Population and Environment (2023) 45:16
https://doi.org/10.1007/s11111-023-00430-7

ORIGINAL PAPER

Demographic and socioeconomic effects of environmental policies: the 1927 special goat tax and mountain depopulation in Italy

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Accepted: 27 June 2023 / Published online: 14 August 2023

Abstract

The research aims to assess the demographic impact related with the implementation of an environmental policy, which affects food availability in economically and environmentally fragile settings, dependent on few, unstable resources. The paper addresses this topic from a particular perspective, namely the special goat tax issued in Italy in 1927. I focus on the goat breeding because of its ecological footprint and the key role on population's livelihood in marginal lands. Methodologically, the paper combines quantitative and qualitative sources. The analysis of demographic dynamics in a broad set of Italian mountain municipalities over the period 1911–1971 is matched with a qualitative part, based on a careful reading of the coeval survey on mountain depopulation. Findings of the analysis highlight that the goat tax undermined food security promoted outmigration and shrinkage in municipalities that were more dependent on goat breeding only. In addition, the 1927 law generated power struggles between landowner and local communities and between collective and private properties. Such results show that socially-blind, top-down environmental policies could exacerbate inequalities, food insecurity and power conflicts that threaten the effective implementation of the law. An ecological transition must be combined with social inclusion, constant care to the governance and power relations in order to extend public support and make regulations more effective.

Keywords Environmental policy · Goat tax · Mountain depopulation · Sustainable development · Fascism

Introduction

Population, food and environment are key issues on the current political agenda. Sustainable development provides a comprehensive strategy to tackle these questions through a resource efficient perspective which promotes social, territorial and

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intergenerational equity (WCED, 1987). However, sustainability has been often described as a purely ecological goal, being easier to conceptualize, measure and implement (Neba, 2007). Accordingly, the spread of environmental policies has been thwarted in several countries. The germane resentment towards ecological regulations has fed the Yellow Vest protest in France and anti-system votes in many states, especially in rural areas (Baranzini & Carattini, 2017; Van der Ploeg, 2020).

Sustainable development requires a holistic approach, which recognizes and enhances the connections between environment, food and population (Jim et al., 2010). The interactions between environment and population are of great interest. The traditional vein argues that population growth induces ecological degradation (Mazur, 2012), massive deforestation, loss of biodiversity and natural resource depletion (Jim et al., 2010), even though the empirical findings are contentious. Sometimes population growth activates some feedback, related to income rise or technological progress, which may mitigate or even compensate its direct effect on land use and CO2 emissions (Weber & Sciubba, 2019). On the other hand, scholars investigate the effects of climate change on population trends (Adams, 2016; Hutter, 2017) or the demographic impact of environmental regulations in different contexts (Hummel et al., 2013).

This paper mainly focuses on how ecological laws can trigger significant demographic consequences, sometimes unexpected and difficult to reverse (Anderson, 2004). In particular, it aims to assess how environmental policies that affect food availability in specific settings influence population change. Links between environmental legislation, food security and demographic trends are more compelling in fragile, unstable and mountain ecosystems (Adger, 2000) where scarcity of resources undermine the trade-off between ecological protection and population livelihood (Nawrotzki et al., 2016). Despite their vulnerability to ecological regulations, few studies have investigated these resource-dependent communities (Haddaway et al., 2013).

Specifically, the paper revolves around the effect of the special goat tax issued in Italy in 1927 on the depopulation dynamics in the mountain areas. The interwar years are a key transition stage in the evolution of the Italian mountain regions. The period was characterized by the Great Depression of 1929, the rising gaps in the land productivity among the Italian farming systems (Chiapparino & Morettini, 2018), the pervasive state intervention in economy (Federico, 2012) and the adoption of a restrictive forestry regulation, aimed to protect woods almost degraded by the excessive exploitation (Barsanti, 2002). At demographic level, the population drop started in the highlands, asynchronously and with varying intensities (INEA VIII, 1938). The population trends reflected to some extent a radical turn in the direction, purpose and cadence of mobility. Since the 1920s, Italy experienced the decline of out-migration and seasonal displacements, and the rise of a more domestic, permanent and selective mobility (Treves, 1976). In this regard, Anna Treves pointed out the role of push factors (such as worsening of living conditions), rather than the attraction of the arrival destinations (Treves, 1976, 158).

Push factors include the anti-goat policy which in the fascist era assumed particular intensity (Armiero, 2011). Fascism began a contradictory rationalization, through sectorial and selective policies: the "battle of wheat" and the import tariffs to protect some crops, considered strategic (Nützenadel, 2001); anti-urban laws and mobility restrictions aimed to stabilize peasants in rural and marginal lands which, regardless,

suffered the effects of the special goat tax. Goats were and still are an essential source of food in the uplands, because of their adaptability to harsh contexts and the cost-effectiveness of their breeding; but they also are the prime culprit of deforestation (Boyazoglu et al., 2005). This is the reason why ecological threats fostered the adoption of anti-goat policies, which were at the same time fuelled by marked social discard towards a kind of breeding considered backward-looking, marginal and unproductive (Corti, 2006). Fascist's goat regulation is just a phase in the prolonged struggle for the use of land between collective and private property, local stakeholders and external capital, multifunctional agriculture aimed at self-consumption and a more market-oriented rational forestry (Morand-Fehr et al., 2004).

The goat tax provides an opportunity to reflect on how the implementation of national-level environmental policies might negatively impact on demographic changes and exacerbate social inequalities, in specific regions. Not only does this case study apply to Italy, but it can be also representative of several less developed countries, currently tackling both the ecological transition and social justice. Italy at that time was still an agricultural country, characterized by large regional imbalances, widespread subsistence farming and food insecurity, especially after the Great Depression (Broadberry et al., 2011).

Methodologically speaking, the paper meets the requests for long-term, comparative studies of human–environment processes aimed at planning proper strategies, tailored to specific contexts (Hummel et al., 2013). The adoption of a municipal scale helps to understand and differentiate the highlands, identify their needs and describe their population patterns. I propose an interdisciplinary approach, which bridges the gap between quantitative and qualitative sources. A cluster analysis on the livestock species allows to identify the municipalities where the goat was a key asset. Then, a multivariate analysis will be run in order to check the influx of goat livestock on population dynamics. This broad statistical insight throughout the Italian territory is complemented by a careful reading of a survey on mountain depopulation, released by the National Institute of Agrarian Economy (INEA) in the 1930s. This was the first, detailed, extensive and objective research on mountain depopulation that involved the most prominent geographers and economists of that time (Ciuffetti & Vaquero Piñeiro, 2019). The goat is a recurring and controversial theme throughout their work, which reveals serious criticism concerning the implemented policies. The issue is addressed with an unusual critical spirit for a time when objective documentation was largely suppressed by Fascism (Ipsen, 1997). The special goat tax spurred intense policy discussions, which somehow reflects today's debate, with the trade-off between environmental and social goals.

In brief I have divided the paper into six sections, the next one exploring the main issues debated in the related literature. Then, I proceed by presenting the case study, describing both the question of the goat tax ("The issue of goat" section) and the mountain depopulation ("Mountain depopulation in the interwar years" section). What follows is the empirical analysis which I have organized into three parts: in the first one, I show data and methods ("Data and methods" section), then I carefully examine how the survey on mountain depopulation addressed the impact of the special goat tax on mountain settlements ("The survey on mountain depopulation" section). The qualitative information drawn from the survey is used to inform a

multivariate model aimed to explore the drivers of population changes across different regions ("Empirical analysis" section). The "Discussion" section addresses the main empirical results, while the last section ("Conclusion" section) provides a conclusion and some policy considerations.

Literature review

The triad population, food and environment respond to the most pressing challenges in the global agenda. Climate change and the loss of plant and animal biodiversity bring to the fore environmental issues (IPCC, 2021) and the need to start an effective ecological transition; growing economic inequalities (Rosés & Wolf, 2021) and reduced social mobility (Stiglitz, 2012) pose a thorny social question (Case & Deaton, 2022). The demographic issue is marked by specular population patterns in developing and developed countries (Lutz & Gailey, 2020) but also among growing urban areas and the rural regions, increasingly aged and depopulated (Collantes, 2009; Johnson & Lichter, 2019).

Climate change, wealth inequalities and population trends strongly affect food security (Lang & Barling, 2012), as witnessed by the recent rise in global hunger (Molotoks et al., 2020). Food shortage mainly regards less developed countries, but the livelihood needs extend to inner peripheries in the developed world as well. As some prominent scholars put it, these "geographically remote, economically marginal, politically powerless and socially inhomogeneous" (Blowers & Leroy, 1994, 203) settings, lacking infrastructures, social capital (Leibert & Golinski, 2016), effective institutions (Tödtling & Trippl, 2005) and essential services (Barca et al., 2014) must embrace a path of sustainable development in order to stem depopulation and improve economic competitiveness (Camagni & Capello, 2013). In such perspective, the revitalization of environmentally sustainable farming and forestry activities is a key priority for inner peripheries (Cesaro & Marongiu, 2017).

At present, sustainable development is as a widespread as a vague concept. The often-cited Brundtland Commission's claimed that sustainable development satisfies the current needs without endangering the future generations WCED (World Commission on Environment and Development), 1987). However, it is not straightforward to reconcile economic development and environmental protection (Jabareen, 2008), livelihood needs and ecological constraints (WCED, 1987). The need for embedded ecological, social and governance (ESG) criteria to achieve long-term, effective sustainability (Peterson, 2015) guides lots of corporates, financial investments and public practices (Matos, 2020). Reference to ESG factors is as unanimous as often opportunistic, trivialized or misunderstood. Some policies only possess an environmental façade ("greenwashing") whereas others are limited to purely ecological purposes (Neba, 2007). Sustainable environmental planning should instead embrace a holistic perspective, which explores the still debated connections with population dynamics (Hummel et al., 2013), social needs and ecological functions (Hutter, 2017). The current literature has thus far failed to unravel deterministic causal links between these fields. Population and environment outline a set of complex context specific relations, which call for a range of methodological approaches (quantitative analysis,

historical case studies, ethnographic investigation) and multiple disciplinary perspectives. However, sectoral studies could explain some processes in a specific place, but provide little generalizability to other settings (Hummel et al., 2013).

