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SACRED GROVES IN MOROCCO: A SOCIETY'S CONSERVATION OF NATURE FOR SPIRITUAL REASONS

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Abstract

In the Maghreb countries, the surroundings of Muslim saint's tombs, which are also used as burial grounds by local people, often shelter the last remnants of forest vegetation in these otherwise intensively cultivated regions. After a brief introduction to the cults of Muslim saints and pilgrimage practises in Morocco, the results of a geo-botanical case study of two areas of sacred groves in northern Morocco (i.e. Tangier Peninsula) are presented. The sacred groves studied are characterised by a fine-grained vegetation mosaic that in part originate from multiple forms and intensities of human use (e.g. pasturing, small-scale burning, grave digging). The results of the vegetation analysis lead to discussion of the potential role of sacred groves in nature conservation. The nature conservation value of sacred places is seen in their roles: as aesthetic elements of the landscape, as models for future attempts to reconstruct degraded areas with endemic forest vegetation, in biodiversity conservation, in the protection of rare plant species, in the protection of genetic resources, and as habitats for animals. The high diversity of sacred groves is seen in relation to the level of human impact. The local society's appreciation of some of these areas is changing. How these changes materialise will have an effect on the long-term conservation prospects for these areas.

Key words: sacred grove, Marabut, saint cult, Islam, Morocco, vegetation, nature conservation.

1 Introduction

The complex and diverse arena of spiritual, emotional, intellectual, and practical activities at the interface of religion and ecology (Sponsel 2001) can be observed at sacred natural places. These places are a phenomenon of many societies, for example: in Greece there are sacred groves for Christian-Orthodox communities, in Japan there are Shinto shrine groves, in India there are sacred groves for local communities in the Himalayas (Ramakrishnan 1996), and in tropical Africa there are grove/community areas with several levels of sacredness (Michaloud and Dury 1998). In the Maghreb countries (i.e. Morocco, Algeria, and Tunesia) in northwestern Africa, the wooded areas surrounding the tombs where Muslim saints are buried and which are also used as cemeteries by local Muslim communities, are holy forests that are protected from clearing for religious reasons. The cultural and spiritual importance of these places is well-known (Lang 1992; Verdugo and Kadiri Fakir 1995). Inside these sacred places, the non-commercial values of the biotic, aesthetic, and spiritual resources was clear long before any environmental conservation assessment system was established in European post-industrial societies. Within these holy territories, trees became protected without being the actual object of protection, because such places play an important role in the identity of the tribal groups associated with them, for genealogy and spirituality (Bourquia 1990).

In the last few years, the interrelations between sacred places, cultural integrity, conservation, and the management of biological diversity have come to the attention of international nature conservation actors (Hay-Edie and Hadley 1998). Despite this attention, there are very few studies that deal with the scientific aspects of these relationships, such as detailed investigations of the flora and other vegetation of burial grounds or other holy places, in relation to their habitat diversity and their conservation value (Middle Europe: Graf 1986; Sub-Saharan Sahel: Guinko 1985; Neumann and Müller-Haude 1999; Togo: Tchamié 2000; India: Alemmeren Jamir and Pandey 2003; Mishra et al. 2004; Upadhaya et al. 2003; Ramanujam and Praveen Kumar Cyril 2003; Ramunujam and Kadamban 2001).

For the Maghreb countries, such studies are not available. General statements have been made about the nature conservation value of the holy forests in Morocco that suggest that these sacred groves might provide evidence of the original woodland types that were once widely distributed in the area (Quézel and Barbero 1990; Benabid 1991). However, a detailed floristic and faunal inventory of these locations remains to be done. Until recently, any sampling of vegetation at sacred grave areas was restricted to the forested component of these places. All non-forest habitats had been ignored (e.g. Northern Morocco: Barbero et al. 1981; Deil 1984; Fennane 1986). Therefore, it remains unclear what kind of habitats, other than woodlands, occur in these places and to what extent the traditional use of sacred groves can substitute for scientifically driven conservation approaches (e.g. protection of flagship species, selection of protected areas according to habitat typology, etc.). It is also uncertain if the traditional limited use of these places is in line with the conservation policies of international organisations that are oriented to, and driven by Western post-modern societies.

The focus here is mainly on the analysis of vegetation and the ecological characterisation of two sacred grove areas in northern Morocco. First a brief introduction into the traditional cult of saints and pilgrimage practises in Morocco followed with an outline of the cultural background of the holy places, then the results of this preliminary case study are presented. Finally, the potential role of sacred groves in nature conservation, the naturalness of vegetation on these places, and their long-term prospects based on present and potential land-use practises and their socio-cultural context are discussed.

