RESEARCH ARTICLE

PEOPLE AND NATURE | BRITISH ECOLOGICAL SOCIETY

Social dynamics of values, taboos and perceived threats around sacred groves in Kurdistan, Iran

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Abstract

1. Sacred groves are important for the conservation of biodiversity in the Middle East, as more formal approaches to protected areas have often failed in this global biodiversity hotspot.

2. This study aims to identify the most important social values, taboos and perceived threats around sacred groves in the Kurdistan province of Iran. We test whether values, taboos and perceived threats are lost in transmission across generations, with increased urbanisation, and with modernising livelihoods.

3. Our survey of 205 local residents revealed that spiritual values, biodiversity and cultural heritage values are key motivations for local people to preserve sacred groves.

4. Taboos restricting natural resource use were widely shared by local people and thus appeared as powerful pillars for conserving sacred groves.

5. Local people expressed a strong perception that sacred groves are threatened, both by deliberate and accidental actions, and from both extractive and non-extractive uses.

6. Social values and taboos around sacred groves in Kurdistan seemed relatively stable, but we found clear differences. The key holders of values and taboos were elderly people, women, rural people and people with traditional lifestyles. We conclude that eliciting the traditional knowledge and management practices of these groups and empowering them to maintain and revitalise their customs, values and taboos through socioeconomic modernisation is crucial for any conservation strategy.

7. Local residents who are young, male, more urban and follow a modern lifestyle may need targeting by awareness-raising conservation programs.

8. Maintaining and fostering informal conservation traditions such as those around sacred groves is particularly important in areas of conflict where other conservation approaches are lacking and where pressures on natural resources are high.

KEYWORDS

biocultural conservation, community-based conservation, protected areas, religion, sacred forests, sacred natural sites, traditional ecological knowledge

1 | INTRODUCTION

Protected areas are the most common global strategy for conserving biodiversity in the face of ecosystem loss, fragmentation, and degradation (Watson et al., 2014). The establishment of protected areas is a proven method for delivering important ecosystem services on which the welfare of current and future generations depends (Castro et al., 2015; Palomo et al., 2011). Protected areas now cover 15% of the global land area (Visconti et al., 2019), and proposals have been made to increase coverage up to 30% (plus additional climate stabilisation areas) by 2030 (Dinerstein et al., 2019). Despite the successes of expanding protected area networks, however, the diversity within species, between species and of ecosystems continues to decline faster than at any time in human history in most taxonomic groups (Brondizio et al., 2019). These declines have been found not only outside, but also inside protected areas (for instance, in flying insects in Germany, Hallmann et al., 2017). Decreases appear to be more moderate within protected areas (e.g. those of global insect abundances, van Klink et al., 2020). In general, the world's protected areas only partly cover areas of importance for biodiversity and are not yet fully ecologically representative and well-connected (Díaz et al., 2019).

The most significant limitations of the formal protected areas approach are in the social realm. Across the world, protected areas are challenged by resource use conflicts with local people and a general difficulty in balancing conservation with economic and social goals (Blicharska et al., 2016; West et al., 2006). Such conflicts are affected by legal, financial, procedural, scientific, social and political drivers. Negative attitudes of local stakeholders toward protected areas, low degrees of stakeholder involvement in protected area management, lack of political support from local and national governments and understaffing of management authorities are common (Kati et al., 2015). Many of these problems are unsurprising, given that top-down protected area strategies have displaced people across the world from their traditional lands, and/or restricted their access to ecosystem services (Palomo et al., 2014). 'People and nature' models have been proposed as frameworks for protected areas to overcome these challenges. Current conservation thinking focuses on linking nature to human well-being, identifying nature's benefits as needed and received by people and envisaging a multi-layered and multidimensional relationship between people and protected areas (Armitage et al., 2020; Mace, 2014).

Sacred groves are a time-tested 'people and nature' approach to conservation, and thus an important complement to formal protected areas (Lowman & Sinu, 2017). Here, we define sacred groves as forests and woodlands that are of particular spiritual significance for people and communities (Pungetti et al., 2012). Sacred groves have persisted in many countries throughout the world and include a wide variety of habitats (Bhagwat & Rutte, 2006). They form a largely unrecognised 'shadow network' of conservation areas exempt from agriculture, forestry and other land uses. Sacred natural sites, including sacred groves, play a role in Bon, Buddhist, Daoist, Christian, Hindu, Islamic, Jewish, Shinto and many other faiths (Dudley et al., 2009). They have been most commonly studied in India, where there are 100,000–150,000 sacred groves (Ormsby

& Bhagwat, 2010). Other hotspots are China (Gao et al., 2013) as well as Western (Barre et al., 2009), Northern (Deil et al., 2005) and Eastern Africa (Doffana, 2017).

Several characteristics make sacred groves relevant for consideration in protected area strategies. First, local people show great willingness to protect and conserve sacred groves. Their local ecological practices, social values and taboos offer powerful protection (Negi, 2010; Xu et al., 2005), as for instance expressed in reduced forest cover losses (Byers et al., 2001). Secondly, sacred groves are small in extent, but disproportionally rich in biodiversity and ecosystem services, especially when forming a network of habitats (Ray & Ramachandra, 2010). Third, sacred groves are often situated in intensively used agricultural or urban landscapes. These are typically locations where formal protected areas are underrepresented and where refuges for endangered species are most needed (Mgumia & Oba, 2003). Fourth, sacred sites have evolved over centuries (Ormsby & Bhagwat, 2010), which means that they play an important role in biodiversity conservation by offering habitat continuity (Kowarik et al., 2016). Fifth, sacred sites involve place-specific social memories related to the stewardship of ecosystems and biodiversity. As 'biocultural refugia' they store, revive and transmit memories that may be useful in the future for coping with social and environmental uncertainties (Barthel et al., 2013). Finally, as multifunctional common-property resources (Rutte, 2011), sacred groves are socially more inclusive than formal protected areas, providing benefits to a broad range of local people (Chandrakanth et al., 2004). Taken together, these characteristics indicate that sacred groves come close to the 'people and nature' ideal of conservation.

