Hutsuls' perceptions of forests and uses of forest resource in Ukrainian and Romanian Bukovina

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HIGHLIGHTS

- The perception of forests by local people living in the Carpathian Mountains has been poorly investigated to date.
- Hutsuls living in Romania and Ukraine share perceptions of forest benefits but differ on perceptions of drivers of forest change.
- Hutsuls living in Ukraine rely more on forest medicinal plants than do Hutsuls living in Romania.
- Political boundaries act as a useful tool to help explain and understand differences in local people's perceptions of forests and their uses.
- Hutsuls' perspectives should be integrated into landscape management in order to minimize forest degradation.

SUMMARY

Socio-economic and political contexts play a major role in a community's perception of the environment, determining natural resource use. We examined perceptions of forest and forest resource use among two Hutsul communities in Bukovina sharing a similar cultural background but living in a region divided by the national border created between Romania and Ukraine in the 1940s. Twenty-nine open-ended and 61 semi-structured interviews were conducted with Hutsuls from Romania and Ukraine. Hutsuls across the border mostly share perceptions of forest benefits, while they differ in perceptions of environmental changes and the drivers of these changes. Hutsuls of Ukraine showed a greater connectedness and a stronger tie to the forest as an essential element of their livelihoods. Moreover, Hutsuls in Ukraine rely more on forest medicinal plants than do Hutsuls in Romania. Hutsuls' perspectives on the negative impact of current forest management policies should be a cornerstone for redesigning sustainable forest management plans.

Keywords: biocultural diversity, Carpathian Mountains, ethnobiology, local ecological knowledge, Non-Timber Forest Products

Les perceptions des peuples Hutsul de la Bukovina ukrainienne et roumaine quant aux forêts et aux utilisations des ressources de ces dernières

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Les contextes socio-économiques et politiques jouent un rôle majeur dans la perception qu'une communauté possède de l'environnement, déterminant son utilisation des ressources naturelles. Nous avons examiné les perceptions de la forêt et des ressources forestières auprès de deux communautés Hutsul dans la Bukovina, partageant des racines culturelles similaires, mais vivant dans une région qui fût divisée par la frontière Roumaine et Ukrainienne dans les années 40. 29 entretiens ouverts, et 61entretiens semi-directifs ont été menés auprès des Hutsuls de Roumanie et d'Ukraine. Les Hutsuls de chaque côté de la frontière partagent pour la plupart les mêmes perceptions des bénéfices fournis par la forêt, alors qu'ils diffèrent dans leur perception des changements environnementaux et des moteurs de ces derniers. Les Hutsuls ukrainiens démontrent une connexion plus profonde et un lien plus fort avec la forêt en tant qu'élément essentiel de leur source de revenus. De plus, ces Hutsuls d'Ukraine sont plus dépendants des plantes médicinales de la forêt que ceux de Roumanie. Les perspectives des Hutsuls sur l'impact négatif des politiques actuelles de gestion forestière devraient devenir la pierre angulaire d'une nouvelle ébauche de plans de gestion forestière durable.

Percepción de los hutsules sobre los bosques y los usos de los recursos forestales en la Bucovina ucraniana y rumana

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Los contextos socioeconómicos y políticos desempeñan un papel importante en la percepción que una comunidad tiene del medio ambiente, lo cual determina el uso de los recursos naturales. En este estudio se han analizado las percepciones sobre el uso de los bosques y los recursos forestales de dos comunidades hutsules de Bucovina que comparten un bagaje cultural similar, pero que viven en una región dividida por la frontera nacional creada entre Rumanía y Ucrania en la década de 1940. Para ello se realizaron 29 entrevistas abiertas y 61 semiestructuradas con hutsules de Rumanía y de Ucrania. Los hutsules de ambos lados de la frontera comparten en su mayoría la percepción de los beneficios de los bosques, mientras que difieren en la percepción de los cambios medioambientales y los impulsores de estos cambios. Los hutsules de Ucrania mostraron una mayor conexión y un mayor vínculo con el bosque como elemento esencial de sus medios de vida. Además, los hutsules de Ucrania dependen más de las plantas medicinales del bosque que los de Rumanía. Las perspectivas de los hutsules sobre el impacto negativo de las políticas actuales de gestión forestal deberían ser una piedra angular para rediseñar planes de gestión forestal sostenible.

INTRODUCTION

Cultural, socio-economic and political systems in which people live largely contribute to shaping how they perceive and relate to their surrounding environment (e.g., Cuni-Sanchez *et al*. 2019, Sunderland *et al*. 2014). Furthermore, the way in which people view the environment reflects different systems of valuation (Pascual *et al*. 2017). For instance, economists suggest that the monetary value of forests and forest resources influences how people relate to the forest, for which they have developed methods to calculate the economic benefit of forests (e.g., Friedrich *et al*. 2019, Hanewinkel *et al*. 2013). In contrast, there is an increasing awareness that economic estimates do not fully capture the manner in which local communities value their forest (Ritter and Dauksta 2006). This is so because forests contribute to local livelihoods in many ways beyond material provision, and thus many local communities across the world have developed strong cultural and spiritual ties to them (Cooper *et al*. 2016, Guadilla-Saez *et al*. 2019, Katila *et al*. 2014). Beyond material provision, local communities value forests because of the learning opportunities, inspiration, and the physical and psychological experiences they provide, and because they support their identities (Diaz *et al*. 2018).

Despite the importance of culture in understanding forest use and management, people's perceptions of forests have been only partially explored (e.g., Alessa *et al*. 2008, Mikusiński and Niedziałkowski 2020, O'Brien 2006, Solomon *et al*. 2018). In the European context in particular, research has addressed people's opinions on specific topics related to forests, such as the introduction of invasive species (Lundberg 2010), intensive forestry (Hemström *et al*. 2014) and the implementation of climate change adaptation strategies (Lenart and Jones 2014). However, few works have examined local communities' perceptions of forests per se (see Paletto *et al*. 2013, Mikusiński and Niedziałkowski, 2020 for exceptions). In a study conducted two decades ago, Jeanrenaud (2001) pointed out that factors such as the globalisation of timber markets, the intensification of forestry practices, the changing policies and patterns of forest governance, and the disruption of traditional values and beliefs generated profound changes affecting the people-forest relations in Europe. This has been confirmed in subsequent studies. In a study in eight European countries, Elands *et al*. (2004) found that the opinions of rural residents regarding forests were affected by the shift of employment opportunities from primary (e.g., agriculture, natural resource exploitation) to secondary and tertiary sectors. Other studies addressed the perceptions of natural forest regrowth by communities living in Southern Europe (Frei *et al*. 2020) or of forest values of small German forest owners (Joa and Schraml 2020). To continue this line of work, here we examine the relationship between local people's perceptions of forests and the use of forest resources.

The study focuses on the Carpathian Mountains, the largest temperate forest ecosystem in Europe, which has been mostly managed for centuries (Griffiths *et al*. 2014), but of which little is known regarding the perceptions of local communities towards the forest. The few studies on the topic suggest that local perceptions are linked to environmental changes. For instance, in Romania, a study of teachers' perceptions of forests revealed that local woodlands had undergone major negative changes (including clearances, destruction and degradation) driven by political factors (Dulamă *et al*. 2017). Similarly, another study found that local Ukrainian communities considered that illegal harvesting was the major threat to the economic and social development of forest areas (Chernyavskyy *et al*. 2011a).

The Carpathian Mountains are a transnational space, home to numerous ethnic groups and local communities (Filep 2009), representing an important European biocultural refugium (Angelstam *et al*. 2013, Barthel *et al*. 2013), as they are simultaneously home to high cultural and biological diversity resulting from the centuries-long interactions of local communities with the surrounding mountain environment (Melnykovych and Soloviy 2014, Skalník 1979). However, this connectedness is increasingly diminishing as local communities adopt new lifestyles in a context of shifting political and economic conditions (Balázsi *et al*. 2019).

The Carpathians are ideal for studying an important aspect often neglected by research on forest perceptions: the role of national policies in shaping local perceptions of forests and their potential impacts on forest resource use. National borders often represent biodiversity reservoirs (Liu *et al*. 2020) and are crucial for ecosystem conservation boundaries

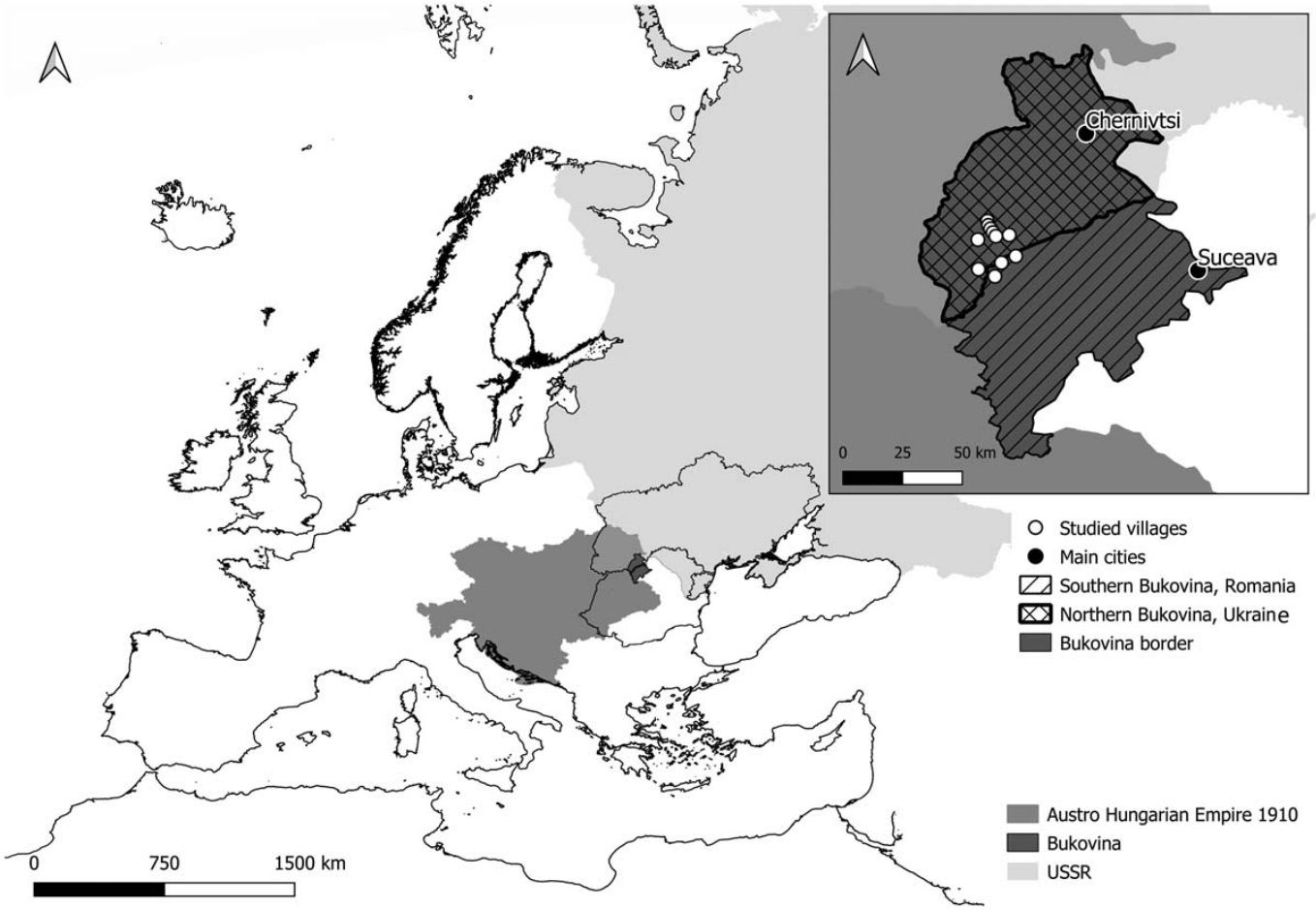
(Dallimer and Strange 2015). Indeed, over the centuries, Carpathian forests have been shaped by different governance systems, from the Austro-Hungarian Empire to the recent regulations of the European Union (Knorn 2012). Carpathian forests had a common management until the 1940s, when forests located in Northern and Southern Bukovina started divergent management under the Soviet Union and the Socialist Republic of Romania first, and then, at the beginning of the 1990s, under the Independent Ukraine and Romania. Since the split of Bukovina, there have been very little interactions between the populations residing in the two halves of the Bukovina, for which differences in how these populations relate to forest might have appeared. Understanding and detecting changes in the way local communities relate to forests around political borders may be crucial for promoting transnational policies able to preserve and promote invaluable living biocultural landscapes.

