



GALICIAN WILD PONIES. SOCIO-ECONOMIC CONTEXT AND ENVIRONMENTAL BENEFITS.

**GALICIA AREA REPORT AND CASE STUDY FOR GRAZELIFE
(LIFE18 PRE NL 002)**

Fagúndez, Jaime; Lagos, Laura; Cortés-Vázquez, José Antonio; Canastra, Flávia.



UNIVERSIDADE DA CORUÑA

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SUMMARY

The University of A Coruña is partner of the GRAZELIFE LIFE preparatory project (LIFE 18 PRE/NL002). We contributed to the main aim of the project of promoting sustainable grazing by large herbivores, with the study of the particular case of Galician wild ponies as a natural grazing semi-wild land use model, and alternative land uses of short and long-term afforestation, extensive grazing and abandonment.

We selected two sub-areas in Galicia representing different situations in dominant land uses and the wild ponies' system. Xistral, in the north, is a protected Natura 2000 site covered by wet heaths and bogs, ponies are owned by commoners that are mainly cattle farmers. Groba, in the south, is a drier area with dominance of forestry use and high frequency of wildfires, where ponies are owned by non-professional farmers.

We performed twenty personal semi-structured interviews with pony owners, land owners and related experts from different sectors (afforestation, tourism, conservation NGOs), and performed two focus groups. We discussed topics such as their relation with ponies, the challenges they face, their demands and feelings on the policies, including CAP subsidies or compensations for wolf attacks, and their expectations for the future.

In the field, we selected representative stands of each land use model in each sub-area and performed a systematic record of plant species, measures of plant biomass, and collected soil samples. Measures were used as proxies of biodiversity changes, carbon storage and wildfire risk, to compare between the selected models.

Main results from interviews and meetings

Emotional attachment and tradition are two of the main reasons for pony ownership in Galicia. In Groba, in particular, it is also a crucial part of the local collective identity, where the tradition of the yearly drift of the ponies is a community festivity. Although direct economic incentives are almost inexistent, the ecosystem services provided by ponies create important indirect economic incentives that also encourage pony ownership. Ponies graze on heath and gorse, maintaining an open landscape. They live in a semi-wild state, requiring little care and attention by owners. Without pony grazing, wildfire risk regulations would force landowners to pay regularly to clear fields by mechanical means. This is a key issue in Groba, where wildfires are a major threat and large amounts of funding are used for vegetation clearing. In Xistral, pony grazing also indirectly benefits farmers because it improves pastures for cattle and increases CAP funding, which is essential to extensive farming in the area.

Attachment to wild ponies has been transmitted by family members generation after generation, and today is overall seriously jeopardised by depopulation and deagrarianisation. In Xistral, wolf predation is also perceived as a main threat.

Key challenges are directly linked to land abandonment and competition with forestry plantations with eucalyptus in non-regulated common lands. In Groba, competition between ponies and eucalyptus forestry constrains the available rangeland area. Yet, sparse pine forestry and ponies are perceived as compatible in both Xistral and Groba, because pine stands provide cover against harsh weather.

Administrative requirements such as microchipping, mandatory since 2008, is yet an additional burden to owners in both in Groba (administrative) and Xistral (economic). The responsibilities derived from the risk of eventual traffic accidents and problems with insurance are also identified as a main threat, mainly in Groba.

CAP application is detrimental for ponies because heathlands grazed by wild ponies are not fully considered permanent pastures, while ponies score as cattle but are not eligible for direct payments.

Main results from field work

We found a consistent gradient of higher species richness and diversity in the natural grazing semi-wild model, represented by open heathland, followed by long-term afforestation (pine plantations) and lower at short-term afforestation (eucalyptus plantations). Improved grasslands, representing an extensive grazing model, had the lowest values in Xistral. Abandonment also implies a depletion of plant diversity and an increase in wildfire risk. In Xistral, *Erica mackayana* wet heaths held a high species diversity and a large number of species with interest for conservation, in line with the scientific literature.

Soil organic matter was higher in natural grazing semi-wild stands in Xistral compared to other models, but within plot variation was high. In Groba, short-term afforestation showed the lowest values. Above ground woody plant biomass of pine trees in Groba approximately doubles the shrub biomass of the dry heathland, and the eucalyptus short term afforestation stand had the lowest values. In Xistral, shrubs of the grazing semi-wild and pine trees of afforestation had similar values, higher than eucalyptus. Overall carbon storage is higher in grazing semi-wild and long-term afforestation, and lower at short-term afforestation and extensive grazing in Xistral.

Considering vegetation structure, maximum height and species composition, we found extensive grazing as the lowest model for wildfire risk followed by grazing semi-wild and long-term afforestation. Abandonment, followed by eucalyptus plantations, has the higher risk as it has a high density and height of flammable species like gorse, especially in Groba.

Final conclusions

The grazing semi-wild model represented by the open landscape continuously grazed by wild ponies in Galicia is a sustainable grazing system with high rates of ecosystem services and a strong cultural connection with rural communities. For supporting this valuable system, policies should focus on the main demands of the owners considering specific conditions for CAP measures, easing bureaucracy, and limiting transformation to less sustainable land uses like eucalyptus afforestation. With this aim, we propose that the areas with traditional management of ponies should have specific conditions related to microchipping, CAP subsidies, payment for wolf attacks and conditioning forestry use. These measures should target conservation of the existing populations of wild ponies in the Galician mountains and associated goods and services.

1. INTRODUCTION

1.1. Wilds of the North West

Far from heavily intensified agriculture landscapes of northern and central Europe, Galicia, the north west corner of the Iberian Peninsula, remains a rural region with a large population percentage still related to non-industrial forms of farming in small properties (Figure 1). Yet rural landscapes, hitherto mostly agrarian, are rapidly changing, in a slow but continuous process of depopulation and land abandonment. This is particularly acute on the mountain areas of inland Galicia. For example, since the nineteen fifties the provinces of Lugo and Ourense, which represents over two thirds of the area of Galicia, have lost nearly 30% of the population and today holds less population than in the nineteenth century.



Figure 1 – Above: General view of Serra do Xistral. Below: Serra da Groba.

One of the consequences is that the territory of Galicia is now turning wild. The term “wild” has brought some discussion to the European conservation arena, but here it means a general abandonment of agricultural and pastoral activities promoting regeneration of natural vegetation like dense scrub. This form of “rewilding” by land abandonment combines with the exponential growth of the forestry sector, particularly eucalyptus plantations (Figure 2). This process represents a major challenge for the region, that has raised much concern from environmental and socio-economic perspectives.



Figure 2 – Left: *Eucalyptus nitens* plantations, Xistral. Right: *Eucalyptus globulus* plantations, Groba.

1.2. The beasts stand alone

The case of the so-called Galician “wild” ponies is paradigmatic of the abovementioned phenomenon. Once a widespread form of land use that included free-roaming ponies in the open, mountain landscapes, is now fading away. Ponies are still drifted yearly for catching the foals and cut the manes. Foals are today a meat source. Not long ago they were kept for riding and the mane of the sheared mares used for making up mattresses. The relation between the owners (besteiros) and the ponies represent an archetype of the ancient Europeans connection with nature, carved into stone and cave paintings. Some pony populations are still present in part of the Atlantic Europe (Ireland, Wales, or England). The largest population of wild ponies resides in Galicia and North Portugal, where the relevance of the drift (*curro*) is still an important event for the community (Figure 3). However, most of the other uses have been lost and ponies contribute little or even nothing to the household economies of besteiros, which together with the general abandonment of rural areas, threatens its survival.



Figure 3 – Above: Wild pony in Xistral. Below: *Besteiros* in the *curro*, Groba.

1.3. Heathlands on the heartlands

Natural open spaces are not that frequent on the Atlantic European region, the land generally covered by natural deciduous forests or tree plantations of different species. Openness relates to rangelands of large herbivores or other management activities such as burning or mowing. Heathlands are another common feature of the European Atlantic landscapes (Figure 4), also at the brink of disappearance in many countries where a minimum representation is preserved. Efforts on conservation of remaining areas in northern countries contrast with the loss and transformation of this habitat going on in Galicia.



Figure 4 – Above: *Erica umbellata* dry heathland, Groba. Below: *Erica mackayana* wet heathland, Xistral.

1.4. Goods from the mountain

Heathlands and other related open habitats provide important services and contribute to a heterogeneous landscape. This habitat is home to a range of plants and animals, many of them have become rare or extinct in large areas of Europe. Amphibians, butterflies, reptiles or certain mosses are among the most affected by fragmentation or reduction of heathland patches. Biodiversity, understood as the number, rarity and distribution of biological entities is, in general terms, positively influenced by the maintenance of these habitats.



Figure 5 – Nothorn wheatear (*Oenanthe oenanthe*) in the heathland, Xistral.



Figure 6 – A field with *Narcissus bulbocodium*, a species listed in the annex V of Habitats Directive.

Other goods or services are provided by the mountain heaths, such as being the keeper of a hidden treasure. Underneath, a highly organic soil preserves tons of organic carbon. Avoiding carbon release to the atmosphere guarantees a neutral effect on global warming, as long as carbon storage is maintained at similar rates. Finally, the issue of wildfires is related to the conditions of the biomass, the risk of ignition and the flammability of the different species.

1.5. The GRAZELIFE project and UDC contribution

Large herbivores leave a clear mark on the landscape. Only recently we are beginning to understand the profound impact they leave on their surroundings, and how the ecosystem depends on their performance. This is the leitmotiv of GRAZELIFE, a collaborative project ran by Rewilding Europe and other partners and funded by the EU through the LIFE Preparatory Projects call. In the project, the peculiarities of eight different European areas with large herbivores in wild or semi-wild conditions were studied through discussion with relevant stakeholders and data gathering in the field. Alternative models of land use were compared to the traditional one that may include wild or semi-wild herbivores, to evaluate the impact of land use model changes in the environmental and socio-economic dimensions.