A growing strand of literature explores the effectiveness of environmental protection schemes in fostering sustainable development (Neba, 2007). The environmental regulation is often blamed for being socially (Peterson, 2015) and place blind (Barca et al., 2012), careless of its demographic consequences (Geddes & Jordan, 2012), and implemented through a top-down approach which overrides the needs of the direct recipients of these policies (Neba, 2007). Regulation can exacerbate social inequalities (Hutter, 2017; Marino & Ribot, 2012) as benefits and burden are unevenly distributed according to age, gender, job, wealth, education, political, institutional and physical settings (Muttarak et al., 2015). Environmental laws tend to widen the territorial gaps and boost a further marginalization of some areas, losing population and cultural heritage (Bryant et al., 2011). Benefits of the policies generally occur at global scale, while their costs mainly strain locally (Peterson, 2015). This stimulates a fatalistic culture of depopulation that is difficult to eradicate and at the same time strengthens the aversion towards environmental rules, perceived as a threat to the community's livelihood.

Besides, environmental regulation reflects power inequalities (Boyce, 2018) for the already mentioned fact that it is implemented through a top-down approach that penalizes peripheral territories, far from decision-making centres and lacking in decision-making power (Blowers & Leroy, 1994). The marginal areas and the weakest social groups complain that their needs and habits are often ignored, misrecognized (Peterson, 2015) stereotyped (Marino & Ribot, 2012), stigmatized as worthless or backward-looking (Sisson, 2021). By restricting ownership and use of the local resources, the legislator deprives the local communities of both a self-government capacity and a territorial capital sedimented over the centuries (Peterson, 2015).

Socially blind, top-down environmental laws create conflicts at different levels: between social classes differently struck by the regulation (Peterson, 2015), between local communities and external stakeholders, municipalities and central administration on the extraction and exploitation of natural resources (Lorah & Southwick, 2003). Environmental regulation contributes to increase the resentment of some communities towards the stigmatization or prohibition of customary practices. Land use constraints are a clear and painful evidence of the impotence, marginality and absence of prospects of the "places that do not matter" (Rodríguez-Pose, 2018), which vent their repressed and unheard rage in anti-system votes or street protests (Baranzini & Carattini, 2017). Disagreement with the inequitable burden of the environmental policies won votes for Brexit in Wales (aimed to take back control of fishing policies; Stewart et al., 2022). The same happened with the backlash of the Yellow Vest movement in France that stood against the carbon tax discussed in 2010 because it disproportionately affected low-income households, without offering adequate compensation (Baranzini & Carattini, 2017). The massive street protests pushed the French government to revert that policy (Bergquist et al., 2020). Another turbulence broke out in the Netherlands in 2022, when farmers opposed the governmental request of a radical 30% reduction in livestock numbers, in order to meet environmental targets. Despite sharing ecological concerns, farmers consider

unfair letting them alone deal with the whole burden of nitrogen reduction, without affecting other industries (The Guardian, 2022).

The demographic impact of environmental policies is a further contentious topic. Land use restrictions affect population dynamics (Tasser et al., 2007) in a rather complex way. The crux of the debate concerns the trade-off between social costs and environmental benefits of the land constraints (Lorah & Southwick, 2003). Some scholars claim that environmental protection fosters population growth due to a profitable use of resources and natural amenities (tourism, extensive breeding), whereas others assert that this regulation undermines the exploitation of basic resources and causes outmigration (Lorah & Southwick, 2003).

The demographic consequences of the environmental rules vary according to the local contexts (Curtis et al., 2021). Environmental policies intensify the people–land conflict in settings with poor resource endowment and scarce alternative land use. Any constraints or charge on basic resources significantly undermine both livelihood security and the resilience of the whole community, which is left with fewer options to adapt to the changing scenario. Population displacement allows to cope with external shocks and food insecurity but at the same time it warns about the rupture of social resilience (Adger, 2000). Place-blindness therefore represents a major fault of the environmental policies (Galán et al., 2022). The adoption of a "one-size fits all" strategy is harmful in ecologically critical settings, such as mountainous areas.

In sum, the environmental policy has both expected and unexpected effects on demography. Policy planners either ignore or downwardly revise their long-term consequences on population; despite an increasing awareness of the social impacts of a given regulation, they still consider it secondary in their ranking of priorities (Anderson, 2004).

The case study

The issue of goat

Livestock is a key asset for many small farmers in developing countries. It provides food, manure and assistance in working the field, a kind of capital that secures from the risks of volatile crop yields (Desiere et al., 2015). The size and composition of the livestock are selected according to the investment profitability: the highest revenues per unit are assigned to dairy cattle which, therefore, are strongly supported by EU policies (Quaranta et al., 2020). However, this kind of assessment overlooks some costs of breeding and the ability to meet the farmers' basic needs. Considering these elements would enhance the return of small animals that help at mitigating poverty and food insecurity in the poorest social strata (Desiere et al., 2015).

Goats have been long placed on the lowest step of the livestock ladder because of their low profitability (Boyazoglu et al., 2005), despite showing better adaptability to harsh conditions, the ability to exploit marginal areas covered by poor quality forage (Usai et al., 2006), cheap rearing costs, high nutritional value of their products, being more oriented to self-consumption than on the market (Desiere et al.,

2015). These features are prominently displayed in the Alps, where herders usually integrate dairy cattle with sheep and goats in order to fully exploit scarce resources, support low incomes and feed local population (Corti, 2006). Goat should therefore not be regarded as a residual, obliged rearing but as a rational, cost-effective choice in mountain regions (Desiere et al., 2015).

A lot has been said about the goat dilemma, namely whether it is more useful or harmful. From an ecological viewpoint, "the predatory tooth" of the goat rips the foliage and damages the woods (Ciuffetti & Vaquero Piñeiro, 2019). On the contrary, their selective nibbling of grasslands (Tasser et al., 2007) positively impact on the sapling density, reduce shrub vegetation and therefore fire risk (Delattre et al., 2020). In addition, goats play a key role in subsistence economies where they provide hide, fur, fat but especially milk and meat that increase both the lipidic and protein intake of mountain communities (Boyazoglu et al., 2005). This earned the goat the names of "friend of the farmers" (Visconti Venosta, 1813) or "cow of the poor" (Grand & Delatouche, 1950). However, the latter definition embeds a sort of social discredit towards goat rearing, which is relegated to marginal social groups, remote communities and backward farming, often detached from the market (Corti, 2006).

The stigma of the goat has favoured the introduction of numerous special taxes and constraints across Europe, which has been justified with environmental, social and economic reasons (Armiero, 2011). Complaints for excessive deforestation, soil erosion and landslides have been documented in Italy since the eighteenth century (Vecchio, 1974). The rising demand of wood, coal and electricity by nascent industries led to intensive exploitation of mountain assets, also depleted by the local communities (Ciuffetti, 2019). During the First World War, the Alpine forests were devastated by both the prolonged military presence (Armiero, 2011) and the "nagging" (Ermacora, 2009, 53) cutting of timber for military logistics. The massive deforestation raised awareness of the aesthetic, historical and environmental values of woods, which should be preserved through severe restrictions of traditional practices in forest areas (Bonan & Biasillo, 2019). Wood degradation was in fact ascribed to the misuse of their resources by poor and ignorant mountain communities, whose needs had to be sacrificed to the higher interests of the Nation (Armiero, 2011).

Reforestation soon became the Fascist's only policy for mountain areas: wood protection was assigned to the "Milizia Nazionale Forestale", whereas propaganda was in charge of the so called "Comitato Forestale Nazionale", founded in 1928 and first headed by Arnaldo Mussolini, the Duce's brother. The militarization of the Royal Corps of Forests, which in the 1926 was transformed into the National Forest Militia, marked the transition to repressive control of local populations, as evidenced by the sharp increase in sanctions promulgated by the militia (Armiero et al., 2022).

The 1927 special tax on goats[1] is part of this reforestation policy. At first, goats were banned from some forests considered vulnerable on a hydrogeological level (Royal Decree n.3267, 30–12-1923), later the regime introduced a stringent ad hoc tax, which strongly impacted on goat grazing, especially at local level (Armiero,

[1] Tax on goats, introduced with Royal Law Decree 16-1-1927 and promulgated on the Official Journal on the 14-2-1927.

Table 1 Relative change (1908 = 100) in livestock, Italy* 1908–1971

	1918	1930	1941	1961	1971
Equine	95	112	85	57	26
Buffaloes	112	127	111	119	210
Cattle	99	110	132	146	131
Pigs	93	132	145	135	239
Sheep	104	93	89	60	50
Goats	114	71	66	42	33

Source: personal elaboration on Ministero per l'agricoltura (1910–1921) *and Istat* (1933–1948**–1963–1974)

*Data are net of the provinces annexed after the First World War

**Data on livestock census at 30 June 1941

2011, 138). "The tax was set at a level almost equivalent to the animals' market value: hence the peasants had no choice but to kill off the goats" (King, 1988, 314). It mainly affected the poorest families who owned more than three goats and used to take them to pasture in wooded or bushy land (Bonan & Biasillo, 2019). The special goat tax had a twofold goal: on the one hand, it aimed to protect the forests and on the other hand to advocate for more advanced breeding systems, through the replacement of goats with other livestock species (INEA, VII, 1937). Goats were tolerated as the last resort in otherwise sterile settings (Barsanti, 2002). However, several agrarian experts had already warned about the drawbacks of anti-goat policies that prevent the rational use of marginal, rugged lands (Voglino, 1904).