2 The Religious and Cultural Meanings of Sacred Places in Morocco

Orthodox Islam does not allow any veneration of saints. In contradiction, the religious practises of Moroccan Muslim societies are based on the appreciation of the spiritual authority of patron saints (Marabout or Marabut). Initially, the faithful assembled around the living saints. Since the beginning of the 15th Century, the religious brotherhoods around these saints played important political, economic, and social roles, especially in the fight against the Spanish and Portuguese forces that occupied the Atlantic coastal areas of Morocco.

Today, the authority of the saints and the movements associated with them are still alive (Geertz 1968; Gellner 1969; Lang 1992). They are expressed in collective pilgrimages, the moussem (= maoussim), to the saints tombs (qubba) which are shaded by trees (Verdugo and Kadiri Fakir 1995). The pilgrimages are practised at a particular time of the year (Berriane 1990) and repeated periodically. The majority of these pilgrimages are associated with the agricultural calendar. Sixty percent of the celebrations are concentrated after the traditional harvest time, during the period from August to September, when people are more available. Other moussem events are linked to religious festivals, but mainly to the birthday of the Prophet (Maoulid).

Figure 1 illustrates the number and distribution of moussem events in Morocco. The occurrence of pilgrimages to sacred places is not a single event, but a phenomenon that happens in large parts of the country. About 735 pilgrimages occur every year. They are more common in rural areas and in the western and southern parts of the country. Concentrations in some areas can be explained by high population densities, richness of agricultural life, historic centres of devotion to a saint, and the distribution of tribal groups.

The cultural event triad of: pilgrimage, religious celebration, and popular festival, is rooted in religious rituals with their economic and social aspects extending to pre-Islamic Arabia. Furthermore, this cultural event was influenced by two typically Moroccan phenomena, the groups of devotees associated with a saint and the traditional type of market places (*souks*), as well as the agricultural rites of the Berber-Mediterranean world. It is the first example in the socio-cultural history of Morocco of an event where there is harmony with the society's choice of recreation and entertainment even though it is sacred. People travel because it is necessary to go on a pilgrimage, but also due to their need for holidays. When a *moussem* occurs at

the end of the agricultural period, it becomes the most important, often the only, entertainment event in some rural areas.

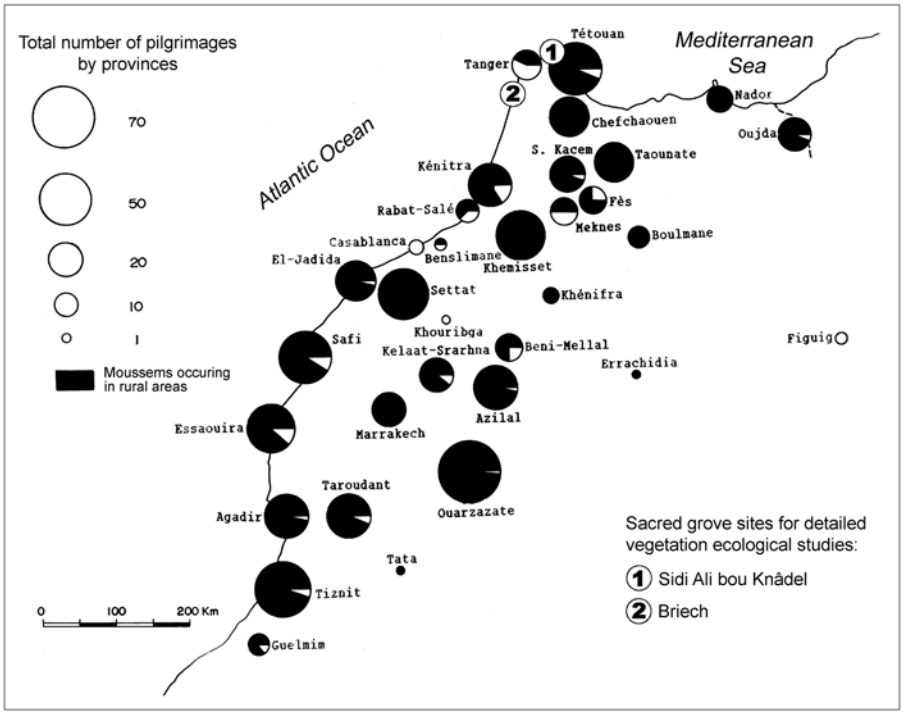

Figure 1. Distribution of collective pilgrimages to the tombs of Moslem saints in Morocco (based on data from 1982, Berriane 1992) and location of geo-botanical case studies 1 and 2.