The University of A Coruña (Galicia, Spain) participated in the partnership contributing with our own case study, which focused on the role played by the Galician wild ponies and their cultural and environmental importance. During these two years, we have worked with pony owners and other stakeholders from sectors such as forestry, farming, and veterinary. We selected two different areas (Groba in the South, and Xistral in the North), and conducted personal interviews and focus groups at each of them. In addition, we conducted fieldwork in these areas, performed measures, gathered samples and analysed field data. This study provides a limited, but qualitatively representative picture of the complex and diverse cultural and ecological systems in Galicia where ponies play their role. In what follows, we present the key outcomes and main conclusions of our work on the Galician study area within the GRAZELIFE project. Our aim is to provide an insight into the captivating life of Galician ponies, and the admirable work of those who own and care for them.

2. METHODS

2.1. Study Area

Galicia is located in the north west of Spain, amid the Atlantic and Mediterranean biogeographic regions (Figure 7). The primary sector is very relevant in the region, including farming and livestock. Forestry use has been relevant since the afforestation politics started in the past century. Afforested land is mainly dedicated to pine and eucalyptus. Wild ponies managed traditionally occur in the western and northern areas of Galicia, with an estimated census of 22,000 ponies in the 1970s which has probably dropped to about a half in fifty years. Wolf is the main predator of ponies and is only absent in the southwest.

We performed our analysis in two different areas of Galicia, which are representative of the diversity of vegetation and climate conditions of the region, as well as of management practices applied to wild ponies (Table 1).

Serra do Xistral (hereafter Xistral) is a mountain range with heights between 600-1000 m. The climate is very wet, with 1124 mm of rain and absence of summer droughts. The height of the mountains, and the frequent fog and rain coming from the Cantabrian sea, has raised the existence of a good representation of Atlantic Wet Heaths (Habitats Directive code 4020*), Raised Bogs (7110*) and Blanket Bogs (7130*), and thus it was designated as a Natura 2000 site. The study area was located in the south of the mountain range where around 600 ponies roam free in several Communal Lands (3800 ha) that usually have a perimetral fence. Communal lands are mainly dedicated to cattle farming in combination with wild ponies which improve pastures for cattle. The hunting data for wild herbivores in this area show the main game species are wild boars (*Sus scrofa*), roe deer (*Capreolus capreolus*) and very few red deer (*Cervus elaphus*) (Table 1). Afforestation with pine (*P. sylvestris*) in the 1960s-70s has not changed the farming vocation of the land. More recently some areas around the common land and outside the Natura 2000 site are being afforested with eucalyptus (*Eucalyptus nitens*) (Figure 2). In addition, there are some improved pastures dedicated to cattle farming.

Serra da Groba (hereafter Groba) is a mountain range (50-650 m) near the ocean and the largely populated area of the city of Vigo. The climate is oceanic but with a

strong Mediterranean influence, high rainfall (1446 mm) and temperatures and a moderate summer drought. Heathlands alternates with afforested land, mainly dedicated to pines (*Pinus pinaster*, *P. radiata*) and eucalyptus (*Eucalyptus globulus*), in the landscape. This mountain range extends for about 10000 ha where a population of about 1100 ponies roam free on several non-fenced common lands. Ponies roam free in the heathlands of Serra da Groba, while cattle is more scarce. As for wild herbivores, hunting data of the area show that only wild boars are hunted (Table 1). Several severe wildfires have affected the area during the course of the last 20 years.

Table 1 – Characteristics of the two study areas. Data about wild ungulates refer to the average number of hunted individuals per 100 ha per year in the last 10 years.

	GROBA	XISTRAL
Climate	Atlantic, with strong Mediterranean influence Temperatures: annual mean = 12.5°C, summer mean = 17.9°C	Atlantic (hyper)oceanic Frequent fogs Temperatures: annual mean = 9.7°C, summer mean = 14.5°C
Vegetation (Habitats)	Community interest habitat: dry heathlands (4030)	Priority habitats: wet heathlands (4020*) and bogs (7110* and 7130*) Natura 2000 SAC Serra do Xistral
Main uses of common lands	Forestry	Cattle farming
Main social issues	Forest fires – pony relevant for shrub biomass control Great social and cultural relevance of pony drifts (<i>curros</i>)	Habitat conservation – pony grazing relevant for habitats' conservation High relevance of cattle farming means pony grazing help in shrub pastures maintenance Wolf predation on ponies
Wild ponies densities	0.11 ponies/ha	0.16 ponies/ha
Cattle densities	0.05 cows/ha	0.54 cows/ha in heathlands 1.82 cows/ha in improved pastures
Wild ungulates densities	Roe deer present 0.27 wild boar/100 ha	Red deer present 0.36 roe deer/100 ha 0.50 wild boar/100 ha

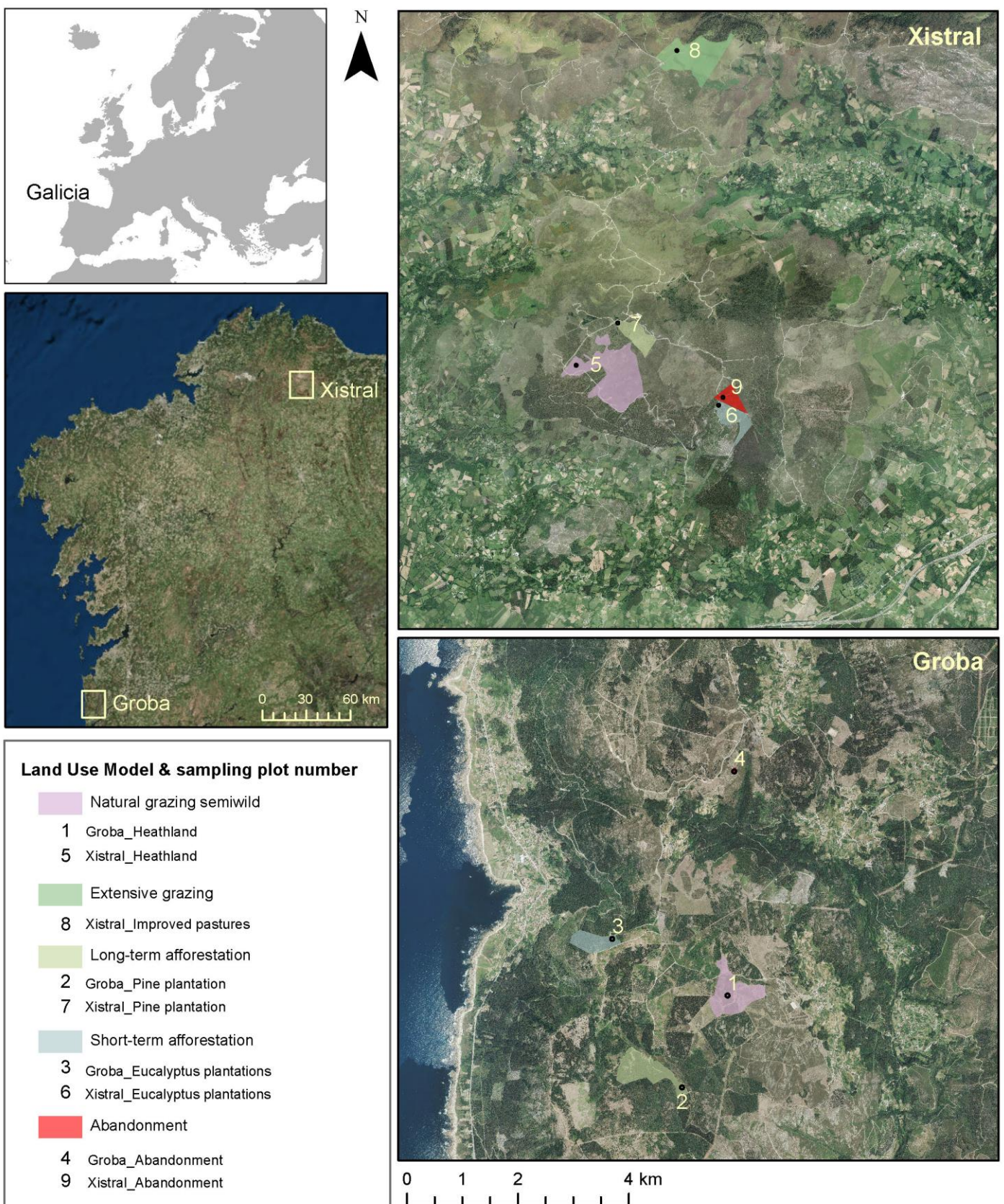


Figure 7 – Location of Galicia with the two study areas and the distribution of plots with different land use models.

2.2. Interviews

One of the main tasks in the project was to interview people involved in the activities of ponies' management and other related activities. We conducted a total of 13 semi-structured interviews with 20 different people in both Groba and Xistral. We talked to pony owners, landowners, experts in different fields and NGO representatives (Figure 8). On average we talked for an hour and a half in each interview, ending up with 1291 minutes recorded.

We used a qualitative interview guide for the first part of the interviews to gather information on their relationship with ponies, and their perception on different issues of land ownership, environmental services, history and tradition, and variegated incentives.

