



Interstitial but Resilient: Nomadic Shepherds in Piedmont (Northwest Italy) Amidst Spatial and Social Marginalization

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Published online: 14 September 2018
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Abstract

Mobility, nomadic pastoralists' main adaptive strategy, has been compromised by agricultural expansion and rangeland fragmentation, among other factors, in many pastoral contexts. Among nomads' coping strategies, is re-shaping mobility in shrinking grazing grounds. Through semi-structured interviews, we examine adaptation and resilience to the effects of increasingly intensive land use and marginalization focusing on Alpine nomadic pastoralists in Piedmont, Northwest Italy. Our results show that Alpine nomads access a wide variety of grazing grounds through a web of social relations with multiple stakeholders, acting in the interstices of mainstream society and navigating marginal contexts: geographically, they use fallow, abandoned, and post-harvest plots; economically and socially, they interact with other marginal groups (e.g., migrants) and are stigmatized by diverse sectors of society. This use of interstitial spaces is in itself a form of adaptation that is taking place in diverse geographical contexts as nomads reconfigure their mobility and social relations to access the scattered pieces of land left unused by industrial, agricultural, and conservation land uses.

Keywords Nomadic pastoralism · Resilience · Sheep husbandry · Transhumance · Europe · Piedmont · Northwest Italy

Introduction

For thousands of years, nomadic pastoralists have exploited the most marginal areas of the world in terms of vegetal biomass production using mobility as their main adaptive strategy to exploit patchy and seasonal grazing resources (Niamir-Fuller 1998; López-i-Gelats *et al.* 2016). However, pastoral mobility has been compromised by agricultural expansion, rangeland fragmentation, intensification of livestock husbandry, and political and institutional marginalization in many pastoral contexts (Fernandez-Gimenez and Le Febre 2006; Galvin *et al.* 2008). As a consequence, the numbers of nomadic pastoralists have been declining worldwide, along with local livestock breeds and products, as well as associated cultural practices, knowledge, and rituals. Pastoral nomads have adapted in a variety of ways, including adopting other (non-livestock) productive strategies, diversification of their livestock portfolio, specialization on specific products, breeds, or

production strategies, while maintaining their mobility in changing contexts, e.g., traveling further and motorized livestock transport (Fernandez-Gimenez and Le Febre 2006; McCabe *et al.* 2010). Several studies have addressed pastoral systems' resilience in a changing world (Homann *et al.* 2008; Postigo *et al.* 2008; Thornton *et al.* 2009; Robinson and Berkes 2010; Dong *et al.* 2016). However, scholars have paid less attention to how pastoral systems adapt to changes (e.g., in land tenure and use, urbanization, agricultural intensification) that are marginalizing them socially, economically, and geographically. We use the case of nomadic shepherding in Piedmont, Northwest Italy, focusing on the system's resilience in a context of marginalization at multiple levels to examine how nomadic shepherds are adapting to the effects of increasingly urbanized contexts and intensive land use.

Alpine nomadism, as this pastoral system is sometimes called (in Italian *pastorizia vagante*, lit. 'wandering pastoralism'), is a form of mobility-based sheep husbandry widespread in several regions of North Italy (Verona 2006; De Marchi 2010; Nori and De Marchi 2015; Verona 2016). It can be conceptualized as a form of vertical transhumance, as these shepherds and their flocks seasonally exploit complementary resources in both highlands and lowlands (Ruiz and Ruiz 1986; Bunce *et al.* 2004; Mack *et al.* 2013; Juler 2014). But unlike contemporary forms of European transhumance, in

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which the animals are stabled during winter, in Alpine nomadism winter mobility is retained and focuses on forage resources available in the intensively used lowlands (Aime *et al.* 2001; Fernandez-Gimenez and Le Febre 2006). In this study, we chose to use the terminology ‘Alpine nomadism’ to maintain the nuances of the Italian term and to stress the fully mobile aspect of the system.

Although mobile pastoralism (including transhumance and nomadism) is commonly associated with environments with low human population density and extensive rangelands (Blench 2001; Dong *et al.* 2016) and it is sometimes considered not compatible with agricultural industrialization policies and land use (Eriksson 2011), Alpine nomadism occurs in a highly industrialized agricultural and densely populated area, e.g., the Po Valley and the surrounding mountains. Its success depends on the ability of shepherds to find interstitial grazing grounds not only geographically (e.g., between cornfields, cities, road infrastructures, private fields, protected areas) but also socially and politically (Aime *et al.* 2001).

Pastoralism has witnessed a steep decline during the last hundred years in favour of intensive forms of animal husbandry based on stabling and economies of scale rather than mobility (Lozny 2013). Of the wide network of pastoral movements that used to connect European mountain pastures with lowlands and cultivated areas, only truncated forms survive (Kerven and Behnke 2011). The lowlands and valleys have been engulfed in housing, infrastructure, factories, and intensively cultivated fields, leaving little space for sheep, while economies of scale have favoured intensive husbandry in the lowlands and marginalized local mountain production. Several institutions and organizations (e.g., Slow Food, the European Union) have been calling for a revalorization of mountain production and a reactivation of traditional forms of landscape management, thus recognizing the importance of supporting forms of livestock husbandry based on mobility and rooted in the territory (Rokos and Michailidou 2005; Kerven and Behnke 2011). Policies of the EU and other institutions influence shepherds’ decision-making and reverberate across their environmental, social, and political landscape (Eriksson 2011; Nori and De Marchi 2015).