The impact of sacred groves, for inner-Moroccan tourism, as a destination of pilgrimage has been explained by Mohamed Berriane (1990). Some *moussem* events, like the pilgrimage to the grave of Marabout Moulay Abdessalam in the Western Rif Mountains, assemble huge numbers of pilgrims from vast areas, and last several days. Others are only of local importance, receiving just a small number of visitors over a period of one or two days. Amongst the main pilgrimage events, the one to the tomb of Moulay Abdellah is the most celebrated. This tomb is situated on the Atlantic coast close to El Jadida, in the vicinity of the metropolitan area of Casablanca, and is accessible to several other cities. This pilgrimage underwent an interesting mutation to the extent that it now attracts up to 74,000 visitors, who are mainly urban residents. The Moroccan tourists come in August to benefit from the tomb's nice location on a beach. Although the veneration of the saint remains the central objective of the event, the religious motivation for participation in the event is decreasing. This *moussem* has become more and more a simple holiday and camping event, from which commercial entertainment services are making a profit. A

tendency towards secularism is therefore also apparent in urban pilgrimage places (Lindner 1999).

3 Localisation and Physical Environment of the Study Areas

Two locations near the city of Tangier were selected for a detailed geo-botanical analysis, to provide insight into the biotic diversity, the vegetation structure, and the traditional land use of graveyards in rural areas (Figure 1). These cemeteries are situated within different natural landscapes.

The first cemetery, named Sidi Ali bou Knâdel, is located a few kilometres south of the Straits of Gibraltar, situated at the top of a marl hill near the sandstone ridges of Jebel Sanduc, in the eco-region "Crêtes du Détroit" (André 1971; Deil 2003). It is at an altitude of 140 metres above sea level. The mean annual rainfall ranges from 750 to 850 mm, with the maximum portion of this precipitation occurring in winter. The occurrence of the Kermes oak (*Quercus coccifera*[20]) indicates that the dry summer season is moderated by an oceanic variant of the Mediterranean climate. The area is frost-free, and often subjected to high speed winds.

The second cemetery, Briech, is named after the nearby village. It is located between the cities of Tangier and Azilah on a littoral sand plateau bordering the Atlantic Sea, in the ecoregion called "Sahel du Nord." It is at an altitude of 40 metres above sea level. The precipitation is slightly lower than for the first location, ranging from 650 to 700 mm. The bioclimate is of a subhumid character with mild, frost free winters. The remnants of the original evergreen forests are dominated by the Wild Olive (*Olea europaea*[20]), the Dwarf Palm (*Chamaerops humilis*[20]), and the Mastic Tree (*Pistacia lentiscus*[20]) (Emberger 1939).

Apart from the differences in soil and climate, both locations have characteristics in common. They are spiritual places only of local importance, therefore they are not the focus of regional or nationwide pilgrimages. They have a small domed mausoleum for their saint at their centres, with the graveyards unfenced. On both graveyards, the central area around the tomb is covered by a closed evergreen forest. Both sacred grove areas are used by the local people as burial grounds, and also as pasture.

4 Methodology of the Geo-botanical Analysis

In May 1993, both cemeteries were studied to document their plant species and vegetation types, and to determine whether they had a biological conservation value (e.g. endangered species). The botanical analysis included the following steps:

1) Data sampling: The whole area of the cemetery was classified initially according to the dominant life form and the vertical structure of the

[20] Nomenclature based on Valdes et al. 1987.

vegetation (e.g. closed forest, open woodland, maquis, lawn with annual plant species, etc.). Representative sample plots in these pre-stratified vegetation types were selected and all vascular plant species on the sampled sites (17 in total) were recorded. Species abundance was also estimated.

2) Data treatment: The floristic samples from both locations were grouped according to floristic similarity to define plant communities (i.e. grouping of sites by common species combinations and ecological conditions). The primary data set is presented in Table 1.

3) Both study areas have been mapped (Figure 2 and 3) to: document the cover value of the different plant communities, to see what kind of vegetation mixture is created by the multipurpose use of these places, and to monitor future changes.

5 Results of the Geo-botanical Case Studies

The sacred areas studied provide small-scale mosaics of different plant communities. These include evergreen sclerophyllous forests, thickets of thorn bushes, and an abundance of flowers in the border areas. Annual species and those species linked to disturbed ground are predominant. The areas are also very heterogeneous from a structural point of view (Table 1, Figure 2 and 3).