The biodiversity conservation potential of many sacred groves is well-established (Bhagwat & Rutte, 2006), and bodies such as the International Union for Conservation of Nature (IUCN) and UNESCO have included sacred groves in their conservation strategies (Verschuuren et al., 2010). Despite these efforts, however, many of the world's sacred groves are declining in their extent or their ecological qualities are being degraded. The drivers behind this weakening of sacred groves are complex, and include legal (e.g. loss of customary rights in sacred groves), socioeconomic (e.g. increasing population numbers) and cultural aspects (e.g. loss of traditional faiths; Bhagwat & Rutte, 2006; Chandrakanth et al., 2004).

A substantial amount of research has addressed sacred groves in different biomes and linked to different faiths in the world (as reviewed by Bhagwat & Rutte, 2006; and Rutte, 2011). Very little is known, however, about sacred groves in the Middle East, the world region covering Western Asia, Egypt, Iran and Turkey. The study of sacred groves in this world region is particularly important, as the Middle East hosts several global biodiversity hotspots (most notably, the Irano-Antolian biodiversity hotspot, Mittermeier et al., 2011). More than 400 plant species are limited to the Irano-Anatolian hotspot. In addition, more than 360 bird, 140 mammal, 115 reptile, some 20 amphibian and around 90 freshwater fish species (many of these being endemic) have been recorded (Critical Ecosystem Partnership Fund, 2020). At the same time, the region has a large population and is subject to natural resource pressures, weak governance of formally protected areas and complex demographic, socioeconomic and political

dynamics (Ghoddousi et al., 2017; Talebi et al., 2013). Many community-based approaches to nature conservation, such as sacred groves and the 'Hima' system, have traditionally developed in the Middle East, but are currently in decline. The Hima protected area system is an ancient Arabic approach that protects trees, wildlife, grasslands, fields, woodlands and wetlands from indiscriminate harvest on a temporary or permanent basis (Gari, 2006). An erosion of the religious beliefs and cultural traditions that created and maintained both Hima lands and sacred groves is routinely mentioned in the literature (Khan et al., 2008; Serhal et al., 2011). Those values, taboos and perceived threats have, to our knowledge, not been assessed, and are related to sociodemographic changes. Our study aims to identify the most important social values, taboos and perceived threats around sacred groves in the Kurdistan province of Iran, an area close to the Iraqi border. We test whether the values, taboos and perceptions of threats that are important for the maintenance of sacred groves are lost in transmission across generations, with increased urbanisation, and with modern livelihoods. We also assess differences between women and men, and between locals with and without formal education, and analyse the interactions between the expressed values, taboos and perceptions of threat. We discuss the potential and challenges of sacred sites to inform 'people and nature' approaches to conservation.

2 | METHODS

2.1 | Study area

The study area includes sacred groves located close to villages in Baneh County, Iran. This region is embedded in the Zagros mountains that range from the Mediterranean Sea in eastern Turkey to the Persian Gulf in southern Iran, and are considered homeland of the Kurdish people. The main vegetation type is oak woodland, comprising *Quercus brantii*, *Quercusin infectoria* and *Quercus libani* (Talebi et al., 2013). The main companion woody species include *Pistacia atlantica*, *Crataegus* sp., *Cerasus* sp., *Amygdalus* sp. and *Astragalus* sp. Baneh County has some of the richest flora in Western Iran, comprising around 1,000 plant species. About 250 plant species have been recorded in the sacred groves used in our study (Z. Shakeri, K. Mohammadi Samani, E. Bergmeier, & T. Plieninger, unpubl. data). The plant families with the highest species numbers are Asteraceae, Fabaceae, Apiaceae and Poaceae. The climate is semi-humid and cold, with total precipitation of 600–800 mm, 40% of which occurs during winter as snowfall. The average minimum and maximum temperatures are –1.5 and 26.4°C respectively.

Our study focused on 25 villages in Baneh County (35°45′-36°10′N, 45°40′-46°00′E, extent: 1,584 km^2), increasing in altitude from north (1,000 m) to south (3,200 m), with an average of 1,550 m (Figure 1). The mean distance (±*SE*) of the villages from Baneh city (*c.* 69,600 inhabitants) is 16.6 ± 8.8 km. According to the Iran population census of 2016, the total population of the villages comprises 10,359 individuals, with 22–1,613 inhabitants per village. The illiteracy rate among the population is around 25%. The language of the inhabitants is Kurdish (Sorani) and they practice Islam (Sunni). Many residents perform a traditional land use called galazani (a complex, indigenous silvo-pastoral system, Valipour et al., 2014), but this lifestyle is increasingly being abandoned. The most common means of subsistence are animal husbandry, traditional agriculture and transporting goods across the Iran–Iraq border (so-called Kolbari; Table S1). In recent years, the low profitability of traditional land-use practices has resulted in a shift of livelihoods toward gardening, Kolbari and out-migration to urban areas.
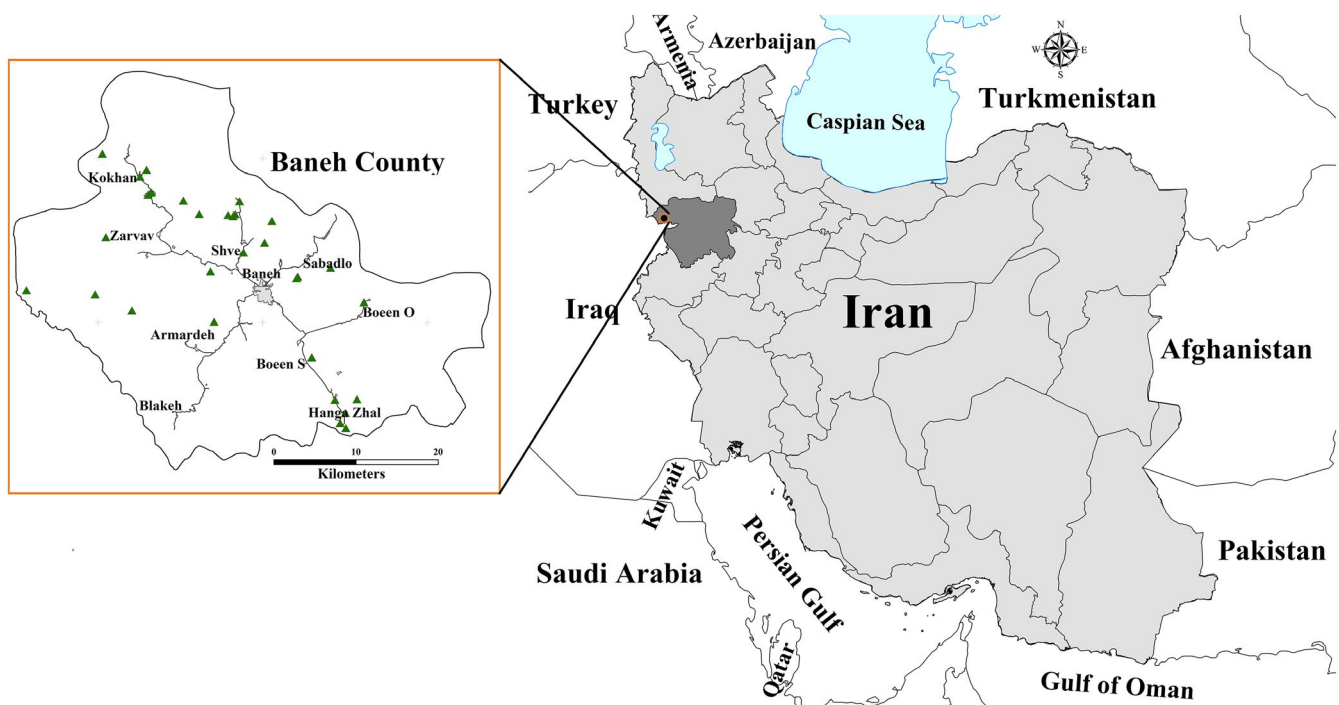
FIGURE 1 Map of the Baneh study area. Triangles show the sacred groves included in this study