To address these issues, we draw from the literature on resilience, defined as the ability to adapt and maintain livelihoods under changing conditions (Walker *et al.* 2004; Nelson *et al.* 2007), and marginality, defined as ‘the position of people on the edges, preventing their access to resources and opportunities, freedom of choice, and the development of personal capabilities’ (von Braun *et al.* 2009). Situations of marginality are defined by a specific position of the actor (a person or group) within the multiple dimensions (e.g., economic, geographical, social, cultural) of peoples’ livelihoods (Gatzweiler and Baumüller 2014), and manifest themselves with conditions of exclusion from the mainstream society and economy, and from processes of decision-making that take place at a

higher (national, regional) political level. We understand marginalization to be the social phenomenon by which an individual is pushed to the edge of a group, or a group to the margins of the larger society (von Braun *et al.* 2009). The struggle of marginalized pastoralists to maintain the resilience of their social-ecological system vis-a-vis rangeland fragmentation and land use intensification gives rise to a complex suite of adaptive practices that we term interstitial pastoralism, understanding interstitiality as the condition of being between spaces, of filling spaces, of being in the background, of going unnoticed. Alpine nomads and other pastoralists whose livelihoods are becoming increasingly marginalized have sought opportunities in these interstitial, marginal conditions.

We first describe the Alpine shepherds and their flocks, their economy, their annual itineraries, and their categorization of the landscapes they pass through with their flocks. We then address the wider links the shepherds have with the ‘outside’ world and the ways in which the outside world shapes their nomadic movements. Finally, we discuss our results in terms of the degree of resilience that mobility provides to Alpine pastoralists, highlighting the similarities of interstitial forms of pastoralism in widely different geographical and social contexts.

Background

Piedmont in North-western Italy has over 4 million inhabitants and a population density of 173 people/km². Mountains cover about 40% of the area, with hills and plains each comprising 30%. Corn and winter wheat are the main crops in the plains, apart from northern Piedmont where rice fields predominate. Livestock husbandry and transhumance have historically been an integral part of the Piedmont foodscapes, with widespread use of mountain pastures during summer and a diversity of livestock breeds and livestock-derived products.

Sheep-based Alpine nomadic pastoralism has a long history in Piedmont, where shepherds used to move seasonally between the summer mountain pastures and the winter plains (Bini and Vicquère 2013). The use of mountain pastures in the Western Italian Alps has been shown to go back more than 5000 years (Pini *et al.* 2017). The prevalent use of sheep in this system has shifted through time from multi-purpose uses (i.e., milk, meat, and wool) to an increasing degree of productive specialization in meat production. Sheep milk was widely used for cheese making in the Po plain until the thirteenth to fourteenth centuries, when cow milk became more commonly used (Montanari 2003). Nowadays, cattle husbandry is more important in economic terms and cultural relevance than sheep husbandry across most of the area. The decline in value and demand for wool, which shepherds used to sell to local factories, in the last century further pushed shepherds to specialize in meat production and meat-oriented productive systems.

The typical breed has always been the Biellese sheep, which remains one of the most important sheep breeds in northern Italy.

Over the centuries, shepherds continuously adapted their movements to changes in land use occurring in the highlands (allocation of the best grazing grounds to cattle) as well as in the lowlands, where they had to negotiate their transit and access with different landowners and stakeholders (e.g., tolls paid to Benedictine monasteries for transit, negotiations with farmers for access to stubble; Roletto 1920). In different parts of the region, shepherds and their flocks have seasonally used a combination of ecosystems. For example, shepherds of Valsesia continue to spend the winter in the *baraggia*, a dry heather moorland with scattered forest trees that remains a crucial ecosystem for their continued survival (Bini and Vicqu ery 2013).

Over the last 30 years there has been a drastic decline in livestock farms (−74%) and a concomitant livestock concentration in larger farms. The decline was particularly evident in the hills (−26%) and mountains (−36%), with repercussions on land maintenance and ecosystem management (Regione Piemonte 2017). In Roaschia (Southern Piedmont), where the local sheep breed (Frabosana or Roaschina) is an excellent milk producer and sheep husbandry has a long history, the number of sheep has declined since the Second World War to the point that Roaschian pastoralism has almost disappeared and the Frabosana is listed among the endangered ovine breeds (Aime *et al.* 2001). Negative trends for nomadic pastoralism in the North of Italy include increasing concentration of livestock husbandry, abandonment of marginal areas and small-scale productive strategies, and increasing land use intensification especially in the lowlands.