At Briech, *O. europaea* is the only species of the tree layer. The undergrowth varies according to the grazing intensity. In some parts (Table 1, col. 4-5), *P. lentiscus* and *C. humilis* have both been degraded by grazing to small shrubs that form a dense thicket under the tree layer. In other parts of the site, permanent browsing has completely removed the shrub layer and the undergrowth is now dominated by ephemeral herbs like *Mercurialis annua* ssp. *ambigua*[20] and *Urtica urens*.[20] These species are favoured by the microclimatic conditions under the tree canopy, which primarily consists of a higher air humidity and shading, as well as by the high nitrogen content of the topsoil, which is a result of fertilisation by the manure of animals resting in the shade of the trees. The grove is situated close to the village and the grazing intensity is high throughout the year. The Wild Olive has not regenerated for decades. The canopy is still closed, but the tree population is getting an unbalanced age-structure. In the long term, this patch of forest will disappear. Pierre Quézel and Marcel Barbero (1990) call this type of degradation the "therophytisation of forests." Such "subfossil" wooded areas, without any true forest tree species in the herb layer, are now quite common in Morocco.

At Sidi Ali (Table1, col. 1-3), the mixed forest is dominated by the *O. europaea* var. *sylvestris* regenerating in the shelter of dense *Pistacia* thickets. *Q. coccifera* and *P. lentiscus* compose a second tree layer. In spring time, species sprouting from subterranean bulbs (e.g. *Arum italicum*,[20] *Arisarum simorrhinum*,[20] and adapted to shadow like *Torilis nodosa*[20] cover the forest floor. The central woodland is surrounded by a dense mantle community.

Table 1. Vegetation types occurring around two tombs for Moslem saints. This list was shortened to the most frequent and indicative species (the full data set is given in Deil 2000). The nomenclature of the plant species is according to BenitoValdes et al. (1987).

Column						11	11	1111
	123	45	6	7	89	01	23	4567
Area (S = Sidi Ali, B = Briech)	SSS	BB	S	S	BB	BB	SS	SSBB
Character species of evergreen forests								
Olea europaea sylvestris (tree)	aaf	aa	.	.	aa	..	..	....
Olea europaea sylvestris (shrub)	ff.	..	f	r	..	..	..	..rr
Clematis cirrhosa	frf	..	.	r	..	..	..	....
Smilax aspera	..f	..	r	.	..	..	..	....
Arisarum simorrhinum	rff	rr	r	r	..	..	..	....
Arum italicum	rfr	..	.	.	..	..	..	....
Character species of maquis/thicket								
Pistacia lentiscus (tree)	ffa	..	.	.	.f	..	..	....
Pistacia lentiscus (shrub)	ff.	fa	f	f	..	..	..	....
Chamaerops humilis (shrub)	f..	ff	f	f	rr	.r	..	..r.
Quercus coccifera (tree)	fff	..	.	.	..	..	..	....
Quercus coccifera (shrub)	ff.	..	.	d	..	..	..	....
Character species of the spiny mantle community								
Calicotome infesta intermedia	.r.	..	a	r	..	..	..	....
Asparagus aphyllus	...	rr	r	.	..	..	..	..r.
Rubus ulmifolius	...	ff	.	.	..	..	..	...r
Fire succeeder and subspontaneous ornamental								
Cistus monspeliensis	...	..	.	a	..	..	..	....
Iris germanica	...	r.	.	.	..	.f	..	....
Ombrophytic ruderals								
Geranium rotundifolium	rr.	..	.	.	..	..	..	....
Torilis nodosa	ff.	..	.	.	..	..	..	....
Geranium purpureum	..r	..	.	r	..	..	..	....
Mesophytic ruderals								
Mercurialis annua ambigua	.r.	..	.	.	ff	r.	..	....
Urtica urens	...	..	.	.	aa	..	..	....
Malva parviflora	...	..	.	.	rf	..	..	....
Sisymbrium officinale	...	..	.	.	ff	f.	..	....
Hordeum leporinum	...	..	.	.	ff	fr	..	..r.
Chrysanthemum coronarium	...	..	.	.	rr	aa	..	..rr
Verbascum sinuatum	...	..	.	.	..	rr	..	....
Dry resistant ephemerals								
Trifolium scabrum	rr.	..	.	.	..	.r	af	....
Trifolium stellatum	fr.	..	.	.	..	..	af	....
Cleonia lusitanica	...	..	.	.	..	..	ff	....
Daucus muricatus	...	..	.	.	..	..	rf	....
Aegilops geniculata	...	..	.	f	..	fr	rr	ffaa
Brachypodium distachyon	ff.	..	f	f	ff	ff	ff	ffff
Trifolium angustifolium	r..	.r	.	.	..	r.	rr	r.ff
Character species of productive grassland								
Hordeum bulbosum	...	fr	.	.	..	rr	..	..rf
Hedysarum coronarium	...	..	.	.	..	..	fa	ff..
Leontodon maroccanus	...	..	f	.	..	..	rr	....
Pasture weeds and ruderals								
Galactites tomentosa	rf.	..	.	r	rr	fr	ff	.rff
Avena barbata s.str.	...	..	.	.	..	rr	..	ffff
Scabiosa simplex dentata	...	..	.	.	..	..	.r	ra..
Bromus diandrus	...	..	.	.	..	rr	..	..ff
Desmazeria rigida	.r.	..	.	.	..	..	..	rf..
Atractylis cancellata	...	..	.	.	..	..	f.	r...
Cynara humilis	r..	rr	r	.	..	..	r.	rrrf
Scolymus hispanicus	rr.	r.	.	.	..	.r	..	..rr

