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Summer Livestock Farming at the Crossroads in the Ukrainian Carpathians

The Unique Case of the Chornohora Mountain Range

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This study investigated summer farming in the Chornohora and the adaptation strategies practiced in summer pasturelands, using field observations, in-depth interviews with local inhabitants, and official data from Ukrainian

institutions. The indigenous Hutsul people have developed organizational forms of animal husbandry—often based on family farming—that they try to follow despite the lack of support from the state. Which of the summer farming types practiced in the Chornohora adapts well to modern challenges? What can be learned from the Chornohora's

example for the protection of traditional landscapes shaped by seasonal grazing in other mountain regions? We approach these problems through 5 case studies, chosen from more than 40 farms that were investigated during visits to the study area over 5 years, illustrating a range of practices from traditional transhumance to agritourism and including both private and collective farms, some within protected areas. Chornohora's 40 working farms present a unique contrast to the common pattern of grassland abandonment and afforestation in the Ukrainian Carpathians.

Keywords: Family farming; mountain grasslands; livestock grazing; transhumance; protected area; Chornohora; Carpathians.

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Introduction

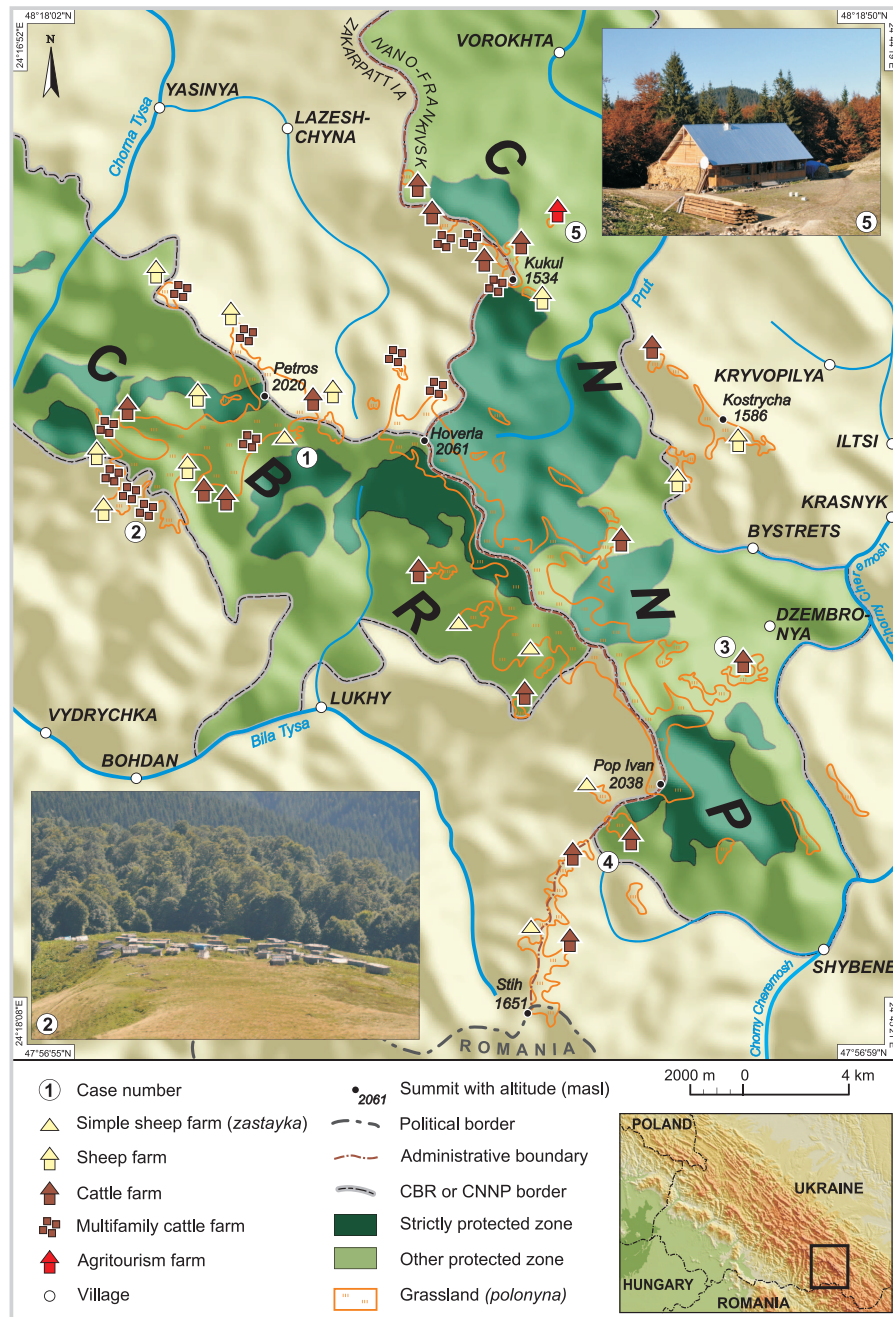
The shrinking of seminatural mountain grasslands is widespread in many parts of Europe, causing the loss of large areas of traditional landscape as well as a decline in biodiversity. This process is mainly due to a gradual decrease in seasonal sheep and cattle grazing (Bunce et al 2004) over the 20th and 21st centuries. In contrast, in the Ukrainian Carpathians after the post-World War II forced collectivization of land, grazing on summer mountain pastures was intensified by large collective farms called *kolhosps* (Lavruk 2011). When these farms were closed in the 1990s, many local communities returned to traditional land use practices. However, in the period of economic transition that followed the dissolution of the Soviet Union, farmland abandonment and depopulation soon became dominant processes in the Ukrainian Carpathians (Angelstam et al 2013) and as a result of abandonment many grasslands are being overgrown by woody vegetation (Kozak et al 2007; Taff et al 2010). Chornohora, the highest mountain range of Ukraine and the traditional grazing area for the Hutsulshchyna cultural region (Kubijowicz 1926; Woźnowski 1930; Kubijovych 1935, 1937), is one of the last places in this part of Europe (outside Romania) where mountain summer farming is still widely practiced (Figure 1; Gudowski 2001; Troll and Sitko 2006;