In Italy, the number of goats incurred a substantial loss beginning with the end of the 1920s, in absolute terms and compared to other types of livestock (Table 1). It was assumed that the goat size was under-recorded by peasants and census officials (King, 1988) to avoid both the special tax and the social blame associated with this breeding, but undoubtedly, the decline was strong and persistent throughout the twentieth century. In the post-war period, however, the goat trend was similar to other species such as sheep and horses. The anomalous collapse of the 1930s was particularly striking in mountain areas, where goats were concentrated (Table 2). This reduction came shortly after the enactment of the special goat tax of 1927. This sudden, rapid, huge fall in goat livestock right at the start of mountain depopulation, represents the most noteworthy feature of the Italian case.

Table 2 Share of livestock in mountain regions, Italy (1908–1971)

	1908	1930	1961	1971
Equine	25.0	24.1	23.3	30.3
Buffaloes	5.3	3.0	0.8	0.7
Cattle	23.7	21.4	14.7	13.9
Pigs	22.3	20.7	12.8	11.4
Sheep	33.5	34.0	34.2	34.7
Goats	46.6	39.9	41.4	42.2

Source: personal elaboration on Ministero per l'agricoltura(1910) *and Istat* (1933–1963–1974)

Mountain depopulation in the interwar years

The interwar years represented a turning point in the Italian demographic history (Treves, 1976). The period was characterized by the break with the previous demographic patterns, a qualitative leap in terms of mobility, which took new forms and directions (Gallo, 2012) and the early deconstruction of the rural settlement, which swept through after the Second World War (Tino, 2016).

The interwar period was marked by both the Fascist regime and the Great Depression, which prompted underemployment and subsistence problems in several territories (Toniolo & Piva, 1988). The Fascist economic policies (quota 90, trade tariffs, the "battle of wheat") protected crops addressed to the internal market, in order to reduce the deficit of the agricultural-food balance with the foreign countries (Chiapparino & Morettini, 2018). This strategy damaged export-oriented crops (also suffering from the collapse of prices on the international markets), alongside the animal husbandry (Tino, 2016) and subsistence mountain economies in general (Federico, 2005). As a consequence, these interventions amplified the pressure on the departure of the population from the most disadvantaged areas (Treves, 1976). This phenomenon clashed, however, with the "desire" of the regime to put a cap on urbanization, fearing that bigger districts would hinder the demographic growth of the country and would concentrate in few centres potentially rebellious proletarian masses (Ipsen, 1997).

Depopulation in Italy and Southern Europe could be considered the outcome of the dissolution of traditional economies, grounded around small farm production, transhumant breeding, pluriactivity, seasonal migration and maximum exploitation of the local resources in sparse and self-sufficient communities (Collantes, 2009). Livestock farming plays an essential role in this process, which is connected to the exhaustion of seasonal migrations of peasants, shepherds and laborers (INEA, VIII, 1938) Such mobility prevents the excessive degradation of living standards (Lorenzetti, 2019) by providing income remittances and reducing demographic surpluses (Ciuffetti & Vaquero Piñeiro, 2019). At high altitudes, agriculture alone cannot feed the inhabitants, therefore they must rely on mobility strategies aimed to balance resources with the population (Viazzo, 1989) As evidence of this, coeval observers noted that villages with large migratory flows enjoyed better life conditions than neighbouring areas (INEA, V, 1937). The crisis of pastoralism marks the transition from temporary to permanent emigration, which depleted the resources of the native communities (Tino, 2016) and resulted in depopulation (Fornasin & Lorenzini, 2019). This trend is exacerbated by forest constraints drastically reducing the number of sheep and especially goats, thereby fuelling emigration from the mountain (Ciuffetti & Vaquero Piñeiro, 2019).

Nevertheless, mountain depopulation in Italy must be examined at subregional scale. A relevant distinction is to be made between the Alps and the Apennines, where depopulation takes on different causes, times and intensities. While the Alps are mainly characterized by forest and pastures activities, the Apennine region relies more on agriculture and is connected to the neighbouring hilly, lowland and maritime areas (Ciuffetti & Vaquero Piñeiro, 2019). The diversity of the context clearly influences population change in mountain regions. For example, the population fall in Piedmont and Liguria, but also several southern regions, started at the end of the nineteenth century, while the northern

Apennines' decline began in the 1920s and the shrinkage of the Central Apennines can be witnessed only after Second World War (Golini et al., 1976). In addition to the many agricultures in "Italies", we should also investigate the multiple mountains in "Italies", extremely different with regard to environmental and socio-productive conditions (INEA, VIII, 1938).

Data and methods

The paper integrates a quantitative analysis of municipal-scale data with a qualitative part, based on the careful reading of the survey on mountain depopulation carried out between 1932 and 1938, which provides unique insights on social relations, economic structures and living standard in the highlands. In particular, I have extracted all the text passages addressing the topic of the goat, in order to integrate and inform the empirical analysis. The quantitative part examines the demographic dynamics of the period 1911–1971 in a set of mountain municipalities. This is the appropriate scale to assess the impact of an environmental regulation uniformly applied to heterogeneous settings (Weber & Sciubba, 2019). Municipality connects self-government and political representation; it is the context where policies are effectively implemented, where power conflicts between local communities and central government arise and the relationship between population, food and environment becomes more stringent. In addition, the municipal scale allows to better capture different demographic patterns (Delgado Viñas, 2019), also thanks to the availability of reliable long time-series, collected from the census and population registry. However, municipality represents a proper unit of investigation only when making broad comparisons (Braudel, 1969). I therefore explored a large set of municipalities in order to achieve a systematic, organic view of the depopulation process in the light of 1927 goat tax.

Firstly, what needs to be detected are the ecosystems where goat breeding plays a significant role. This is done through a specialization index of provincial goat livestock compared to the national one in 1908. The index is

$$S_i = \frac{G_i}{G} / \frac{L_i}{L} \tag{1}$$

where G and L are, respectively, the number of goats and the total livestock, in the province i and in Italy. I have selected the provinces over the threshold of 1.3 (and with at least 5,000 heads) or with a share of more than 2% of the national goat livestock. These criteria draw 26 provinces at 1930's borders, which cover 81% of the mountain goat population in 1908 and 84% of those in 1930 (Fig. 1).

The study sample includes all the mountain municipalities located in these provinces. This dataset must undergo a complex task of data homogenization, in order to address several territorial changes (ISTAT, 2001).[2] I have also

[2] Since the 1930, there have been relatively few boundary changes in the administrative units of the selected sample. Re-drawing of municipal boundaries, nevertheless, have been addressed with the now classic proportional hypothesis which assumes an equal distribution of the population (or of the character examined) within the municipal borders; consequently, a given fraction of the annexed or ceded territory corresponds to the same fraction of the population annexed or ceded (Vitali 1968, 57).

removed from the sample the 56 municipalities with population greater than 10,000 inhabitants in 1931, because their demographic patterns and economic-institutional contexts are not comparable to the rest of the mountain settlements. Finally, I have obtained a sample of 1285 municipalities at the 1930

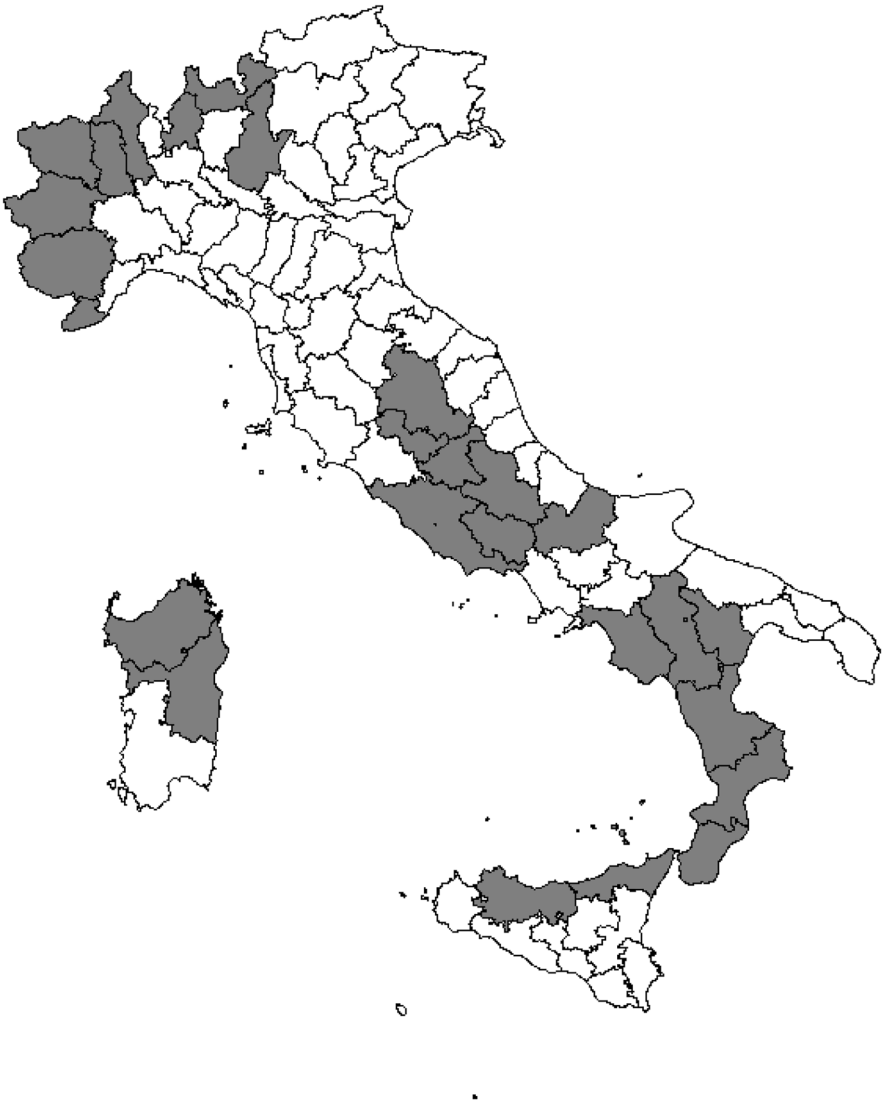

Fig. 1 Provinces included in the study area (in grey), at 1930 borders

borders.[3] The data distribution of the selected municipalities, aggregating at a provincial level (Table 3), reflects the discrepancy in the timing of depopulation and in the demographic transition, as well as the different size of settlements, much smaller in the Northern Italy. However, the widespread enlargement of the range of the size of population in the 1930s witnesses the onset of a process of territorial polarization, which shoots up steadily after the Second World War.