Methodology

Fieldwork was carried out between March and May 2017 in Piedmont. Data collection included a review of the available literature and public records, most importantly from the four animal health authority offices in Piedmont to which shepherds submit applications for grazing permission that require a list of the species and number of their animals and their itineraries within a one-year period, in this case for 2016. Anthropological fieldwork methods (Bernard 2006) included participant observation and in-depth semi-structured interviews with 20 nomadic shepherds (all men, from 20 to 80 years old, with a mean age of 49) selected randomly¹ from the health authority's list. Shepherds were first contacted by telephone and then, with their agreement, visited in the field. Questions addressed herd size, itineraries, perceived

environments, engagement in EU subsidy programmes, relations with local and regional institutions, owners of private lands, and markets, constraints, and opportunities. Interviews lasted for two to three hours, were conducted in Italian, recorded, and later transcribed. The transcriptions and notes were coded and analyzed through description, explanation, interpretation, and quotations, and through descriptive statistics. Prior to the interviews, we explained our methodology, aims, and projected outcomes of the study, and informed consent was obtained verbally. Throughout the field study, the ethical guidelines of the American Anthropological Association (AAA 1998) were followed.

Results and Discussion

The Shepherd and his Herd

There are 65 fully nomadic sheep flocks in Piedmont that move throughout the region, especially in mountainous and hilly areas and along river banks (e.g., Po, Sesia, Tanaro, Ticino). Herd size ranges between 400 and 3000 sheep. Shepherds claim that a herd with less than 500 sheep is not economically viable, while the maximum viable herd seems to be about 1500 sheep (Table 1).²

Some 85% of the shepherds interviewed have only Biella sheep while the remainder have Bergamo sheep or a mix of both breeds. However, nomadic flocks always include a variable number of goats (one tenth or less than the sheep) that provide milk and nurse lambs whose mothers reject them and whose grazing complements that of the sheep although can also damage valuable plants such as young poplars in reforestation areas or pulp-production plantations, some donkeys (up to 15) that provide transport for goods and lambs, especially during the seasonal movements up and down the mountains, as well as a variable number of dogs (both guard dogs and sheep dogs). About one third of the shepherds also have a few cows for subsistence milk production. According to some informants, in the past chickens and rabbits were also kept.

The flocks are grazed during the day, and at night they are penned in mobile fences. Shepherds live in caravans, although many have families in a permanent house that they visit once a week or more often depending on the distance. Herding units generally consist of one shepherd and possibly his wife and one or more helpers (in 40% of the units), who may be relatives. The shepherds make decisions regarding herd movement and pasture selection and rarely leave their flock. Recent research has stressed the key role of migrants for the resilience of Euro-Mediterranean, including Italian, pastoral

¹ With two restrictions: only shepherds who moved through more than four municipalities and had sheep in their herd were considered

² The limited data available from other regions of North Italy show comparable numbers: in Lombardy, 60 shepherds have about 60,000 sheep or about 1000 per flock (Regione Lombardia 2013).

Table 1 Number of sheep per herd per zone (data collected from the Health authority office)

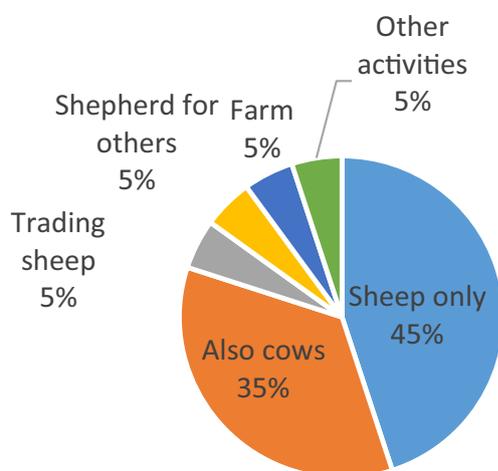
	Torino	Cuneo	Alessandria	Novara
Small (<500 sheep)	7	4	2	10
Medium ($500 \leq x < 1500$)	10	2	4	10
Big (≥ 1500 sheep)	2	/	/	3
Total number of herds per zone	19	6	6	23

systems (Huband *et al.* 2010; Nori 2014; Nori and De Marchi 2015), and most of the helpers we met are Romanian, particularly from the area around Bacau, and have had experience with herding in their home country. Shepherds' spouses are usually in charge of bureaucratic tasks keeping contacts with animal health and local authorities, take care of cattle, and care for lambs and sick sheep. In addition, food preparation, sometimes including cheese making for their own use, is a daily task. If included in the herding unit, male relatives are primarily responsible for helping (and learning from) the shepherd.

About 80% of the shepherds have no other income than from sheep (meat only) and in some cases cows (milk and cheese production). The remaining 20% derive other income (Fig. 1) from part time activities such as trading sheep, as hired shepherds in Switzerland during summer time, as night guards, or from pensions. Some 95% of the shepherds receive EU subsidies aimed at preserving mobility-based and marginally located pastoral systems and livelihoods.