Gudowski et al 2009; Lavruk 2011). However, as the traditional summer farming products hardly compete nowadays with cheaper mass products, pastures in this Carpathian region are being gradually abandoned too. Studies on timberline changes in the Chornohora have confirmed considerable reforestation in pastures abandoned several decades ago (Klymyshyn et al 2007; Sitko and Troll 2008).

Rising demand for pastureland in the Chornohora in historical times led to a decrease in forests formed by spruce (*Picea abies*) or beech (*Fagus silvatica*) and in some areas also by Swiss stone pine (*Pinus cembra*) or sycamore (*Acer pseudoplatanus*). This trend also concerned subalpine shrubland of dwarf pine (*Pinus mugo*) and green alder (*Alnus alnobetula*) (Środoń 1948). As a result, next to natural alpine meadows with *Juncus trifidus* and *Carex curvula*, large subalpine grasslands appeared. On the overgrazed pastures dense tussock grasses spread, forming secondary meadows dominated by *Nardus stricta*, *Deschampsia caespitosa*, and *Festuca airoides* (Malynowsky 2003; Kricsfalussy 2013). Such natural (or seminatural) and secondary mountain grasslands, often representing high conservation values, are called *polonynas*, and form the distinctive landscape of the Ukrainian Carpathians (Kricsfalussy 2013).

As a consequence of the processes mentioned above, Chornohora today is characterized by an interesting

FIGURE 1 Summer livestock farms active in the Chornohora in recent years. (Map and photographs by Mateusz Troll)



landscape contrast: secondary shrubs are covering pastures abandoned several decades ago and this shrubland neighbors grasslands that are still grazed seasonally. The variety of summer farming practices that can be found in close vicinity, differing in organizational form, spatial extent, and production profile makes this mountain range a real “living laboratory” of summer animal farming. This agropastoral diversity is due to the

fact that the Chornohora mountain range contains 2 distinct parts of Hutsulshchyna: the Zakarpattia region in the southwest (historically part of Hungarian and later Czechoslovakian Subcarpathia) and the Ivano-Frankivsk region in the northeast (formerly Polish Pokuttia). Consequently, traditional activities of the indigenous Hutsul people (Figure 2) evolved in different legal and institutional contexts, which influenced, for example,

FIGURE 2 Hutsul family that used to work each summer on a cattle farm below Mt Petros in the western Chornohora, just outside the CBR. (Photograph by Mateusz Troll)



land ownership. These differences, in our opinion, have been recently reinforced by a shift in land management policy: 1-year leases for mountain pastures are being replaced by 49-year leases. This has already been implemented in the Ivano-Frankivsk region. Adding a further degree of complexity to land management patterns in the region, some of the farms operate within 1 of 2 large protected areas: the Carpathian National Nature Park (CNP) and the Carpathian Biosphere Reserve (CBR).

To the best of our knowledge, no studies exist either on the interdependence between the use of *polonynas* and their ownership status or on the current land ownership structure in comparison with the situation before the forced Soviet collectivization. Thus it appears that more than 2 decades after the collapse of the Soviet Union one of the key issues in the use of high mountain areas in this part of the Carpathians has not yet been investigated. In this study we try to shed some light on these matters, using the Chornohora as an example. Moreover, we aim to determine the scale of summer farming in this mountain range and through this to portray the diversity of the traditional use of high mountain grasslands in this part of the Carpathians.

Such a synthesis for this area is so far lacking in the scientific literature. It could be of practical value, given the growing interest in extensive, traditional land-use practices that could save shrinking European biodiversity resources, including high-nature-value (HNV) farmlands (Paracchini et al 2008; Knowles 2011). Finally, we investigate the extent to which contemporary summer farming practices in this part of the Carpathians adapt well to modern challenges and could therefore be a useful example for other European mountain regions. We approach the problem through 5 detailed case studies of summer farming practices in the Chornohora, with special attention to their organizational and spatial dimensions.