1930 is the reference year being right after the introduction of the goat tax of 1927, but especially because of the availability of detailed and reliable information at municipal scale on population (census 1931), natural balance (municipal registry offices was reorganized since the 1930s; Del Panta & Detti, 2019), livestock (livestock census of 1930) and agricultural crops (agricultural cadastre of 1929). Information shortage particularly affects livestock farming, for which official sources were scarce, and mainly restricted to the 1908 and 1930 censuses, which provided reliable data, audited by municipal officials.[4]

The selected sample is explored through a multistage methodology. I first tried to locate the places where the goat used to be an essential resource, both for lack of alternatives and for their contribution to the local community. I therefore run a cluster analysis on the variables describing the two relevant dimensions of goat rearing, such as the goat specialization index (compared to major geographical areas: North, Center, South, Islands) and the ratio of goat heads to local population at the time of the 1931 census. The former variable helps to clarify the role of the goat within the local grazing system; this is a crucial piece of information since the vulnerability of breeding systems dependents on a single resource (Haddaway et al., 2013). The second variable measures the importance of goats in population livelihood: goat breeding is strongly addressed to self-consumption and for this reason closely connected to the subsistence of the local community (Desiere et al., 2015).

The estimation of a hierarchical Ward clustering, using a Euclidean distance similarity measure splits the sample in five partitions selected according to both larger pseudo-F Calinski-Harabasz and Duda-Hart indexes. Table 4 provides a detailed profile of the groups. In particular, cluster 2 includes 195 municipalities distributed across Italy and characterized by a sizeable number of goats, often paired with the sheep. Cluster 3 covers 160 municipalities mainly located in the Alps and highly specialized in goat grazing, which represents a large part of the livestock. In these groups, goat grazing plays a central role, alone (cluster 3) or associated with the sheep (cluster 2).

The goat tax is often considered an environmental measure with negative social effects, because it mainly affects the poorest strata of the population (Armiero, 2011; Bonan & Biasillo, 2019). In lack of a family budget of the goat breeders, I test

[3] For example, municipalities to be found in Campania today, such as Gallo or Letino, were assigned to the province of Campobasso, where they had merged after the temporary suppression of the province of Caserta, from 1927 to 1945.

[4] The so-called 1918 census was actually a national survey compiled by the same breeders and in a country still plagued by war devastation (Barsanti, 2002). The results, confined at provincial scale, are however essential to draw the trend of goat breeding before the enactment of anti-goat rules.

Table 3 Population range of selected municipalities, by province at 1930's boundaries (1911–1951)

			Population 1911		Population 1921		Population 1931		Population 1936		Population 1951	
N. Municipalities	Province code	Province	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
55	1	Torino	58	6700	58	6542	93	5664	132	5486	74	5868
50	2	Vercelli	129	9864	130	9318	111	8956	122	8576	116	9207
75	3	Novara	371	8629	373	8794	377	9191	257	8632	270	10,157
67	4	Cuneo	329	9408	328	9741	313	8840	330	8281	285	8365
17	7	Aosta	239	4850	221	5061	216	4618	210	4595	209	4809
53	8	Imperia	304	5539	328	6142	198	7256	203	7334	222	8515
90	13	Como	177	4440	180	4927	194	5398	189	5461	205	6672
77	14	Sondrio	281	7104	231	7060	159	6518	125	6772	154	7056
67	17	Brescia	610	6413	520	6413	578	6413	656	6413	632	6413
24	54	Perugia	911	9364	890	9364	894	9364	883	9364	731	9364
5	55	Terni	459	4366	464	4366	477	4366	457	4366	424	4366
47	57	Rieti	542	10,347	669	10,043	638	7794	666	7419	604	7009
49	58	Roma	506	8612	443	9348	450	9078	332	9289	244	9732
37	60	Frosinone	753	6882	817	6818	883	6783	909	6507	872	6257
82	65	Salerno	776	8884	652	8680	667	9425	727	9701	751	11,911
100	66	Aquila	867	10,319	681	9475	624	9871	645	11,653	578	11,052
95	70	Campobasso	548	9702	576	9334	429	9330	435	10,137	401	11,050

Table 3 (continued)

N. Municipalities	Province code	Province	Population 1911		Population 1921		Population 1931		Population 1936		Population 1951	
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
74	76	Potenza	822	7642	843	7809	808	8386	877	9275	898	10,466
21	77	Matera	959	8087	937	7304	1115	7677	1153	8275	1256	9628
17	78	Cosenza	1567	6395	1485	7026	1516	7668	1630	7081	1812	9175
26	79	Catanzaro	833	6792	839	7240	802	7698	818	6882	919	8348
20	80	Reggio Calabria	1448	6136	1582	6529	1560	6199	1611	6057	1778	6563
30	82	Palermo	1072	10,224	1074	11,368	837	9920	1044	10,042	1139	10,553
78	83	Messina	1199	10,031	1036	10,315	936	9474	895	8839	779	9310
11	90	Sassari	700	9380	774	6478	806	7575	878	8069	1188	9321
26	91	Nuoro	615	7248	646	8534	721	9188	769	11,459	845	16,949
1293		Total	58	10,347	58	11,368	93	10,002	122	11,653	74	16,949

Source: elaboration on Istat (1977)

Table 4 Livestock species (share on livestock) and goat-population ratio, by cluster (1930)

Municipalities	Cluster	Cluster name	Cows	Equines	Pigs	Sheeps	Goats	Goat/population
297	1	Livestock size	0.14	0.07	0.09	0.55	0.15	0.21
195	2	Goat Number	0.16	0.06	0.08	0.44	0.27	0.37
160	3	Goat specialization	0.18	0.07	0.07	0.31	0.36	0.30
409	4	Equine specialization	0.19	0.11	0.09	0.52	0.09	0.08
224	5	Cow specialization	0.29	0.08	0.09	0.51	0.02	0.02
1285	Total	Italy	0.18	0.08	0.08	0.50	0.15	0.16

Source: personal elaboration on Istat (1933) *and* Istat (1934)

this assumption through an ordinary least squares (OLS) estimation based on the following model:

$$goat\_sh_{i,t} = \beta_0 + \beta_1 x_{i,t} + \varepsilon_i \tag{2}$$

The specification (2) regresses the share of the goat on the total livestock at municipality i at time t (1908, 1930) on a vector of regressors x_i which includes some demographic (population density, seasonal emigration), morphological (altitude, ruggedness, accessibility), social (illiteracy, agglomerate settlement) characters (Table 5). The aim is to find some significant connection between goat grazing share and some proxy of marginality.

I have then analysed the population change in the study sample across some subperiods, starting from 1911–1921 to 1951–1971, by using population time series at 1930 municipal borders (ISTAT, 2001).

The paper's main goal is to test if the implementation of the special goat tax impacts on population dynamics. Accordingly, I have adopted an ordinary least squares (OLS) estimation based on the following equation:

$$\Delta n_{i,t} = \beta_0 + \beta_1 x_{i,t-1} + \beta_2 z_{i,t-1} + \varepsilon_i \tag{3}$$

where n_t is the natural logarithm of the population of the municipality i at a time t (where $t = 1911, 1921, \ldots, 1971$), $x_{i,t-1}$ is a vector of regressors and $z_{i,t-1}$ is a suitable set of explanatory variables, as observed at the beginning of each period. The regressors include both the share of goats on the total livestock and the goat intensity that is the ratio of goat per capita. The former variable expresses the role of goat grazing in the local farming economy, whereas the latter shows the relative size of goat rearing in local communities.

The set of control variables includes some drivers of mountain depopulation reported in the literature and the INEA Survey (1932–1938). Altitude is the main feature of mountain settlements. It determines the frequency of relations (Belanche et al., 2021), type and result of farming activities (Viazzo, 1989). It is a proxy for different factors, which can enhance or hinder the resilience to adverse events. High-altitude villages are less exposed to subsistence crises because of their lower dependence on farming practices but more vulnerable to adverse

Table 5 Description of selected variables

Variable	Description	Year	Source
Illiteracy rate	Illiterate people over 6 years (% on population aged 6 and over)	1911–1921–1931	Population census
Male ratio	Ratio of male to total present population	1911–1921–1931–1936	Population censuses
Present on resident population	Present population on resident population	1911–1921–1931–1936–1951	Population censuses
Population density	Population on surface area (hectare)	1911–1921–1931–1936–1951	Population censuses
Altitude	Municipal altitude, in meters	1931	Population census
Squared altitude	Municipal altitude, in meters (squared)	1931	Population census
Agglomeration rate	People in agglomerated centres (% on total population)	1931	Population censuses
Access to city	Population of the closest city/ distance to the closest city, for each municipality	1911–1921–1931–1936–1951	population censuses; Istat 2019
Goat intensity	Loading of goat livestock on present population	1908–1930	Livestock census, population census
Goat change	Change in goat livestock	1908–1930	Livestock censuses
Goat share	Goat share on total livestock	1908–1930	Livestock census
Rate of natural increase	Number of births minus number of deaths (‰ on total population)	Between 1931 and 1936	Civil Registry; population censuses
Net migration rate	Enrolled minus cancelled people in civil register (‰ on total population)	Between 1931 and 1936	Civil Registry; population censuses
Crude birth ratio	Number of live deaths occurring during the period (‰ on midperiod population)	Between 1931 and 1936	Civil Registry
Crude death ratio	Number of live deaths occurring during the period (‰ on midperiod population)	Between 1931 and 1936	Civil Registry
Consumption	Consumption tax revenue (in Liras) on present population	1936–1937	Istat 1941
Ruggedness	Standard variation digital elevation model	2011	Istat, Ispra
Macroareas	Dummy variable	1911–1921–1931–1936–1951	Istat
Activity rate	Percentage ratio of active persons to total residents aged 15 and over	1936	Population census
Agriculture rate	Employed in agriculture (% of total employment)	1936	Population census
Artisans rate	Employed as artisans (% of total employment)	1936	Population census
Population size	Size of resident population (ln)	1911–1921–1931–1936–1951	Population census

weather conditions than meadows and pastures (Viazzo, 1989). The terrain ruggedness index expresses the amount of elevation difference among adjacent cells of the digital elevation model provided by ISPRA. This topographic factor hinders trade, livelihood, and farming activities (Nunn & Puga, 2012), with the sole exception of the goat, which thrives in rugged lands (Armiero, 2011).