The interview guide was divided in seven main topics (context, land management, challenges, ecosystem services, socio-cultural aspects, tourism, economy) and several subtopics. Interviews were conducted following the standards of exploratory and descriptive qualitative research, adjusting questions to a spontaneous conversation in order to avoid interferences from the researchers. We then used a structured questionnaire for the second part of the interviews, divided into further seven topics (food production, timber/wood production, risk of wildfire mitigation, use of chemicals, animal welfare, abundance of plant and animal species, ecosystem services) to collect more precise data on specific issues for systematic comparison with other case studies.

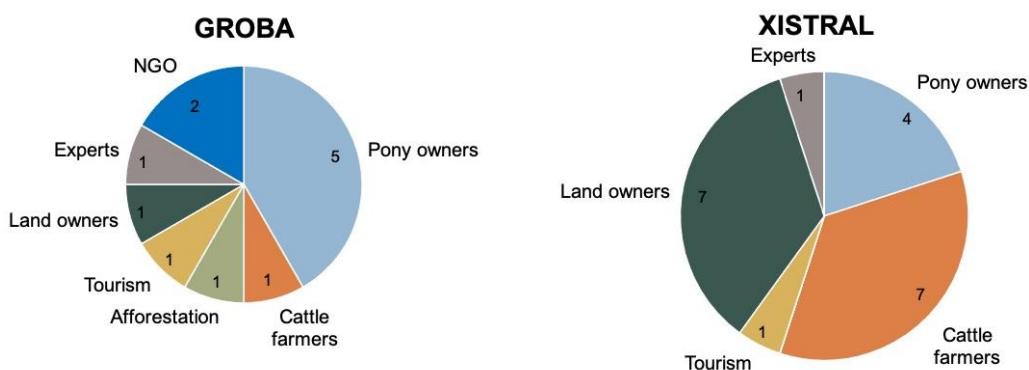


Figure 8 – Number and type of individual that were interviewed. Note: In Groba, the person related with tourism also represent an NGO for the conservation of ponies and the cattle farmer is a pony owner as well. In Xistral, the four pony owners are also cattle farmers and the seven landowners are cattle farmers as well.

The interviews began with an explanation of the aims of the Project GRAZELIFE and how the data would be used (including anonymity), and the signing of a prior-informed consent form. Interviews were audio-recorded and conducted in the native languages of the interviewees (Galician or Spanish). They were transcribed verbatim and coded following two set of codes: pre-defined codes drawing on the main objectives of the GRAZELIFE project, and emergent codes drawing on stakeholders' discourses (Table 2). We used these codes to conduct content analysis and

narrative configuration analysis. From this, we identified the issues of most concern for the interviewees in each area. Narrative configuration analysis was used to describe the subjective experiences of human-pony relationship, the socio-economic context of each stakeholder, and the main forces that constrain land uses

Table 2 – Code book used for interview analysis.

GROUPS OF CODES (pre-defined)	CODES (pre-defined and emergent)
Incentives	Past and present uses, tradition Cultural-emotional- identity factor Economic profitability Land management
Ecosystem services	Wildfires Biodiversity Landscape Cultural
Management	The <i>curro</i> Parasites Feeding Pony handling Control Death
Challenges	Bureaucratic burden (included subsidies and identification) Wolf predation Interactions with forestry Interaction with cattle Interaction with hunting Interaction with tourism Insurance Roads and crops entrance Pony grazing and CAP Generational replacement/depopulation Breed control (<i>Pura Raza</i>) Limitations Natura 2000 Diseases
Context	Economy Population History Land size, ownership structure Land closures



Figure 9 – Different moments during the interviews. When possible, interviews were done on the mountains or on the farms of the cattle breeders, visiting the area or the farm, to better contextualize the answers.

2.3. Stakeholders Meetings

Two focus groups were held with stakeholders, one in each area (Groba and Xistral) in October and November 2019. The aim of these meetings was to present the project and to facilitate the sharing of knowledge between stakeholders and GRAZELIFE project. The focus groups were specifically designed to gain a deeper understanding of social issues around semi-wild pony rearing, and to triangulate and test the robustness of the information gathered from the interviews. Stakeholders were selected among representatives of the different land use models considered during the project (grazing semi-wild by wild ponies, extensive grazing by livestock, afforestation) and with different roles, including different interest in relation with the semi-wild pony system and different views about their negative and positive aspects.

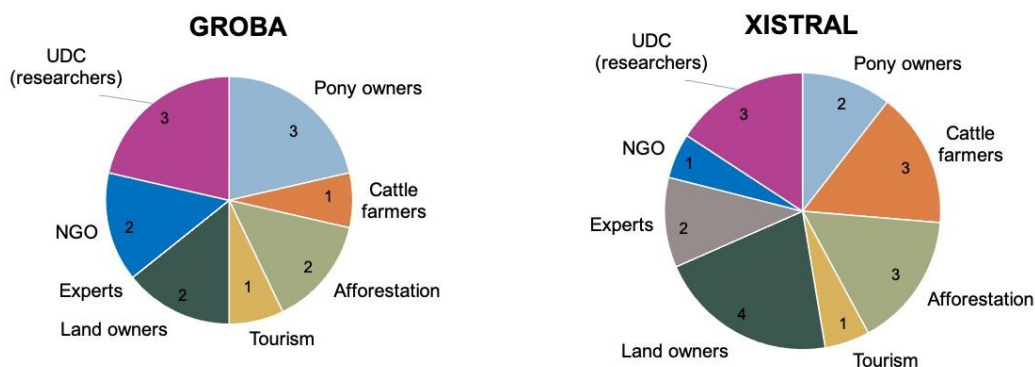


Figure 10 – Number and type of participants per sector in the focus groups. * indicates stakeholders that held different roles. In A Groba, the cattle farmer is also a pony owner; representatives of afforestation are Common Land board members involved in forestry management; and the person related with tourism has recently created a NGO to conserve the ponies. In Xistral, the cattle farmers are also pony owners (2) and commoners (3).

The focus groups included ten people in Groba and 11 in Xistral. Targeted groups included: 1) Land users, including pony owners or representatives of pony owner's organizations, cattle farmers, forestry sector, tourism related companies or organizations; 2) Land owners, mainly members of Common Lands board; 3) Experts; and 4) NGOs. Both focus groups were organised and moderated by three researchers from the UDC (Figure 10). They lasted 155 minutes in Groba and 123 minutes in Xistral.

The meetings began by welcoming the participants, explaining the dynamic of the meeting, signing an informed consent form, and briefly presenting the project GRAZELIFE. The debate was moderated by one of the researchers, adapting the questions in the interview guide to the focus group. Focus groups were recorded and transcribed verbatim. The content was coded using the same code book than with interviews.



Figura 11. Grupos de discusión que se celebraron en Abadín – O Xistral (izquierda) y en Baiona – A Groba (derecha).

2.4. Field Work

Field work was performed in the selected land use models with the aim to describe the ecological characteristics of each model in relation to the three main topics included as main objectives in the GRAZELIFE project: Biodiversity, Carbon Storage and Wildfire Risk. Field work was performed in both areas in July and September 2020 and February 2021.






First, we visited both areas and selected potential fields for setting our sampling plots. We finally decided to sub-divide the afforestation model including long-term and short-term afforestation, which corresponds with pine plantations in the former and eucalyptus plantations for the latter. Extensive grazing was identified in Xistral but not in Groba, abandonment fields were identified but we were unable to perform the survey until 2021 because we needed external assistance to clear our way.

In both sub-areas the reference model of grazing semi-wild is an open stand covered by heath, a dry type dominated by *Erica umbellata* in Groba and a wet heath dominated by *Erica mackayana* in Xistral (Table 3). Abandonment plots were identified in both areas and are represented by previous heathland plots where there has been no herbivory for the last years and are now dominated by gorse (*Ulex* sp.).



Figure 12 – Groba: Above Left: Long-term afforestation plot – *Pinus radiata* plantation. Above right: Short-term afforestation plot – *Eucalyptus globulus* plantation. Below left: Abandonment plot dominated by *Ulex* sp. Below right: Natural Grazing Semi-wild plot – *Erica umbellata* heathland.

Table 3 - Definition of each land use model analyzed in the Galician case study.

	MODEL	CASE STUDY DEFINITION
	<p>Natural grazing semi-wild</p> <p><i>Sampled vegetation stands correspond with heathlands grazed by ponies</i></p>	<ul style="list-style-type: none"> Free roaming horses In large areas (500-10,000 ha) Density = 0.11-0.16 ponies/ha Additional feeding is exceptional, no fertilizers, generalized use of dewormers Social herds, number of stallion is controlled Year round in natural & semi-natural habitats
	<p>Extensive Grazing</p> <p><i>Sampled vegetation stands correspond with improved pastures grazed by cattle</i></p>	<ul style="list-style-type: none"> Extensive grazing by cattle Density = 1.82 cows/ha on improved pastures Feeding in winter with hay and silage harvested in summer Use of fertilizers, and medicines (dewormes, other) 1 sire for a large group, even artificial insemination Animals permanently on the field, alternation among artificial improved pastures and natural/seminatural habitats
	<p>Long-term afforestation</p> <p><i>Sampled vegetation stands correspond with pine plantations</i></p>	<ul style="list-style-type: none"> Forest plantations to create stands with long term rotations (>35 years) Closures to avoid entrance of livestock, ponies and wild herbivores in the first stages of plantation/natural regeneration Mechanical clearings of shrubs, pruning dependent on subsidies can occur
	<p>Short-term afforestation</p> <p><i>Sampled vegetation stands correspond with eucalyptus plantations</i></p>	<ul style="list-style-type: none"> Forest plantations to create stands with short term rotations (12-20 years) Mechanical clearings of shrubs dependent on subsidies can occur on long term afforestation
	<p>Land abandonment</p> <p><i>Sampled vegetation stands correspond with heathlands with no grazing</i></p>	<ul style="list-style-type: none"> Livestock or wild pony use has been abandoned at least for the last 10 years. No mechanical cutting/clearing Low-medium numbers of (wild) herbivores intensively hunted No active measures to increase numbers of herbivores

Short-term afforestation was represented by *Eucalyptus globulus* plantations in Groba, and *E. nitens* in Xistral. Long term afforestation, by *Pinus radiata* in Groba, and *P. sylvestris* in Xistral. Extensive grazing was represented by improved pastures fertilized periodically by farmers and with higher densities of cattle (Figures 12 and 13). Due to local variations they differ to a certain point from the original definition of the GRAZELIFE project. For example, dewormers are not supposed to be used in the grazing semi-wild model, but in Galicia some dewormers are given to ponies. At the same time, in Galicia the number of stallions is controlled while the general grazing semi-wild model considers social herds (sex and ages). Another example is the afforestation model, in which we identified two main types of plantations (long-term and short-term) with different management regimes.