Study area and methods

The Chornohora range (Hoverla, 2061 masl) is situated between the Chorna and Bila Tysa Rivers in the west and the Chorny Cheremosh River in the east (Figure 1). In the south, between Mt Pop Ivan and Mt Stih, it borders the Maramureş Mountains, the frontier between Ukraine and Romania. This area covers about 900 km², including more than 70 km² of *polonynas*. Our study area included also

outlying villages—seats of local authority as well as dwelling places of families working in summer farms and sending animals there. The population of the area inhabited by people connected with Chornohora farms exceeds 80,000, including 1 town, Rakhiv, with population of about 15,000 (Verkhovna Rada of Ukraine 1994–2013); Rakhiv is the seat of Rakhiv *raion* (administrative district) authority.

In order to collect both qualitative and quantitative data on the current scale and condition of summer farming in the Chornohora, we relied almost entirely on field studies, as the data available through official institutions were insufficient. The lack of up-to-date maps of the Chornohora range, and of complete information about the number of animals grazing there, meant that we needed to find working farms in the field, except for the Western Chornohora, where the majority of them were mapped during previous studies (Troll and Sitko 2006). For 5 years (2009–2013) we visited the study area 3–4 times per year, reaching almost all of the farms recently working in Chornohora, some of them several times. The farms that we omitted in the Kukul and Kostrycha areas are already well investigated (Gudowski et al 2009).

For the purpose of this study we conducted more than 30 unstructured interviews concentrating on the 5 farms we chose for a detailed analysis. We visited informants on *polonynas* and in many villages; the farthest one was located about 50 km from the range. Our respondents included 10 herders, 6 leaseholders, 8 staff members of protected areas and scientific institutions, 2 forestry workers, 4 local administrators, 5 tourism business owners, and 1 former *kolhosp* head. In some cases a person represented more than 1 category (eg leaseholder and herder). The topics of the interviews varied depending on the interviewee, but we generally focused on the following:

- The number of sheep and cattle and any changes in recent years;
- Villages of origin of the farm's workers and animals;
- Transhumance routes;
- Ownership of *polonynas*;
- Land use and other summer farming practices and their impact on the environment;
- Economic profitability of summer farming; and
- Summer farms' potential to develop as rural tourism sites.

A similar methodological approach was recently applied in research on pasture management in another post-Soviet country, Kyrgyzstan (Dörre and Borchardt 2012; Liechti 2012). We always talked with respondents in Ukrainian, without the help of interpreters.

The information gathered through fieldwork was compared with the scientific literature (also Ukrainian), as well as a variety of current and archival source materials such as old cadastral data, pre-World War II

statistics, CBR and CNNP maps, and back issues of local newspapers. These data broadened our knowledge on the historical, social, economic, and institutional contexts in which summer farming practices developed in the Chornohora.

Results

As our investigation showed, a total number of 5500 sheep, 1000 head of cattle, and more than 100 horses were grazing on Chornohora's pastures in 2009. These numbers are 3–4 times lower than in the 1930s (Kubijovyč 1937) and much lower than in the Soviet era (unfortunately, complete data for this period are not available). Most of the livestock appeared on the Zakarpattian side: about 77% of sheep, 77% of cattle, and 30% of horses. We found more than 40 seasonal sheep and cattle farms working in Chornohora mountain range in recent years (Figure 1). For a detailed investigation, we chose 5 that exemplified a variety of organizational forms, from the most traditional to the most modern. We named each farm after the *polonyna* on which it is situated, as Hutsuls usually do.

The sheep farm on Zelenyi Zholob (Hreble) *polonyna* represents a simple, traditional form of summer farming. The Sheshul farm combines traditional communal grazing and a multifamily business. The farm on Smotrych *polonyna* is based on extensive use led by 1 family with a transhumance dimension, while the Shchivnyk-Gropa farm is relatively big and modern but maintains a traditional character. Finally, Borsuchna seems to be a regional forerunner of a new approach to summer farming, linking it with rural tourism. Figure 1 and Table 1 present main locational features of the farms, and Table 2 summarizes some of their social and economic characteristics.

Case study 1: Traditional, communal sheep herding

Zelenyi Zholob (Hreble) farm is situated in Western Chornohora (Table 1; Figure 3) in the Mt Pietros area. It operates on Zelenyi Zholob and Hreble pastures. A sheep farm existing there in the early 1930s was the biggest in the whole Czechoslovakian part of the Chornohora, with 860 sheep and goats (Kubijovyč 1937). After the World War II these pastures were included in a local *kolhosp*. Since the dissolution of this collective farm in the late 1990s, summer farming has continued, although pastures are now included in the CBR zone, called a “zone of anthropogenic landscapes”, where extensive seasonal grazing is allowed (Carpathian Biosphere Reserve 2014).

Like it was between World War I and World War II, Zelenyi Zholob farm is now used by the inhabitants of the nearest village, Bogdan. In order to maintain summer farming there, every year the head of the village needs to apply for a short-term lease from the head of the Rakhiv *raion*, as the land belongs to the state. Because the track

TABLE 1 Location and protection status of farms chosen for case studies.