Despite some similarities in the orographic characters, mountain municipalities show peculiar features depending on their prevailing economic function. The settlement model determines timing, frequency and characters of the socio-economic relations at the territorial level (Veneri, 2011). The agglomerated settlement identifies a local community, endowed with their own patrimonial, religious and political identity, and characterised by shared culture, values and history (Capello, 2019). Conversely, sparse settlement identifies agricultural communities, with individual or family-based attitude, less resilient to exogenous shocks.

Literacy rate can affect population changes by promoting a selective migration. Mobility can represent a basic survival strategy for poor, illiterate people, but even a planned, deliberate choice aimed to improve the economic and social positions (Faggian et al., 2017). In traditional communities the uneducated people either have higher sense of place-belonging (Belanche et al., 2021) or miss necessary requirements to migrate (Viazzo, 1989). Gender could also affect depopulation. Most empirical findings emphasise greater female propensity to permanent emigration to urban areas, where they can find more job opportunities, especially in the service-sector, as well as better marriage prospects (Leibert, 2016). Conversely, males were more involved in temporary migration (Viazzo, 1989; INEA 1938). This strategy represents a distinctive character of the mountain villages (Collantes, 2009), resulting in provision of remittance inflows and a less demographic pressure on the scant local assets (Viazzo, 1989; Ciuffetti & Vaquero Piñeiro, 2019). The ratio between present and resident population is the only available proxy for temporary migration. In a context of out-migration, a lower ratio means higher temporary mobility.

Population dynamics in rural regions are also affected by centripetal forces towards surrounding urban centres (Faggian et al., 2017). In this regard, I build an accessibility index to the closest large city for each municipality, assuming that the pull factors are stronger in municipalities closer to cities. The accessibility index of municipality i at time t is:

$$A_{i,t} = \frac{P_{i,t}}{D_{i,j}} \tag{4}$$

where $D_{i,j}$ is the distance from the closest city j and $P_{i,t}$ expresses the population at each census date. The cities include all the provincial capitals exceeding 10,000 units and the municipalities above 30,000 units (i.e. Biella, Lamezia Terme) which provide the benefits of urbanization such as public services, comfort of life and the opportunities deriving from a larger network of contacts.

Population density promotes depopulation when the demographic load exceeds the local resources (Bonelli, 1967), but it also positively affects residents' wellbeing in rural areas (Zelinský et al., 2021), enhancing social interactions and community

attachment (McKnight et al., 2017). Most findings point out that depopulation is a self-reinforcing process that can trigger a spiral of economic decline, cut of public services and further emigration (Elshof et al., 2014). In addition, I also introduce some macroregional dummies, because depopulation assumes different timing and characters between the Alps and the Apennines (INEA, 1932–38).

I further add other variables to the basic model (3), available only for a single period, since 1936. The specification is designed to verify if the low R2 of model (3) is due to the presence of omitted variables. I therefore introduce a labour market structure (occupation in the main economic sectors), which shapes the productive skills of a place and affects depopulation processes (Li et al., 2019), and consumption tax revenue in order to proxy the living standard, which represents a significant push factor in mountain emigration (Treves, 1976). I also consider among the regressors for the span 1931–1936, the rate of change in goat population between the 1908 and 1930 censuses. Detailed descriptions of the covariates in the model and a report of the descriptive statistics are, respectively, provided in Table 5 and 6.

Furthermore, and for the same period, I have explored the determinants of both natural and migratory balances, treated as endogenous variables in Eq. (2). These data are derived from the population equation

$$\Delta Pop_t = N - M + E - D \tag{5}$$

where N means the births, M the deaths, E the enrolment and D the dismissal on the civil registry. (3) allows to solve the updating deficiencies of the registry offices in order to assess the migratory balance $(E - D)$ drawing on reliable data, such as the natural balance$(N - M)$.[5]

Results

The survey on mountain depopulation

This section presents qualitative results drawn from the meticulously reading of the survey on mountain depopulation, aimed to inform the model building in the quantitative part of the paper. In the 1930s, mountain depopulation achieved such significant and widespread dimensions as to prompt a specific official survey, began in 1930 and continued until 1938 (Perrone, 2019). It achieved a complete coverage of the Alpine area (seven volumes, with 43 monographs) but only partial results for the Apennines (two volumes, with 10 monographs; Perrone, 2019). The investigation involved the best geographers, agronomists and agricultural economists of the time, whereas demographers played a marginal role (Lorenzetti, 2019). The interdisciplinary and holistic perspective; the ability to blend quantitative statistics and qualitative information; the adoption of a comparative perspective; the vastness, breadth

[5] Since both 1931 and 1936 censuses took place in April 21, I have modified both these yearly total for the effective days included in the intercensal period: 254 days in 1931 and 111 in 1936.

Table 6 Descriptive statistics

Year	1911				1921				1931				1936			
Variable	Mean	Std. Dev	Min	Max	Mean	Std. Dev	Min	Max	Mean	Std. Dev	Min	Max	Mean	Std. Dev	Min	Max
Illiteracy rate	0.40	0.28	0.00	0.89	0.30	0.23	0.00	0.82	0.22	0.19	0.00	0.85				
Present on resident population	0.92	0.09	0.48	1.51	0.91	0.09	0.36	1.73	0.95	0.09	0.33	2.19	0.96	0.06	0.48	1.38
Access to city	1.70	2.42	0.09	16.94	1.94	2.82	0.09	17.88	2.30	3.67	0.10	25.20	2.64	4.54	0.12	31.16
Population density	0.87	0.87	0.02	11.35	0.87	0.91	0.02	12.05	0.90	1.03	0.02	15.56	0.90	1.04	0.02	15.67
Goat share	0.22	0.15	0.00	0.83					0.15	0.13	0.00	0.84				
Goat intensity	0.29	0.39	0.00	4.22					0.18	0.29	0.00	5.88				
Male ratio	0.47	0.05	0.28	0.78	0.48	0.03	0.30	0.76	0.48	0.04	0.31	0.78	0.48	0.03	0.34	0.77
Altitude	6.21	0.82	1.10	7.51	6.21	0.82	1.10	7.51	6.21	0.82	1.10	7.51	6.21	0.82	1.10	7.51
Ruggedness	5.63	0.56	2.44	6.91	5.63	0.56	2.44	6.91	5.63	0.56	2.44	6.91	5.63	0.56	2.44	6.91
Agglomeration rate									0.79	0.22	0.01	1.00				
Population change	−0.01	0.10	−0.63	0.56	−0.04	0.13	−0.84	0.51	−0.01	0.09	−0.56	0.35	0.02	0.12	−1.09	0.49
Goat change (1908–1930)									−0.09	1.78	−1.00	25.13				
Activity rate													0.48	0.10	0.20	0.91
Agriculture rate													0.33	0.13	0.01	0.73
Artisans rate													0.03	0.02	0.00	0.13
Consumption													16.27	15.20	0.73	157.39

and detail of the analysis; and the critical attitude (Bonan & Biasillo, 2019; Fornasin & Lorenzini, 2019) even in a period marked by an oppressive censorship make the survey on mountain depopulation a milestone for understanding the long-term evolution of the Italian uplands (Perrone, 2019).

Goat grazing is a recurring theme throughout the eight volumes of the survey which provides, as outlined above, a comprehensive, systematic and detailed assessment of the effects of the 1927 tax. The authors reviewed both the positive and negative impacts of goats in mountain regions, without sparing any explicit questions about the effectiveness of the then current legislation (Fornasin & Lorenzini, 2019).

The immediate effect of the 1927 tax was a huge drop in the number of goats, which "suffered a meltdown" (INEA, I, 1932, 439), "a real hecatomb" (INEA, I, 1934, 111), a "frightening extermination that made them almost entirely disappear from the mountain of which they were, with unappealable judgment, declared enemies[6]" (INEA, VII, 1937, 24). In the 3 years following the promulgation of the law, the goats in Valle Roya and Vermenagna (Piedmont) have been reduced by 50% (INEA, I, 1932). Even though some isolated voices argued that goat decrease was completely unbound by grazing restrictions (INEA, I, 1932), most of the experts pointed out that the special goat tax has penalized marginal, steep slopes which do not allow the grazing of other animals (INEA, II, 1935; INEA, IV, 1938).

The goat tax also affected food security because these animals were a major source of livelihood for mountain families (INEA, VI, 1934; INEA, VII, 1937). The loss of goats mainly affected the child population, who strongly relied on goat's milk, and at the same time wiped out both meat and cheese from the diet of the mountaineers. The new rules further deteriorated the modest standards of living of the inhabitants: "the food regime, based on maize, potatoes and, to a lesser extent, wheat bread, has become even more deficient when the strict application of measures against goats has made it impossible to replace meat with milk and cheese, almost completely absent" (INEA, VII, 1937, XXXIIX). In addition, the goat tax almost completely cut out a basic revenue of the mountain economies (INEA, I, 1932). "Due to the forced limitation of goat breeding, Carnia alone lost about one million liras per year" (INEA, IV, 1938, 518). The goat is undoubtedly considered the most profitable animal for the highlands because it procures for itself the pasture in slopes that are usually inaccessible to cattle, and provides a certain and valuable income, in proportion to its cheap price (INEA, I, 1934).