FIGURE 2 Sacred grove near Hanga Zahl (Photo by Aioub Moradi)

Each of the villages has 1–3 sacred groves (extent: 0.3–7.0 ha, Figure 2). These comprise patches of old-growth forests or wooded areas (Figure 3). Sacred groves include cemeteries or individual tombs, and are recognised by the local people as the dwelling places of their ancestors' souls. Most sacred groves are located in plain terrain. Since they are used as burial places, they are all located close to roads. Some sacred groves include a grave belonging to a saint (recognised as 'Shakhs'). Sacred groves including Shakhs possess higher spiritual value for people, and they are therefore typically larger and better preserved. Generally the land of the sacred groves has been endowed to a mosque, and serves as a cemetery for the village. Sacred groves are therefore formally in public ownership. When there was no more space for new tombs, people endowed new land as sacred groves (while preserving the old ones). Villages thus often have more than one sacred grove. Sacred groves are typically surrounded by grazing land, farmland, orchards and inhabited areas (Figure 2).

Traditionally, local communities have established strict rules for sacred groves that prohibit the felling of trees, hunting, animal grazing, collecting fodder, firewood or other plant products (Figure 4), and they protect sacred groves from disturbances like fire. Anyone is free to enter the sacred groves. Sacred groves are sometimes used as places for traditional ceremonies. For example, Sizdah Be-dar is an old religious-ceremony from the Zoroastrian era, and an important cultural ceremony in Iran and other Persian language countries like Afghanistan and Tajikistan. On Sizdah Be-dar day, people go out into nature with their families and celebrate the arrival of spring.

Rapid social changes have collided in recent decades with sacred values and caused the decline or destruction of sacred groves in some villages. For instance, we observed several cases where sacred groves had been destroyed due to the construction of paved roads, treasure hunting and illegal excavations, the commercial collection of medicinal plants, livestock grazing, squirrel hunting and the over-pollarding of trees.

2.2 | Questionnaire design

We developed a paper-based questionnaire to elicit people's values, taboos and perceived threats involving sacred groves. The questionnaire consisted of four parts. Parts I to III comprised lists of statements on values, taboos and perceived threats, to which respondents could agree or disagree. These statements were defined after initial

FIGURE 3 Inside of a sacred grove in Bikash, depicting *Quercus infectoria* and *Quercus brantii* trees and a well-developed herbal layer
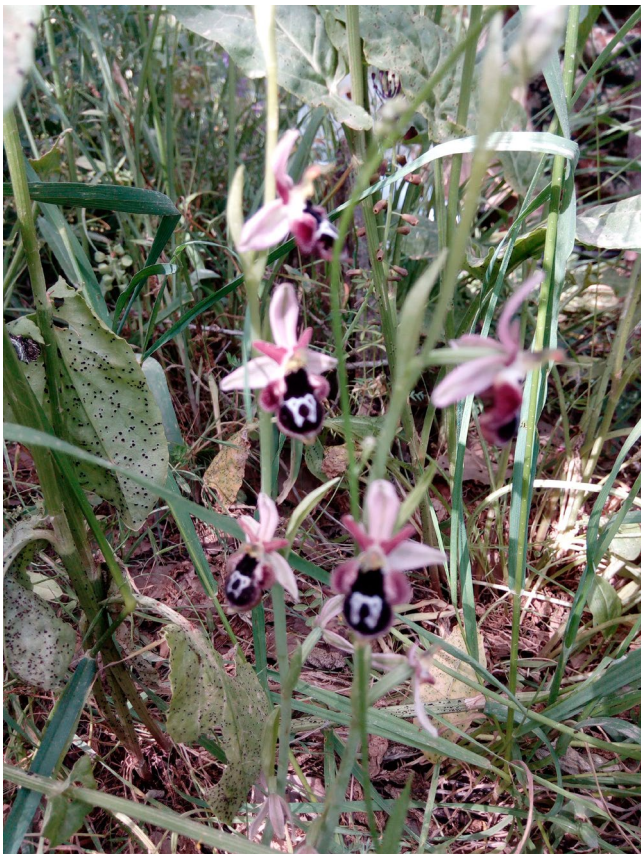
FIGURE 4 *Ophrys reinholdii* ssp. *straussii* is a rare orchid. Its roots are harvested for traditional medicinal uses. The orchid remains relatively common in sacred groves, where it is protected by taboos