In this work, the geopolitical diversity of the Carpathians is used to assess the potential effect of state policies on local people's perceptions of the forest and the use of forest resources. The specific aims of this work are to detect similarities and differences regarding 1) local perceptions, and 2) uses of forest resources between Southern Bukovinian (SB) and Northern Bukovinian (NB) Hutsuls, living under the same political entity until the 1940s and currently split between Romania (Southern Bukovina) and Ukraine (Northern Bukovina). In the last section of this work, we discuss the implications of our results for making current forest management plans more inclusive of the perspectives of the traditional communities, such as Hutsuls.

THE CASE STUDY

Bukovina, a multicultural region of the North-Eastern Carpathians (Fisher and Röger 2019), offers an interesting case to analyse the effects of borders in forest perceptions, as its partition between two states in 1940 has resulted in uneven socio-economic changes across the border, with potential consequences on how forests are perceived and used. Bukovina is crossed by the Carpathian Mountains which traverse Eastern Europe for over 1500 km. Figure 1 summarizes the complex geopolitical history of Bukovina, a duchy of the Austro-Hungarian Empire until 1918, when it was included in the Greater Romania. In the 1940s Bukovina was split with the Northern part becoming part of the Soviet Union and the Southern part that soon was included into the Socialist Republic of Romania. Then, in 1991, when the Soviet Union collapsed, Northern Bukovina integrated the Independent Ukraine. In Southern Bukovina, the Revolution occurred in December 1989 and Romania joined the European Union in 2007.

FIGURE 1 *Historical changes of the Bukovinian territories (1775–1991) and current map of Bukovina*



Among the several ethnic groups living in Bukovina, the Hutsul have developed a specific relationship with the forest, being especially skilled in wood harvesting and processing (Bocharnikov 2012, Czubiński 2014, Figlus 2009) While they cannot be considered as indigenous peoples (see Sajeva *et al*. 2019 and the references included), they are one of the traditional peoples in Europe with a long history of interaction with the environment. Although we lack precise historical information about Hutsul settling it is generally believed that Hutsuls settled in the Carpathian highlands between the 14th and 18th centuries, where they established themselves at an altitude between 500 and 1000 m asl, mainly subsisting on pastoral activities (Figlus 2009, Hrabovetsky 1982, Lavruk 2005). Despite the political separation, the Hutsuls maintain a similar cultural identity on both sides of the border. Hutsuls are largely devoted to small-scale animal husbandry (mainly cows and sheep) and crop farming, along with the harvest of edible and medicinal forest products. In addition, young men are occasionally hired for forest activities or work in private forests on the Romanian side.

Amato (2021) reported that the term 'Hutsul' has its roots in words meaning 'bandit' and 'thief', also commonly used to refer to other pastoral societies, probably in relation to the practice to graze other's land (Aime *et al*. 2001). However, Hutsuls are better known as the 'wild people of the forest', as they have a long history of dependence on forest resources from both an economic and a cultural perspective (Drăguşanul 2011, Saghin *et al*. 2017),

Hutsuls speak an unwritten language. In addition, Hutsuls living in Romania also speak Romanian, and Hutsuls living in Ukraine speak Ukrainian, their respective languages of school instruction.

Hutsuls are defined not only by their language, but also by their music and its songs, clothes (which enables identification of the village of origin based on distinctive features), and handicrafts (woodcarving, painted eggs called 'Pysanka', specific Kosiv Hutsul ceramics which included into UNESCO List of the Intangible Cultural Heritage of Humanity and handmade national embroideried clothes) (Haratyk 2014). Traditional handicrafts play an important role in the forming of identity and is influenced by local flora and fauna and human interconnections with surrounding nature. Among the agricultural activities which mostly contributed to the Hutsul identity, there is the Hutsul horse breed, a very strong equine that plays an important role in both forestry and hay-making activities.

The current population in the Hutsul area is approximately 28 700 people, about 7300 in Romania (based on our own estimations due to the lack of an accurate census, see Saghin *et al*. 2017) and about 21 400 in Ukraine (based on the National Ukrainian Census 2001). In this article, the names of the countries (Romania and Ukraine) are used only to indicate a geographical location, while the abbreviations NB (Northern Bukovina, currently in Ukraine) and SB (Southern Bukovina, currently in Romania) are used to distinguish Hutsuls living respectively in Ukraine and in Romania.

Forests dominate the Bukovinian Carpathians landscapes. Forests in the study area mainly consist of *Picea abies* (L.) H. Karst. (65%), *Fagus sylvatica* L. (15%), and *Abies alba* Mill. (18%), with some individuals of *Quercus* spp., *Carpinus betulus* L. and *Alnus glutinosa* (L.) Gaertn (2%).

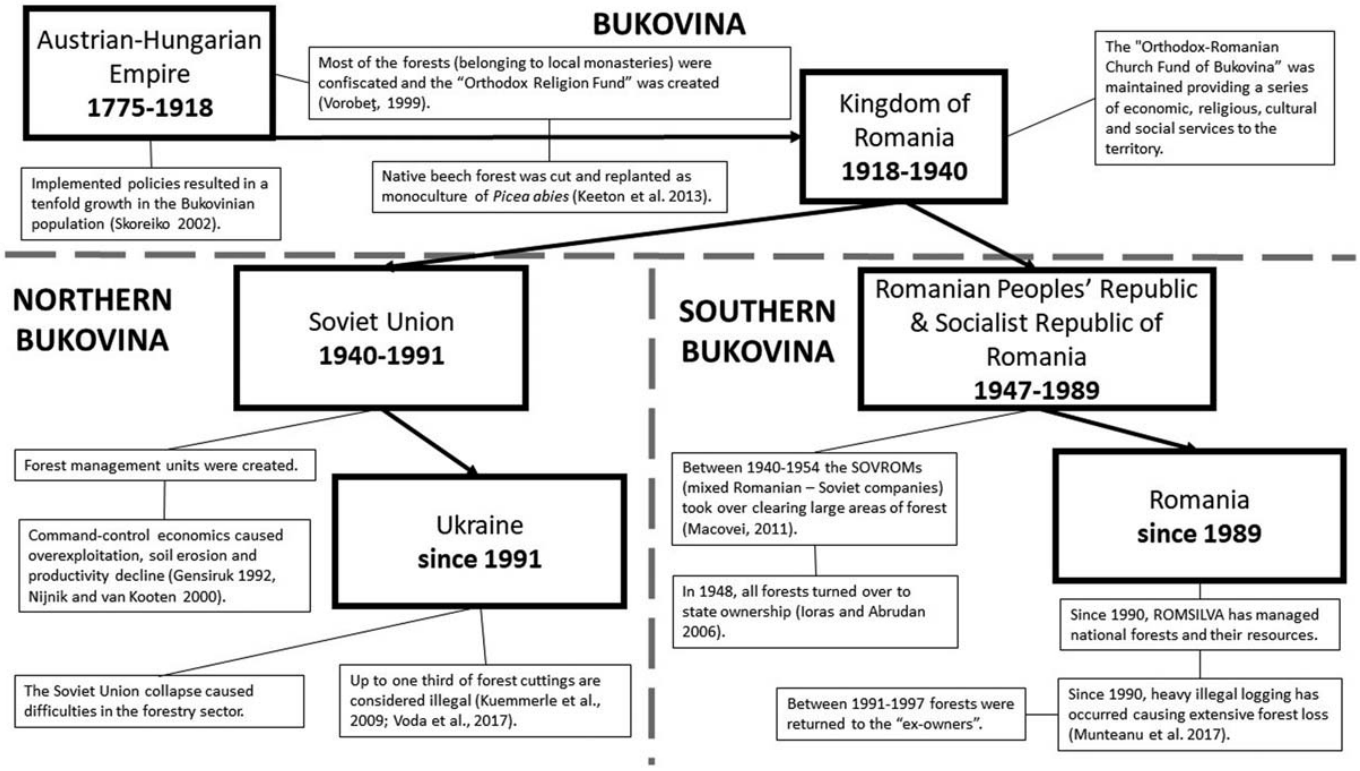
However, the complex geopolitical history of Bukovina has also complicated the history of forest management, including land ownership and access. Figure 2 illustrates the main impacts of socio-political changes on the Bukovinian forests over the last 250 years.

Bukovinian forests are highly altered and disturbed landscapes as anthropogenic impacts on vegetation have been significant since the 18th century (Solodkyi 2012). Currently the forest of the study area are state-owned on the Ukrainian side where the state forestry enterprise 'Putyla Forestry' harvests 60 000 m^3 of logs annually in a forested area of 32 114 ha (see appendix table 1). A timber processing facility in the area processes 150 000 m^3 of wood annually, mostly for export (State Forest Fund of Ukraine 2018). In the area, Cheremosky National Nature Park was founded in 2011. On the Romanian side, 85% of the forest area is owned by the State, under the control of the National Forest Administration (ROMSILVA), while around 20% is owned by private actors, including local Hutsuls inhabitants. The national forest is locally administrated by forestry enterprises of Falcau and Brodina which manage over 21 800 ha in the municipalities of Brodina, Ulma and Izvoarele Sucevei. In the area there is a special avifaunal protection area named Obcina Feredeului. On both sides of the border, it is currently possible to harvest forest food and medicinal plants for personal consumption in the state forests, although official authorizations are required for gathering with commercial purposes. Firewood collection is forbidden. In the Romanian private forests, owners can forbid the harvest of forest products. Hutsuls have, therefore, the right to harvest forest products such as berries, medicinal herbs or mushrooms in any state-owned forest for personal consumption, while they can also harvest firewood onlyfrom their own forest (if owned, in Romania). Similarly to Ukraine, collection of berries and mushrooms for commercial purposes are allowed with special permit, called 'ticket', which can be obtained from state forestry enterprise. This also applies to church owned forests which are considered private. In Romania the forest use is regulated by the order 767 of the ministry of waters and forests, which was promulgated in summer 2018.