Farm name	Location	Altitude (masl)	Region/raion	Distance by road to nearest village (km)	Protection status
Zelenyi Zholob (Hreble)	Slopes of Mt Petros	1440–1570	Zakarpattia/Rakhiv	Bogdan: 16	CBR “zone of anthropogenic landscapes” ^{a)}
Sheshul	Slopes of Mt Nedeya	1220	Zakarpattia/Rakhiv	Vydrichka: 11	Outside protected areas
Smotrych	Slopes of Mt Smotrych	1230	Ivano-Frankivsk/Verkhovyna	Dzembronya: 3	CNNP “utility zone” ^{b)}
Gropa-Shchivnyk	Slopes of Mt Pop Ivan (Gropa) Ridge linking Mt Chornohora and Mt Chyvychny (Shchivnyk)	1450 (Gropa) 1360 (Shchivnyk)	Ivano-Frankivsk/Verkhovyna	Shybene: 12.5 (Gropa) 12 (Shchivnyk), Lukhy: 18 (Gropa) 14.5 (Shchivnyk),	CNNP “utility zone” ^{b)} (Gropa) Outside protected areas (Shchivnyk)
Borsuchna	Side ridge of Mt Kukul	1150	Ivano-Frankivsk/Yaremche	Vorokhta: 6	CNNP “controlled recreation zone” ^{b)}

^{a)}Carpathian Biosphere Reserve (2014).

^{b)}Carpathian National Nature Park (2014).

connecting Bogdan with Zelenyi Zholob crosses a state forest, a permit from the forest district office in Rakhiv for a defined number of animals is also needed.

At present, seasonal grazing on Zelenyi Zholob farm is organized in a traditional way, with only basic infrastructure (Table 2). There is no permanent building, but only a very simple shelter called a *zastayka*—a wooden structure open in the front, which can be easily moved from one place to another along with the sheep pen. As a result, the exact location of the farm changes every few years within meadows and shrubland of Zelenyi Zholob and Hreble (Figure 3).

For cheese production, an open fire outside the shelter is used. A *zastayka* does not entirely protect the staff from rain, wind, or cold and does not provide enough space to store the dairy products or food supplies. For this reason, sheep owners come to the farm at different times during the season to take the cheese that belongs to them and to bring food for the shepherds. When the cheese is weighed and distributed, it is generally assumed that 1 sheep gives about 36 l of milk, with which 12–15 kg of cheese can be produced. Only fresh cheese is produced on Zelenyi Zholob farm, not the well-known *bryndza*, which needs more lengthy processing. Responsibility for the animals and dairy production on a *polonyna* is taken by the *starshyi* (older) *chaban*—an experienced shepherd who manages the farm during the summer season. The name *chaban* is typical for a sheep herder on the Zakarpattian side. This role has a social dimension: the local community chooses one every year; in practice, a good *starshyi chaban* can continue in the role for many years, as our informant Mykola did.

In recent years the number of sheep on this farm was rather stable. The flock from Zelenyi Zholob is led every day within an approximately 4 km radius from the farm (Figure 4), which is typical for sheep farms (according to a local saying, “sheep like walking”). This area includes both seminatural and alpine meadows between 1400 and 2000 masl (Figures 3 and 4).

Case study 2: Multifamily communal cattle farming

The Sheshul farm is in Western Chornohora in the lower part of the Sheshul *polonyna* (Table 1; Figure 1), which is state property administrated by the Rakhiv *raion*. Animals from this farm also graze in its higher parts, included in the CBR “zone of regulated protected regime” that provides reserves of timber, hay etc (Carpathian Biosphere Reserve 2014). In the early 1930s, a Czechoslovakian cattle farm with 130 cows and 60 heifers from the town of Rakhiv operated there at 1370 masl (Kubijovyč 1937). Right after World War II (1945), the headage was similar, with 180 cows from Rakhiv and the nearby village of Roztoky grazing on 205 ha (Posysen 1994).

Now Sheshul is used as communal pasture for animals from Roztoky. Like in the case of Zelenyi Zholob and other communal pastures in this area, summer farming is based on 1-year leases taken by the head of the village from the *raion* authority. Like Zelenyi Zholob, the village head’s representative who organizes the grazing on the *polonyna* is an experienced herder chosen by the local community for a particular season. In case of a cattle farm he is called simply *starshyi* (older).

Sheshul farm, unlike cattle farms on the Ivano-Frankivsk side of Chornohora, contains numerous small

TABLE 2 Characteristics of farms chosen for case studies.

Farm name	Status	Number of staff	Staff villages of origin	Livestock		Max. distance of transhumance route (km)	Infrastructure
				Species	Headage		
Zelenyi Zholob (Hreble)	Communal livestock farm	4–5	Bogdan, Vydrichka	Sheep	400–500	20	1 simple shelter (<i>zastayka</i>)
Sheshul	Communal livestock farm	5	Roztoky	Cattle	98	17	90 small barns (built by many livestock owners)
Smotrych	Individual (49-year lease) livestock farm	3	Sokolivka, Babyn	Cattle	35–40	50	1 large barn, 1 building for staff and dairy production (post-Soviet)
Gropa-Shchivnyk	Individual (49-year lease) livestock farm	6	Babyn, Brustury, Zakarpattian villages	Cattle Horses	70–131 26–37	70	2 large barns, 2 buildings for workers and cheese production (mainly post-Soviet)
Borsuch-Na	Individual (49-year lease) agritourism farm	2–3	Vorokhta	Cattle Horses	5–20 1–4	6	1 barn, 1 building for workers, cheese production and tourists, 1 building for tourists only (built by a single leaseholder)