Figure 13 –Xistral. Above left: Natural Grazing semi-wild plot – *Erica mackayana* heathland. Above right: Long-term afforestation plot - *Pinus sylvestris* plantation. Below left: Short-term afforestation plot - *Eucalyptus nitens* plantation. Below middle: Abandonment plot. Below right: Extensive grazing plot – Improved pasture.

We performed our survey in a 25 m radius circle plot, designed for the purpose of this study (Figure 14). The circle included four 4x4 meter sub-plots, where we recorded plant species, estimated their cover and measured their height.

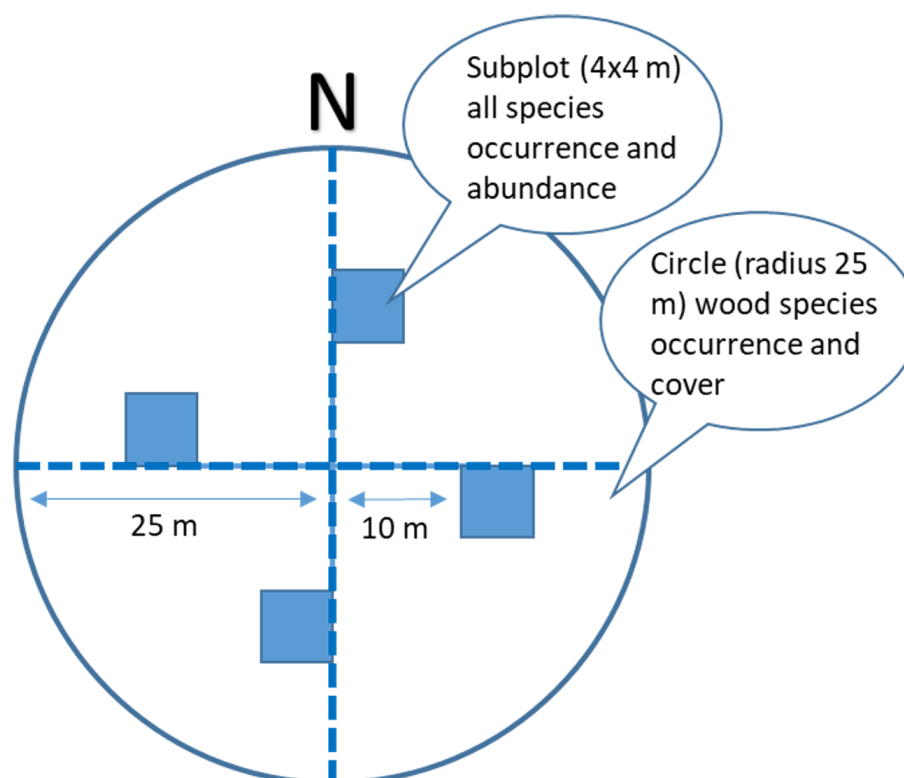


Figure 14 – Case study plot design.

Then, we cut all above ground biomass and divided the sample in gorse, heathers and grasses, and weighed them in the field. A sub-sample was taken to the lab and heated in the oven at 70°C until constant weight to calculate the average weight loss of desiccation. We also sampled soil cores from each sub-plot and calculated the organic matter content following a standard procedure (*Lost On Ignition*; LOI). In the circle, we counted trees and measured their perimeter at breast height and estimated their height. To obtain an overall shrub cover value, we recorded shrub species contact and height in N-S and E-W plot transects.

We quantified carbon storage in trees using density, diameter and height of each species, and applying known rates for biomass and carbon. This ratio is available for the main timber species¹. For shrubs, we used dry biomass of the sub-plots and calculated the equivalence in the area of the circle plot. Our own unpublished data from previous analyses were used to quantify carbon on shrub biomass for each species. For this analysis, carbon storage in herbaceous species was dismissed. For soil carbon storage, we converted soil organic matter using standard conversions. Overall carbon storage for each model was calculated by summing above-ground shrubs and tree and soil carbon storage.

¹ Diéguez-Aranda, U., Rojo-Alboreca, A., Castedo-Dorado, F., Álvarez-González, J.G., Barrio-Anta, M., Crecente-Campo, F., González, J.M., Pérez-Cruzado, C., Rodríguez, R., López-Sánchez, C.J., Balboa-Murias, M.A., Gorgoso, J.J. & Sánchez, F. (2009). Herramientas selvícolas para la gestión forestal sostenible en Galicia. Dirección Xeral de Montes, Consellería do Medio Rural, Xunta de Galicia. Santiago de Compostela.

Ministerio de Medio Ambiente, Rural y Marino (2002). Tercer Inventario Forestal Nacional. Madrid.

Ministerio de Medio Ambiente, Rural y Marino (2011). Cuarto Inventario Forestal Nacional. Madrid.



Figure 15 – The team working during the field work. Above left: Collecting above ground plant biomass. Above right: Cover measures using transects. Below left: Measuring shrub height. Below right: Soil sampling.

3. RESULTS

3.1. Meetings and Interviews

Past and present uses of ponies, a matter of tradition

Wild ponies have been living in a form of semi-wild state in communal lands in Galicia - such as those in Groba and Xistral - for more than the collective memory of the local population can recall. In fact, all our interviewees tell us that their parents, grandparents and great grandparents kept a close relationship with ponies, which were used for the transportation of people and goods and for agricultural work.

“I was born among horses. My great-grandparents already had horses in the mountains. This tradition has been around for many, many years” (Ç01, Çroba)



Besteiros, those who possess ponies, used to own reproductive mares and a few stallions that grazed and roamed free all around the communal land. They required much less care and intervention than regular farm animals like cows, sheep or goats. Foals were sometimes removed from the mares and sold in order to be tamed at home and used as working or carrying animals. A few would be sold for meat consumption, though less often. The rest of the time, ponies would live and graze freely, keeping the mount “clean” (sic) from scrub, a service much valued by commoners and land owners. As such, ponies were traditionally part of the ordinary life of many local inhabitants in rural Galicia - such as Groba and Xistral- and an essential instrument for their livelihood, economy and subsistence.

But ponies were also part of the “extra-ordinary”, since they were the central piece of one of the most significant annual event: the *curros*. Once or twice a year, ponies were gathered from the hills and drifted to enclosed sites. Once there, foals were fire branded to identify their owner. Pony owners would also cut the manes to sell them and, arguably, to get rid of flies and other pests. To achieve this, they would need to catch and hold on to the ponies using ropes or their own arms, depending on the local tradition of each *curro*. The sites for this job would be either a corral (*curro*) on the communal lands (as in Groba) or at the stables of any local neighbor (as in Xistral). In both cases, the complexity of the *curros* would require a group of locals getting together to work collectively, which was an exceptional event in the kind of peasant society that dominated in the past, where most of the work was carried out by members of one single household unit. In Groba, locals would organize big, festive reunions, as they came from all the valleys around the communal land to take part of the *curro*. In the local festivity calendar, it was one of the “big days”: a kind of cornerstone for the local community’s sense of identity. On the contrary, in Xistral, reunions for the *curros* were smaller, more modest and not so festive, involving only a group of relatives and neighbors.

The situation has changed dramatically in the last four decades. Today ponies have lost a lot of their mundane, instrumental features in many areas. They are no longer tamed and used for transportation since cars and trucks popularized in the second half of the 20th century. The same happened when tractors replaced animals in agricultural work. In Groba, and many parts of Galicia, most of the rural population have abandoned the primary sector, migrating, working in a variety of other sectors and/or commuting to nearby cities. In Xistral and other parts of Galicia, farming is still the main economic activity (mostly dairy and beef cattle farming), but small family farms are disappearing, being replaced by modern, industrial scale farms that keep little ties with traditional ways of using local resources (among others, the use of ponies for transport and scrub control). In both areas ponies are no longer a valuable commodity. According to our interviewees, the reasons for this decline may vary from site to site. Besteiros do wish to continue with this activity but depend on a favorable administrative and economic context in which they can do so.

More cultural-emotional incentives than economic profitability

Delving into the current particularities of each area, we found that the tradition of owning ponies is still rather alive among a minority, yet very active and visible group of locals in Groba. Each member of this small group (aprox. 75), of *besteiros*, own from a couple up to over a hundred ponies, which graze freely in the generally unfenced communal lands. Today there are nearly 1100 ponies. *Besteiros* represent around 10% of the communal landowners, and none of them work in the primary sector anymore. Though ponies still provide an important service for communal landowners by clearing the land of gorse (*Ulex* spp.), which reduces wildfire risks, they no longer generate any significant economic profit for *besteiros*. On the contrary, ponies cause them a variety of costs and expenses, as well as worries, troubles and conflicts.