deliberation with local people during exploratory visits to the study area. Part I presented a series of nine statements on values attached to sacred groves, including, for example, biodiversity, recreational and cultural heritage values (using the ecosystem services terminology of the Millennium Ecosystem Assessment, 2003). Part II enquired about taboos that respondents would respect around sacred groves. Among the nine statements were, for instance, 'Hunting must not be practiced in sacred groves' and 'Visitors must not step on graves'. Part III was dedicated to 10 types of perceived threats to sacred groves, and asked, for example, about wildfires, the overaging of trees (a failure of saplings entering mature tree size classes and the gradual mortality of large trees, Montagnini & Ashton, 1999) and the destruction of graves. The responses given in Parts I to III were measured using Likert-type scales, ranging from 1 ('strongly disagree' for Parts I and II, and 'not important at all' for Part III) to 5 ('strongly agree' for Parts I and II, and 'very important' for Part III). Respondents could also note that they did not know an answer (see Table S2 for full statements). Part IV asked about respondent characteristics, such as age, gender, occupation, level of formal education and performing galazani (as a proxy for practicing a traditional lifestyle). Our questionnaire did not include open-ended questions. Finally, distance to the next large city, Baneh, was calculated for each village. The questionnaire was pretested with colleagues at the University of Kurdistan in Sanandaj, Iran.

2.3 | Data collection

The survey population of this study comprised residents from the 25 villages. These villages were selected to represent a gradient from being close to being distant from Baneh city, and to include smaller and larger settlements. A strictly random selection of villages was not possible, as we depended on the permission of village councils to perform interviews and conduct vegetation studies. We aimed for a sample size similar to that used by Allendorf

Variable	Category	Frequency (respondents)	Ratio (%)
Distance to city	Long distance	69	33.7
	Medium distance	84	41.0
	Short distance	52	25.4
Age	Old: >50 years	77	37.6
	Middle: 31–50 years	80	39.0
	Young: 18–30 years	48	23.4
Gender	Female	87	42.4
	Male	118	57.6
Formal education	No primary schooling	83	40.5
	At least primary schooling	122	59.5
Performs traditional lifestyle (galazani)	Yes	108	52.7
	No	97	47.3
Sample size (N)		205	100.0

et al. (2014) and Ormsby (2013), and finally obtained a total of 205 responses (1–15 responses per village, max. 1 respondent per family) through purposive sampling. We selected interviewees so as to cover all age groups, both women and men, and literate and illiterate villagers. Of our final sample, 58% were men and 42% were women. Twenty-three percent of respondents were <30 years, 39% were 30–60 years and 38% were >60 years old (Table 1). Survey participants were invited and interviewed in public places, such as mosques and tea houses. Interviews with women and elderly people were carried out in their homes. The households were all in a similar distance to the groves, because houses are concentrated in the inhabited area of the villages. We performed data collection from April to September 2017. The questionnaires were filled in with the help of local facilitators. Interviews were carried out orally in the Sorani language. Facilitators introduced respondents to the purpose of the survey and the use of the data, and guaranteed that no respondent names were recorded. We did not compensate respondents financially. Our University of Kurdistan research team had been working in this region since 2005, and this long-term relationship created trust with the local people. A systematic self-assessment provided by the University of Kassel ethics board indicated that our survey required an ethically sensitive procedure, but the board granted an exemption from requiring formal ethics approval. Ethical guidelines developed for the European Commission's Horizon 2020 Programme were fully considered, for example by ensuring that no children or other vulnerable populations were interviewed, that participation was voluntary, that respondents were not deceived about the purpose of the study, that data processing was subject to appropriate safeguards and that the data minimisation principle was considered. Our facilitators obtained informed consent before performing the interviews. The survey was delivered orally, and consent was also given verbally. To obtain written informed consent would have been culturally inappropriate, and impossible in practice, as around 41% of the respondents were illiterate (Table 1). The general distrust of local people toward outsiders in the conflict-prone study area also did not allow written information to be collected from the respondents.

2.4 | Data analysis

We performed descriptive and statistical data analyses with XLSTAT 2017. We used descriptive analyses to show the arithmetic means of expressed values, taboos and perceived threats (according to the 5-point Likert scales). Descriptive and correlation analyses ensured that the dataset fulfilled the statistical assumptions for the subsequent multivariate tests. We performed pairwise multiple comparisons (post hoc comparisons) after a multi-way ANOVA to compare the differences in the expressed values, taboos and perceived threats among different types of respondents. We then used a redundancy analysis (RDA) to explore the degree of influence from taboos and perceived threats on values linked to sacred groves (Martín-López et al., 2012). This statistical technique provides the means for conducting direct exploratory analysis, in which the associations between values may be explored with respect to their relationships with any set of predictors of interest (in this case taboos and perceived threats).