In Romania, forest management plans last for 10 years and are compulsory for all forest larger than 10 ha (Bouriaud *et al*. 2013, Nichiforel *et al*. 2020). These plans, based on technical prescriptions, define the amount of timber which can be harvested and the owner cannot subsequently change the management goals (Bouriaud *et al*. 2013). National forest administration or licensed foresters are responsible to select, mark and record trees to be harvested (Nichiforel *et al*. 2020).

As in Romania, Ukrainian forestry enterprises manage forest following a ten-year management plan, developed by the independent planning and management organization 'Ukrainian State Project Forest Management Production Association VO 'Ukrderzhlisproekt'. These management plans include qualitative and quantitative characteristics of each forest patch, planning management activities and harvesting details. The management plan takes into account the specific economic and ecological conditions of each area (Shparyk 2014).

FIGURE 2 *Impact of socio-political changes since the 18th century on land ownership and access to forests by Hutsul communities in Bukovina*



METHODS

Data collection

Data were collected within the framework of the ERC-funded project, DiGe, which aims to understand the mechanisms of change in ethnobotanical knowledge experienced by small ethnic groups under centralized governance of the Soviet Union and in bordering countries (see Mattalia *et al*. 2020, Stryamets *et al*. 2021). To assess local perceptions of forests and uses of forest resources, in summer 2019 open-ended interviews were conducted with Hutsuls from Bukovina living on both sides of the Romanian-Ukrainian border.

Data were collected from two different samples. First, to capture people's perception of and relation to forests, 29 participants were selected using convenient sampling initially and later the snowball sampling technique (Noy 2008). Fifteen open-ended interviews were conducted in the municipalities of Brodina, Ulma and Izvoarele Sucevei (Suceava, NE Romania) and 14 in the municipality of Putyla (Chernivtsi, SW Ukraine). Open-ended interviews were more suitable for understanding the perceptions related to the forest. Second, semi-structured interviews and participant observation were used to collect information about forest resource use (see Mattalia *et al*. 2020, for the ethnobotanical description of food and medicinal plants used by Hutsuls). This was considered the most suitable method because it helped the interviewee to elicit plants and uses. Purposive sampling was employed to select 30 Southern Bukovina (SB, in Romania) and 31 Northern Bukovina (NB, in Ukraine) Hutsuls locally recognized as knowledgeable. Interviews addressed uses of edible and medicinal forest plants, parts used, preparation mode and medicinal purposes. The interviews were conducted in Romanian and Ukrainian. Voucher specimens were gathered with interviewees, also noting plant species habitat. For the purpose of this work, a forest taxon is defined as a plant taxon which grows in the forest or at the edge of the forest according to the perception of the interviewees.

In Romania, the same people were interviewed for the two parts of this research, while in Ukraine there was only partial overlap between participants, as the research was carried out during two different visits (2018–2019). Data were collected following the ethical guidelines prescribed by the International Society of Ethnobiology (2006). The data collection protocol was approved by the Ethical Committee of Ca' Foscari University of Venice.

Data analysis

Data from open-ended interviews were used to assess how Hutsuls on both sides of the border perceive forests. The comparison of responses enabled us to identify 1) the perception of the forest by both groups and whether they are common to both the groups across the border or not, 2) which forest plants are considered edible by one or both groups, 3) which food preparations are common to both communities or only reported on one side of the border, and 4) what proportion of forest food and medicinal plant taxa are used in each community. Transcripts and notes from interviews were manually organized and coded (classified), in Microsoft Excel, according to the main topic raised by the interviewees. An inductive

approach was used to identify the most relevant topics appearing in narratives in relation to forest perceptions. The first and last authors identified keywords according to the overlapping meaning of the textual citations. To minimize language biases, expressions with similar meaning were combined under the same keywords. One narrative could include several keywords and therefore could be classified in different categories. The categories were organized into three main topics: forest benefits, observed ecological changes, and drivers of change. When reporting citations, the area (NB for Northern Bukovina and SB for Southern Bukovina) is indicated along with the gender of the interviewee and their year of birth.

To assess people's use of forest resources, an ethnobotanical database was created in Excel. The database included the scientific name, parts used, and preparation mode reported by SB and NB Hutsuls separately. Each line of the database is considered a Detailed Use Report (DUR) which includes all details of a plant species use. Information on the same taxon from each side of the border was combined to identify similarities and differences. Specifically, for medicinal plants cited, a list was generated and the emic medicinal use was added, which was classified according to the etic categories of ICD-11 (World Health Organization 2018).

RESULTS

Hutsul forest perceptions

Hutsul narratives on forests resulted in 59 keywords organized into three main topics: forest benefits, observed ecological changes and drivers of change (Table 1).

Forest benefits

Many narratives included references to forest benefits, or the many ways in which forests contribute to local people's livelihoods. Specifically, in the narratives provided by both Southern Bukovinian (SB) and Northern Bukovinian (NB) Hutsuls, we found 22 different keywords that referred to economic, aesthetic and cultural benefits provided by forests (Table 1). More than half (12) of the keywords referring to forest benefits were shared by Hutsuls on both sides of the current Romanian-Ukrainian border. In particular, both communities agreed on the importance of gathering forest resources, especially berries, edible mushrooms and arnica, as an income-generating strategy. For instance, a middle-aged Hutsul woman stated "*People who do not have a lot of land go to harvest (mushrooms). They earn money from this activity. They harvest all summer long*" (SB woman, 1972). Respondents, however, also referred to some problems derived from the commercialization of forest resources, including overharvesting. For example, SB Hutsuls consider that the commercialization of forest products is not very profitable: "*It is possible to sell mushrooms. The 'colectorul'* (a person who directly buys from locals to resell to factories) *comes and buys them. He earns a lot of money because he buys at 20 lei and sells at 40–50 in Campulung*" (SB man, 1978). On the other side of the border, an interviewee argued that "*There are no more blueberries because the zahotivelniki* [заготівельники] (people who buy forest products from locals) *are buying too many blueberries and there are no more in the forests*" (NB woman, 1978). Several NB interviewees pointed out the need for intensive harvesting of forest products (especially blueberries) to earn cash, for which some people even collect green fruits.

TABLE 1 *Topics and categories of the narratives related to forests among Hutsul interviewees living in Northern (NB) and Southern Bukovina (SB)*

Topic	Category		SB Hutsuls (RO)	NB Hutsuls (UA)
Forest benefits	Economic benefits	Contribution to the local economy	27	22
		Contribution to health and food security	10	12
	Cultural benefits		9	9
	Aesthetic benefits		1	3
Observed ecological changes	Changes affecting forest food and medicinal plants and fungi		6	14
	Changes affecting forest tree species		4	8
Drivers of change	Management changes	Changes in forestry activities and intensity	22	13
		Changes in tools and techniques	9	4
		Changes in regulations (related to political changes as well)	8	4
		Changes in knowledge	0	4
	Climate change		7	4
	Political changes		8	3
	Socio-economic changes		2	4

The importance of forests and forest products (including timber, wild food plants, medicinal plants and mushrooms) for nutrition and health was repeatedly mentioned in both Hutsul communities. Hutsuls recognise the singularity and authenticity of their forest products, which they consider as having curative power. Indeed, most of the interviewees showed a sense of pride for their territory, highlighting the deliciousness of its food and the strong curative power of its medicinal plants.

Cultural benefits appearing in narratives from interviewees on both sides of the border highlight the similar views of the two Hutsul communities on this topic. Thus, respondents from both communities mentioned culturally-based appreciation for forests and forest resources, such as the tastiness and high quality of local forest products. For instance, a middle-aged SB woman exclaimed: "*Boletus! Look! How good! What a scent! What a taste!*" Cultural appreciation was also highlighted in the expression of negative feelings towards forest destruction. Several SB Hutsul respondents used the word *distrusă* – 'destroyed' to refer to the forest, also in the context of human-induced changes. "*Forest is not managed, forest is destroyed*," expressed a group of elders, judging the current process of exploitation. A NB woman (1972) proposed making more careful use of forest resources, including reserving the use of mushrooms only for special occasions such as Holy Evening, to reduce gathering impact. A NB woman (1975) reported: "*My heart aches. We have such a factory for medicinal plants and they pull up everything in a row in such a way that makes my heart ache*".

Finally, aesthetic benefits were especially reported by NB Hutsuls. These benefits particularly refer to the "such a good air" (which they connect to the presence of the forest), but also to the pleasure of walking in the forest and to their satisfaction with the landscape. For example, a SB woman simply stated that the place where she resides (i.e., Upper Suceava valley) is "*Such a good place to live in!*"

Observed ecological changes

A predominant topic of Hutsul forest narratives involves the many ecological changes observed in local forests, and how these changes affect both the forests themselves and their resources (Table 1). NB Hutsuls generally summarised the changes observed by saying that "*The forest is no longer healthy*" (NB woman, 1965). A SB Hutsul noticed that "*The forest is young. Once the forest was old, but the forest is now clear cut. Everything is cut, so it remains empty*" (SB man, 1934).

Moreover, changes have also been noticed in specific elements of the forests: "*The forests have changed. The forests have a lot of clear-cuts now, so there are no more blueberries. Instead, raspberries are growing in the clear-cuts*" (NB woman, 1965). Along the same lines, in Ukraine a peculiar change in moss was reported by a woman: "*There are no mushrooms in the forest this year. There is a lot of moss, and trees are getting rotten because it was too rainy. Normally, only hundred-year-old trees get moss*" (NB woman, 1964). Another interviewee observed that ecological changes resulted in a shift in the mushroom harvesting season. During an interview in the month of July, an informant noted that "*Normally, they should have appeared already. There used to be plenty. They used to harvest so many mushrooms! In other rainy seasons like this, it was full. But now I don't see them*" (SB woman, 1982). Conversely, on the Ukrainian side of the border one interviewee mentioned "*Everything comes now earlier*" (NB man, 1972).

Drivers of change

Four different drivers of change dominated interviewee narratives: management, climatic, political and socio-economic drivers (Table 1). Among SB Hutsuls, the most frequently mentioned drivers of change refer to changes in the way the forest is managed. Climate change was also mentioned as a more recent driver of change.

Before presenting the changes in forest management, it is important to note that these are strongly related to political changes. For instance, the transition from the Soviet Union to independent Ukraine was reported as a shift from a long-term management model to an "*economy-driven only*" management model (NB man, 1965). Political changes were especially reported in Romania, where several interviewees noted that forest resources have been managed in a different way *după Revoluție*, i.e., after the 1989 Revolution.

Four different aspects of forest management were mentioned as having shaped the current status of forests: changes in forestry activities, changes in tools and techniques used for forest management, changes in forest regulations, and changes in local knowledge regarding the forest. First, informants reported changes in forestry activities and the intensity of forest management. "*The forest has been cut*" was the most common observation in Romania, reflecting the extreme intensity of forest management. On both sides of the border, respondents stressed the impact of such intense management on forest resources. According to informants, cleaning the forest by cutting small areas was a better technique that clearing large plots, as it is done now. This is so because, when large plots are cut, berries and mushrooms cannot grow easily because of greater exposure to direct sunlight. Informants also mentioned that in the past, before the collapse of the Soviet Union and the revolution in Romania, replanting was performed annually, whereas now people no longer replant, as "*It is all about money*." On both sides of the border, illegal logging was also mentioned. Indeed, NB Hutsuls reported to have noticed that, during Soviet times, the forest was better managed for long-term exploitation, while now, much more attention is paid to obtaining an economic return in a short time.