Although the number of *besteiros* keeps shrinking year after year, the relationship with wild ponies is still a crucial part of the local collective identity. In fact, everybody has an emotional attachment with them that originates on childhood memories. People have grown up having horses at home and in the hills, looking for and after them, organizing and taking part in the *curros*. In a way or another, it is part of what and who the locals think they are themselves, whether they think it is a traditional value (positive emotional incentive, dominant among *besteiros*) or backward (negative emotional incentive, widespread among some parts of the local population). For those sharing positive emotional views, “it is like a type of craziness”, as one interviewee puts it [G07]. This is particularly visible during the *curros*, which are organized twice a year: a truly festive event that congregates family, friends and neighbors. Keeping such tradition is one of the main reasons why *besteiros* still look after the ponies.

In Xistral the situation is rather different. There is an estimate of 600 ponies grazing free in the several communal lands comprised in the study area. *Besteiros* still work in the primary sector, they are mostly farmers that breed beef cattle and today represent around 30% of the communal landowners. Small family farms are dominant in the area, though they are in decline as meat and milk prices have not risen in the last two decades. In fact, they mainly rely on CAP subsidies to make their living out of farming.

Ponies are kept in fully or partially fenced communal lands, where they provide a fundamental service by feeding on gorse and keeping the land “clean” and “open” for cattle to access grass. The relationship with wild ponies is also a significant component of the local identity and tradition, although less than in Groba. Only a few *besteiros* organize large communal *curros*, the majority do the pony drifting with a group of relatives or friends. However, ponies are still useful to the dominant primary sector.

“I have beasts because they clean and because there were always beasts in my family. They are out there in the mountain and don't require work... I just want to follow what has always been there” (XO4, Xistral)



Key to land management and with few care needs

Ponies live and graze mainly in communal lands (either fenced or unfenced) that belong and are managed by comuneros (commoners): neighbors of the local villages that have a land-use right just because they live in there. Comuneros associations are responsible for land management and draw benefits from land exploitation, which are used to pay for maintenance and local festivities. The most important source of benefits in Groba commons is the forestry sector. Common lands are planted with eucalyptus and pine trees, for the timber and paper industry, while cattle grazing is marginal (there are only a few part-time farmers). Lands are routinely cleared of shrub and overgrowth vegetation to prevent wildfires.

In Xistral, the use of land for forestry varies depending on the zone (some may have only 30% while others up to 70% of forestry cover), wood is sold in auctions, while cattle grazing is widespread and the cornerstone of many household economies. Keeping common land cleared of plantations and scrub is fundamental not only to feeding their cows, but also to receiving CAP subsidies (agroenvironmental subsidies), which depend on keeping a high “pasture admissibility coefficient” – a coefficient that is inversely proportional to shrub cover. The reasons for this is that, since farmers tend to own more cattle than their private land can feed, they need to include also their share of common lands in their CAP application in order to not exceed the stocking rate necessary for CAP funding. And to do this, these common

lands need to be “eligible” as grazing pastures, *i.e.* relatively free from plantations and scrub.

In both sites ponies are generally well adapted to living in a semi-wild state: they rarely develop diseases, they graze on broadly available plants, they reproduce without veterinary assistance. In fact, they do not demand a great deal of attention and this is one of their main advantages. However, they need certain care work, as *besteiros* explain: a) looking for and after them during winter, when weather conditions are harsher and the animals might struggle to find enough food; and b) cutting the manes, deworming and marking new foals periodically. In Xistral, some commoners drive their ponies from the top of the hills down to the valleys and near their farms to graze on their private fenced pastures, and release them in spring. *Besteiros* in both areas argue that cutting the manes helps the ponies get rid of flies and pests. They also apply dewormers and external insecticides to help ponies get rid of flies and ticks.

Ponies improve the land for cattle grazing and reduce wildfires

All our interviewees agree that pony grazing is a major asset for communal lands. Ponies perform better on grazing on gorse, when compared to other animals like goats, and unlike other animals (cows, sheep). This is particularly important because it impedes the formation of a canopy, keeping the lands “clean” and “accessible”, according to their own criteria of “clean lands” as lands that both people and animals can access and walk through.

In Xistral there seems to be a very well balanced and unproblematic co-existence between ponies, farm animals (mostly cattle) and even some wild herbivores (deer, roe deer). They do not compete for resources as each graze on different species. As previously described, synergies between cattle and pony grazing create important indirect economic benefits for the local population. There also seems to be a perceived balance between ponies and forestry, as pines provide cover and protection for the animals during harsh weather. Conflicts only emerge with wild boars, which dig in pasture lands, impeding cattle grazing.

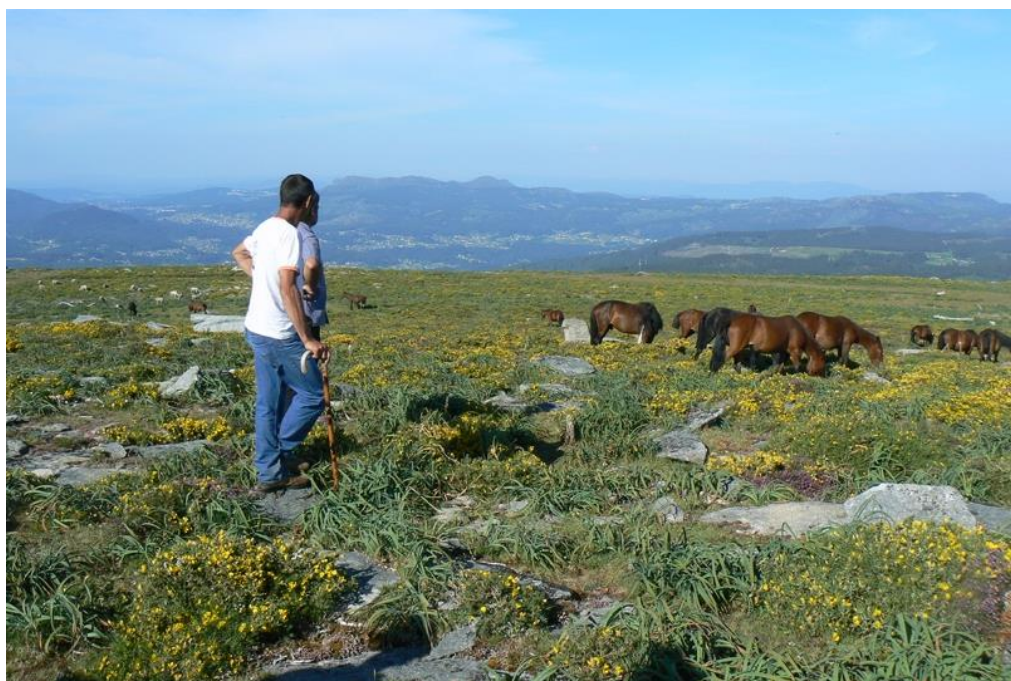
**“Horses eat gorse, better (...). On the heathlands, they clear the heath a lot and then they favour the pasture for the cows”
(XO2, Xistral)**



In Groba, “clean” lands (meaning grazed lands) are perceived as a protection against wildfires. Wildfires is a rather big issue in this part of Galicia, with thousands of hectares burnt every year. The dense forestry exploitation with pyrophytic species such as eucalyptus and pines and the particular warm, sub-Mediterranean climate worsen the threat of large wildfires.

Widespread land abandonment that leads to scrub growth is also seen as a major fire threat. Yet, the widespread consensus is that wildfires almost never happen naturally but are always intentionally caused by humans. Some blame on cattle farmers cleaning the land to create pastures. Others blame on acts of revenge caused by deeply rooted land disputes between neighbors. Most of the locals have vivid memories of past or recent wildfires and their catastrophic ecological effects. Regulations on wildfire prevention force landowners to prevent from vegetation encroachment, which, in the absence of pony grazing, is done by mechanical means – a costly job that could as well be provided by ponies in a cheaper and more environmentally-friendly way (Table 4). In Xistral, wildfires are not an issue and barely anybody remembers when the last fire occurred, though plantations are widespread. If any, they have memories of blanket bog traditional burning.

“The horses in winter, if there are tall shrubs, they get in the middle and eat gorse (...). If there were no horses, it would burn every year” (ÇO1, Groba)



Main challenges for pony owners: wolves, microchip, pressures from forestry sector and CAP

In Xistral, interviewees argue that around 80% of new foals are killed and eaten by wolves; a rate that has increased in recent years (Table 4). They feel unable to stop this. Wolves, vultures and other scavengers together consume the whole carcass leaving very few remains of the kill, difficult to be found and hard to be claim as wolf predation. In addition, they can only claim for the wolf predation on foals from identified mares. Due to the large and remote grazing areas, control is difficult and the majority of wolf damage cannot be claimed or are eventually declined. Indirectly, some assume that because wolves prey on ponies so often, this somehow lessen the chances of suffering attacks on calves. There are no wolves or other pony predators in Groba, but locals keep memories of the times when wolves were still present and hold a negative view of them.

Administrative control for ponies' identification and subsidies create burdens and major challenges in both areas. While traditionally pony identification relied on fire brands, marking ponies with microchips – a technology lately made compulsory by the regional government following the European Regulations – aim to facilitate identification by agents that are external to the local communities, for example in case of a traffic accident. In Groba, taking care of the ponies in their free time leaves besteiros with little time and resources for dealing with the kind of bureaucracy that microchipping involves and is thus seen as yet another constraint for pony owning. Some interviewees argue that it increases costs and

time constrains with practical problems, since the animal needs to be immobilized in order to be identified. Bureaucratic burdens are more easily tolerated in Xistral because *besteiros* are more accustomed to it as full-time farmers. On the contrary, the biggest microchip burdens are conflicts with the calculation of livestock load.