The livestock regulation is often considered unfair because it heavily burdened on the most deprived families (INEA, III, 1935). As noted in the INEA, I, 1932, the "goat is one of the fundamental resources for the poorest families, who own or rent the most unfavorable and inconvenient pasture lands. For the low income that the goat gives in comparison to the sheep, a somewhat high tax, as is the current one, is enough to make its breeding fruitless" (INEA, I, 1932, 389). It is then added that goats are "the expression of a poor economy" (INEA, I, 1932, 458) and they are "the miserable possession of the poor" (INEA, III, 1935, 176), who

[6] The quoting words are originally written in Italian and translated in English by the author.

cannot afford to keep a cow; hence, they cover the most urgent food needs with one or two goats, which are neither expensive nor demanding (INEA, III, 1935).

The survey also complains about the place-blind, top-down characters of the reforestation policy. The criticism directed at the uniform application of the goat tax throughout the Italian territory is recurring. Several scholars suggest that forestry legislation should be calibrated on both the environmental and socio-economic characteristics of the contexts: goat breeding is harmful in some regions, but it is the keystone of the farming system in poor rocky lands, which no other animals can advantageously use (INEA, I, 1932; INEA, IV, 1938; INEA, V, 1937). At high altitudes, "the goat embodies for the life in our mountains, what the camel stands for the life in the desert, and what the reindeer represents for the life in the boreal regions" (INEA, I, 1934, 42).

The survey also finds fault with the excessively strict and vigorous implementation of the forestry laws (INEA, IV, 1938; INEA, VI, 1934; INEA, I, 1934), accompanied by "very strong fines, which have brought real terror among the populations" (INEA, VII, 1937). Besides, Serpieri himself complained the excessive zeal of forest militia in the application of the anti-goat measures (Armiero, 2011, 143). In 1934 the experts pointed out that.

> No less serious are the psychological effects. The settler is slowly persuading himself that the mountain is now completely ruined, and that his personal position is transitory. The obstacles put against the goats irritate him in a particular way and he is driven to see in the Forest Militia and in the land constraints useless hangings and the root causes of his sad situation. In summary, we see in this economic chaos and in this widespread pessimistic mentality, a considerable danger. There is a danger that the forces that tended to resurrect the mountain will fade and disappear, and there is a danger that, under the pressure of leaving and forgetting the ungrateful places, the settlers will deplete the land in such a way that any future improvement will be prevented. (INEA, VI, 1934, 183)

It is clear that the special goat tax "feeds a sense of dejection, a lesser attachment to the mountain and, consequently, an easier desertion of the farm, where the farmer believes himself persecuted by the prescriptions of the forest police" (INEA, VI, 1934, 118).

Finally, I have found repeated references to the negative demographic impact of the goat tax, which has encouraged permanent emigration (INEA, I, 1932; INEA, VII, 1937). Accordingly, the survey confirms the empirical findings of chapter 5.2: larger population losses occur in the municipalities where goat breeding takes greater importance (INEA, I, 1934). The renowned agrarian economist Mario Bandini pointed out that the "forestry policy currently acts in the sense of facilitating the exodus: and this is a simple statement of fact" (INEA, VI, 1934, 172). The goat tax was among the drivers of village depopulation, as already pointed out by Serpieri, by which "tragic voices come from the mountains. Entire areas are depopulating, life is dissolving… In these conditions, even the sacred protection of forests, even the war against goats is becoming cruel" (in Armiero, 2011, 133).

However, that did not matter the government technicians behind the reforestation laws. They claimed that "the question of the goat does not exist or, at least, it will no longer exist in a few years, when we have managed to banish even the last goat from our mountains" (INEA, I, 1934, 50). They were confident that the strategy "more cattle and fewer goats" would safeguard the interests of the Nation and of the mountaineers themselves (INEA, II, 1935). Certainly, at no time did the goat hinder the cattle farms; on the contrary, these livestock species graze on different lands, at different times (INEA, I, 1934).

The survey includes a range of divergent positions, for and against goat tax. The contributors recognize the necessity to put a brake on environmental degradation, but at the same time, they are aware that its application may undermine the livelihood in remote municipalities (INEA, II, 1935). The issue must be addressed from a holistic perspective, balancing the needs of both forest and pasture, which represent the pillars of the mountain economy (INEA, III, 1935).

A widespread skepticism towards "a forestry policy that believes in greening the mountains by annihilating the goat heritage with a tax" (INEA, VII, 1937, 140) transpires from the survey. The goat became the scapegoat for a power and economic conflict for local resources. Yet, "what has stripped the Apennines of woods is the axe, the excessive demographic pressure and the proximity of populous centres which incessantly require firewood and timber for work" (INEA, I, 1934, 53). Man, not the goat, is to be blamed for forest degradation (INEA, V, 1937). This top-down approach undermines the reforestation policy, which requires instead mutual trust between state and local communities (INEA, I, 1934). Despite the commendable purposes, the reforestation policy shall have been mitigated because "proclaiming excellent the destruction of the goat heritage of these poor people, sounds almost insulting to the increasingly rampant misery. Only the most total and naïve ignorance of the local economy could lead us to believe that in that way we can successfully guide the mountaineers towards more advanced forms of breeding" (INEA, VII, 1937, 80).

The survey suggested abolishing the special goat tax or at least applying it in a milder way, forbidding the grazing in constrained forests but granting it in areas without environmental risks (INEA, IV, 1934). It would have been also necessary to rationalize the exploitation of those forests owned by institutions and private individuals (INEA, I, 1932). As can be seen in volume VI, to counter depopulation "the parish priests of the mountain hamlets, all insist on three points: taxes, roads and goats" (INEA VI, 1934, 187).

The analysis of the INEA Survey thus contributes to inform the empirical segment of the study, which must consider different contexts and incudes some proxy of socio-economic marginality, remoteness, goat variation, share and intensity.

Empirical analysis

The unequal distribution of goats across the Italian highlands calls for an identification of the factors behind their presence; I have therefore run a OLS regression where the dependent variable is the share of the goat on the total livestock in 1930 (Table 7). Empirical findings show that the share of the goat rose with illiteracy, which is a sign of low productive and socially backward communities. The

significance of altitude, with negative coefficient, and ruggedness, with a positive one, is consistent with studies arguing that living conditions were worse in medium-altitude settlements, located in steep slopes, lacking the fertile lands at the valley floor or the lush summit pastures (Vitte, 1995). In addition, the share of the goat decreases with population size, sparse settlements and male presence; this could mean that goat rearing is more popular in less populated municipalities characterized by widespread temporary migration, usually masculine. Similar evidence also emerges for the year 1911, confirming persistent connections between the share of the goat and marginality, framed in different morphological, geographical and social terms. The importance of the goat in the breeding system of the poorest and most marginal municipalities confirms its epithet of "cow of the poor" and suggests that goat tax bears down on the most fragile communities in particular.

The excessive burden on the weaker social strata also characterizes several current environmental policies. I have examined the municipal distribution of the Italian car park system according to the emission standards set in 2014, when France introduced the carbon tax harshly contested by the Yellow Vest movement. The most polluting cars (Euro1, 2 and 3) are widely spread in the inner areas and in the municipalities with lower income per capita, whereas urban and wealthier centres show greater propensity for greener vehicles (Tables 8 and 9).

Returning to our case study, concentration of goat breeding in poorer contexts could suggest that the marginality and not the goat tax favoured the demographic decline of these municipalities. However, the cluster analysis presented in the fourth chelped to deny such thesis. The population reconstruction for the

Table 7 OLS regression results for goat share 1931 and 1911, specification (2)

Dependent variable	Goat share_1931		Goat share_1911	
Variable	Coef	Std. Err	Coef	Std. Err
Altitude	−0.039	−0.004***	−0.030	0.005***
Illiteracy rate	0.306	0.035***	0.364	0.044***
Access to city	−0.001	0.001	−0.002	0.002
Male ratio	−0.373	0.095***	−0.307	0.113***
Agglomeration rate	0.044	0.016***	0.051	0.020***
Present on resident population	0.031	0.040	−0.019	0.049
Population size	−0.029	0.005***	−0.033	0.006***
Ruggedness	0.015	0.006**	0.022	0.008***
North	0.127	0.014***	0.087	0.018***
South	0.041	0.013***	−0.005	0.015
Island	0.118	0.015***	−0.004	0.018
Constant	0.494	0.074	0.541	0.092
Obs	1284		1284	
F	34.520		14.440	
R^2	0.230		0.111	

**Significant at 10 percent, * *significant at 5 percent, and * * *significant at 1 percent*

Table 8 Car fleet by emission standards in Italian municipalities split by NSIA classification; share on total cars (2014)

NSIA classes	Euro 0	Euro 1	Euro 2	Euro 3	Euro 4	Euro 5	Euro 6
Hub	10.9	3.4	13.4	17.2	33.4	20.6	1.2
Intermunicipal hub	13.1	4.3	15.8	18.8	31.9	15.5	0.6
Outlying	9.2	3.5	14.4	18.9	34.6	18.7	0.7
Intermediate	12.1	4.7	17.2	19.7	31.5	14.3	0.5
Peripheral	14.5	5.6	18.7	20.1	29.1	11.7	0.3
Ultra-peripheral areas	14.5	5.5	18.7	20.1	29.6	11.2	0.3
Centres	10.2	3.5	14.0	18.1	33.9	19.4	0.9
Inner areas	10.8	3.8	14.8	18.5	33.2	18.1	0.8
Italy	10.5	3.7	14.5	18.3	33.5	18.7	0.9