Second, SB and NB Hutsuls reported changes in the tools and techniques used for resource extraction, and particularly timber extraction. Traditionally, local people used to harvest wood only during winter. In contrast, Hutsuls mentioned that now companies extract logs for timber throughout the year, which results in woody varieties with more accentuated shrinking and swelling of wood that is harder to process. Some SB informants reported that new logging techniques were implemented in the 1980s and 1990s, when the timber sector was a vital source of local employment. One informant

said, "*In the time of Ceaușescu (1967–1989), there was a lot of work in the forest here. Many people worked. But now, people* (of the timber companies) *introduced strong tractors that make roads, get the trees: 10 trees; 20 m³ at once [. . .]. And in the time of Ceaușescu, it was not like that. People walked with horses and shipped* (the trees) *to the river. Everything was manual. And there were jobs. Now there are not*" (SB man, 1957).

Third, informants mentioned that changes in regulations, heavily affected by political changes, were important drivers of forest change. This was especially perceived in Romania, where forest ownership has partially changed since the time of Ceaușescu. Interviewees reported that with these changes they are not free to manage the forest or its resources because the management is done by private owners or state forestry districts. For example, they complained that they need official authorization to sell forest products in Romania. One informant said "*We are afraid that they* [the government] *will forbid us to do so* [to pick mushrooms and berries] *and this is the last thing we have from the forest. They created a national park but I don't know if it will be for bad or for good*" (NB man, 1942).

Fourth, changes in forest management are also related to the loss of local knowledge. For example, Hutsuls observed that there are fewer mushrooms because "*People don't know how to use them* (the mushrooms) *properly*" (NB woman, 1978). As a NB woman (1975) reported: "*Arnica was very curative. [. . .] a little bit is very good as an emollient. Hutsuls knew that it cannot be uprooted. And now these barbarians are uprooting everything in a row.*" Such lack of local knowledge was typically expressed by contrasting "us-Hutsuls" and "them-the others", mainly referring to other Ukrainians. These narratives report that while Hutsuls know how to use resources properly, "they-the others" do not.

The people interviewed rarely mentioned climate change as a driver of forest change. Nevertheless, several informants mentioned that "*the climate has changed*", and particularly the amount and intensity of rain. According to informants, these changes also drive some changes in the forest. For example, one informant reported that windstorm strength can now "*kill the forest*" (SB woman, 1950). Interviewees from Southern Bukovina showed us patches of forest destroyed by a windstorm that occurred a few years ago and mentioned that these events are increasingly more frequent. Indeed, some Hutsuls reported to have perceived such climate changes for the last 10–15 years.

Use of forest resources among Hutsuls

Hutsuls living on both sides the border use forest plants for food and medicinal preparations (see Appendix), although there are some important differences between the two groups. NB Hutsuls reported about 30% more forest medicinal plant DURs and taxa and about 21% fewer forest food DURs than SB Hutsuls (Figures 3 and 4).

Forest medicinal plants

Forest medicinal plants were mentioned in both communities for treating several disorders, primarily of the digestive and respiratory systems, as well as for general health. Among SB

FIGURE 3 *Distribution of food and medicinal use of resources among Hutsuls of Southern Bukovina, Romania (DUR, frequency of occurrence*

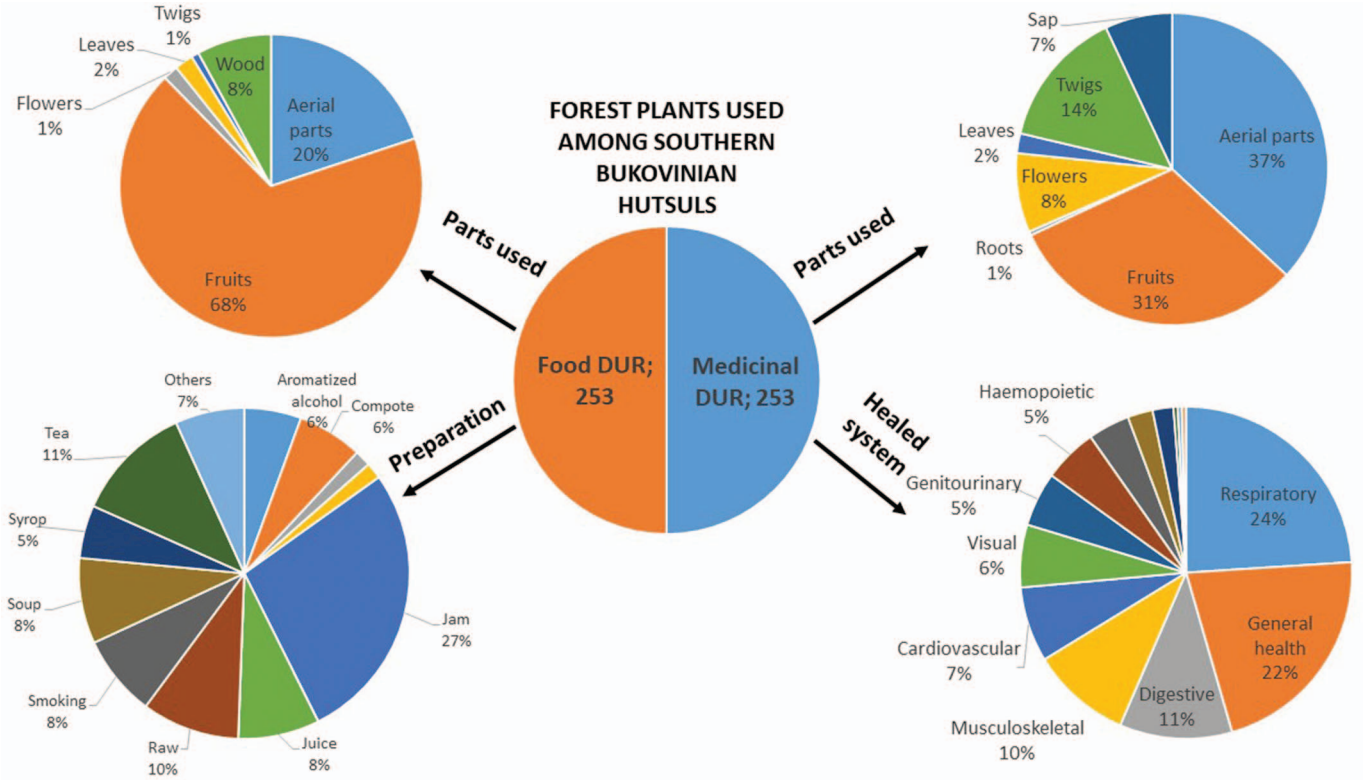
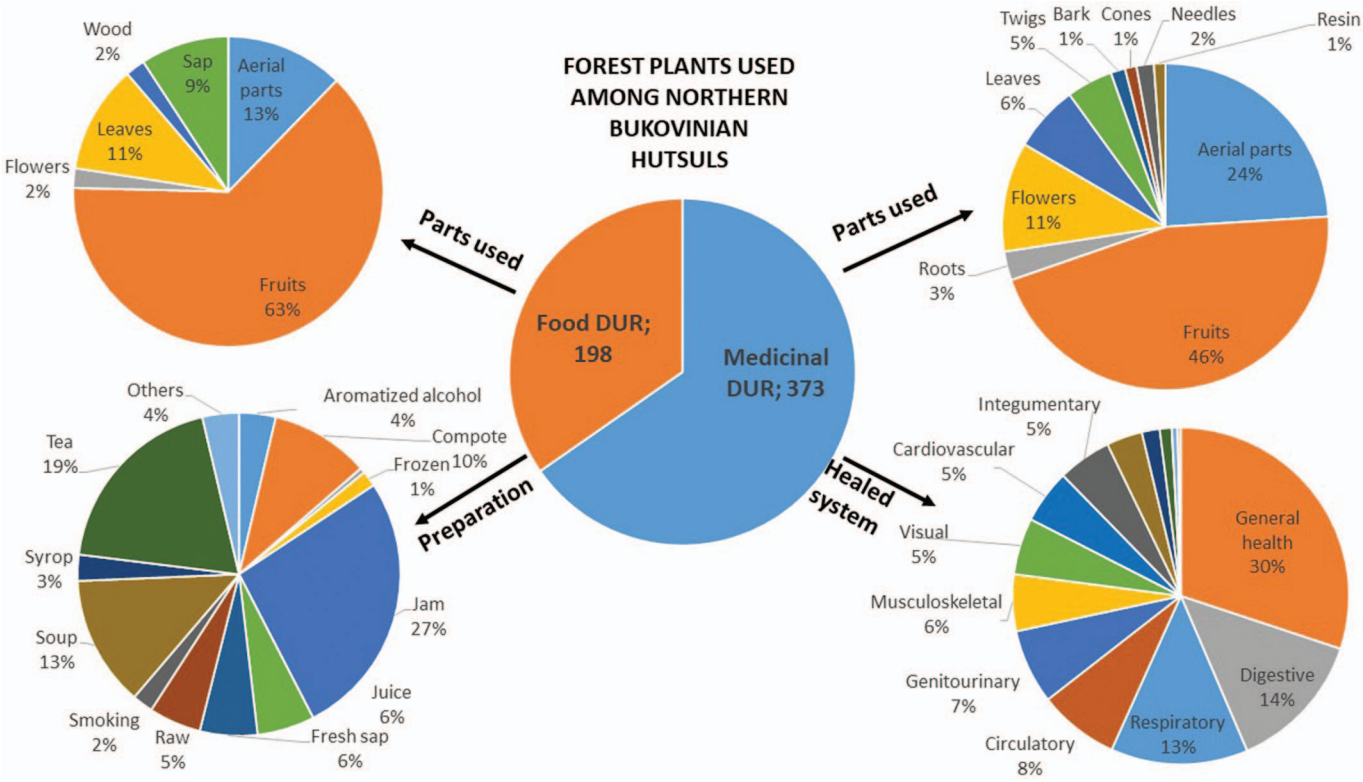


FIGURE 4 *Distribution of food and medicinal use of resources among Hutsuls of North Bukovina, Ukraine (DUR, frequency of occurrence)*



Hutsuls, 253 medicinal DURs were recorded, corresponding to 16 taxa, including three taxa with medicinal uses only (*Abies alba*, *Betula pendula* Roth and *Pinus sylvestris* L.). The taxa most frequently mentioned as medicinal include *Vaccinium myrtillus* L., *Urtica dioica* L. and *Rubus idaeus* L. The plant part most commonly used for medicine was the fruit, followed by aerial parts (of seven taxa including *Urtica dioica*, *Fragaria vesca* L. and *Equisetum* spp.), and coniferous twigs. Medicinal uses of forest taxa mainly targeted the respiratory system and general health. As for the digestive system, the plant most reported for its curative properties was *Vaccinium myrtillus*, which was also mentioned as being useful for vision.