Nowadays, the hegemonic domination of the forestry sector in Groba as the more profitable form of land use is seen as a threat to ponies because it reduces the amount of land available for grazing. There is a consensus around the idea that the forestry sector competes with ponies for land availability. New forms of extracting timber from communal lands imply dense stands with limited space between trees. This impedes the access of ponies and the food available for them. *Besteiros* are particularly adamant about this and consider forestry use, as it is being developed at present, the main ecological threat to the communal lands.

Regarding costs, the only benefit *besteiros* in Groba might extract from ponies are from selling foals for meat. Interviewees univocally agree that by no means meat sales match the costs of pony ownership, but their meat is particularly valued among the local society.

In Xistral, economic constraints are felt differently. They hinge on the role of ponies as allies in land clearance. On one side, ponies help to increase their CAP subsidies by augmenting their Pasture Admissibility Coefficient – and it makes more grass and pastures available for cows. On the other side, ponies and cattle score equally for the livestock load calculation, so ponies may jeopardise their capacity to meet the 1 animal / 2 hectares ratio that make them eligible for agroenvironmental CAP payments. However, ponies are not eligible for direct CAP payments, except those classified as endangered breed (*Cabalo de Pura Raza Galega*²) (Table 4). In view of all this and considering that reducing the number of cattle is not an option for some communities since it would worsen their already precarious economy, there is a possibility that some ponies present today in the Galician mountains are kept unregistered.

² Galician Decree 149/2011. For further information see <https://puraga.es>

Table 4 - SWOT analysis of the semi-wild pony grazing socio-economic system.

<p style="text-align: center;">Strengths</p> <ul style="list-style-type: none"> • Fundamental ecosystem services provided against wildfires • Fundamental socio-ecosystem services provided to enhance pastures and extensive farming • Few care needs, low vulnerability to diseases • Compatible with cattle, synergic relation • Most efficient performer as shrub grazer 	<p style="text-align: center;">Weaknesses</p> <ul style="list-style-type: none"> • Little economic benefits • Low profitability compared to other land uses (forestry) • Not eligible for direct CAP payments (except those of rare breeds) • Count as livestock load for CAP • Difficult control due to its semi-wild state, which may cause problems of traffic accidents
<p style="text-align: center;">Opportunities</p> <ul style="list-style-type: none"> • Compatible with pine plantations • Strong emotional bond and tradition implies that the besteiros do wish to continue with this activity • Strong interest in using ponies to keep lands open and reduce fire risk • Landowners are also ponyowners in Xistral, which reduces conflicts between diverging interest • High cultural and touristic values 	<p style="text-align: center;">Threats</p> <ul style="list-style-type: none"> • Wolf predation (Xistral) • Depopulation (Xistral) and deagrarianization (Xistral and Groba) • Loss of tradition and little transmission to new generations • Forestry policies that favours eucalyptus plantations • Landowners are mostly not ponyowners in Groba, which generates conflicts between diverging interest • Microchipping is compulsory • Expensive and problematic insurance issues

3.2. From the Field

Biodiversity

Plant richness and diversity showed illustrative results with clear differences among models. We recorded a total of 27 vascular plant species in Groba and 43 in Xistral. Numbers ranged from 3 to 22 in the 4x4 m subplots. Recorded trees included the planted species and occasional occurrence of other species. In the shrub layer, ericaceous species (heathers) are dominant, together with gorse (*Ulex* spp.). Grasses are also represented in all plots (Figure 16).

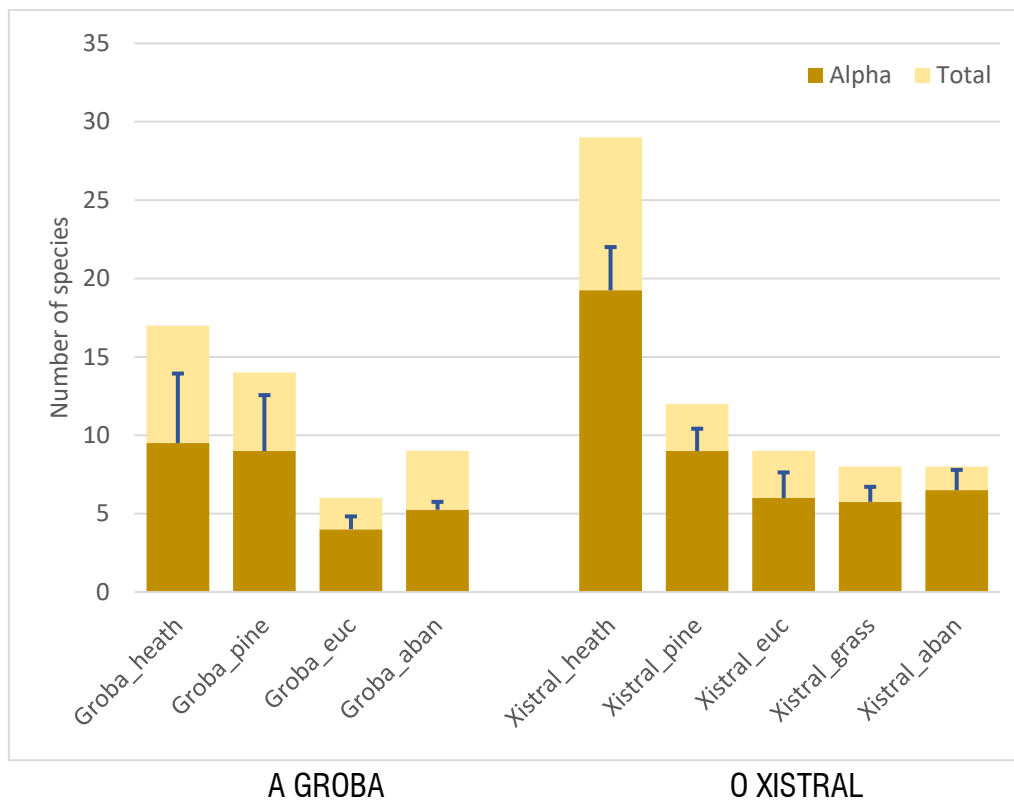


Figure 16 -Total and subplot (alpha) plant species diversity in the land use models of Groba (left) and Xistral (right). Asterisks represent statistically significant differences.

Species-rich wet heath plot in Xistral was dominated by the endemic *Erica mackayana* and *Calluna vulgaris*, other shrub species like *Ulex gallii*, *Erica cinerea* or *Daboecia cantabrica* were less frequent. Herbaceous species included *Molinia caerulea*, *Nardus stricta* and other grasses, sedges like three *Carex* species, and representatives from other eleven plant families. We recorded several rare species, including endemic species (*Euphorbia polygalifolia* subsp. *hirta*, *Carex durieui*), or threatened at European level (*Gentiana pneumonanthe*). The abandoned plot included the main shrub species, but herbaceous ones were nearly absent. The pine plantation of *Pinus sylvestris*, a stand of medium size trees, showed a dense grass cover of *Agrostis capillaris*. Typical grassland species like *Trifolium repens*, and forest species like *Holcus mollis* were also recorded. In turn, in the *Eucalyptus nitens* plantations, *Molinia caerulea* was dominant, with low covers of heathland shrubs, mainly *Ulex gallii*. The improve pasture plot had a limited number of grassland species, in which *Agrostis capillaris* and *Festuca nigrescens* were dominant.

The dry heath of Groba was evenly dominated by *Erica umbellata*, *Calluna vulgaris*, and *Ulex minor*. Two other shrubs, *Ulex europaeus* and *Erica cinerea*, were also present with low cover. Grasses included *Agrostis curtisii*, *Agrostis stolonifera*, *Danthonia decumbens* and *Pseudoarrhenatherum longifolium*. Over half of the species (nine out of 17) were recorded in only one subplot. *Hypericum linariifolium* was the most remarkable species recorded, as it is not frequent in the region. Again, the abandonment plot included the same structural, dominant

species, but herbs were much rare. The *Pinus radiata* plantation had a mixture of ericoid shrubs like *Calluna vulgaris*, *Erica ciliaris* and *E. cinerea*, and grasses like *Agrostis stolonifera* and *Danthonia decumbens*. In turn, eucalyptus plantation was species poor, densely covered by *Pteridium aquilinum*, together with the exotic invasive species *Acacia melanoxylon*.

Carbon Storage

We found high levels of soil organic matter in all models, reaching over 50% in wet heaths of Xistral (Figure 17).