3 | RESULTS

3.1 | Values, taboos and perceived threats

Spiritual values and biodiversity were the most common values (average of 4.7 and 4.3 respectively), followed by inspiration and cultural heritage values (averages of 3.8 and 3.7; Figure 5a). In contrast, values such as recreation, harvesting wild plants and social relations were perceived as less important by the respondents (averages of 1.4, 2.3 and 2.5). With a summed average value of 4.2, the importance seen in taboos was overall very high. From our pre-defined list
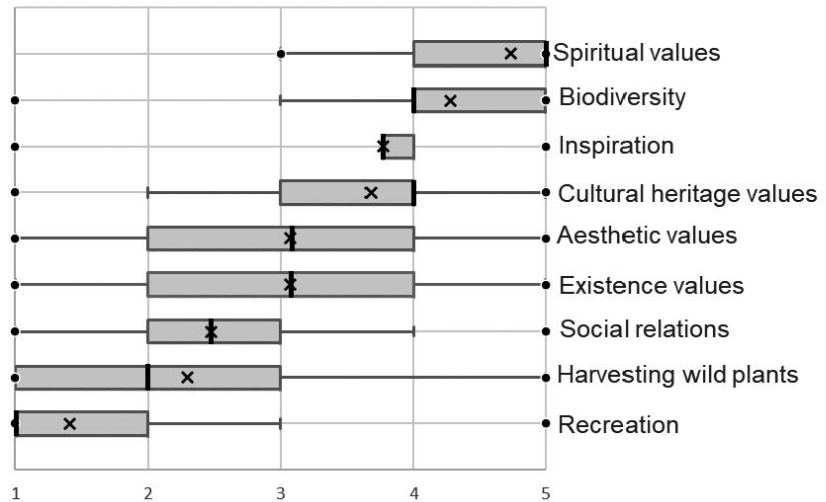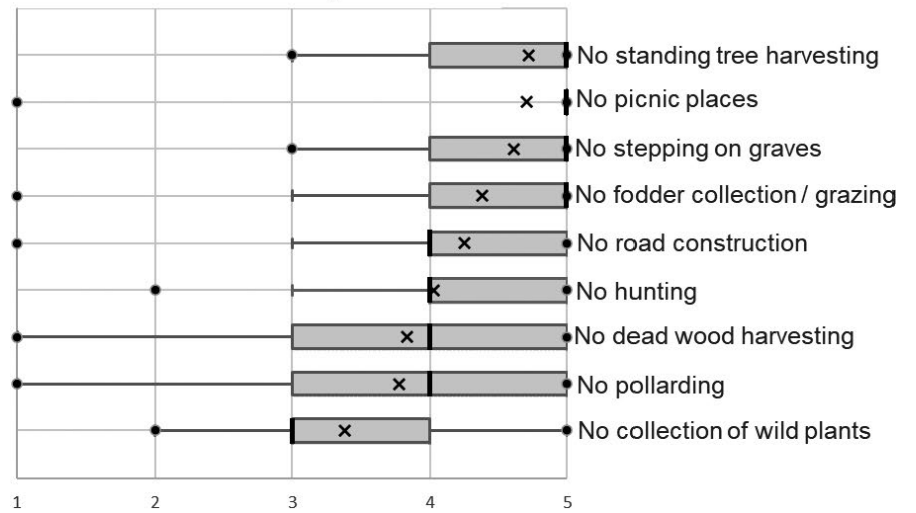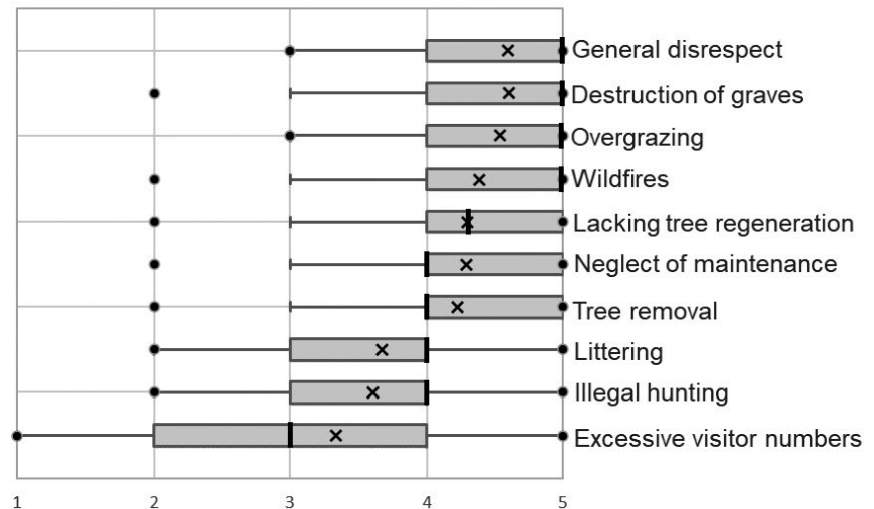
of potential taboos, respondents identified taboos against the use of sacred groves as picnic places and the cutting of living trees as most important (averages of 4.7). This was followed by those against stepping on graves and against collecting fodder and/or livestock grazing (averages of 4.6 and 4.4). Taboos restricting the collection of wild plants and the pollarding of trees were perceived with lower values (averages of 3.4 and 3.8; Figure 5b). Respondents also expressed strong concerns about perceived threats. General disrespect,

destruction of graves and overgrazing were the threats perceived with the highest values (average of 4.6, 4.6 and 4.5). In contrast, excessive visitor numbers and illegal hunting were perceived as less important threats (Figure 5c).

3.2 | Social drivers

Several factors significantly affected the expressions of values, taboos and perceived threats (Table 2; Table S3 for full documentation of significance values, effect sizes and uncertainty intervals). In relation to the perception of values, proximity to the region's capital city was a relevant factor in the stronger appreciation of recreational values and a weaker perception of spiritual values. Higher age was relevant for attributing higher importance to biodiversity, inspiration and spiritual values, and less importance to the harvesting of

wild plants. Female respondents attributed stronger importance to aesthetic values, cultural heritage values, social relations and existence values than did male respondents. Respondents who had received formal education attributed greater importance to inspiration than those without formal education. A respondent's involvement in practicing a traditional lifestyle was relevant to spiritual values, and less relevant to harvesting wild plants in sacred groves.

In the importance of taboos, greater distances to the city were relevant to stronger attitudes against dead wood harvesting, fodder collection and grazing, pollarding and stepping on graves (Table 3). Respondents living in villages at a medium distance from the city found the taboo against road construction less important. Older respondents held stronger taboos against road construction, the harvesting of living trees and stepping on graves. Women expressed stronger attitudes against pollarding in sacred groves than men, but they expressed fewer attitudes against harvesting living

TABLE 2 ANOVA test comparing the expressed values depending on respondent characteristics (black/grey: Statistically significant [$p < 0.05$] higher/lower importance of the value for the group in relation to the reference category)

Variable	Distance to city		Age		Gender	Formal education	Traditional lifestyle
Reference category	Short		Young		Male	No	No
Category	Long	Medium	Middle	Old	Female	Yes	Yes
Spiritual values	■			■			■
Biodiversity			■				
Inspiration				■		■	
Cultural heritage values					■		
Aesthetic values					■		
Existence values					■		
Social relations					■		
Harvesting wild plants				▩			▩
Recreation	▩	▩					

TABLE 3 ANOVA test comparing the expressed taboos depending on respondent characteristics (black/grey: Statistically significant [$p < 0.05$] higher/lower importance of the value for the group in relation to the reference category)

| Variable	Distance to city		Age		Gender	Formal education	Traditional lifestyle
Reference category	Short		Young		Male	No	No
Category	Long	Medium	Middle	Old	Female	Yes	Yes
No living tree harvesting				■	▩		
No picnic places							
No stepping on graves	■	■		■			
No fodder collection/grazing	■						■
No road construction		▩	■	■			
No hunting							
No dead wood harvesting	■	■					■
No pollarding					■		
No collection of wild plants							

trees. Formal education did not affect the perception of taboos. Respondents living a traditional lifestyle supported the taboos against road construction, dead wood harvesting and fodder collection more strongly.