Source: Personal elaborations on Istat data

period 1911–1951 shows that municipalities specialized in goat breeding have had trends aligned with the national average, but different intensity (Table 10). They grew more in 1911–1921 and show a smaller decline both in 1921–1931 and in 1951–1971. The only discrepancy arose in 1931–1936, when the goat specialized cluster lost residents, contrary to the demographic increase of the sample average. The study of demographic components helps to clarify these specular trends. The goat specialized group has a more effective demographic regime than the Italian average: the simultaneous coexistence of fewer births and deaths fits well to contexts that are dependent on few resources (Viazzo, 1989). Despite a smaller rate of natural increase compared to sample average (Table 11), the demographic decline of 1931–36 is attributable to the net migration deficit, higher than for the other clusters. This population fall certainly draws attention because it occurred with greater intensity in the goat specialized clusters, in spite of the restrictions on mobility issued by the fascist regime. The main suspect is that the special goat tax enacted in 1927 may have

Table 9 Car fleet by emission standards in Italian municipalities split by income range; share on total cars (2014)

Income range	Euro 0	Euro 1	Euro 2	Euro 3	Euro 4	Euro 5	Euro 6
6–12	20.3	7.5	21.2	19.4	23.7	7.7	0.2
12–15	16.2	6.1	19.9	20.4	27.4	9.7	0.3
15–19	11.6	4.2	16.3	19.6	32.6	15.1	0.5
19–24	8.6	3.0	13.0	18.0	35.2	21.1	1.1
Over 24	9.1	2.8	11.1	15.8	35.1	24.7	1.3
Italy	10.8	3.8	14.8	18.5	33.2	18.1	0.8

Source: Personal elaborations on Istat data

Table 10 Rate of change by cluster, resident population (1911–1971)

Cluster	Cluster name	1911–1921	1921–1931	1931–1936	1936–1951	1951–1971
1	Livestock size	0.99	−0.28	1.15	6.76	−14.33
2	Goat number	0.31	−0.51	0.71	7.69	−7.66
3	Goat specialization	0.64	−2.25	−0.82	4.50	−9.50
4	Equine specialization	−1.04	−3.61	−0.34	4.44	−14.27
5	Cow specialization	0.54	−4.42	−0.72	2.61	−10.95
Total	Italy	0.04	−2.37	0.08	5.22	−12.38

Source: Personal elaborations on Istat (1977)

affected the demographic decline of 1931–1936 and the lower growth (relative to the national average) of 1936–1951.

This hypothesis is explored through a set of linear regressions framed in Eq. (3) (Table 12).

In the initial stages (1911–1921 and 1921–1931), the share of the goat did no impact on population dynamics, unlike other factors such as population density and temporaneous emigration (expressed by the variable president on resident population). Population dynamics in the 1921–1931 span is also influenced by illiteracy, accessibility to surrounding urban centres and goat intensity. The scenario dramatically changes in the following periods, when the share of the goat becomes a driver of shrinkage.

Among the control variables, agglomeration share and temporary migration still positively affect demographic trends, which benefited from less population sparsification. However, the most noteworthy evidence are the opposite signs of goat share and goat intensity. This underlines that goat grazing plays a dichotomic role: those who have many goats but also other livestock do not suffer the demographic decline, unlike those specialized in goat rearing. The share of the goat has a negative impact on population change only beginning with the 1931–1936; right after the enactment of goat tax of 1927. The empirical analysis tallies with the INEA Survey in highlighting the selective impact of the goat tax, which is very harmful in areas specialized in goat grazing. The opposite influence of the share of the goat and goat intensity persists over time.

Only for the period 1931–1936, am I able to include the rate of change of the goat stock between 1908 and 1930 among the regressors of the baseline specification (3), with negative results in correlation with population growth (Table 13). Therefore, higher rates of population decline mainly occur in areas specialized in goats and subject to larger decline in the goat population, induced by regime policies. In the 1936–1951 specification, I also added the share of active population engaged in agriculture and the consumption revenue per capita, both negatively correlated with population change, as expected. Low agricultural profitability and poor living standards are primary push factors behind emigration, mainly occurred in marginal lands.

Table 11 Absolute value and rate of change 1931–1936 of some demographic indicators, by cluster

Cluster	Cluster name	Crude birth ratio	Crude death ratio	Rate of population change	Rate of natural increase	Net migration rate	Births	Deaths	Population change	Natural balance	Net Migration balance
1	Livestock size	2.76	1.59	0.23	1.18	−0.95	111,838	64,218	15,343	47,620	−32,277
2	Goat number	2.63	1.50	0.14	1.13	−0.99	60,962	34,758	1704	26,205	−24,501
3	Goat specialization	2.47	1.48	−0.16	0.98	−1.15	35,575	21,391	2480	14,184	−11,704
4	Equine specialization	2.58	1.61	−0.07	0.97	−1.04	149,515	93,252	8427	56,263	−47,836
5	Cow specialization	2.29	1.49	−0.14	0.80	−0.94	57,729	37,546	−46	20,183	−20,229
Total	Italy	2.58	1.56	0.02	1.02	−1.00	415,619	251,165	27,908	164,455	−136,547

Source: Personal elaborations on Istat (1934–1937)

Table 12 OLS regression results for population changes, different periods, specification (3)

Dependent variable	Population changes (1911–1921)		Population changes (1921–1931)		Population changes (1931–1936)		Population changes (1936–1951)	
Variable	Coef	Std. Err	Coef	Std. Err	Coef	Std. Err	Coef	Std. Err
Population density	0.007	0.002***	0.016	0.002***	0.001	0.001	0.016	0.002***
Altitude	0.031	0.010***	0.006	0.012	0.017	0.008*	0.114	0.012***
Square altitude	−0.004	0.001***	−0.001	0.001	−0.002	0.001**	−0.013	0.001***
President on resident population	0.341	0.020***	0.802	0.021***	0.487	0.016***	0.387	0.031***
Goat share	0.006	0.013	−0.003	0.014	−0.045	0.012***	−0.092	0.017***
Goat intensity	0.004	0.006	0.019	0.006***	0.031	0.005***	0.066	0.008***
Access to city	−0.001	0.001*	−0.003	0.001***	0.000	0.000	−0.002	0.000***
Male ratio	−0.298	0.046***	0.051	0.050	−0.101	0.037*	−0.038	0.050***
Illiteracy rate	0.056	0.016***	0.036	0.018**	0.054	0.014***	0.173	0.021***
Agglomeration rate	−0.003	0.008	0.021	0.009**	0.027	0.006***	0.044	0.009***
Ruggedness	0.003	0.003	0.004	0.003	0.004	0.002	0.010	0.003**
North	−0.042	0.008***	−0.043	0.008***	−0.009	0.006	0.034	0.008***
South	−0.053	0.006***	0.004	0.006	0.018	0.005***	0.011	0.007***
Island	−0.031	0.007***	−0.023	0.008***	−0.011	0.006	0.022	0.008**
Constant	−0.231	0.042***	−0.832	0.046***	−0.507	0.032***	−0.677	0.052***
Obs	1284		1284		1284		1284	
F	13.53		58.49		48.34		29.20	
R^2	0.130		0.392		0.348		0.244	

**Significant at 10 percent, * *significant at 5 percent, and * * *significant at 1 percent*

Discussion

During the interwar years, mountains began to divide between shrinking and growing regions. These contrasting trends launched a polarization process that would characterize the following decades and that continues until today (Gløersen, 2012). The upward depopulation trends in the European mountains are triggered by structural processes of modernization and urbanization that have been amplified by specific political and economic events (Delgado Viñas, 2019). One of these is the special goat tax, which exemplifies how environmental regulation enhances population loss by spurring outmigration.

The special goat tax produced the expected environmental impact, scilicet the increase of woodland and the collapse of goat farming. The effectiveness of the policy was due to the implementation of centralized and militarized corps such as the Milizia Nazionale Forestale, who have displaced the local authorities (Corti, 2006).

On the other hand, the paper provides some evidences on the relationships between goat tax and mountain depopulation in Italy. Data shows that the goat breeding has been collapsing since the 1930s, after anti-goat regulation. The specialization in goat

Table 13 OLS regression results for population changes, 1931–1936 and 1936–1951, specification (3) adding further control variables

Dependent variable	Population changes 1931–1936		Population changes 1936–1951	
Variable	Coef	Std. Err	Coef	Std. Err
Population density	0.002	0.002	0.004	0.003
Altitude	0.018	0.014	0.078	0.019***
Squared altitude	−0.002	0.001	−0.010	0.002***
President on resident population	0.472	0.026***	0.412	0.050***
Goat share	−0.054	0.020***	−0.056	0.027**
Goat intensity	−0.004	0.001***	0.062	0.012***
Access to city	0.000	0.001	−0.003	0.001***
Male ratio	−0.108	0.062*	0.075	0.080
Illiteracy rate	0.056	0.023**	0.276	0.033***
Agglomeration rate	0.025	0.010**	0.015	0.014
Ruggedness	0.005	0.004	0.008	0.005
North	−0.007	0.009	0.060	0.014***
South	0.021	0.008***	0.009	0.011
Island	−0.005	0.010	−0.016	0.014
Goat change	0.037	0.009***		
Constant	−0.500	0.053***	−0.500	0.083***
Activity rate			−0.087	0.062
Agriculture rate			−0.344	0.049***
Artisans rate			−0.239	0.177
Consumption			0.000	0.000***
Obs	1268		1283	
F	35.61		38.03	
R^2	0.353		0.351	

**Significant at 10 percent, * *significant at 5 percent, and * * *significant at 1 percent*

breeding has become a driver of depopulation only since the 1931–1936 years, that is after the introduction of the special goat tax in 1927. Such tax achieved some ecological results, but it simultaneously negatively hit the main source of livelihood in more marginal municipalities, where goat represented a larger share of livestock; there was no alternative to goat grazing but emigration, while other contexts could adapt by exploiting other resources. This regulation therefore addressed the relations between environment, population and food in marginal areas, poorly endowed in natural resources. The deterioration of living standard causes permanent outmigration and the beginning of a depopulation process difficult to reverse. On the qualitative side, the INEA Survey also evidences that the goat tax results in a steep fall of goat livestock and affects the livelihood of the poorest villages, where the goat was an irreplaceable source of income and food. The goat tax thus promotes emigration and depopulation, as highlighted in the empirical analysis.