Cover: r = rare (1-2.5%), f = frequent (5-25%), a = abundant (25-100%).

In the mantle community shrubs like *Calicotome infesta* ssp. *intermedia*[20] or *Asparagus aphyllus*[20] occur (Table 1, col. 6). The thorny thicket is opened from time to time by burning. This initiates the establishment of a low maquis, dominated by the rockrose (*Cistus monspeliensis*[20]) (Table 1, col. 7). This rockrose shelters some rare tall growing herbs like *Cirsium scabrum* (Poir.) Bonnet & Barratte and *Origanum compactum*.[20]

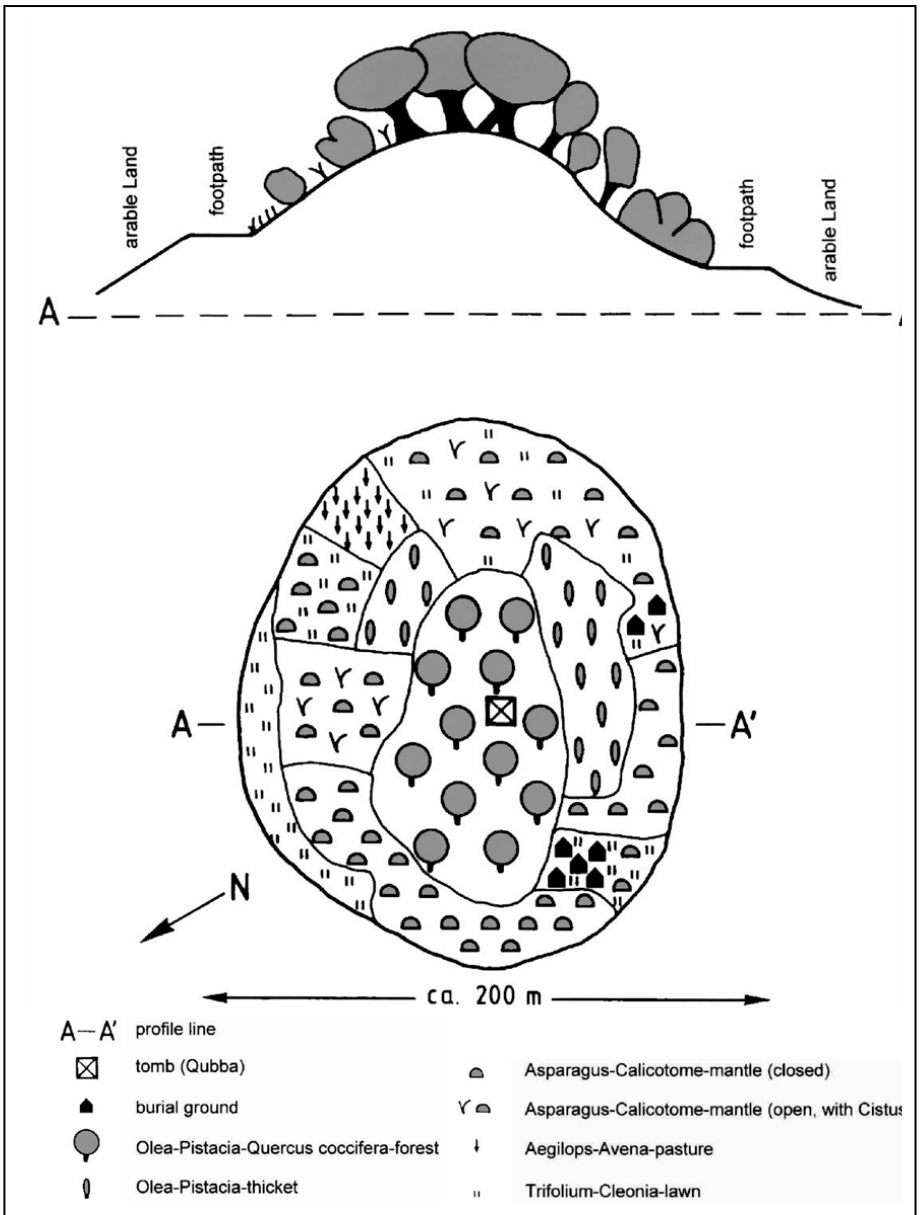

Figure 2. Vegetation map of the holy forest Sidi Ali bou Knâdel

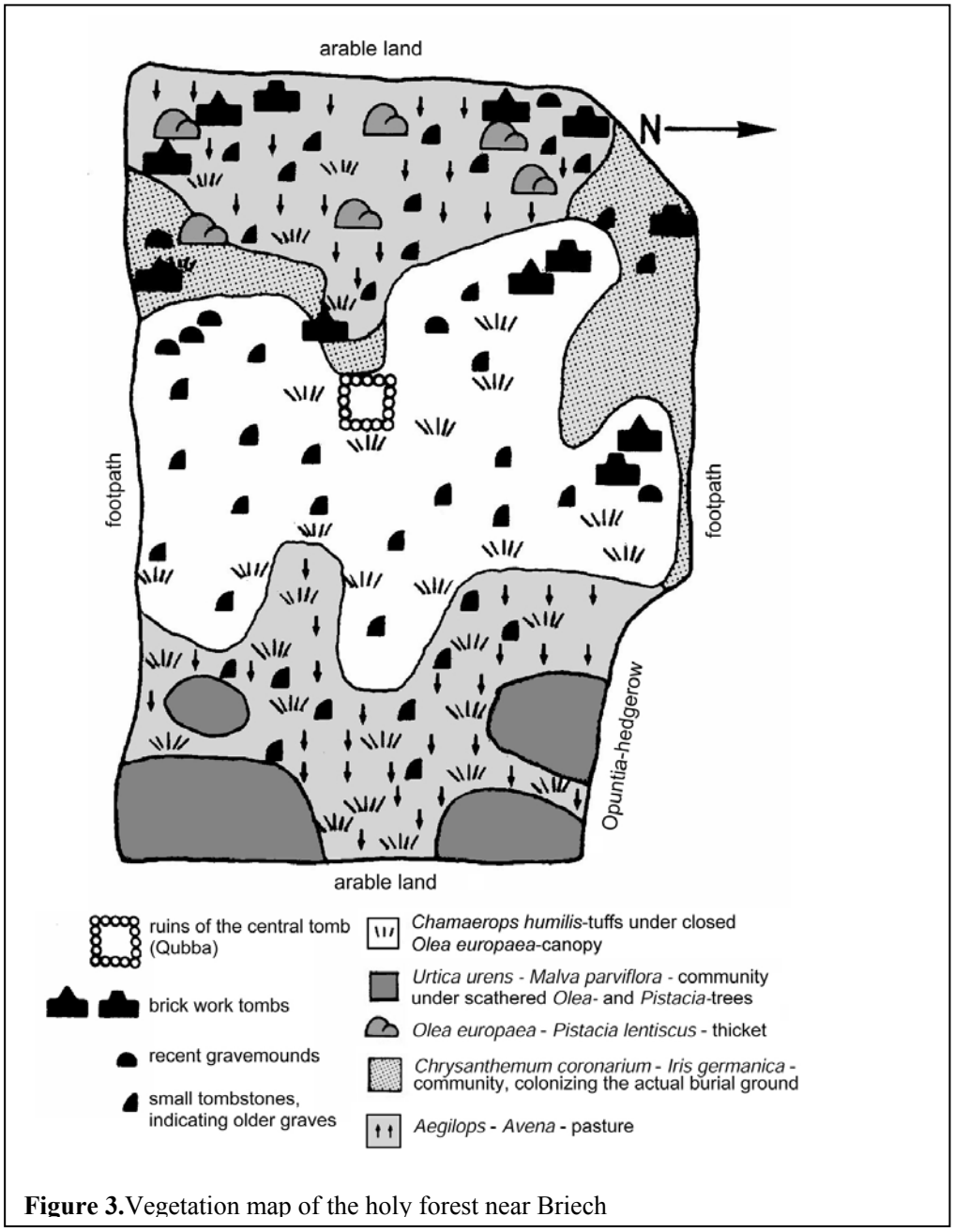

Figure 3. Vegetation map of the holy forest near Briech

On sunny and sandy sites, the *Malva parviflora-Urtica urens-Mercurialis annua*-community is replaced by another ruderal community, dominated by the Wild Chrysanthemum (Table 1, col. 10-11). In springtime, this community appears in a marvellous assortment of species with striking flowers like *Chrysanthemum coronarium*,[20] *Hedysarum coronarium*,[20] *Galactites tomentosa*,[20] and *Verbascum sinuatum*.[20] This attractive indigenous flora (*Chrysanthemum-Iris*-community in

Figure 3) is enriched by planted and sub-spontaneous species like *Pelagonium capitatum*.[20] *Iris* species (e.g. *Iris germanica*[20] and *I. albicans*[20]) are often planted at Muslim cemeteries. They have persisted over hundreds of years. Former Islamic graveyards in Southern Spain, abandoned since the Christian reconquest, are still characterized by the occurrence of Iris populations (Valdes et al. 1987).