In relation to the perception of threats, respondents living farther away from the city showed stronger concerns in relation to wildfires, overgrazing, littering and the destruction of graves than those living close to the city (Table 4). Older respondents were more concerned

TABLE 4 ANOVA test comparing the perceived threats depending on respondent characteristics (black/grey: Statistically significant [$p < 0.05$] higher/lower importance of the value for the group in relation to the reference category)

Variable	Distance to city		Age		Gender	Formal education	Traditional lifestyle
Reference category	Short		Young		Male	No	No
Category	Long	Medium	Middle	Old	Female	Yes	Yes
General disrespect				■			■
Destruction of graves	■				▨		▢
Overgrazing	■						■
Wildfires	■		■		▨		
Lack of tree regeneration							
Neglect of maintenance					■		
Tree removal							
Illegal hunting					■		
Littering	■				▨		
Excessive visitor numbers					■		■
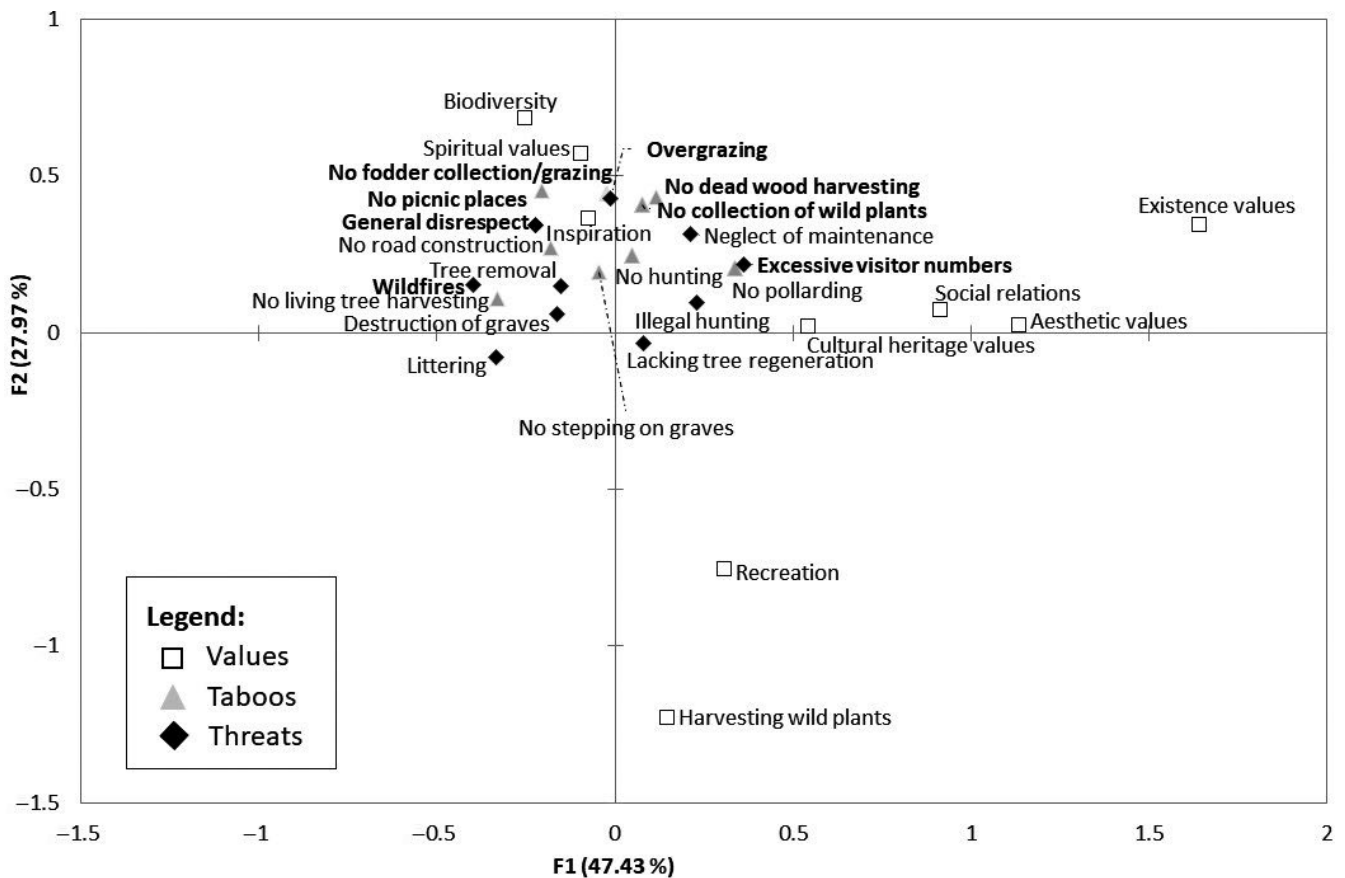
FIGURE 6 Biplot of the RDA analysis showing the relationships between values, taboos and perceived threats (bold: Explaining variables with higher standardised canonical coefficients for axes 1 and 2)

about wildfires and general disrespectful behaviours than younger respondents. Women expressed more worries about the neglect of maintenance, illegal hunting and excessive numbers of visitors than men. Men perceived greater threats from wildfires, littering and the destruction of graves. Formal education did not have any effect on the perception of threats. Respondents practicing a traditional lifestyle showed stronger dismay about overgrazing, excessive visitors and general disrespect.