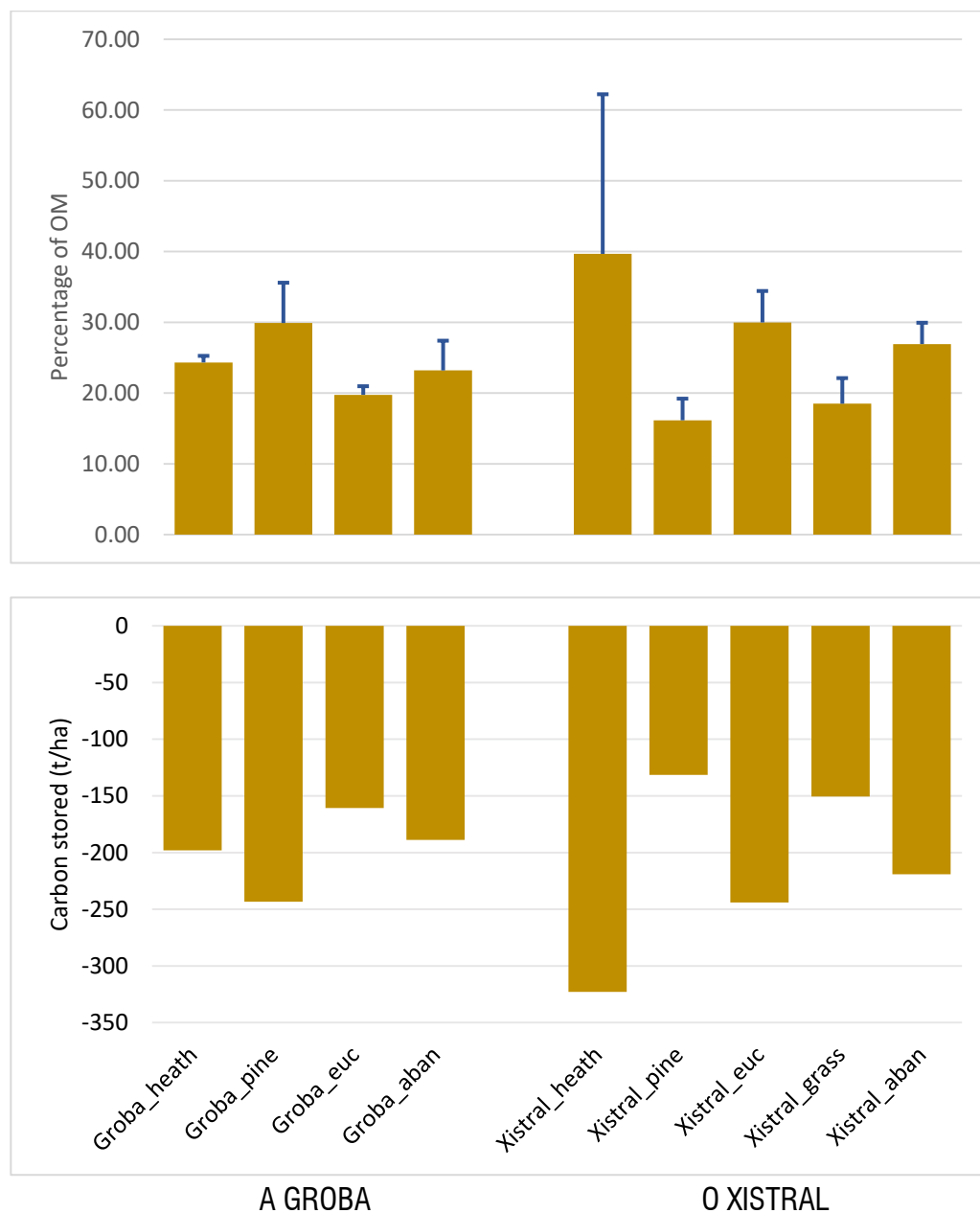


Figure 17. Above: Percentage of soil organic matter in the different models. Below: Soil Organic Carbon (SOC) stored in each model.

However, we found high variations within and between models in soil organic matter content. Soil organic carbon was estimated as ranging from 67.8 tons per hectare (eucalyptus plantation in Groba) to 152.9 tons (wet heathland in Xistral) in each circle plot. The estimated shrub biomass was similar in both heathland areas. We calculated five or six tons of above-ground organic carbon stored in plant tissue. Tree plantations showed a higher variation, ranging from 20 tons of carbon in the mature pine forest of Groba, to seven tons in the eucalyptus stand of Groba (Figure 18).

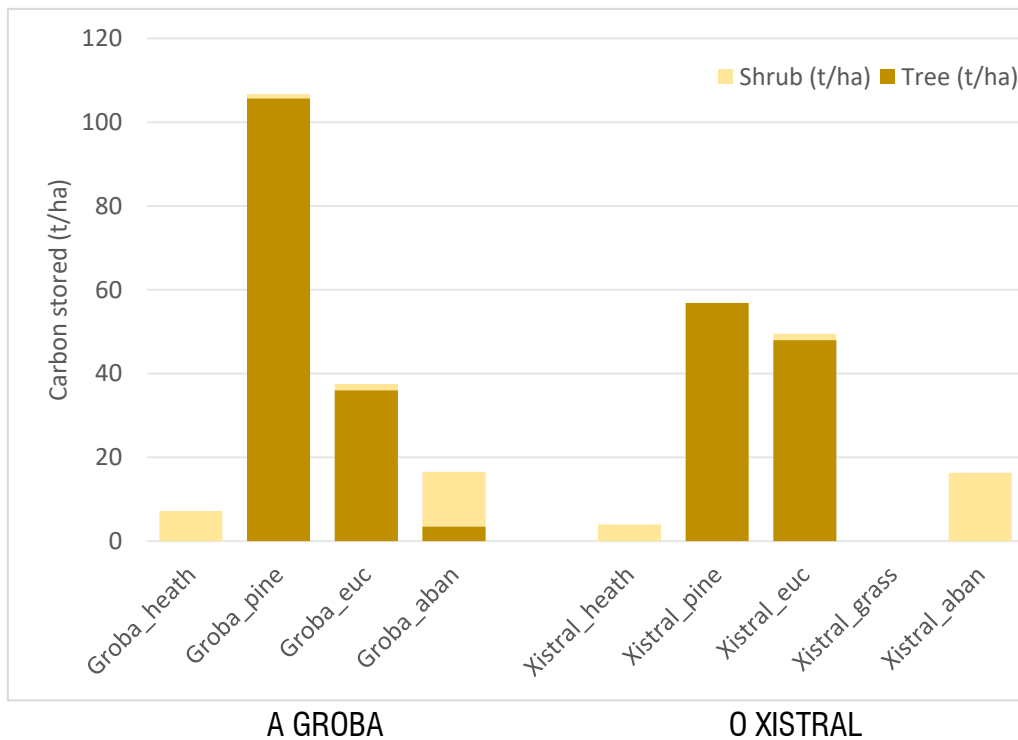


Figure 18. Above ground carbon stored in trees and shrubs for each plot.

Overall (Figure 19), carbon loads adding carbon stored in living plants and soil showed a clear trend in Xistral with higher values for heathland (natural grazing semi-wild) and lower in pine plantation (long-term afforestation), and intermediate values for the other two models. In Groba, carbon storage in long-term afforestation was higher and short-term afforestation had the lowest values. Abandonment plot had intermediate values in both areas.

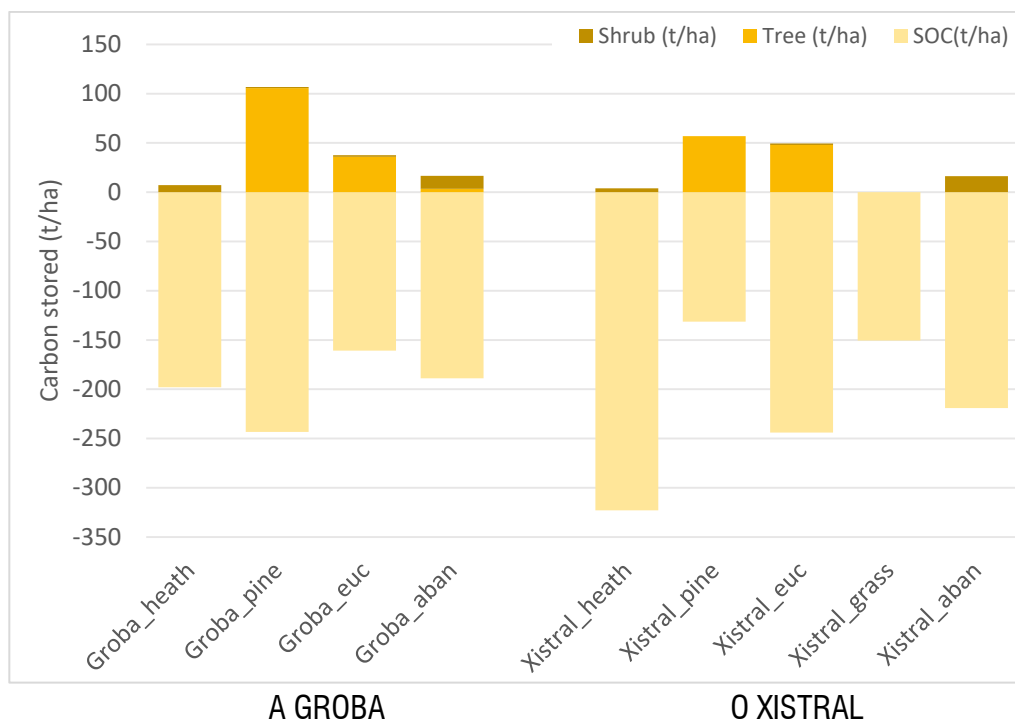


Figure 19. Total carbon storage for plot in each model estimated from soil organic matter and living plant biomass separated by trees and shrubs.

Fire risk

To address the issue of wildfire risk, we evaluated potential risk from climatic constraints of each area, and the local conditions of vegetation in each plot (Table 5). Groba has a sub-Mediterranean climate with higher summer drought, which results in a high prevalence of wildfires in summer. In Xistral, precipitation and cloud cover is even through the year, including the summer, therefore less prone to wildfires.

The wildfire risk of the plots was expressed as the specific condition of a given vegetation in relation to flammability and risk of ignition considering vegetation cover of the dominant species and contrasting literature on the issue. For example, eucalyptus plantations were considered as having high risk³, and gorse (*Ulex* spp.) is considered as having highly flammable risk⁴. In Xistral, the highest risk is found in the eucalyptus plantation, as the species is highly flammable, and the understory has an important percentage of gorse as measured in the plot transects. In turn, gorse cover was very limited in the heathland. The pine plantation has an herbaceous understory and moderate tree density. Improved pasture has the lowest risk. In Groba, eucalyptus plantations have a dense understory of *Pteridium aquilinum* (Figure 20), which leaves large amounts of dry material that can pose a high risk of ignition. The dry heath has a limited capacity of ignition as woody vegetation is low. The pine tree has low shrub cover in the understory (Figure 20).