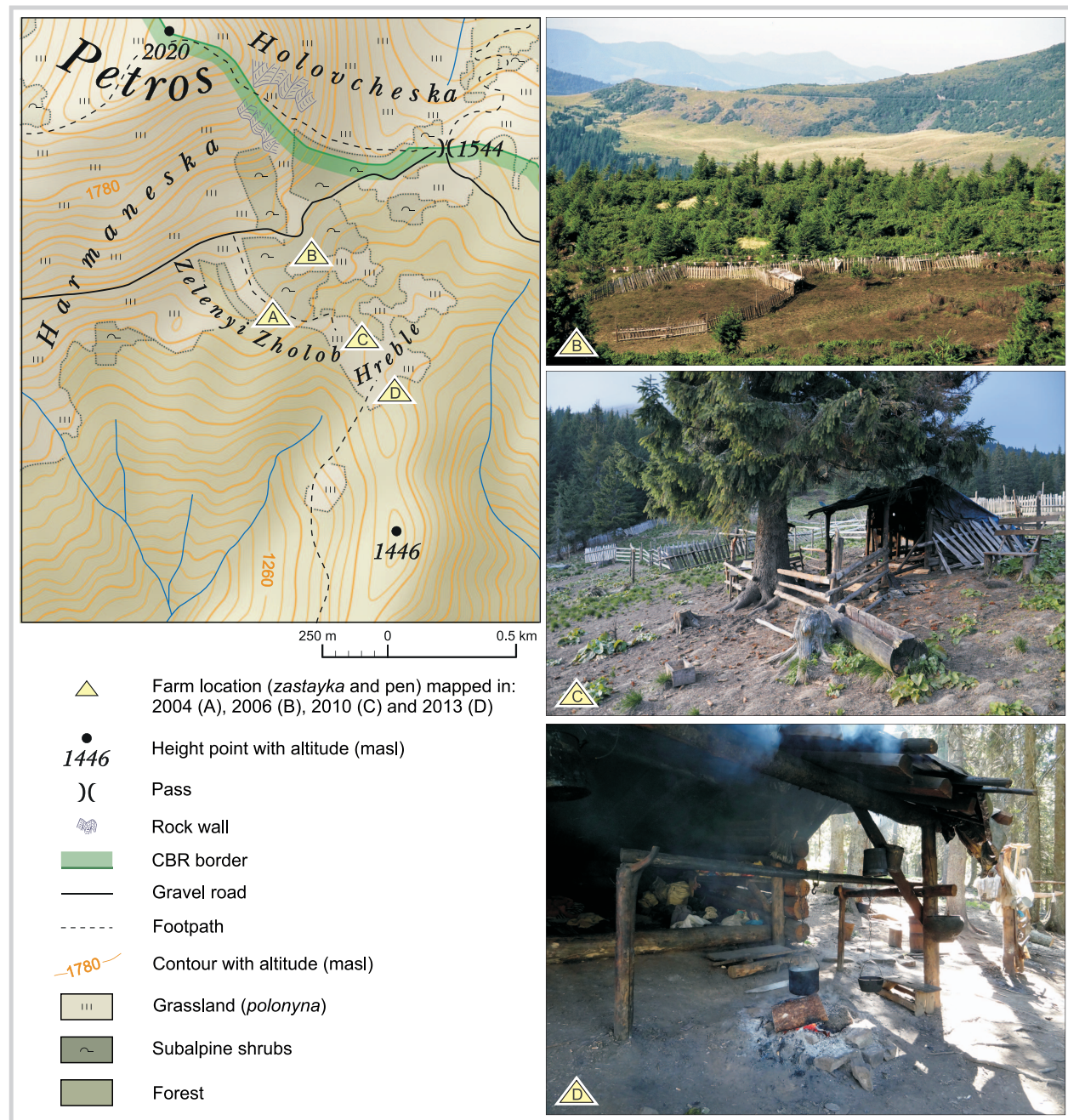
barns for 1 or 2 cows (Table 2), as every cattle owner who wants to send animals to this pasture needs to build a barn for them. In the mid-2000s there were 90 such barns (Troll and Sitko 2006), making Sheshul the biggest farm of this type in Chornohora, with a whole family employed to look after the young cattle and dairy cows. In 2010 there were 5 young men looking after 55 dairy cows and 43 heifers and calves. The calculation of the amount of the dairy products that cattle owners should receive at the end of the season is based on a contract between them and the *starshyi* in which the price for the milk is stated. Because there is no cheese production on this cattle farm, the *starshyi* comes to the *polonyna* once a week to collect the milk. According to our respondent Vasyl—who was *starshyi* on the Sheshul farm in 2010 and in charge of a sheep farm on nearby Verkhnyi Shchavul *polonyna* in the Maramureş Mountains—it is not possible to live

exclusively by summer farming, even working on 2 pastures at the same time.