The Shepherd and his Landscapes

Year-round mobility, particularly winter mobility in the lowlands, is the distinguishing trait of Alpine nomadic pastoralism in contrast to other forms of Alpine transhumance. We interviewed shepherds about their yearly movements and plotted these on a map, recording also the time and reasons for

**Fig. 1** Shepherds' income sources

choosing a particular grazing location (Fig. 2). The 20 itineraries show the actual movement of each informant during 2016. The routes taken are variable, both among shepherds as well as from year to year for the same shepherd. All the itineraries have in common movement between the lowlands and the mountains, and exhibit uniformity of mountain grazing and flexible itineraries in the interstices of the plains that result in a somewhat fan-like shape. Southwestern Piedmont has no Alpine nomadic pastoralism because it is intensively cultivated with corn and wheat, and shepherds often use trucks to cross the plain (hence the straight line on the map). Several shepherds spend the winter in Monferrato, a hilly area characterized by small allotments, a variety of crop fields, and substantial landscape and ecosystem diversity. In North Piedmont, flocks generally spend the winter in rice fields and along river-banks, before ascending the Pennine and Lepontine Alps in late spring.

Yearly movements can be grouped into four main periods (Table 2) defined by the continuous pendulum between highlands and lowlands and their transition phases. Alpine nomadic pastoralists and their flocks spend about four months a year in the highlands, exploiting the forage-rich pastures during the summer season. The movements up and down the mountains are mostly done on foot (particularly the return to lowlands), occasionally by truck, and can last one month or more with the flock moving daily. During the descent, flocks follow river-banks and graze from fallow fields before moving at the beginning of October to cultivated fields and meadows, in accordance with agricultural cycles and navigating different anthropogenic and semi-natural environments.

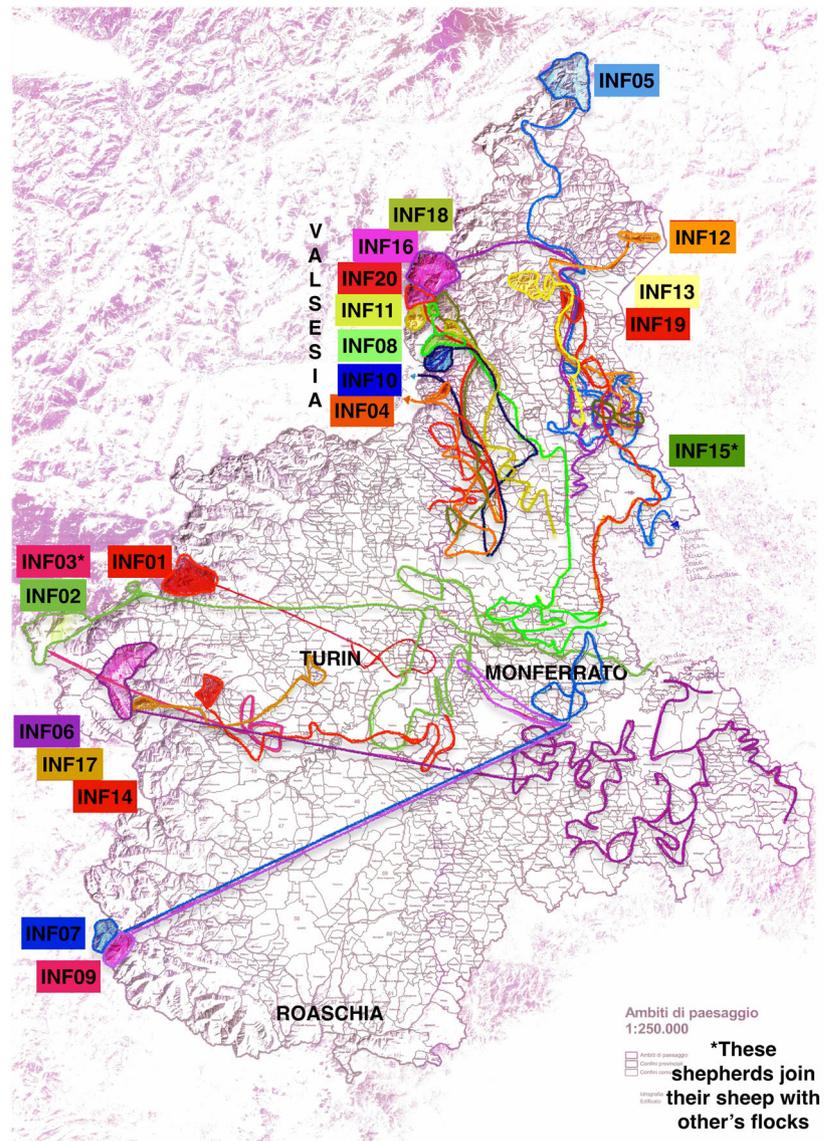
When asked to free list and describe the environments they move across, shepherds provided a nuanced understanding of the landscape around them, listing 40 perceived environments (Fig. 3; we did not include the environments mentioned by just one informant). Every informant reported both horizontal and vertical transhumance that included a variety of landscapes such as mountain pastures, hilly areas, river banks, as well as city parks (two shepherds bring their flock to graze in the outskirts of Turin, one in the Parco del Valentino, at the very centre of the city), roadsides, and abandoned plots.