The integration of qualitative and quantitative analyses allows a better understanding of the impact of the anti-goat policy on demographic trend. Of course, I am aware that Eq. (3) cannot provide a comprehensive description of the population dynamics. In several cases, idiosyncratic factors seem to dominate, as underlined by a rather low R^2 in some estimates, especially for the periods characterized by the world wars. A quite low R^2 is typical of historical models and constrained to a limited set of variables. Population trends are probably influenced by some omitted variables, as I have verified by adding some controls to the model for the period 1936–1951. The inclusion of some variables on economic structure significantly increases the explanatory power of the model, but these elements were not available at the municipal level before 1936.

In this paper, the detailed look at the INEA Survey integrates and enhances the quantitative analysis, contributing to clarifying casual connections not empirically provable because of data shortage. For instance, the survey highlights the negative impact of the goat tax on the deterioration of living standards, for which there are no reliable statistics. The survey highlighted that the anti-goat regulation worked especially to the detriment of the poorest mountain communities already suffering from the fall in prices of livestock products due to the Great Depression. Unsurprisingly, the municipalities with the highest taxes gave the highest percentage to depopulation (Gaspari, 2019, 163). A key point concerns the size and range of the livestock. Through a cluster analysis, I distinguish goat specialized municipalities, where the goat is the main means of livelihood, and goat intensity municipalities, where the sizeable goat heads are part of a more varied livestock. A sudden and burdensome charge, such as the goat tax, strongly affects the economic viability of municipalities that are highly dependent on local resources and whose inhabitants do not have other choices than farming or migrating. Specialization in a farming type reduces the resilience of the community, particularly vulnerable to exogenous shocks such as a policy that penalizes the prominent grazing system. Despite the fact that it included some of the poorest and most marginal mountain municipalities, the intensity goat cluster has suffered less the 1927 tax. Local farmers possessed many goats but also other livestock species, especially sheep. They have coped with the special tax by encouraging different grazing, which enable their stay in the homeland. The trade-off between environment and economy is sharper where an ecological regulation undermines the livelihood of the population. In such contexts, people hardly notice the benefits prompted by the ecological protection or a new economic system hinged on more profitable cattle livestock (INEA, VIII, 1938) or tourism (Lorah & Southwick, 2003).

In the interwar years, goats gained symbolic significance in the dispute on the extraction and exploitation of local resources. Goats embodied both self-consumption and common use of lands, whereas the forestry policy favoured the extensions of woods, to be exploited privately and exclusively. Goat tax selectively affected a type of breeding, exacerbating the marginalization of remote, high-altitude municipalities, which can draw on few resources, aside from the goat. The excessive burdening upon the poorest households increased the still large inequality. By depriving many peasants of their main (sometimes the only) source of livelihood (King, 1988), anti-goat rules undermined food capacity and deteriorated the diet quality in the highlands, especially among the most vulnerable groups (Corti, 2006). This discouraged

people from living in remote, unproductive lands, where the few available resources are unusable and often blamed. The government policy therefore provided a moral justification to out-migrate and fed a "culture of depopulation" difficult to reverse (Bryant et al., 2011) and functional to the advantage of powerful lobbies.

The demographic and social effects of the goat tax were overlooked by policies aimed to a rationalization often based on aseptic technical criteria, conceived by eminent figures such as Serpieri, Valenti, Giusti and Gini. Agricultural productivity could have been increased by the battle of wheat and selected breeds; total land reclamation would have solved the problems of malarial or landslide areas; demographic policies would have allocated workforce in deficient places, and even the Italian race could have been improved through eugenics. In this way, the forestry policy would have truly halted the degradation of the forests and promoted the transition to more productive agricultures and livestock.

However, the Fascist policy-makers neglect the distinctive features of the Mediterranean mountain that are a strongly anthropized context endowed with peculiar organizational structures, in both land tenure and access. The mountain grazing system is historically based on common lands (Galán et al., 2022), which allow to optimize land use through adequate forms of exploitation. Collective properties play both a significant ecological function and a key role in securing additional resources for small farmers vulnerable to adverse weather or economic fluctuations (Galán et al., 2022).

Collective property is usually considered a resource against poverty (Vitte, 1995, 201), as well as the goat. Both of them were, not accidentally, the target of a forest policy that, under the guise of environment protection, set implicit economic and social goals. The goat tax aimed at weakening common lands, where such animals grazed. The 1927 rule is therefore a crucial step in the long-standing debate between preserving the rights of the local population or making the lands more profitable.

The tax is therefore an excellent example of top-down, socially and spatially blinded, unfair rule because it has mainly affected poorer, resource-dependent and vulnerable municipalities. The goat tax has exacerbated the marginality of these places and started a population drop which has fed a vicious cycle of economic decline and the rise of a culture of depopulation. Land use constraints triggered a loss of wealth, political power and control over the local resources, undermined common property institutions (Adger, 2000) and heightened mountain depopulation (Vecchio et al., 2002).

Conclusion

The research shows the direct link between the reduction in the number of goats reared in the mountains and depopulation, especially following the tax issued in 1927. The results provide some insights on the pernicious impacts of an environmental regulation indifferent to local specificities. The goat tax is a good example of socially and spatially blinded policy, which particularly burden on several communities, more constrained in the choice of resources. This stylized fact has already mentioned in the historical literature, but essentially according to qualitative analyses

and detailed investigation of local case studies. Conversely, the paper proposes a quantitative exploration on a large number of municipalities, over a long period of time. This approach is in line with the current literature, which demands more comparative studies of human–environment processes over a long period of time (Weber & Sciubba, 2019).

In addition, the paper provides new methodological insight into this research field. Most studies on rural settings swing between quantitative investigation at the national level and qualitative case studies at the local level (Milbourne, 2007). The adoption of a multidisciplinary perspective could be helpful in framing the empirical results better, through the interplay of quantitative methods and coeval qualitative survey which prove information unavailable in the statistical sources.

The forestry policy implemented during the Fascist Period clearly showed merits and limits of a regulation that has proven to be as successful in the environmental protection as unethical and harmful to local settlements. This strategy neglected the rights, needs and priorities of the people who made use of the local natural resources. The Italian woods and pastures have gone from excessive exploitation to the substantial interdiction of anthropic activities with the consequence that many mountain lands have lost their productive function to the detriment of the local economy. A major flaw of the goat tax was to ignore the specific characters of the highlands, which deserve a tailored strategy. Since the late Middle Ages, policymakers have argued that marginal lands need special provisions, such as the "freedom of clearing" at the root of collective properties. Arrigo Serpieri warned in 1931 that "we must above all beware of bringing here—in this substantially different world [Ndr. *the mountain*]—the same criteria that can be valid elsewhere. What elsewhere is progress, here can be regression" (in Ciuffetti, 2019, 263). The great heterogeneity of the highlands supports place-sensitive policies aimed to spread development in the largest number of areas (Iammarino et al., 2019). These strategies are place and people-oriented because they consider both environmental and human needs (Jim et al., 2010). The demographic impact of the special goat tax shows the dangers of short-sighted environmental policies that amplify existing imbalances (Quaranta et al., 2020) by putting uneven burden over the poorest groups and the marginal settlements (Hutter, 2017; Marino & Ribot, 2012). The land constraints undermine livelihood in some municipalities and generate a sort of fatalistic resignation, which frustrate people's wish to remain.

In the "Empirical analysis" section, I draw an analogy between goat tax and the carbon tax at the centre of current debate. In both cases, the legislator faces a pressing problem (global warming today and forest degradation in the 1930s) trying to limit a harmful practice, such as the circulation of polluting vehicles or goat grazing. However, these practices are widespread above all among the poorest strata of the population, who are therefore penalized by the law. The environmental protection thus widened the already large social gaps, deteriorated the standard of living of the poorest communities and favoured the depopulation of the mountains. But while Fascist regime had the power to provide an authoritarian implementation of its policies, the democratic countries must face a social dissent that risk of undermining the rule and democracy itself. Today, the tax on polluting vehicles stimulates mass protests (as in the case of the Yellow Vests), prohibited under the Fascist regime, where emigration

was the only possible form of dissent. In the 1930s, mountain population felt more and more neglected and "left behind" but, unlike today, shame prevailed over the anger, and it led to massive outmigration.

Basically, the goat tax addresses a still controversial issue: should the policy save the environment from people or rather save it through the people? (Armiero, 2011). The analysis of goat tax could provide a lesson to policy makers to plan pragmatic and organic policy aimed to reach environmental, social and economic sustainability. The main limit of the anti-goat policy was the sectorality, inherent in considering forest and pasture as alternative land uses. This approach is not adequate to the mountain environments, where often woods and pastures were complementary (Bonan & Biasillo, 2019). Mountain settings need a holistic strategy of sustainable development, able to combine environmental protection with better living conditions. This approach should involve new and sustainable ways to use those lands (fields, pastures, woods) marginalized by intensive farming (Zanon, 2018). Extensive grazing is a key element of this strategy (Quaranta et al., 2020) because of its valuable roles on biodiversity protection, cultural identity and ecosystem services (Galán et al., 2022). In this perspective, even goat farming may represent a proper support for the highlands.

Recently, some governments have adopted a policy bundling approach in order to holistically face several intertwined environmental, social, economic and demographic questions. This comprehensive approach pervades the Green New Deal and the European recovery packages after the COVID-19 crisis. The National Recovery and Resilience Plan combines environmental, social and economic reforms towards a decarbonized society (Bergquist et al., 2020).

It is time to be aware that a greener society is not necessarily a fairer one and that environmental protection goes hand in hand with social justice in planning effective, long-run sustainable development.

Funding Open access funding provided by Università Politecnica delle Marche within the CRUI-CARE Agreement.

Data availability All of the data used for the paper are publicly available using the information provided in the text, references and footnotes.

Declarations

Conflict of interest The author declares no conflict of interests.

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