Case study 3: Single-family cattle farm with old transhumant connections

Smotrych is a small farm in the eastern part of the Chornohora within the CNNP “utility zone” (Carpathian National Nature Park 2014) where economic activity is allowed, but subordinated to rules of nature conservation (Yavorskiy et al 2009). It is an example of a farm located at a relatively low altitude that has maintained extensive pasture use. Until World War II, Smotrych was a large *polonyna* (about 300–360 ha) that covered the ridge of Mt Smotrych (1894 masl). During the Soviet era, the pasture became part of a *kolkhosp*. Since the dissolution of the *kolkhosp* in the 1990s, livestock grazing has continued, but on a diminishing scale, and

FIGURE 3 Zelenyi Zholob (Hreble) sheep farm in the CBR zone of anthropogenic landscapes—location changes 2004–2013. (Map by Mateusz Troll based on Krukar and Troll 2013; photographs by Mateusz Troll and Agata Warchalska-Troll)



today only secondary meadows situated in the forest zone are used (Figure 5).

Since the mid-1990s, Smotrych *polonyna* has been used for cattle grazing on the basis of private 1-year leases, recently changed to a 49-year lease. Although formally the new 49-year lease is held by an inhabitant of the nearby village of Dzembronya, it is subleased by Vasyl, who is from the village of Sokolivka, about 50 km from Smotrych. In Sokolivka and neighboring Babyn village,

livestock farming is still an important activity handed down from father to son, even though it takes the herders 2 days of walking to reach the Chornohora, using an old transhumance route. Vasyl continues this activity as his father did, accompanied by his brother-in-law. Every year since the land management policy change, he takes a 1-year lease from the official long-term leaseholder. The animals that graze on Smotrych come from several villages that are on the way from Sokolivka and Babyn to

FIGURE 4 Sheep grazing on a subalpine *polonyna* in the western Chornohora in the CBR buffer zone. (Photograph by Mateusz Troll)



the pasture. The owners of the animals are mostly Vasyl's regular customers. In recent years there have usually been around 35–40 dairy cows grazing on Smotrych, which means, according to Vasyl, that the farm is close to the limit of profitability. In his opinion, the amount of livestock taken to the summer pasture each year depends mostly on weather conditions and meat prices. In 2013 (and in a few previous seasons) there was not enough rain in spring and it was recognized that the pasture would be of poor quality. Therefore, it was not reasonable to take a greater number of cows to the *polonyna*, even though more were available. As for the meat prices, according to Vasyl they have a major influence on annual changes in the number of bulls.

All milk produced on Smotrych *polonyna* is processed into cheese directly on the farm, in wooden buildings inherited from the *kolhosp* (Figure 5). The calculation of the cheese production that each cattle owner will receive at the end of the grazing season is based on the “milk yield for a measure” procedure that used to be typical for Hutsulshchyna but is now rare. On a particular day (about a month after the grazing starts), all cattle owners come to the farm to observe the milking, and the proportion of the total milk volume belonging to each owner observed on that day is used to apportion the final dairy production at the end of the season. This procedure

enables a more precise calculation of the final production and encourages both the herders and the cattle owners to invest in cattle and pasture quality.

In addition to animal husbandry, spending summer on the *polonyna* enables Vasyl and his family to pick mushrooms and forest fruits, which gives them additional income. However, he emphasized that it is not possible to live only by summer farming, which is rather a family tradition to him. Outside the grazing season, members of the family work in crafts.

Case study 4: Combining modern animal husbandry and tradition

Gropa-Shchivnyk farm consists of 2 *polonynas* 3 km apart: Gropa on the south edge of the Chornohora range and Shchivnyk in the neighboring Maramureș Mountains (Figure 1). According to old Austrian cadastral data, both *polonynas* were owned and leased by inhabitants of remote Hutsul villages from Kosiv and Verkhovyna *raions* since at least the end of 18th century. During the Soviet era, both pastures were collectivized. Starting from the mid-1990s, Shchivnyk and Gropa together were seasonally leased by Ivan, a veterinarian from Verkhovyna, who had worked on the collective farm on Shchivnyk. He started using these 2 *polonynas* as 1 farm: Shchivnyk as pasture for dairy cows and Gropa for heifers, calves, and horses. This

FIGURE 5 Smotrych cattle farm with buildings from the collective-farm era situated on a secondary pasture that is gradually reverting to woody vegetation in the CNNP zone of economic activity. (Photograph by Mateusz Troll)



specialization was due to the better accessibility of the former property, which is important for transport of milk and dairy products to villages. Ivan used to hire people from the remote village of Babyn (around 70 km from the farm), who were known as exceptional herders. This village has traditional connections with pastures in the area that predate World War II.

Following the introduction of 49-year *polonyna* leases, Ivan has leased only Shchivnyk since 2011, while Gropa is currently leased by a local hotel owner. In spite of this, both *polonynas* still operate as 1 farm being taken on 1-year subleases by the same herders from Babyn who worked there before, all members of the same family. The earlier specialization, Shchivnyk for dairy cows and cheese production and Gropa for young cattle and horses, is maintained. Thanks to the strategic location of the farm at the border between the Zakarpattia and Ivano-Frankivsk regions, animals from both sides are sent there, which is a rare example of a link across this historically deep divide. Despite its modern character, in Gropa-Shchivnyk farm the traditional “milk yield for a measure” procedure is used. Like on Smotrych, on Gropa and Shchivnyk *polonynas*, buildings from the *kolhosp* era are still in use.