The outer fringes of both groves are subjected to constant heavy grazing pressure and to periodic disturbances (burials). There, plant communities occur that are rich in species and which are dominated by small ephemeral herbs (e.g. *Trifolium scabrum*[20], *T. stellatum*[20], *Cleonia lusitanica*[20]) (Table 1, col. 12-13) (*Trifolium-Cleonia*-lawn in Figure 4), weedy annual grasses (e.g. *Aegilops geniculata*[20], *Avena barbata*[20]) *(Aegilops-Avena*-pasture in Figure2 and 3), and by higher growing thistles (e.g. *Galactites tomentosa*[20], *Cynara humilis*[20], *Scolymus hispanicus*[20])(Table 1, col. 14-17).

At the studied graveyards, pasturing, small scale burning, and burial activities result in a small-scale mosaic of different vegetation types. In total, they form a vegetation complex with a repetitive spatial pattern. A typical zone ranges from the domed mausoleum in the centre; surrounded by a forest with a shade tolerant herb layer, a spiny mantle community, and scattered shrubs; and then a pasture of tall growth leads to a dwarf ephemeral lawn at the outer fringes with recent grave-mounds. The central forest is less degraded at the Sidi Ali (i.e. far from settlement) location than the Briech (i.e. close to the village) location.

6 Discussion

6. 1 The potential role of sacred grove areas for nature conservation

Usually, Marabout grave areas are not nature reserves in the legal sense in that they are not protected by Moroccan law, and the protection of certain organisms is not their direct intention. In only a few cases have some of these sacred places been included in nature conservation priority programmes, for example, the Marabout Sidi Bourhaba area between the cities of Kenitra and Rabat where the sacred grove is situated close to a lagoon. However, even without any official status, these sacred places function as nature reserves to a certain extent (Quézel and Barbero 1990; Benabid 1991). In these cases, conservation is the by-product of other intentions (yet, for an unusually restricted definition of conservation see Smith and Wishnie 2000).

The case studies here represent a first insight into the sacred groves of Morocco. There is no other known survey of sacred grove vegetation in the whole country. It is therefore not known if sacred groves alone would represent all major biotope types of value for nature conservation in Morocco. It also remains unclear to what extent the traditional use of sacred grove sites can substitute for conservation approaches that follow criteria applied by scientists and conservationists.

6.2 Nature conservation value of sacred places in Morocco

6.2.1 Landscape aesthetic elements

The case studies both show that sacred groves are of high structural and floristic diversity. These areas are especially important as structural elements in the monotonous, nearly completely deforested lowland landscapes of Morocco. Their striking arrangements of trees and ornamental flowers are of high aesthetic value.

6.2.2 Models for the potential forest vegetation

Due to agricultural clearing nearly all forests have disappeared from the landscapes of Morocco. Sacred groves therefore represent the only places from which natural or semi-natural forest structures and floristic compositions might be reconstructed. They could be used as models for reforestation projects trying to reconstruct degraded areas with endemic vegetation. However, their roles as model areas should be considered carefully, since these holy forest patches have not yet been investigated systematically with respect to their environmental and topographical position on the landscape. The extent to which these holy forests represent the actual natural vegetation that would have occurred based on average environmental conditions (i.e. the formerly widespread natural or semi-natural vegetation) remains unknown.

6.2.3 Biodiversity conservation

Sacred groves provide habitats for many plant species. On the few hectares that compose the sacred areas of Sidi Ali and Briech, about 170 species of vascular plants were found. This outstanding floristic diversity is related to a relatively constant and moderate level of human impact on these areas. This result is in agreement with the intermediate disturbance hypothesis of biodiversity (Connell and Slatyer 1977).