Among NB Hutsuls, 373 medicinal DURs from 23 taxa were recorded. The most used plant part was fruit, which represented over 46% of all DUR, including the fruit of six species of forest berries. The aerial parts of 15 taxa were employed in several preparations including teas. Flowers of ten taxa were also used for various medicinal purposes in tea preparations. Among NB Hutsuls, 30% of taxa were considered useful for general health, of which *Rubus idaeus* was the most quoted. Among NB Hutsuls, the main use of forest medicinal plants was to treat general health issues, whereas among SB Hutsuls the most common use was to treat problems of the respiratory system. In both communities, the digestive system was also treated using forest species, and in particular *Vaccinium myrtillus*. Indeed, this is the most important taxon among NB Hutsuls who mentioned 104 medicinal DURs for *Vaccinium myrtillus* compared to 45 medicinal DURs among SB Hutsuls. Another important category among NB Hutsuls was circulatory disorders (especially hypertension) often treated with forest medicinal plants (particularly *Viburnum opulus* L.). *Arnica montana* L. was used to treat the musculoskeletal system among SB Hutsuls.

Forest food plants

Romanian and Ukrainian Hutsuls reported the use of 17 and 22 forest food plant taxa, respectively. In both Hutsul communities, the most common preparation of edible plants was jam followed by tea and soup. Among SB Hutsuls, 253 DURs were recorded for food preparations. About 25% of DURs involved the preparation of jam from forest berries and *Picea abies.* Another important food category was tea. Ten percent of the DURs referred to forest berries eaten raw. Forest fruits were the most represented plant part (58%) followed by aerial parts (mainly *Urtica dioica* as soup and forest fruits prepared as teas). Among NB Hutsuls, 191 DURs were recorded for food preparations. Almost two out of three mentioned plant parts used were forest fruits, while aerial parts and leaves represented 11% and 10% of the reported DURs, respectively. Twenty-eight percent of the reported DURs were used for jam, 20% for tea, and 14% for soup. NB Hutsuls mentioned the preparation of tea from 13 taxa including forest fruits and other forest plants. The comparison of forest resource uses shows that SB Hutsuls reported about 25% more forest food DURs (= 75 DURs) than did NB Hutsuls, even though the latter reported the use of five more taxa compared to those living in Romania. This means that SB Hutsuls used food taxa more homogeneously than did NB Hutsuls. In both communities, the most important edible plant resource

of the forest was forest fruits, which were important not only for their berries but also for their aerial parts, which were sometimes used as teas.

DISCUSSION

Results from this work show that Hutsuls across the Romanian-Ukrainian border mostly share perceptions of forest benefits, while their reports on environmental changes and the drivers of these changes diverge. In addition, NB Hutsuls rely more on forest medicinal plants than do SB Hutsuls, who use forest plants for food and medicinal purposes in a more balanced way.

Before discussing these results, we note three methodological caveats that might affect our findings. First, we acknowledge limitations in data collection associated with the use of open-ended interviews, and particularly with the fact that this technique does not allow for the reliable quantification of information. Despite this limitation, this methodological technique was chosen as it allows for better conversational flow and more nuanced information on the interviewees' perceptions. Second, we also acknowledge that our interpretations of interviewees' narratives might be affected by our dependence on translation. While the interviews were conducted in Romanian and Ukrainian, the topic of the forest is strongly embedded into Hutsul culture, so it is possible that it might have been better explained by the interviewees in their native Hutsul language. Finally, we are also aware that because our sample was not randomised, the perceptions presented here lack external validity.

The three main findings and their interpretations are summarized in table 2.

The first important finding of this work is that SB and NB Hutsuls share the perception that forests are vital for their livelihood, providing many benefits in economic terms, but also in terms of food security and health. Despite the overall similarity, a detailed analysis suggests an important difference. In Northern Bukovina, currently in Ukraine, commercialisation of forest products, such as mushrooms and berries, is a more important source of cash income than in Southern Bukovina, currently in Romania. Indeed, while the sale of forest products was reported in both communities, among SB Hutsuls it was considered mostly as a complementary source of income, whereas among NB Hutsuls it was considered a primary source of income. The sale of forest products link the Hutsuls with international markets through dealers who buy forest products from places located in very remote areas and sell to bigger buyers which will prepare the product for export (see Cioacă and Enescu 2018, Zhyla *et al*. 2018). Ethnobotanical data also suggest differences in uses of forest resources for household consumption, with SB Hutsuls mentioning 30% more food uses, but NB Hutsuls showing a predominance of the medicinal use of forest products, probably due to their lower access to money and larger number of barriers to access the healthcare system (Anzenberger *et al*. 2011). In other words, our ethnobotanical data reinforces the idea that NB Hutsuls are more dependent on forest resources than SB Hutsuls. For NB Hutsuls forest resources have a safety – net function as well as cash generation role.

The difference between NB and SB Hutsuls might be recent and probably linked to political changes. Indeed, the harvest of wild plants for medicinal purposes decreased in Romania for the decade 2009–2019 (our analysis on Romanian Forest Authority (ROMSILVA) data), whereas forest products still seem to play a crucial role in Ukraine,

TABLE 2 *Main findings and their interpretations of local perceptions and uses of forest resources among Hutsuls living in Northern and Southern Bukovina (currently in Ukraine and Romania respectively)*

MAIN FINDING	INTERPRETATION OF THE FINDING
SB and NB Hutsuls share the perception that forests are vital for their livelihood, providing many benefits in economic terms, but also in terms of food security and health.	• The commercialisation of forest products, is a more important source of cash income among NB than SB Hutsuls probably due to the different political (and economic) history • NB Hutsuls show a predominance of the medicinal use of forest products probably because of their lower access to money and more barriers to access the healthcare system
NB Hutsuls who live in Ukraine perceived more ecological changes than SB Hutsuls who live in Romania.	• NB Hutsuls might have reported more changes simply because forests on the Ukrainian side have undergone more changes than forest in the Romanian side, perhaps due to a different management history since the 1940s • It is also possible that NB Hutsuls perceive more changes in forests because of the major importance of the forest and forest resources for their livelihoods. NB Hutsuls have less diversified sources of income compared to SB Hutsuls. Therefore, the gathering and commercialization of berries and mushrooms play a fundamental role in sustaining their livelihoods, constituting one of the sole sources of monetary income, as Hutsuls living in Ukraine appear to depend heavier on their surrounding environment
Hutsuls living in Romanian emphasized the drivers of forest change.	• Clear cuts (among SB Hutsuls) and the overexploitation of forest resources (among NB Hutsuls), both refereeing to changes in management, were among the most quoted drivers of change • The importance of the drivers of changes among SB Hutsuls could be explained by the more abrupt political changes with regard to forests which occurred in Romania

despite the perceived deterioration of their forests (Melnykovych and Soloviy 2014, Stryamets *et al*. 2015). In that sense, forest uses in Romania might be converging with the use of forest resources in other European countries, where plant gathering is mainly a recreational activity (e.g., Turtiainen and Nuutinen 2012, Remm *et al*. 2018), whereas forests uses in Ukraine correlate with the trends in Eastern Europe, where wild edible plants picked in the forest are an important source of income and food (e.g., Stryamets *et al*. 2015). We argue that such difference might be largely explained by the major social and political changes occurring in Romania (Sandu *et al*. 2020) and fostered by an emigration process that has promoted changes in mentality (Pescaru 2018). These changes are more limited in Ukraine, which does not belong to the European Union and has a limited migration flow compared to Romania.

The second important finding of this work is that NB Hutsuls who live in Ukraine perceived more ecological changes than did SB Hutsuls who live in Romania. Those changes were found to affect forests (e.g., changes in the mean age of the trees) and forest resources (e.g., decreased abundance of food and medicinal wild plants). We suggest two potential explanations for this finding. NB Hutsuls might have reported more changes simply because forests on the Ukrainian side of the border have undergone more changes than forest in the Romanian side, perhaps due to a different management history since the 1940s. Indeed, in Northern Bukovina, after the collapse of the Soviet Union, the forestry enterprises started relying on their own economic resources due to the changes in the financial support from the State (Chernyavskyy *et al*. 2011b). This led to an intensification of forest resource use and to a decrease of forest employees. In addition, the forest management changed, for instance they switched from the planting of trees to natural regeneration (Shishkaninets 2011, Lavny 2019). Therefore, this resulted in an uneven forest management across the Romanian-Ukrainian border which may have led to the different perception of forest ecological changes between the two Hutsul communities.

It is also possible that NB Hutsuls perceive more changes in forests because of the major importance of the forest and forest resources for their livelihoods. It has been argued that people whose livelihoods depend on local resources are better observers of environmental change (Alessa *et al*. 2008, Shukla *et al*. 2019). Since 2007, Hutsuls living in Romania have been subsidized by the European Union for managing their meadows (e.g., making hay), subsidies becoming a relevant source of income for the rural population. Indeed, many Hutsuls visited in Romania were nearly self-sufficient for staple food production, and, at the same time, obtained cash from selling milk to a nearby factory through EU agricultural subsidies and from the remittances sent by relatives working in other European countries. These sources of income, together with the employment shift occurring in Romania with youth outmigration, might have impacted SB Hutsuls perception of forest ecological changes, as the time spent in the valley and in the forest is now reduced. Conversely, in Ukraine, NB Hutsuls have less diversified sources of income, which are indeed limited to the few resources such as forest products and vegetable and animal products provided by mountain family farming. In this economic context, the gathering and commercialization of berries and mushrooms play a fundamental role in sustaining their livelihoods, constituting one of the sole sources of monetary income, as Hutsuls living in Ukraine appear to depend more heavily on their surrounding environment.

The third important finding of this work is that drivers of changes in forest management, while mentioned by Hutsuls belonging to both communities, were especially important in Romania. Clear cuts (among SB Hutsuls) and the overexploitation of forest resources (among NB Hutsuls), both relating to changes in management, were among the most quoted drivers of change. The finding is not new, as changes in management techniques (e.g. Babai 2017, Melnykovych *et al*. 2018, Nijnik van Kooten 2000), as well as illegal logging (Knorn 2012, Kuemmerle *et al*. 2009) have been reported in studies across several areas of the Carpathians.

It is interesting to note that while Hutsuls living in Ukraine observed more changes in forests, those living in Romania observed more drivers of forest changes. Given that political changes affecting forest were more quoted in Romania, the apparent contradiction in findings could be explained by the more abrupt political changes with regard to forests which occurred in Romania. Despite other political changes, forests are still fully state-owned in the Ukrainian study area, for which Hutsuls may not have perceived tumultuous changes in management as the access to forest resources is not limited. The situation is different in Romania where there has been a process of forest privatization which has affected people's ability to use the forest and its resources (Munteanu *et al*. 2016, Nichiforel *et al*. 2020). Indeed, Palaghianu and Nichiforel (2016) have already noted that the change in the Romanian political system in 1989 resulted in important challenges in the forest sector, such as the chaotic management of the process of forest restitution and the major governance failures in fostering responsible forest management. Together, such political differences might explain that Romanian informants mentioned more drivers of forest change.