Alpine Pastures

Alpine pastures (up to 3000 m asl) were mentioned by all informants but one and are the most cited landscape used for grazing³; 60% regard Alpine pastures as 'the best they can offer to their sheep,' with abundant water and grass, claiming that the grass is very nutritious ('the grass never gets old', 'sheep eat little but they are always full'), though sometimes

³ One shepherd divided Alpine pasture into two different areas: the *drua*, an area close to the cabin with higher fertility due to continuous presence of livestock, and the *giavina*, highland grasslands dotted with stones.

Fig. 2 Itinerary of 20 interviewed shepherds taken in 2016 (the places named on the map are also mentioned in the text)



limited in quantity. Most shepherds further report that the quality of the grass increases with altitude, and mentioned, among others, *Ligusticum mutellina* ('as thin as parsley'), *Trifolium alpinum*, *Trifolium incarnatum*, and *Festuca alpina*.

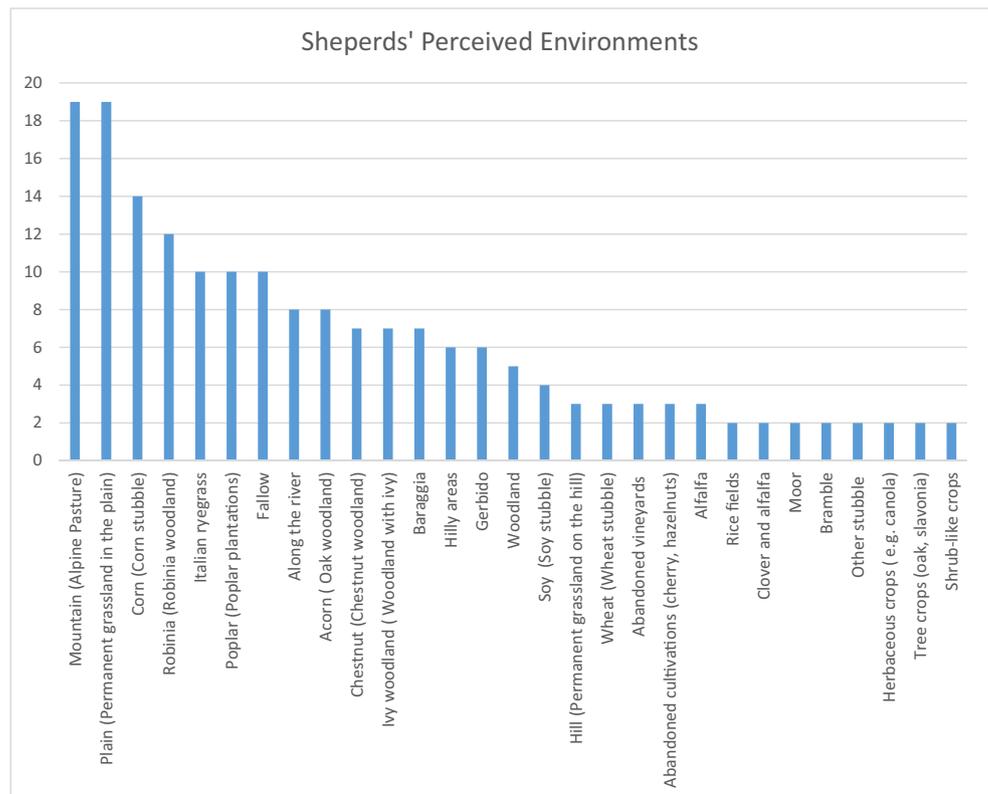
As in Northeast Italy (Nori and De Marchi 2015), Alpine pastures are mostly rented by shepherds for the summer season. They are allocated through a system of auctions, and this is an important cost and problematic for access to mountain

Table 2 Yearly movements of nomadic shepherds in Piedmont

Season	Activity
Oct–Nov to May–Jun	Lowlands grazing
May–Jun	Transition (transhumance to highlands)
Jun to Sep–Oct	Highlands grazing
Sep–Oct	Transition (transhumance to lowlands)

pastures. Nomadic shepherds live in mountain cabins and usually visit more than one cabin per summer season, moving between the lower (intermediate altitude grasslands and meadows) and the highest (permanent grasslands at 2000 m and above). Most of these cabins have no water or electricity guaranteed; some are better equipped and can be reached by motorized transport. A positive aspect of Alpine pastures according to informants is the lack of intensive agriculture and hence of residues from chemical herbicides and pesticides, with overall better health outcomes for the animals. The shepherds also regard the summer as a positive time of the year, when 'days are beautiful and there is not a lot of bureaucracy [as is needed to navigate the lowlands].' Problems include the presence of wolves, conflicts with tourists (e.g., their potential encounters with guard dogs, and the conversion of grazing grounds to tourist facilities), the increasing cost of mountain pasture, and the somewhat isolated living conditions, often

Fig. 3 Number of citations per perceived environment



without a proper cabin, road access, or telephone network. In the mountains, sheep husbandry suffers from competition with cattle husbandry, which usually occupies the better pastures due to cattle herders' capacity to pay higher rents and their utilization of grazing grounds with cheese-making facilities, which are also those with better infrastructure. Instead, sheep husbandry is marginalized to higher elevations and to pastures with difficult access, lacking cheese-making facilities, and with steeper grazing slopes.