Even though Shchivnyk is a relatively large farm, Ivan’s family does not rely entirely on the income it brings, as he also works in the local meat industry and operates a small hotel with his wife.

Case study 5: Summer farming and agricultural tourism

Borsuchna *polonyna* is a small secondary meadow that probably appeared between the mid-1860s and the early 1870s; it is shown for the first time on the *Third Military Survey for Galicia* for 1872 (Biszak et al 2007). In the Soviet era this pasture was not included in any collective farm, belonging instead to a state forestry enterprise. Since the late 1960s, Borsuchna has been used by 2 Hutsul families living in the nearby village of Vorokhta. They used to organize grazing of both state and private cattle and sheep. Since the mid-1980s, the meadow had been used less and less intensively, sometimes serving only as daily pasture for cattle from Vorokhta. Finally, it was abandoned for many years and became overgrown. In 2010 Vasyl, a descendant of the previous leaseholders, acquired a 49-year lease and cleared the shrubs and trees. His farm is located only 6 km from Vorokhta (Figure 1; Table 1), within the CNNP “controlled recreation zone”

(Carpathian National Nature Park 2014), where forms of tourism and recreation that have a low environmental impact are allowed (Yavorskiy et al 2009).

The Borsuchna farm is a rare example (to the authors' knowledge, the only one in the Chornohora) of a site that combines tourism with summer livestock pasturing. Vasył's family background and experience of working abroad (eg in Austria) seem to have strongly influenced his decision to create a tourism product based on traditional pasturage. It can be argued that his activity goes beyond pure business, as he promotes the regional Hutsul culture as well as local artists, including musicians and craftspeople. His guests can observe herders taking care of the animals and the production of traditional *bryndza* cheese, taste regional meals, and listen to Hutsul music. At the same time, modern recreational activities such as horse, sleigh, and off-road vehicle riding and trekking are provided, along with accommodations at the standard of a mountain hostel. Unlike other cases described in this paper, animal husbandry is subordinated to recreation. Outside the grazing season, the farm serves only tourism purposes. Vasył said that the long-term lease encouraged him to invest in the farm's infrastructure and that he planned to build further amenities soon. However, he said that the lack of state support, high instability of meat prices, and problems with selling wool and dairy products are great obstacles to this kind of grass-roots business. These circumstances forced him to limit the number of animals he takes to his *polonyna*; between 2011 and 2013 the number of cows dropped from 20 to 5 (Table 2). He also stopped keeping his own flock of sheep.

Discussion and conclusions

The number of working summer farms we found in the Chornohora is probably the largest in the Ukrainian Carpathians, although we did not find any comparable data for other mountain ranges. The cases described in this paper show a variety of coexisting organizational forms of seasonal grazing on *polonynas*. Their basic differentiation concerns the ownership status of the grazed meadows: communal pastures in the Zakarpattia and pastures under long-term leases on the Ivano-Frankivsk side. Communal grazing on the Zakarpattian side (Zelenyi Zholob and Sheshul farms) is organized by local authorities on pastures seasonally leased from the *raion*, even though usually whole families are employed there. Similar organizational forms of grazing have been identified elsewhere, for example in Central Asia (Vanselow et al 2012). Because of some general rules concerning use of these communal meadows, all of the Zakarpattian farms in this area, in spite of infrastructure or livestock differences, work in a way similar to Zelenyi Zholob (sheep farms) and Sheshul (cattle farms). The simplest, most traditional forms of summer farming are found on sheep farms. This is not surprising as studies, for

example from the Alps, show that sheep farms are generally more obsolete than cattle farms (Sturaro et al 2009).

Typical family farms, run as private businesses, appear rather on the Ivano-Frankivsk side, where *polonynas* have been recently leased for 49 years. The introduction of long-term leases encourages holders to invest in infrastructure (as in Borsuchna and Shchivnyk-Gropa). Ownership and cultural factors apparently affect differences in production specialization, workforce profile, and, as a consequence, economic profitability. The most complex dairy product of summer farming, the well-known Carpathian cheese called *bryndza*, which brings the biggest return (Gudowski et al 2009; Lavruk 2011), is not produced in many Zakarpattian farms, even though it is popular in this region. In contrast, most family farms on the Ivano-Frankivsk side specialize in such production—which confirms, in our opinion, their more commercial orientation. This is also manifested by the traditional “milking for a measure” procedure (confirmed in Smotrych and Gropa-Shchivnyk farms), which enables the herders and the cattle owners to calculate the distribution of the final cheese production more precisely. As for the workforce profile, it is more typical that in large sheep farms (like Zelenyi Zholob) only men work, while cattle farms often hire whole families including women (as in Gropa-Shchivnyk, Smotrych, Borsuchna, and many other farms), who are traditionally employed to milk cows—not only in the Ukrainian Carpathians (de la Martinière 2012). As the significance of meat as a farm product is growing (despite fluctuations in meat prices), fewer women and children appear on *polonynas* (Gudowski et al 2009), which we observed as well.