Overall, analysing the perceptions of the changes in forests and the drivers of these changes is crucial to improving our understanding of how political changes have affected the relationship between Hutsuls and the forest. In Romania, political changes have resulted in the privatization and mechanization of forestry activities, leaving Hutsuls 'on the edge of the forest' with forests being increasingly exploited by foreign companies through local companies. Consequently, Hutsuls living in Romania perceive the forest as an important element which supports their identity, but less so their economy. Conversely, in Ukraine, Hutsuls showed a greater connectedness and a stronger tie to the forest. Hutsuls living in Ukraine mentioned forest overexploitation, especially with regard to berries and mushrooms, and underlined the essential role of gathering from the forest for their livelihoods.

It is worth noticing that, regardless of their material dependence on forest, both Hutsul communities consider the current forest management as unsustainable due to the clear-cuts, overexploitation of forest fruits, lack of reforestation policies and illegal logging, which can also be considered

as a consequence of political changes. This trend is confirmed by several recent publications both in the academic (e.g., in Romania Bouriaud 2005 and in Ukraine Kuemmerle *et al*. 2009) and general publications (e.g., Greenpeace Romania 2019, Walker 2020, Bezpiatchuk 2020, Replianchuk and Kokhan 2018, Earthsight 2018).

In their narratives, Hutsuls made clear evaluations of past and present management techniques and the impacts of such techniques on forests and forest resources. Such insights could represent important elements for contribution of Hutsul traditional knowledge to the sustainable forest management. Given the Hutsuls' deep understanding of their interactions with local forestlands, they could make an invaluable contribution to the implementation of sustainable forest management practices. Indeed, the inclusion of perspectives of local communities, with their centuries-long co-evolution with the surrounding environment, in the forest-related policy making arena has already been suggested (Elbakidze and Angelstam 2007, Johann *et al*. 2012, Melnykovych *et al*. 2018). Moreover, the divergences found in the Hutsul communities living across the border suggest the need for context-based strategies for the involvement of local communities in this process, which is crucial in post-socialist countries (Vasile 2008).

CONCLUSIONS

Overall, our results show that Hutsul perspectives on forest benefits are similar on the two sides of the Romanian-Ukrainian border, yet the perceptions of forest ecological changes and the uses of forests resources differ. We argue that the divergent perceptions of forest ecological changes could be largely due to changes in forest management which were implemented differently in the separated political contexts in which the two Hutsul communities have lived in the last 80 years. Indeed, border creation which occurred in the early 1940s has resulted in different socio-economic conditions in the two Hutsul communities, which have remarkably influenced the use of forest resources and their connectedness to forestlands.

On both sides of the border, Hutsul perspectives on forest management and its impacts on forest resources should be increasingly taken into account in landscape management plans.

Local societies' impacts on forest and forest management impacts on social groups are important aspects that should be considered in landscape management decisions, particularly in hotspots of biological and cultural diversity. As political borders affect environmental management schemes, the different perspectives of forest management across borders should be considered in decisions regarding the management of ecologically similar landscapes.

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REFERENCES

AIME, M., ALLOVIO, S., and VIAZZO, P.P. 2001. *Sapersi muovere: i pastori transumanti di Roaschia*. Meltemi Editore, Roma, Italy.

ALESSA, L., KLISKEY, A., WILLIAMS, P., and BARTON, M. 2008. Perception of change in freshwater in remote resource-dependent Arctic communities. *Global Environmental Change* **18**(1): 153–164.

AMATO, A.J. 2021. *The Carpathians, the Hutsuls, and Ukraine: An Environmental History.* Lexington Books, Lernham, USA.

ANGELSTAM, P., ELBAKIDZE, M., AXELSSON, R., ČUPA, P., HALADA, L., MOLNAR, Z., PATRU-STUPARIU, I., PERZANOWSKI, K., ROZYLOWICZ, L., STANDOVAR, T., SVOBODA, M., and TÖRNBLOM, J. 2013. *Maintaining cultural and natural biodiversity in the Carpathian Mountain ecoregion: need for an integrated landscape approach.* In: KOZAK, J., OSTAPOWICZ, K., BYTNEROWICZ, A., and WYŻGA, B. (ed.) Integrating nature and society towards sustainability. Springer, Dordrecht, Netherlands.

ANZENBERGER, P., POPOV, S.B., and OSTERMANN, H. 2011. Factors that motivate young pharmacists to work in rural communities in the Ukraine. *Rural and Remote Health* **11**: 1509.

BABAI, D. 2017. "If you got a forest, you got gold." The joys and woes of forest use in Gyimes (Eastern Carpathians, Romania). *Acta Ethnographica Hungarica* **62**(1): 163–186.

BALÁZSI, Á., RIECHERS, M., HARTEL, T., LEVENTON, J., and FISCHER, J. 2019. The impacts of social-ecological system change on human-nature connectedness: A case study from Transylvania, Romania. *Land Use Policy* **89**: 104232.

BARTHEL, S., CRUMLEY, C., and SVEDIN, U. 2013. Bio-cultural refugia-safeguarding diversity of practices for food security and biodiversity *Global Environmental Change* **23**(5): 1142–1152.

BEZPIATCHUK, Z. 2020. Ukraine floods: Why climate change and logging are blamed. *BCC* Available at https://www.bbc.com/news/world-europe-53233387 (Accessed 3 January 2021)

BOCHARNIKOV, V., LALETIN, A., ANGELSTAM, P., DOMASHOV, I., ELBAKIDZE, M., KASPRUK, O., SAYADYAN, H., SOLOVYI, I., SHUKUROV, E., and URUSHADZE, T. 2012. Russia, Ukraine, the Caucasus, and Central Asia. Traditional Forest-Related Knowledge. In: PARROTTA, J.A., and TROSPER R.L. *Traditional Forest-Related Knowledge: Sustaining Communities, Ecosystems and Biocultural Diversity* (Vol. 12, pp. 251–279). https://doi.org/10.1007/978-94-007-2144-9

BOURIAUD, L. 2005. Causes of illegal logging in Central and Eastern Europe. *Small-scale Forest Economics, Management and Policy* **4**(3): 269–291.

BOURIAUD, L., NICHIFOREL, L., WEISS, G., BAJRAKTARI, A., CUROVIC, M., DOBSINSKA, Z., GLAVONJIC, P., JARSKÝ, V., SARVASOVA, Z., TEDER, M., and ZALITE, Z. 2013. Governance of private forests in Eastern and Central Europe: An analysis of forest harvesting and management rights. *Ann. For. Res* **56**(1): 199–215.

CHERNYAVSKYY, M., SOLOVIY, I., HENYK, Y., KASPRUK, O., HENYK, O., MELNYKOVYCH, M., HERASYM, H., and SAVKA V. 2011a. *Problems of local population legal assess to forest resources and illegal logging in forests of the Carpathians and the Western Polissya*. Liga-Press Lviv, Ukraine

CHERNYAVSKYY, M., KRYNYTSKYI, G., and PARPAN, V. 2011b. Close to the nature of forestry in Ukraine. *Scientific works of the Forestry Academy of Sciences of Ukraine* (9): 29–35.

CIOACĂ, L., and ENESCU, C.M. 2018. Trends in the evolution of harvesting of non-wood forest products in Romania. *Research Journal of Agricultural Science* **50**(4): 82–86.

COOPER, N., BRADY, E., STEEN, H., and BRYCE, R. 2016. Aesthetic and spiritual values of ecosystems: Recognising the ontological and axiological plurality of cultural ecosystem 'services'. *Ecosystem Services* **21**: 218–229.

COYNE, E.V. 2014. Coming down from the mountain: dialect contact and convergence in contemporary Hutsulshchyna. Doctoral dissertation, UC Berkeley.

CUNI-SANCHEZ, A., NGUTE, A.S.K., SONKÉ, B., SAINGE, M.N., BURGESS, N.D., KLEIN, J.A., and MARCHANT, R. 2019. The importance of livelihood strategy and ethnicity in forest ecosystem services' perceptions by local communities in north-western Cameroon. *Ecosystem Services* **40**: 101000.

CZUBIŃSKI, J. 2014. Identity and identification of the architectural environment in selected health resorts in the Hutsul region's Prut river valley, Hutsul region Ukraine. *Technical Transactions Architecture* **6-A**: 59–73.

DALLIMER, M., and STRANGE, N. 2015. Why socio-political borders and boundaries matter in conservation. *Trends in Ecology and Evolution* **30**(3): 132–139.

DÍAZ, S., PASCUAL, U., STENSEKE, M., MARTÍN-LÓPEZ, B., WATSON, R.T., MOLNÁR, ZS., HILL, R., CHAN, K.M.A, BASTE, I.A., BRAUMAN, K., POLASKY, S., CHURCH, A., LONSDALE, M., LARIGAUDERIE, A., LEADLEY, P.A., VAN OUDENHOVEN, A.P.E., VAN DER PLAAT, F., SCHRÖTER, M., LAVOREL, S., AUMEERUDDY-THOMAS, Y., BUKVAREVA, E., DAVIES, K., DEMISSEW, S., ERPUL, G., FAILLER, P., GUERRA, C.A., HEWITT, C.L., KEUNE, H., LINDLEY, S., and SHIRAYAMA, Y. 2018. Assessing nature's contributions to people. *Science* **359**(6373): 270–272.

DRĂGUŞANUL, I. 2011. *Breaza, satul primei iubiri a lui Iraclie Porumbescu.* Muşatinii, Romania

DULAMĂ, M.E., ILOVAN, O.R., and MAGDAŞ, I. 2017. The forest of Romania in scientific literature and in geography. Teachers' perceptions and actions. *Environmental Engineering and Management Journal* **16**(1): 169–186.

EARTHSIGHT. 2018. *Complicit in Corruption*. July, 63. Available at: https://docs.wixstatic.com/ugd/624187_b18651c93cce4e1d8fce83e9b922c871.pdf Last Access 3 January 2021.

ELANDS, B.H., O'LEARY, T.N., BOERWINKEL, H.W., and WIERSUM, K.F. 2004. Forests as a mirror of rural conditions; local views on the role of forests across Europe. *Forest policy and economics* **6**(5): 469–482.

ELBAKIDZE, M., and ANGELSTAM, P. 2007. Implementing sustainable forest management in Ukraine's Carpathian Mountains: the role of traditional village systems. *Forest ecology and management* **249**(1–2): 28–38.

FIGLUS, T. 2009. *Past and present of Hutsulshchyna as the Carpathian borderland region. Remarks on changes of spatial structures, ethno-cultural specificity and heritage.* Państwowy Instytut Naukowy-Instytut Śląski w Opolu, Wydawnictwo Instytut Śląski, Katedra Geografii Politycznej i Studiów Regionalnych Uniwersytetu Łódzkiego.

FILEP, B. 2009. Interview and translation strategies: coping with multilingual settings and data. *Social Geography* **4**(1): 59–70.

FISHER, G., and RÖGER, M. 2019. Bukovina: a borderland region in (trans-) national historiographies after 1945 and 1989–1991. *East European Politics and Societies* **33**(1): 176–195.

FREI T., DERKS J., FERNÁNDEZ-BLANCO C.R., and WINKEL G. 2020. Narrating abandoned land: Perceptions of natural forest regrowth in Southwestern Europe. *Land Use Policy* **1**(99): 105034.

FRIEDRICH, S., PAUL, C., BRANDL, S., BIBER, P., MESSERER, K., and KNOKE, T. 2019. Economic impact of growth effects in mixed stands of Norway spruce and European beech–A simulation based study. *Forest policy and economics* **104**: 65–80.