Wolves have re-colonized the Alps, including Piedmont's mountainous and hilly areas, during the last 20 years after almost a century of absence (Marucco 2014). The establishment of wolf packs in the highlands has generated alarm and tension among livestock owners who generations ago abandoned the measures necessary to reduce the likelihood of wolf attacks. An occasionally heated debate is ongoing in Italy about the presence of wolves in the Alps and their impact on local livestock husbandry (Verona *et al.* 2010; Nori and De Marchi 2015). In spite of this, no informant reported wolf predation on their flocks nor considered wolves a grave problem. This is surprising given the several cases of wolf predation on domestic livestock that have occurred in the Alps in the last 20 years and the fact that big nomadic sheep flocks are theoretically more difficult to guard and thus an easier target for wolves (Verona *et al.* 2010). Shepherds are aware of the risks connected with the presence of wolves, and never leave their flock unattended, but overall they consider, as one stated,

that 'chemical products on the plains kill more than wolves in the mountains' (cf. Bini and Vicqu ery 2013).

Lowland Permanent Grasslands and Cultivated Fields

Permanent grasslands and cultivated fields on the plains and in the hills were mentioned by 19 and three informants respectively (most shepherds refer to them simply as grasslands) and are the most important winter pastures. They are regarded as 'fat,' as they have fertile soils and include abandoned and hay fields. Forty percent of the shepherds rent these fields from late autumn to winter for their good grass and the relative ease of monitoring the flock. On the negative side, when it is rainy these fields quickly turn into muddy areas not suited for grazing.

Grasslands in the hills are highly regarded for the diversity and quality of their grasses ('grasses have a different taste up on the hill'). However, increasingly fewer shepherds are using hilly grasslands for two reasons, according to informants. The first relates to the small size of the grazing parcels relative to increasing average flock sizes: as economic returns per sheep decline over time due to the marginal economic position of nomadic shepherds, they are increasing their flock sizes in an attempt to lower production costs (Nori 2014). Indeed, in North Italy Alpine nomadic pastoralism, average herd size increased from 100 to 150 sheep a century ago to about 1000 today (Regione Lombardia 2013). The second reason

relates to the depopulation of hilly areas and their abandonment as productive areas, which according to informants means less fertilization and lower grass quantity and quality, as well as more abandoned areas unsuitable for grazing.

Cultivated fields are also important for the provision of stubbles. Corn, soy, wheat, and oat stubbles, in order of number of mentions, are important sources of proteins for nomadic flocks. Corn stubbles are the most popular but shepherds limit their access to sheep claiming that too much causes swelling and death by rumen blockage. Some herders avoid corn stubble altogether, others continuously check their animals for any sign of distress after consumption ('at night you shouldn't see them full'). Soy stubbles are visited in the early spring, when soy fields' nitrogen fixing properties provide an early growth of nutritious grass.

Woodland Plantations

Black locust, poplar, acorn, and chestnut woodlands, in order of importance, provide diverse grasses as well as shade. Black locust woodlands were mentioned by half of the informants as palatable for their sheep but also dangerous because the trees' thorns may cause wounds and limps. Poplar woodlands and plantations used to be a key riparian environment for nomadic flocks; shepherds reported a sharp drop in the number of these plantations in recent years as they are often converted to corn, wheat, and Italian ryegrass cultivation. Poplars are essential for nomadic flocks because they provide shade, a place that can be easily enclosed, and a soil that does not suffer from trampling when rainy. However, grasses in the understory are not highly valued, except for *Stellaria media*. Acorn and chestnut tree woodlands are typically found in northern Piedmont. However, shepherds reported that chestnut woodland grazing has been compromised during the last decade by the widespread impact of the chestnut gall wasp on chestnut production (sheep are fond of chestnuts) as well as by the effects of abandonment of chestnut woodlands and management, which make them 'dirty' (i.e., with an abundance of dead biomass and colonized by brambles) and unsuitable for grazing.

Fallow, Abandoned Plots, and Protected Areas

Some 80% of the informants reported grazing their flocks on fallow land, abandoned and unused plots (e.g., vineyards and cherry-orchards), and brambles. As recognized by the herders themselves, grazing keeps these areas 'clean' by removing dry biomass and halting the colonization of shrubs and brambles, at the same time reducing the damaging impact of wildfires and maintaining the landscape. Sheep grazing is an integral part of landscape management in many European countries, providing a wide range of ecosystem and cultural services, such as articulating unused green spaces, maintaining and

supporting biodiversity and landscape diversity, preventing the growth of secondary forest, and generating short food chains of culturally-meaningful products (Nori and De Marchi 2015; Ross *et al.* 2016; Triboi 2017). In the name of these services, shepherds also seek access for their flocks to protected areas and regional parks. However, in recent years, traditional winter feeding grounds along rivers have been declared protected areas by the regional legislation because of their high biodiversity. This has shortened and limited the time that shepherds can spend there, when they are not completely banned due to concerns over trampling, overgrazing, and disturbance of nesting birds (Regione Piemonte 2008). Shepherds argue that they should be allowed access for the ecological benefits of sheep grazing for that same biodiversity that park authorities aim to conserve, and further warn that without grazing the areas will 'turn dirty,' with adverse consequences for soil fertility and biodiversity ('no dung, no fertility').

