Parks and Factors in their Success. Science 293(5532): 1045–1046.

Tuan, Y. F. (1978). Sacred Space: Exploration of an Idea. In Butzer, K. W. (ed.), Dimensions of Human Geography: Essays on some Familiar and Neglected Themes. Department of Geography of the University of Chicago, Chicago, pp. 84–99.

Wadley, R. L., and Colfer, C. J. P. (2004). Sacred Forest, Hunting, and Conservation in West Kalimantan, Indonesia. Human Ecology 32(3): 313–338.

Wassie, A., Sterck, F. J., and Bongers, F. (2010). Species and Structural Diversity of Church Forests in a Fragmented Ethiopian Highland Landscape. Journal of Vegetation Science 21(5): 938–948.

Wendebourg, D. (2005). Monasticism. In Fahlbusch, E., Lochman, J. M., Mbiti, J., Pelikan, J., and Vischer, L. (eds.), The Encyclopedia of Christianity, J-O, vol. 3. William B. Eerdmans Publishing Company, Grand Rapids, pp. 624–631.

White, L. J. (1967). The Historical Roots of Our Ecologic Crisis. Science 155(3767): 1203–1207.

Wild, R., and McLeod, C. (eds.) (2008). Sacred Natural Sites: Guidelines for Protected Areas Managers. IUCN, Gland.

Wilson, E. O. (2002). The Future of Life. Knopf, New York.