In our view, Gropa-Shchivnyk and Borsuchna family farms represent 2 possible directions of further development of private summer farming in the Chornohora: one based on commercial animal husbandry and the other combined with tourism. However, individual small owners face serious problems due to price fluctuations, lack of stable long-term incentives, bureaucracy, and corruption, which were mentioned by many respondents. In our opinion, commercially oriented farms may also be more likely to increase pressure on fragile grasslands when the situation of animal husbandry improves. Small, underinvested family farms like Smotrych are likely to disappear unless modernized. In contrast, less advanced collective farms like Zelenyi Zholob and Sheshul seem to be more flexible in this unfavorable economic situation. In our view, they are also less susceptible to overgrazing, as the communal pastures are usually large, which enables herders to move the flocks throughout the season. Provided that some simple good practices are implemented (concerning waste disposal and the use of firewood), they could become valuable examples to follow.

Summer farming on both sides of the range certainly needs support, as extensive animal husbandry cannot become competitive without long-term incentives and promotion of its products. So far no long-term program of this kind has reached our respondents. In addition to its traditional significance to local communities, summer livestock farming in the Chornohora has also survived due to the lack of employment alternatives in the region and harsh development conditions. This proves the general tendency observed in European mountainous regions: the HNV farmlands—the areas that maintain the highest biological values—usually overlap with the Less Favored Areas (LFA), that is, those that need the most economic support (Banko and Bartel 2010).

The average seasonal income of a leaseholder of a relatively big farm has been shown to be only 2 times that of a wage in the local forestry industry for the same period (Gudowski et al 2009). For a simple herder, the proportion is even worse. This means that the money earned during 4 months on a *polonyna* is not sufficient for the rest of the year. Confirming this, none of our respondents said that they could live only by summer farming. The fact that this hard work brings only low income, insufficient for financial stability of a family, can soon result in lack of interest in such a job among the younger generation. Interestingly, this contrasts with findings on family farming strategies in another mountainous post-Soviet region, northern Kyrgyzstan (de la Martinière 2012), where cattle farming—and especially the meat branch—appears to be the source of stable, relatively high income.

Another common concern of Chornohora's herders and livestock owners is that many of the new long-term leaseholders (especially those from outside the region) may be more interested in developing recreational resorts than in continuing summer farming. As evidence from neighboring mountain ranges (the Bukovel and Dragobrat ski resorts) shows, once transportation into an area is improved, recreational facilities can easily be established. Therefore, many *polonynas* may turn into either shrubland or ski slopes.

The main feature that characterizes this part of the Carpathians is the unbroken continuity of pasture use despite the Soviet collectivization and the establishment of large protected areas. Such continuity was interrupted in the Western Carpathians and is now being re-introduced, for example in the Carpathian Convention (Carpathians Unite 2012; Foundation Pasterstwo Transhumancyjne 2013). In the Chornohora there is still a

chance to maintain the sustainable, extensive use of seminatural grasslands without such interruption.

The question of the extent to which this Eastern Carpathian example is transferable to other mountain ranges, such as the Alps or Western Carpathians, remains open. We believe that the introduction of modernized forms of communal grazing may be an option when the reintroduction of extensive summer farming based on a private business model does not meet expectations (eg Bender 2010). Despite some conflicts with local communities, especially concerning the CBR (Wallner et al 2007), the case of the Chornohora proves that nature conservation can successfully coexist with grazing: about half of its working summer farms are located within protected areas (but outside their strict protection zones). CBR and CNNP have so far managed to protect this unique mountain range from large-scale recreational investments, at the same time enabling the traditional use of *polonynas*. This can be a valuable lesson for many protected grassland areas in Europe. The example of the Chornohora shows that extensive seasonal grazing based on indigenous traditional practices, combined with nature protection, can be the key to sustainable development of mountain areas and can hinder the shrinking of seminatural meadows. This Ukrainian case may also be of interest to pastureland stakeholders in less developed post-Soviet mountainous countries, for example in Central Asia, where efforts to implement sustainable land use practices of mountain pastures are being made in the context of post-socialist economic transition (Dörre and Borchardt 2012; Liechti 2012; Vanselow et al 2012).

In the Chornohora, pastures that remain in use can be found in close proximity to abandoned and overgrown ones. This illustrates the importance of grazing for the maintenance of *polonynas*. It can be observed especially on the Ivano-Frankivsk side in the central and eastern parts of the range, where strict protection zones are larger and summer farms less frequent (see Figure 1). The majority of currently working farms are in the Zakarpattian Chornohora, located in Rakhiv *raion*, which has the lowest farmland abandonment rate in the Western Ukraine (Baumann et al 2011). This demonstrates the exceptional character of the Chornohora when compared to the rest of the Ukrainian Carpathians, where grassland conversion to other uses and afforestation at the timberline—apart from the common cropland abandonment—reach the highest rates in the Carpathians (Griffiths et al 2013; Shandra et al 2013).

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