From an ecological perspective, Alpine nomadic pastoralists use renewable resources in areas unfit for intensive land uses (e.g., mountain pastures), in unused and abandoned plots, and make a secondary, seasonal, and complementary use of spaces with other land use priorities (e.g., conservation of river banks, crop production in cultivated fields, hay production in meadows visited after the second or third cut). Absent added grains and feeds, herd size is limited by the biomass produced in these environments and by their accessibility. Accessibility of grazing plots is vital to Alpine pastoralist's resilience in terms of both geographical and socio-political accessibility.

Social and Economic Relations

We have described the different ecosystems where shepherds move their flocks and how their access to these grazing areas is continuously shaped by the wider society of the region. During the winter, Alpine nomads wander among municipalities that allow their transit and municipalities that do not, cross busy roads and railways, move their flocks at night to avoid blocking traffic, and struggle to keep flocks out of parks and other protected off-limit areas. This navigation of the landscape is social as well as geographical. Shepherds need not only to know the geography of places and the characteristics of the grazing resources in each place in different seasons, but also to establish and maintain a vast array of social relations to be able to access those resources (Fig. 4). These diverse relationships are integral to the pastoral system and take place with a range of social (e.g., other shepherds, farmers, field owners, tourists), political (e.g., agricultural unions, road police, municipal and health authorities, the EU), and economic (e.g., shearers, tradesmen, slaughterhouses, customers) actors and are characterized by the transfer of cash, services (e.g., landscape conservation and

Italy, they are regionally managed and distributed. For the period 2014–2020, the Piedmont Region provides funds and payments to nomadic shepherds through four main schemes (Regione Piemonte 2017): 1) Support to endangered autochthonous breeds; 2) Grazing management (e.g., keeping grazing areas clear of weeds and bushes and free from pesticides, herbicides, or mineral fertilizers); 3) Application of safety systems to prevent canine (e.g., wolves and stray dogs) attacks in the highlands (e.g., electric fences, guard dogs); 4) Application of the pastoral farm plan in Alpine pasture areas. A majority of informants apply to the first two programmes each year, the first by introducing *tacola* sheep, an endangered Piedmont ovine breed, into their flock (10–15% of the total sheep). Most shepherds can only apply for highland grazing management subsidies since they do not have any written contracts for the lowlands. The third and the fourth schemes are allegedly seldom applied for due to the difficulties (e.g., weight, difficulties of transport due to isolation of grazing grounds, rocky pastures) of using electric fences in marginal mountain pastures. Although economic subsidies are a welcome input to shepherds' livelihoods, they also attract speculation, with some actors entering the sector only to intercept the flow of these monies. In the words of one informant, 'they are not shepherds; they have never seen a sheep!' Most shepherds further regard the schemes as a distortion (albeit a necessary one at the moment) of their ultimate goal of being paid the right price (relative to production costs and margins of profit) for their meat. Nevertheless, on the one hand their prices cannot compete with those of intensive livestock husbandry (for complex reasons that include economies of scale, lack of accountancy of intensive farms' externalities in the final price, etc.), and on the other hand lamb, ram, and sheep meat do not have a large market in Piedmont and in North Italy in general. Rams are usually sold alive directly to customers or butcheries, and shepherds eventually receive low prices for their high-quality meat. In recent years Alpine nomads have found a market for their meat among Muslim migrants and families from the Maghreb countries, who have become the main consumers of sheep meat in Italy, and have consequently had to reorganize their slaughtering methods to conform to their Muslim customers demand halal meat. A large number of rams are requested by the Islamic community for *Aid el-Adha*, an Islamic celebration that takes place each year about two months after the end of Ramadan. A marketing possibility for shepherds is to pursue economic stability by adapting to consumer demands and synchronizing flock reproduction and the availability of lambs and rams to the Islamic calendar and to establish networks with halal slaughterhouses (Nori and De Marchi 2015).

In spite of the marketing difficulties, all our informants specialize in meat production, given the market marginality of cheese and wool, the two other main products traditionally obtained from sheep. Cheese production is hampered by the

lack of cheese-making facilities, investment capacity, and labour force inherent in their geographically and socially marginal form of pastoralism. Wool had a huge economic importance in Piedmont until the second half of the nineteenth century (Mocarelli 2009): the income from the March shearing paid the shearers for the whole year, and the income from the September shearing went 'under the mattress' as savings. Nowadays, wool is no longer a reliable source of income, but rather regarded as a cost and 'a special waste': sheep are shorn once a year at Easter and the wool, when sold, is purchased for around 0.30 €/kg, which is not even enough to pay the shearers.

Interstitial Pastoralism

Contemporary Alpine nomadic pastoralists have turned to migrants and abandoned and fallow fields as strategy for adaptation and resilience.