ENSIRUK, S.A. 1992. *Forests of Ukraine.* Lviv: Shenchenko Scientific society, Ukrainian State University of Forestry and Wood Technology. 4 96 p.

GREENPEACE ROMANIA. 2019. Tăierile ilegale din pădurile României raport 2018. Available at https://www.greenpeace.org/static/planet4-romania-stateless/2019/10/10cd1a76-raportpdf.pdf

GRIFFITHS, P., KUEMMERLE, T., BAUMANN, M., RADELOFF, V.C., ABRUDAN, I.V., LIESKOVSKY, J., MUNTEANU, C., OSTAPOWICZ, K., and HOSTERT, P. 2014. Forest disturbances, forest recovery, and changes in forest types across the Carpathian ecoregion from 1985

to 2010 based on Landsat image composites. *Remote Sensing of Environment* **151**: 72–88.

GUADILLA-SÁEZ, S., PARDO-DE-SANTAYANA, M., and REYES-GARCÍA, V. 2019. The role of traditional management practices in shaping a diverse habitat mosaic in a mountain region of Northern Spain. *Land Use Policy* **1**(89): 104235.

HANEWINKEL, M., CULLMANN, D.A., SCHELHAAS, M.J., NABUURS, G.J., and ZIMMERMANN, N.E. 2013. Climate change may cause severe loss in the economic value of European forest land. *Nature Climate Change* **3**(3): 203–207.

HARATYK, A. 2014. The forming of the ethnic identity of hutsul highlanders. *Czech-Polish Historical & Pedagogical Journal* **6**(1): 68–76.

HEMSTRÖM, K., MAHAPATRA, K., and GUSTAVSSON, L. 2014. Public perceptions and acceptance of intensive forestry in Sweden. *Ambio* **43**(2): 196–206.

HRABOVETSKY, V. 1982. *Hutsul region of XIII - XIX centuries: Historical essay*. - Lviv:

Higher School, Lviv Publishing House, University. INTERNATIONAL SOCIETY OF ETHNOBIOLOGY. 2008. *Code of Ethics*. Available online: www.ethnobiology.net/whatwe-do/core-programs/ise-ethics-program/code-of-ethics/ (accessed on 1 September 2020)

IORAS, F., and ABRUDAN, I.V. 2006. The Romanian forestry sector: privatisation facts. *International Forestry Review* **8**(3): 361–367.

JEANRENAUD, S. 2001. *Communities and forest management in Western Europe: a regional profile of WG-CIFM the working group on community involvement in forest management*. IUCN.

JOA, B., and SCHRAML, U. 2020.Conservation practiced by private forest owners in Southwest Germany – The role of values, perceptions and local forest knowledge. *Forest Policy and Economics* **1**(115): 102141.

JOHANN, E., AGNOLETTI, M., BÖLÖNI, J., EROL, S.Y., HOLL, K., KUSMIN, J., LATORRE, J.G., LATORRE, J.G., MOLNÁR, Z., ROCHEL, X., ROTHERHAM, I.D., SARATSI, E., SMITH, M., TARANG, L., BENTHEM, M. VAN, and LAAR, J. VAN. 2012. Europe. In PARROTTA, J.A., and TROSPER R.L. *Traditional Forest-Related Knowledge: Sustaining Communities, Ecosystems and Biocultural Diversity* **12**: 203–249.

KATILA, P., GALLOWAY, G., DE JONG, W., PACHECO, P., and MERY, G. 2014. *Forests under pressure: Local responses to global issues*. IUFRO.

KNORN, J., KUEMMERLE, T., RADELOFF, V.C., SZABO, A., MINDRESCU, M., KEETON, W.S., ABRUDAN, I., GRIFFITHS, P., GANCZ, V., and HOSTERT, P. 2012. Forest restitution and protected area effectiveness in post-socialist Romania. *Biological Conservation* **146**(1): 204–212.

KEETON, W.S., ANGELSTAM, P.K., BIHUN, Y., CHERNYAVSKYY, M., CROW, S.M., DEYNEKA, A., ELBAKIDZE, M., FARLEY, J., KOVALYSHYN, V., KRUHLOV, I., MAHURA, B., and MYKLUSH, S. 2013. Sustainable Forest Management Alternatives for the Carpathian Mountains with a Focus on Ukraine. In: KOZAK, J., OSTAPOWICZ, K., BYTNEROWICZ, A., and WYŻGA, B. (eds) *The Carpathians: Integrating Nature and Society Towards Sustainability. Environmental Science and Engineering*. Springer, Berlin, Heidelberg.

KORDUBA, M. 1901. *Iliustrovana istoriia Bukovyny*, Chernivtsi, Ukraine.

KRUHLOV, I., THOM, D., CHASKOVSKYY, O., KEETON, W.S., and SCHELLER, R.M. 2018. Future forest landscapes of the Carpathians: vegetation and carbon dynamics under climate change. *Regional Environmental Change* **18**(5): 1555–1567.

KUEMMERLE, T., CHASKOVSKYY, O., KNORN, J., RADELOFF, V.C., KRUHLOV, I., KEETON, W.S., and HOSTERT, P. 2009. Forest cover change and illegal logging in the Ukrainian Carpathians in the transition period from 1988 to 2007. *Remote Sensing of Environment* **113**(6): 1194–1207

LAVNY, V.V. 2019. Success of natural regeneration of wood species in windy areas in the Ukrainian Carpathians. *Scientific Bulletin of NLTU of Ukraine* **29**(10): 61–65.

LAVRUK, M.M. 2005. *Hutsuls of the Ukrainian Carpathians (an ethnogeographic study): Monograph*. - L'viv: L'viv Ivan Franko National University Publishing Center.

LENART, M., and JONES, C. 2014. Perceptions on climate change correlate with willingness to undertake some forestry adaptation and mitigation practices *Journal of Forestry* **112**(6): 553–563.

LIU, J., YONG, D.L., CHOI, C.Y., and GIBSON, L. 2020. Transboundary Frontiers: An Emerging Priority for Biodiversity Conservation. *Trends in Ecology and Evolution* **35**: 679–690.

LUNDBERG, A. 2010. Conflicts between perception and reality in the management of alien species in forest ecosystems: a Norwegian case study. *Landscape Research* **35**(3): 319–338.

MACOVEI, C. 2011.The main consequences of application of the legislation on the Bukovinian forests. *Geographica Timisiensis* **20**(1): 5–11.

MATTALIA, G., STRYAMETS, N., PIERONI, A., and SÕUKAND, R. 2020. Knowledge transmission patterns at the border: ethnobotany of Hutsuls living in the Carpathian Mountains of Bukovina (SW Ukraine and NE Romania). *Journal of Ethnobiology and Ethnomedicine* **16**: 41.

MELNYKOVYCH, M., and SOLOVIY, I. 2014. Contribution of forestry to wellbeing of mountain forest dependent communities' in the Ukrainian Carpathians. *Наукові праці Лісівничої академії наук України* (12): 233–241.

MELNYKOVYCH, M., NIJNIK, M., SOLOVIY, I., NIJNIK, A., SARKKI, S., and BIHUN, Y. 2018. Social-ecological innovation in remote mountain areas: Adaptive responses of forest-dependent communities to the challenges of a changing world. *Science of the Total Environment* **613**: 894–906.

MIKUSIŃSKI, G., and NIEDZIAŁKOWSKI, K. 2020. Perceived importance of ecosystem services in the Białowieża Forest for local communities–Does proximity matter? *Land Use Policy* **97**: 104667.

MUNTEANU, C., NITA, M.D., ABRUDAN, I.V., and RADELOFF, V.C. 2016. Historical forest management in Romania is imposing strong legacies on contemporary forests and their management. *Forest Ecology and Management* **361**: 179–193.

MUNTEANU, C., RADELOFF, V., GRIFFITHS, P., HALADA, L., KAIM, D., KNORN, J., KOZAK, J., KUEMMERLE, T., LIESKOVSKY, J., MÜLLER, D., and OSTAPOWICZ, K. 2017. Land change in the carpathian region before and after major institutional changes. In: GUTMAN, G., and RADELOFF, V. (eds) *Land-Cover and Land-Use Changes in Eastern Europe after the Collapse of the Soviet Union in 1991*. Springer, Cham., Switzerland.

NATIONAL UKRAINE CENSUS. 2001. *State Statistics Service of Ukraine*. Available on http://www.ukrcensus.gov.ua/ (accessed on 19 November 2020).

NICHIFOREL, L., DEUFFIC, P., THORSEN, B.J., WEISS, G., HUJALA, T., KEARY, K., LAWRENCE, A., AVDIBEGOVIĆ, M., DOBŠINSKÁ, Z., FELICIANO, D., GÓRRIZ-MIFSUD, E., HOOGSTRA-KLEIN, M., HRIB, M., JARSKÝ, V., JODŁOWSKI, K., LUKMINE, D., PEZDEVŠEK MALOVRH, Š, NEDELJKOVIĆ, J., NONIĆ, D., KRAJTER OSTOIĆ, S., PUKALL, K., RONDEUX, J., SAMARA, T., SARVAŠOVÁ, Z., SCRIBAN, R.E., ŠILINGIENĖ, R., SINKO, M., STOJANOVSKA, M., STOJANOVSKI, V., STOYANOV, T., TEDER, M., VENNESLAND, B., WILHELMSSON, E., WILKES-ALLEMANN, J., ŽIVOJINOVIĆ, I., and BOURIAUD, L. 2020. Two decades of forest-related legislation changes in European countries analysed from a property rights perspective. *Forest Policy and Economics* **115**: 102146.

NIJNIK, M., and VAN KOOTEN, G.C. 2000. Forestry in the Ukraine: the road ahead? *Forest Policy and Economics* **1**(2): 139–151.

NORDLUND, A., and WESTIN, K. 2011. Forest values and forest management attitudes among private forest owners in Sweden. *Forests* **2**(1): 30–50.

NOY, C. 2008 Sampling knowledge: the hermeneutics of snowball sampling in qualitative research. *International Journal of social research methodology* **11**(4): 327–344.

O'BRIEN, E.A. 2006. A question of value: what do trees and forests mean to people in Vermont? *Landscape Research* **31**(3): 257–275.

PALAGHIANU, C., and NICHIFOREL, L. 2016. Between perceptions and precepts in the dialogue on Romanian forests. *Bucovina Forestieră* **16**(1): 3–8.

PALETTO, A., MAINO, F., DE MEO, I., and FERRETTI, F. 2013. Perception of forest values in the alpine community of Trentino region (Italy*). Environmental management* **51**(2): 414–422.

PASCUAL, U., BALVANERA, P., DÍAZ, S., PATAKI, G., ROTH, E., STENSEKE, M., WATSON, R.T., DESSANE E.B., ISLAR, M., KELEMEN, E., and MARIS, V. 2017. Valuing nature's contributions to people: the IPBES approach. *Current Opinion in Environmental Sustainability* **26**: 7–16.

PESCARU, M. 2018. *The Characteristics of the Romanian Emigration Phenomenon. In Rethinking Social Action. Core Values in Practice* (pp. 262–275). Editura Lumen, Iasi, Romania.