3.3 | Relationships between values, taboos and perceived threats

The multivariate RDA analysis revealed significant associations between the expressed values, taboos and perceived threats ($p < 0.001$, 1,000 permutations). The first two axes of the RDA explained 75.41% of the total variance (Figure 6). The first axis of the RDA (47.43% of the variance) revealed two bundles of values. The most negative scores were associated with a first bundle that included spiritual values, biodiversity and inspiration. These values were mainly related to taboos such as those against using sacred groves as picnic places and against fodder collection and/or grazing. They were also related to perceived threats such as overall disrespect, wildfire and overgrazing. Positive scores were associated with a second bundle that included existence values, social relationships, cultural heritage values and aesthetic values. This bundle of values was related to the taboos against dead wood harvesting and collection of wild plants, and perceived threats such as excessive visitor numbers. The second axis of the RDA (27.97% of the variance) revealed a gradient of perceived values. Most notably, biodiversity and most values, taboos and perceived threats were placed with positive scores, while recreational values together with the collection of harvesting wild plants were linked with negative values and placed outside the bundles of values (Figure 6; Table S4). No taboos or perceived threats were found to be linked to these two values.

4 | DISCUSSION

This study set out to explore the potential of sacred groves as a 'people and nature' model of conservation in the Middle East. Formal conservation governance has often failed, and armed conflicts and illicit activities are undermining conservation and sustainable land use in this world region (Baumann & Kuemmerle, 2016; Tellman et al., 2020). Our first finding was that sacred groves remain common features of the landscape, persisting in virtually every village that we visited in Kurdistan. Local people are well aware of these groves and ready to talk about them. None of the groves had been studied before, and we found only one study that included a sacred grove in the whole of Iran (Avatefi Hemmat et al., 2012). In this context, our interest was in how social values (Allendorf et al., 2014), taboos (Barre et al., 2009) and perceptions

of threats (Ormsby & Bhagwat, 2010) are underpinning sacred grove conservation.

Nearly every respondent identified one or more societal values in sacred groves as being important. Similar to findings among Tibetans in Yunnan, China (Allendorf et al., 2014), the highest ranked values were spiritual ones. Respondents emphasised the sacredness of the groves, their function as burial places and the special meaning of tombs of holy persons. Spirituality thus appears to be a major driver underpinning the social values of sacred groves in Kurdistan. Evidence from other parts of the world highlights how religions have influenced not only values and meanings, but also peoples' actions, and policy changes toward environmental conservation (Awoyemi et al., 2012; Bhagwat et al., 2011; McLeod & Palmer, 2015). In addition to spiritual values, the importance of the groves for biodiversity, inspiration and cultural heritage values was commonly highlighted. This finding, similar to perspectives on sacred natural sites by Tibetans (Yaofeng et al., 2009), expresses a biocultural understanding of interlinked intangible natural and cultural heritage values (Hanspach et al. 2020). In contrast, the harvesting of wild plant resources and social relations were considered less important. This seems different from findings from India, where the non-destructive extraction of plant products is a major benefit of sacred groves for local people (Prashanth Ballullaya et al., 2019), and where sacred groves are socially important meeting places (Blicharska et al., 2013). Recreational values were rated with the lowest importance, as has been found elsewhere (Allendorf et al., 2014). Hiking, running, biking and camping have their primary origin in North America and Europe (Bell et al., 2009), and are not common in this part of the world—and seem to be particularly uncommon in a sacred grove.

Adherence to religious and social taboos and fear of repercussions are prime factors in conserving sacred groves world-wide (Barre et al., 2009; Negi, 2010; Prashanth Ballullaya et al., 2019), most notably by driving the conservation-friendly behaviour of people (e.g. against harming snakes, Landry Yuan et al., 2020). Our survey revealed a large number of important taboos prevalent around the sacred groves of Kurdistan. Agreement about taboos was much higher than about social values and also higher than, for example, found in an Indian study of sacred groves (Ormsby, 2013). Of greatest importance for local people were the taboos against cutting trees, picnicking, stepping on graves, collecting fodder and grazing livestock and constructing roads in sacred groves (cf. Avatefi Hemmat et al., 2012). These taboos may be respected even by people who are not part of traditional belief systems but want to avoid trouble with informal local authorities (Barre et al., 2009). None of the taboos was considered unimportant by our respondents. While the sustainability of taboo practices appears threatened due to Western-style education systems in some parts of the world (e.g. in India, Negi, 2010), taboos seem to have remained intact in Kurdistan, despite the region's economic and social development.

Similar to the taboos, there was a very high level of agreement that the future of sacred groves is threatened (cf. Allendorf et al., 2014). These threats were perceived to come from different directions: the increasing natural resource extraction has been

identified as putting pressure on sacred groves elsewhere (Blicharska et al., 2013; Ormsby & Bhagwat, 2010) and was expressed as overgrazing and lack of tree regeneration, tree removal, illegal hunting and the destruction of graves in our Kurdish case. Changing cultural traditions (Ormsby, 2013) were also expressed as threats, however, for example a general disrespect for sacred groves, littering, excessive visitor numbers and a lack of maintenance (often leading to increased wildfires). Unlike other sacred groves (Prashanth Ballullaya et al., 2019), economic and social pressures from outside the villages appeared to play a minor role.

Our study focused on the effects of rurality, age, gender, formal education and traditional lifestyles. We identified a rural–urban gradient that was significant in defining values, taboos and perceived threats toward sacred groves. Our results showed that respondents who lived closer to the region's capital city (i.e. more urban respondents) had a stronger appreciation of recreational values and a weaker perception of spiritual values. This is consistent with previous studies that have linked the values held by urban communities with regard to sacred groves primarily to their environmental merits (Landry Yuan et al., 2020; Prashanth Ballullaya et al., 2019). The same studies, however, recognised that rural communities valued sacred groves beyond for spiritual reasons, as supporting their livelihoods—something that was less evident in our survey. A number of taboos and perceived threats were emphasised more strongly by rural respondents. This may require consideration and a fostering of awareness and stewardship of sacred groves under conditions of urbanisation.