This form of adaptation is also evident in several contexts in which pastoralism loses access to grazing areas as they are converted to other land uses. Interstitial nomadic pastoralism is characterized by five core features: 1) The widespread use of interstitial spaces between other land uses for grazing; 2) Adaptation to movement among these generally unconnected areas (e.g., motorized transport, moving flocks at night, unauthorized grazing and field invasion); 3) Establishment of a wide array of social relations, some potentially confrontational (e.g., with other shepherds, with authorities and conservation institutions and parks, with the average road user, etc.); 4) Interaction of shepherds with other marginal stakeholders and sectors of the mainstream society (e.g., migrants); and 5) A politicization of nomadic livelihoods toward an increasing dependence on wider and complex economic, social, and institutional networks (e.g., EU subsidies).

Loss of control over grazing grounds, economic marginality, and cultural oppression are among the drivers that push nomadic pastoralists to geographic and social margins in many parts of the world. Ahmed (1982) describes the Gomal nomads as living 'in the administrative and social interstices of the larger states of Pakistan and Afghanistan' (1101), and nomadic pastoralism as an adaptation to the political as well as to the natural environment. In Romania, extensive sheep husbandry has expanded following de-collectivization and the fragmentation of land tenure since the early 1990s, occupying the interstices of urban areas (e.g., roadsides, abandoned plots), though governmental laws and policies have often ignored or devalued this practice (Triboi 2017). Forms of interstitial and urban pastoralism occur in France, where sheep can be seen grazing on the outskirts of Paris, and increasingly local authorities and public and private actors use herds in urban areas for their ecological services of maintaining lawns, abandoned lands, river beds, and urban green areas (Garric 2013; Triboi 2017).

In the Laikipia region of Kenya, Maasai and Samburu pastoralists have seen their customary territory greatly reduced since colonization and, more recently, by the expansion of national parks and private conservancies as well as by land grabbing for large-scale agricultural and development schemes. They are being squeezed into the interstices of a territory that they no longer control and of a society with different land use priorities (Letai and Lind 2013). In the process, tension and conflicts are increasing between Laikipia pastoralists and conservation authorities and the wider society. For example, in recent years the Kenyan Army intervened repeatedly to defend private properties from pastoralists seeking grazing grounds for their cattle (German *et al.* 2017). Similarly, during the dry season, the Maasai of the Kenyan Great Rift Valley move their herds along grassy roadsides and into conservation areas (e.g., lake shores) and agricultural fields, and establish adaptive relations with new stakeholders in their customary land (e.g., the Maasai around Lake Naivasha may seek access for their herds to the green residues from the large-scale export-oriented flower and vegetables farms surrounding the lake; Volpato, pers. obs. 2018).

The resilience of nomadic pastoralists in contexts such as North Italy, post-socialist Romania, and the Kenyan Highlands is a testimony to the importance of mobility for livestock husbandry. While witnessing the marginalization of their livelihoods, these pastoralists adapt by seeking access to a variety of scattered plots while establishing an array of relationships with other stakeholders to maintain the resilience of the pastoral system (Galvin *et al.* 2008; Easdale *et al.* 2016).

Conclusions

We have described the adaptation and resilience of Alpine nomadic pastoralists in response to the loss of grazing grounds following urbanization and intensification of land use in Northwest Italy during the last 50 years by using a variety of landscapes to find grazing resources for their sheep and establishing social networks and relations at multiple levels and with multiple stakeholders (e.g., the EU, local authorities, farmers, migrant communities). Piedmont nomadic shepherds act in the interstices of the mainstream society, navigating marginal contexts: geographically, they use fallow, abandoned, and second-hand plots; economically and socially, they interact with other marginal groups of people; politically, they are at the fringes of society and of legality; culturally, they face hostile attitudes from part of the general public and local authorities and are tolerated at best.

Other studies about the resilience of interstitial pastoral systems would prove interesting and give further insights into how nomadic pastoralists adapt and survive in conditions of marginalization, and how mobility is reconfigured into the scattered pieces of land left unused by industrial, agricultural,

and conservation land uses. Also, such studies would provide a background and contextual analysis to be used to build and implement strategies at multiple institutional levels that aim to support nomadic herders by improving access to unused and abandoned plots, by including them into the planning and management of regional parks and conservation areas, by recognizing (also economically) their contributions in terms of ecosystem and cultural services, as well as by finding ways to support their products.

Acknowledgements We are very thankful to all the shepherds and their families for their patience and kindness during the interviews. We also thank Marzia Verona and Pinulin Ghibauda for sharing with us their knowledge about Alpine nomadism and shepherds.

Authors' Contribution GM conducted fieldwork and analysed the data, GV drafted the paper, all authors designed the study, composed the literature review, and worked on, read and approved the final manuscript.

Funding Funds for this study came from the MIUR through the PRIN project 'Biodiversity and ecosystem services in Sacred Natural Sites (BIOESSaNS)', Nr. 2015P8524C, as well as from the University of Gastronomic Sciences of Pollenzo, Italy.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

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