³ Xanthopoulos, G., Calfapietra, C., & Fernandes, P. (2012). Fire hazard and flammability of European forest types. In *Post-fire management and restoration of southern European forests* (pp. 79-92). Springer, Dordrecht.

⁴ Marino, E., Hernando, C., Madrigal, J., Diez, C., & Guijarro, M. (2012). Fuel management effectiveness in a mixed heathland: a comparison of the effect of different treatment types on fire initiation risk. *International Journal of Wildland Fire*, 21(8), 969-979.



Figure 20. Understory of the afforestation plots.

In summary, fire risk overall higher in Groba than Xistral. It is lower in the extensive grazing model, due to the lack of fuel material and higher in the abandonment plot and the eucalyptus plantation (short-term afforestation) in Groba. For Xistral, the plots with the highest fire risk are also the abandonment and eucalyptus plantations (short-term afforestation). Long-term afforestation and natural grazing semi-wild have different conditions but can be considered similar in terms of fire hazard, with a low fire risk in Xistral and low/medium in Groba.

Comparing the models

We rank the different land use models in each area for each topic (we attributed a position, from 1 to 4, for each topic, with lower values (1) meaning that the model performs better in that specific topic than higher number (4) and are presented in Table 6). For Xistral, the model that performed better was the natural grazing semi-wild, which consists in heathland graze by wild ponies, followed by long-term afforestation and abandonment, extensive grazing and short-term afforestation being the worst ones. For Groba the model that performed better was the long-term afforestation, with only 1 point difference for natural grazing semi-wild. Short-term afforestation and abandonment were once again, the worst ones. In each topic there are differences in the scores for each model.

Table 5. Wildfire risk for each land use model based in regional climatic constrains and main species present in each one.

Area	Model	Regional constrains	Description	Main species	Risk
Xistral	Natural grazing semi-wild	Low summer drought. Low prevalence of wildfires	Dwarf ericoid shrubs. Limited gorse cover	<i>Erica mackayana</i> , <i>Calluna vulgaris</i>	Low
	Long term afforestation		Low tree density. No woody understory.	<i>Pinus sylvestris</i>	Low
	Short term afforestation		High tree density. Some gorse understory	<i>Eucalyptus nitens</i> , <i>Ulex gallii</i>	Low/Medium
	Extensive grazing		No woody species	Several grasses	Very low
	Abandonment		Dense shrub cover	<i>Ulex gallii</i> , <i>Erica mackayana</i>	Low/Medium
Groba	Natural grazing semi-wild	High summer drought. High prevalence of wildfires	Dwarf ericoid shrubs	<i>Ulex minor</i> , <i>Erica umbellata</i>	Medium
	Long term afforestation		Low tree density. Very sparse shrub in understory	<i>Pinus radiata</i>	Low/Medium
	Short term afforestation		Medium tree density. Dense understory	<i>Eucalyptus globulus</i> , <i>Pteridium aquilinum</i>	Medium/High
	Abandonment		Dense and tall shrub cover	<i>Ulex europaeus</i> , <i>Erica umbellata</i>	High

Table 6. Partial and final rank score for each land use model in each area, considering individual scores from plant diversity, carbon storage and fire risk. The lower the score, the better the model performs in that topic.

Area	Model	Plant diversity	Carbon storage	Fire Risk	Final score
Xistral	Natural grazing semi-wild	Very high species richness. Endemic and restricted species. High evenness and diversity (1)	High in the soil. Medium in shrubs but long term stability (1)	Low (2)	4 (1,1,2)
	Long term afforestation	Low species richness. No rare species. Some not present in NGSW but low conservation values (2)	Medium/low in the soil. Medium in trees with long term cuts. Very low in herbaceous understory (2)	Low (2)	6 (2,2,2)
	Short term afforestation	Very low species richness. No rare species except ferns (3)	Medium in the soil. Medium in trees with short term cuts. Low/medium in shrub understory (3)	Low/Medium (3)	9 (3,3,3)
	Extensive grazing	Low species richness. Homogeneous cover with low diversity. Problems with weeds (3)	Medium in the soil. Very low in plant biomass (4)	Very low (1)	8 (3,4,1)
	Abandonment	Low species richness. All occur in NGSW (2)	Medium in the soil. Medium/high in shrubs but unclear fate (3)	Low/Medium (3)	8 (2,3,3)
Groba	Natural grazing semi-wild	Medium/low species richness with few rare plants (1)	Medium in the soil. Medium in shrubs but long term stability (2)	Medium (2)	5 (1,2,2)
	Long term afforestation	Medium/low species richness with few rare plants (2)	Medium/high in the soil. High in trees with long term stability (1)	Low/Medium (1)	4 (2,1,1)
	Short term afforestation	Low species richness and diversity. Invasive species present (4)	Medium in the soil. Medium in trees an understory with short term cuts (3)	Medium/High (3)	10 (4,3,3)
	Abandonment	Low species richness and diversity. Some exclusive species (3)	Medium in the soil. Medium in shrubs with unstable fate (4)	High (4)	11 (3,4,4)

4. CONCLUSIONS AND RECOMMENDATIONS

The grazing semi-wild land use model in Galicia represented by the Galician wild ponies system, has a strong cultural connection and emotional bonds amid local communities. The rangelands of ponies are different types of heathlands that provide high rates of ecosystem services: higher biodiversity, large amounts of carbon storage and lower fire risk when compared to other land use models like afforestation, extensive grazing and abandonment models. In some areas, pony grazing has positive externalities: by clearing fields of woody species, mainly gorse, they improve the pasture for cattle and reduce the economic costs of mechanical land clearance for wildfire prevention. However, ponies have a low direct economic value, and the owners face important bureaucratic, administrative and economic burdens that compromise the survival of the model. Hence, our main recommendation to preserve this model, its cultural values and environmental benefits, is that areas where the traditional management system is still in use should have specific regulation and management plans, including: i) a derogation of microchipping recognized in the European regulation EU 2015/262 for Equidae of populations living under wild or semi-wild conditions, ii) establishment of barriers such as perimetral fencing to avoid accidents and other conflicts, iii) payment for wolf presence instead of compensatory programs for wolf attacks, iv) CAP subsidies considering habitat conservation criteria and adapted weight of livestock unit counts for ponies, v) forestry practices adapted to wild ponies. Specific recommendations are included in Table 7.

In summary, we can conclude that action must be taken to prevent the wild pony system to collapse in Galicia. This is a unique cultural heritage with a strong connection with the Galician history, its rural landscape and natural values. We, the Galician people, and our regional, national and EU authorities are responsible for preserving this treasure for future generations. Let's take the step now, before it is too late.

Table 7. Details of main issues, their description and recommendations for the areas with traditional management of wild ponies in the Galician case study.

MAIN ISSUES	DESCRIPTION	RECOMMENDATION
<p>1. The Galician wild ponies management system lack of substantial direct economic profitability compared to other land-uses</p>	<p>Strong competition with other land uses, mainly the forestry sector, which is incompatible with the wild ponies system at a large scale.</p>	<p>Promote the wild ponies management system on common lands and other mountain areas through specific rewarding measures for owners.</p> <p>Include pony grazing in the Forestry Management Plans, establishing specific measures for their preservation and integration with other uses in pony areas.</p> <p>Promote nature conservation and other uses like wildlife tourism in pony areas.</p>
<p>2. The application of the common agricultural policy (CAP) creates burdens for pony owners</p>	<p>Heathlands grazed by wild ponies are not fully considered permanent pastures and a negative coefficient of pasture eligibility is applied according to the proportion of woody species.</p> <p>Cattle (grazer, 450-500 kg) and ponies (mixed-grazer, 250-300kg) score equally when calculating the livestock load in a CAP application. However, ponies are not eligible for direct payments. As a result, in case of an excess of livestock load, ponies are the first to go.</p>	<p>Compensate for low admissibility of high conservation value grazed habitats such as heathlands through conservation outcome-based schemes.</p> <p>Change the status (Livestock Unit counts) of wild pony units grazing in lands with low admissibility, recommended LU=0.6</p>
<p>3. High rates of wolf predation and limited damage payment system</p>	<p>High level of wolf predation on wild ponies. Compensations for wolf attacks are paid after carcasses of killed foals have been inspected, but they are hard to find.</p> <p>Risk of changes in wild ponies' traditional management system as they are confined on fenced pastures close to farms to adapt to the wolf damage payment system. Potential loss of ecosystem services and traditional practices of cultural and ethnographic value.</p>	<p>Payment schemes for owners of ponies managed under traditional systems in areas where they coexist with wolves. Payment for presence of wolves instead of damage compensation programs.</p>
<p>4. The administrative control of wild ponies create burdens for owners</p>	<p>Micro-chipping wild ponies as a form of government control creates economic and time burdens for pony owners, who have limited resources and time.</p> <p>Wild ponies in unfenced areas may enter roads and be involved in traffic accidents. Insurance is rather expensive and companies are usually reluctant to sign contracts.</p>	<p>Use of the derogation provided for in the European regulation EU 2015/262 for Equidae of populations living under wild or semi-wild conditions in certain areas. Wild ponies managed by associations or communal land boards can remain in their area without a micro-chip.</p> <p>Public subsidies for common land owners to fence fields nearby problematic roads. Enhanced traffic signs to warn about animals roaming free. Public system of third-party insurance for ponies.</p>