The ways in which local communities interact, use and manage local resources, including sacred groves, often change across generations (Allendorf, 2020). Our results showed that age group is an important variable influencing values, taboos and perceived threats. We found that older people attributed higher importance to biodiversity, inspiration and spiritual values. Older respondents also perceived stronger taboos against road construction, harvesting from living trees and stepping on graves, and a higher threat of overall disrespectful behaviours compared to younger respondents. Similarly, Campbell (2005) found that elderly people show more respect for sacred groves in Ghana. The loss of the cultural importance of sacred groves among young people is often ascribed to westernised urban cultures (Bhagwat & Rutte, 2006). Interestingly, younger people's knowledge of sacred groves in Yunnan was lower, but the intensity of use and appreciation remained the same across generations (Allendorf et al., 2014). This may call for efforts to strengthen the transmission of traditional ecological knowledge in conservation strategies.

Previous studies have shown how men and women often have different relationships with natural areas due to the gendered divisions of labour, resources and responsibilities (Allendorf & Yang, 2017). The dimension of gender has often remained unconsidered in the literature of social values toward sacred groves, however, and social sampling has underrepresented women or even omitted the gender dimension entirely (e.g. Kandari et al., 2014). Our study identified significant gender differences: women attributed stronger

importance to aesthetic values, cultural heritage values, social relations and existence values, perceived higher taboos toward pollarding in sacred groves and were more concerned about illegal hunting, a neglect of maintenance and excessive numbers of visitors. These results agree with previous studies that relate female perceptions toward intrinsic, non-use and indirect values and toward recognising multiple values from nature. Men, in contrast, often recognise and perceive use values and direct uses from natural resources to a larger extent (Yang et al., 2018). Women are often more prone to support sustainable management practices that contribute to biodiversity conservation (Yang et al., 2018). A consideration of gender may thus help to understand the complexity of relationships between people and nature, and lead to better conservation practices and policies.

Formal education demonstrated few significant relationships to values, taboos and perceived threats, however, we emphasise that such statistical non-significance does not necessarily mean the absence of an effect.

The role of traditional lifestyles (represented by performing the indigenous galazani system) demonstrated a strong influence on the perception of several values, taboos and threats. Traditional respondents showed higher appreciation for those values associated with the primary and ancestral purposes of sacred groves (spiritual values) and held stronger taboos against resource-extracting practices (harvesting wild plants, fodder collection, dead wood harvesting, road construction). These results suggest that respondents practicing a traditional lifestyle are also more traditionalist in their values, envisioning sacred groves as elements with specific and well-defined functions (Ghazanfari et al., 2004), and they therefore do not favour new uses such as recreation. The threats that traditional people perceived (increased general disrespect, excessive number of visitors, neglect of maintenance and overgrazing) are all related to a shift in the role of sacred groves. The maintenance of sacred groves over the centuries has benefited from a community's traditional uses of the land and their lifestyle. For example, tree pollarding is a traditional practice that is currently being eroded. Some herders might turn to sacred groves to mitigate the lack of additional fodder resources, which may lead to overgrazing. Similar associations between loss of traditional ecological knowledge and intensification have been found in other grazing landscapes (e.g. Kizos et al., 2013).

5 | CONCLUSIONS

Sacred groves are in many ways an illustrative, time-tested and successful model of 'people and nature'-centred conservation. Our study adds insights about considering sacred groves as informal components of nature conservation planning in a Middle Eastern study area in the Iranian part of Kurdistan. It highlights that focusing on social dynamics is an important complement to the currently prevailing ecological studies of sacred groves, because 'the role of the sacred groves as biodiversity hotspots and providers of ecosystem

services cannot be separated from the social context in which they exist' (Blicharska et al., 2013, p. 339).

An important insight from our study is that sacred groves in Kurdistan are small but numerous and persistent. Our survey revealed spiritual values, biodiversity and cultural heritage values as key motivations for local people to preserve these sacred groves. It further elicited several taboos restricting natural resource use that were widely shared by local people. Villagers expressed a strong perception that sacred groves are threatened, both by deliberate (e.g. illegal hunting) and accidental (e.g. neglect) actions, and from both extractive and non-extractive uses. Overall, the social values and taboos around sacred groves in Kurdistan seem relatively stable compared to those in other world regions, but our social survey showed clear differences. The key holders of values and taboos are elderly people, women, rural people and people with traditional lifestyles.

We end our study with a reflection on its broader implications for conservation science and practice in the Middle East. We conclude that maintaining and fostering informal conservation traditions is critical for biodiversity conservation in areas of conflict, where formal protected areas have failed and where pressures on natural resources are high. Cultural values deserve greater awareness and consideration in biodiversity conservation, and future research should identify ways of supporting people's cultural values that can effectively enable forest conservation. In this context, taboos are particularly powerful pillars of sacred grove conservation. Biocultural approaches to conservation that incorporate diverse worldviews and knowledge systems have the potential to translate these taboos and their related land-use practices into socially acceptable and environmentally effective conservation outcomes. Integrated landscape management and the design of robust institutional arrangements may offer pathways to identify, manage and negotiate these conflicts, pressures and threats, but need to be interpreted and applied to Middle Eastern realities. This requires particular consideration of questions of agency, access and the autonomy of local communities. Eliciting the traditional knowledge and management practices of sacred groves and empowering people to maintain and revitalise their customs, values and taboos through socioeconomic modernisation is crucial for any conservation strategy. At the same time, local residents who are young, male more urban and follow a modern lifestyle could be an important audience for awareness-raising conservation programs. Intervention from outside needs great sensitivity, however, in the complicated sociopolitical context of Kurdistan.

ACKNOWLEDGEMENTS

CONFLICTS OF INTERESTS

T.P. is an Associate Editor for People and Nature, but was not involved in the peer review and decision-making process.

AUTHORS' CONTRIBUTIONS

T.P. and Z.S. conceived the ideas and designed methodology; Z.S. and K.M.S. collected the data; C.Q.-S. and M.T. analysed the data; T.P. led the writing of the manuscript. All authors contributed critically to the drafts and gave final approval for publication.

DATA AVAILABILITY STATEMENT

Raw data are archived on the Zenodo repository https://doi.org/10.5281/zenodo.4045371 (Plieninger et al., 2020).

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.