6.2.4 Protection of rare plant species

Holy groves provide protection to only a few rare vascular plant species. The majority of the known rare and endemic plant species in Morocco is not associated with closed forests and sacred areas, but to extreme soil conditions and to open habitats (Deil 1993; Fennane and Ibn Tatou 1998). Two of the species associated with forests have been mentioned previously in the descriptions of the case studies. 1) The orchid *Cephalanthera longifolia* was found to be restricted to the central part of the Sidi Ali forest, since this site offers it suitable environmental conditions of permanent shading and an undisturbed humus layer. 2) *Cirsium scabrum* is a thistle that gathers biomass in a vegetative phase lasting several years; it then flowers once before dying. Because of its life cycle, this species is very sensitive to grazing (Gálvez and Hernández Bermejo 1990). On the Tangier Peninsula it occurs almost exclusively in the areas surrounding holy forests.

6.2.5 Protection of genetic resources

Holy forests can be regarded as genetic reservoirs of interesting tree species for forestry. Many of the tree species found in these areas tend to have special eco-types such as for *Pinus halepensis*,[20] *Pinus nigra*,[20] and *Pinus pinaster*.[20] A rare population of a *Quercus coccifera*-ecotype exists as part of the sacred grove of Sidi Ali. This ecotype differs from the widespread Western-Mediterranean Kermes-oak-taxon in

that it resembles *Quercus calliprinos*,[20] the Eastern Mediterranean taxon (Benabid 1985; Quézel 1991).

6.2.6 Habitat function

Sacred areas are expected to offer habitats for many animal species. These fragments might even function as stepping stones for mobile organisms or as home islands for a species, from which it disperses to colonise other areas. None of these assumptions are known to have been investigated yet.

6.3 Human impact on sacred groves

The Mediterranean region is extremely rich in biodiversity, due primarily to the level of human impact (Médail and Quézel 1997; Pignatti and Pignatti 1984; Naveh 1998). Ephemeral plant species in particular have co-evolved with humans, and their agriculture and animal husbandry. A decline in biodiversity in parts of the Mediterranean area is caused either by over-use (degradation) or by abandonment of traditional land use (Seligman and Perevolotsky 1994; Plieninger and Wilbrand 2001). As shown in the case studies here, sacred groves are usually not virgin forests. If they were, the area would be only forest, and low in species diversity. The structural variability and the floristic richness of the study areas is due to a constant, but limited, disturbance by people (e.g. digging, burning, etc.) and their livestock (e.g. grazing, defecation, etc.). Protection of the sacred sites in the sense of "non-use" would in the long term cause their floristic and structural diversity to diminish in that it would cause all the anthropogenic vegetation patches to disappear.

Protection and traditional utilisation need to be balanced to maintain the structural and floristic diversity that presently exists at sacred places. The trees on sacred areas have by tradition a kind of taboo that protects them from being cut down. However, as observed at the Briech study area, the regeneration of the Wild Olive has been prevented for decades due to overgrazing. This same problem could exist for the tree populations of many sacred groves. Although the trees are protected, grazing in the forest patches is too intensive making the forest unsustainable. In these areas the holy forests will disappear in the long-term.

In its present form, the arrangement of vegetation on sacred grove areas is the result of religious and other activities practiced over an unknown, but very long, period. The increasing number of participants in pilgrimages combined with the recent trend to transform these events into domestic tourism experiences could degrade the plant cover around these holy places. Dune ecosystems, like that at the tomb of Moulay Abdellah close to the city of El Jadidah, in particular, are extremely sensitive to severe trampling, especially when the visitors numbers are in the thousands.

6.4 The socio-cultural context and long-term conservation perspectives

An individual's perception and evaluation of a landscape depends on the normative system of his or her society, and how the society relates to the landscape. The structural composition of landscapes (e.g. geometric layout of fields) can be linked to ownership or the kind of economy and labour, but also to spiritual influences (Krings 1991; Yoon 1991). In the Maghreb countries, organisms that inhabit the holy territories of sacred groves are protected without being the actual objects of

protection. They are protected since, they with the space they occupy combine to form special places that play important roles in the identity of tribal groups associated with them, especially for the genealogic record provided by the graves within their borders and the spiritual connections these graves have between the living and the dead (Bourquia 1990). In these holy forests, the noosphere (i.e. world of imagination and intellect) becomes tangible in the biosphere (i.e. physical world of organisms).

It was shown in this study that the combination of traditional religious activities with moderate land use favours biodiversity and other aspects of importance to nature conservation at sacred groves in Morocco. The conservation of holy forests is highly dependent on the trends of modern Moroccan society. Hubert Lang (1992) states that the religious importance of Moslem saints is not on the verge of disappearing, but actually plays an important role in Moroccan society. However, the sacred groves might be endangered by modern socio-cultural trends, like changes from the traditional intention of pilgrimages to more recreational events in the form of domestic tourism (Berriane 1990; 1992).

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