PRAOVEANU, I. 2013. Sisteme şi tehnici tradiționale în agricultura, pomicultura şi lucrul la pădure din satele brănene. *Studii şi Comunicări de Etnologie* **27**(27): 286–294.

REMM, L., RÜNKLA, M., and LOHMUS, A. 2018. How Bilberry Pickers Use Estonian Forests: Implications for Sustaining a Non-Timber Value. *Baltic forestry* **24**(2): 287–295.

REPLIANCHUK, D., and KOKHAN, O. 2018. Deforestation of ukraine's carpathians: where do we go from here? *Hromadske* Available at https://en.hromadske.ua/posts/deforestation-of-ukraines-carpathians-where-do-we-go-from-here (Accessed on 3 January 2021)

RIECHERS, M., BALAZSI, Á., BETZ, L., JIREN, T.S., and FISCHER, J. 2020. The erosion of relational values resulting from landscape simplification. *Landscape Ecology* **35**: 2601–2612.

RITTER, E., and DAUKSTA, D. 2006. Ancient values and contemporary interpretations of European forest culture – reconsidering our understanding of sustainability in forestry. In *Proceedings of IUFRO* (pp. 18–23).

SAGHIN, D., MATEI, E., COJOCARU, I., MANEA, G., and COCOŞ, O. 2017. The Hutsuls in south bukovina: from rural tradition to sustainable development. *Eastern European Countryside* **23**(1): 119–145.

SANDU A., HUIDU, A., and FRUNZA, A. 2020. Social perception of ethical values in the romanian post-secular society. *Journal for the Study of Religions and Ideologies*. **19**(55): 105–20.

SAJEVA, G., BORRINI-FEYERABEND, G., and NIEDERBERGER, T. 2019. Meanings and more. . . Policy Brief of the ICCA Consortium No. 7, 7, 60.

SHPARIK, Y.S. 2014. *The system of planning forestry activities by groups of forest types and forest categories (by economic complexes) in the region of the Ukrainian Carpathians. Forest typology: scientific, industrial, educational aspects of development*. – Kharkiv: Khnau Publishing House, 127–130.

SHISHKANINETS, I.F. 2011. Features of natural regeneration of forest beech in the Ukrainian Carpathians. *Scientific Bulletin of NLTU of Ukraine* **21**(11): 61–66.

SHUKLA, R., AGARWAL, A., SACHDEVA, K., KURTHS, J., and JOSHI, P.K. 2019. Climate change perception: an analysis of climate change and risk perceptions among farmer types of Indian Western Himalayas. *Climatic Change* **152**(1): 103–119.

SKALNÍK, P. 1979. Modernization of the Slovak peasantry: Two Carpathian highland communities. *Anthropology and Social Change in Rural Areas* **253**: 61.

SKOREIKO, H. 2002. *Naselennia Bukovyny za avstriis'kymy uriadovymy perepysamy druhoï polovyny XIX–pochatku XX st.:Istoryko-demohrafichnyi narys* Chernivtsi, Ukraine.

SOLODKYI, V. 2012 *Forests of Bukovyna: Bukovynian Carpathians and Precarpathians*. Zelena Bukovyna, Chernivtsi, Ukraine.

SOLOMON, N., HISHE, H., ANNANG, T., PABI, O., ASANTE, I.K., and BIRHANE, E. 2018. Forest cover change, key drivers and community perception in Wujig Mahgo Waren forest of northern Ethiopia. *Land* **7**(1): 32.

STATE FOREST FUND OF UKRAINE. 2018. *State Forestry Enterprise Pytylske DP.* Available on: https://dpputlg.com.ua/golovna.html (accessed on 19 November 2020)

STRYAMETS, N., ELBAKIDZE, M., CEUTERICK, M., ANGELSTAM, P., and AXELSSON, R. 2015. From economic survival to recreation: contemporary uses of wild food and medicine in rural Sweden, Ukraine and NW Russia. *Journal of ethnobiology and ethnomedicine* **11**(1): 53.

STRYAMETS, N., ELBAKIDZE, M., CHAMBERLAIN, J., and ANGELSTAM, P. 2020. Governance of non-wood forest products in Russia and Ukraine: Institutional rules, stakeholder arrangements, and decision-making processes. *Land Use Policy* **94**: 104289.

STRYAMETS, N., MATTALIA, G., PIERONI, A., KHOMYN, I., and SÕUKAND R. 2021. Dining Tables Divided by a Border: The Effect of Socio-Political Scenarios on Local Ecological Knowledge of Romanians Living in Ukrainian and Romanian Bukovina. *Foods* **10**: 126.

SUNDERLAND, T., ACHDIAWAN, R., ANGELSEN, A., BABIGUMIRA, R., ICKOWITZ, A., PAUMGARTEN, F., REYES-GARCIA, V., and SHIVELY, G. 2014. Challenging perceptions about men, women, and forest product use: a global comparative study. *World Development* **64**: S56–S66.

TURTIAINEN, M., and NUUTINEN, T. 2012. Evaluation of information on wild berry and mushroom markets in European countries. *Small-Scale Forestry* **11**(1): 131–145.

VASILE, M. 2008. Nature conservation, conflict and discourses on forest management: communities and protected areas in Meridional Carpathians. *Sociologie Românească* **6**(03–04): 87–100.

VODA, M., TORPAN, A., and MOLDOVAN, L. 2017. Wild Carpathia future development: From illegal deforestation to a sustainable recreation. *Sustainability* **9**(12): 2254.

VOROBEŢ, V. 1999 Fondul Bisericesc şi pădurile din Bucovina (1783–1918). *Bucovina forestiera* **7**: 1–2.

WOLFSLEHNER, B., PROKOFIEVA, I., and MAVSAR, R. 2019. *Non-wood forest products in Europe: Seeing the forest around the trees*. What Science Can Tell Us 10. European Forest Institute.

WORLD HEALTH ORGANIZATION. *ICD-11 for Mortality and Morbidity Statistics 2018 version*. Available at https://icd.who.int/browse11/l-m/en (accessed 23 November 2020).

WALKER, S. 2020. Violence escalates as Romania cracks down on illegal timber trade. The Guardian. Available at https://www.theguardian.com/world/2020/jan/08/violence-escalates-as-romania-cracks-down-on-illegal-timber-trade accessed (3 January 2021)

ZHYLA, T., SOLOVIY, I., ZHYLA, A., and VOLOSYANCHUK, R. 2018. Mountain communities' households dependency on provisioning forest ecosystem services: the case of Ukrainian Carpathians. *Bulletin of the Transilvania University of Brasov*. *Forestry, Wood Industry, Agricultural Food Engineering* **11**(2): 63–80.

APPENDIX TABLE 1 *Historical view of Hutsul forest ownership and access rules and rights*

	South Bukovina (Romania)		North Bukovina (Ukraine)	
	Ownership	**Access to forest resources**	**Ownership**	**Access to forest resources**
Romania/Ukraine (current)	State-owned (85%) and private (15%)	Free, if not for commercial purposes. Firewood collection is forbidden.	State-owned (100%)	Free, if not for commercial purposes. Firewood collection is forbidden.
Romania (1940–1989)/ USSR (1940–1991)	State-owned (100%)	Free. Firewood collection could be collected in exchange of work.	State-owned (100%)	Free, but firewood collection was forbidden.
	(United) Bukovina			
	Ownership		**Access to forest resources**	
Romanian Kingdom (1918–1940)	Mainly owned by the Orthodox-Romanian Church Fund of Bukovina.		Free, but collection of firewood and building material was regulated.	
Austro-Hungarian Empire (1775–1918)	Mainly owned by the Orthodox-Romanian Church Fund of Bukovina.		Free, including firewood and to some extent building material. In special protection areas activities could only be carried out with the consent of the forest owner.	

APPENDIX TABLE 2 *Recorded forest food and medicinal taxa among Romanian (RO) and Ukrainian (UA) Hutsuls*

Latin name and Family	**Used part(s)**	**Food**		**Medicine**	
		RO	**UA**	**RO**	**UA**
Abies alba Mill. (Pinaceae)	Resin				*
	Twigs			***	
Acer spp. (Sapindaceae)	Sap		**		
	Fruits	**			
Alnus glutinosa (L.) Gaertn. (Betulaceae)	Bark				*
Arnica montana L. (Asteraceae)	Aerial parts	*	**	***	***
Atropa belladonna L. (Solanaceae)	Roots				***
Betula pendula Roth (Betulaceae)	Bark			*	*
	Flowers			*	
	Sap		***	***	*
	Leaves		*		*
Bidens tripartita L. (Asteraceae)	Aerial parts				*
Corylus avellana L. (Betulaceae)	Fruits	**		*	
Crataegus spp. (Rosaceae)	Flowers				**
	Fruits		*	**	***
Dryopteris filix-mas (L.) Schott (Dryopteridaceae)	Aerial parts				***
Epilobium angustifolium L. (Onagraceae)	Aerial parts		**		***
Equisetum spp. (Equisetaceae)	Aerial parts	*	*	***	*
Fagus sylvatica L. (Fagaceae)	Wood	***	*		
Fragaria vesca L. (Rosaceae)	Aerial parts			**	*
	Flowers				*
	Fruits	**	*		***
Frangula alnus Mill. (Rhamnaceae)	Bark				*
Lamium album L. (Lamiaceae)	Aerial parts				***

Latin name and Family	Used part(s)	Food		Medicine	
		RO	UA	RO	UA
Lycopodium clavatum L. (Lycopodiaceae)	Aerial parts				*
Oxalis acetosella L. (Oxalidaceae)	Leaves		*		
			*		
Picea abies (L.) H. Karst. (Pinaceae)	Flowers				***
	Needles				***
	Resin			*	
	Twigs	*		***	*
	Wood	*	*		
	Young cones				***
Pinus sylvestris L. (Pinaceae)	Twigs			*	
Plantago lanceolata L. (Plantaginaceae)	Leaves			*	*
Populus tremula L. (Salicaceae)	Wood		*		
Primula spp. (Primulaceae)	Aerial parts	***		*	
	Flowers				**
Pteridium aquilinum (L.) Kuhn (Dennstaedtiaceae)	Aerial parts				*
Rubus spp. including *Rubus caesius* L. (Rosaceae)	Fruits	***	***		***
	Aerial parts	*			
	Flowers		*		
Rubus idaeus L. (Rosaceae)	Aerial parts	**	**	***	***
	Fruits	***	***	***	***
Sorbus spp. including *Sorbus aucuparia* (Rosaceae)	Flowers		*	**	
	Fruits	**	*		
Stellaria media (L.) Vill. (Caryophyllaceae)	Aerial parts				*
Tussilago farfara L. (Asteraceae)	Aerial parts		*	*	***
	Flowers			*	*
	Leaves	**		*	
	Roots				*
	Whole plant				*
Urtica dioica L. (Urticaceae)	Aerial parts	***	***	***	***
Vaccinium myrtillus L. (Ericaceae)	Aerial parts	***	***	***	***
	Flowers				*
	Fruits	***	***	***	***
Vaccinium vitis-idaea L. (Ericaceae)	Aerial parts			***	***
	Fruits	***	***		
	Roots				*
Viburnum opulus L. (Adoxaceae)	Aerial parts		**		
	Flowers				*
	Fruits	**		***	***
	Leaves				*

* DUR mentioned by less than 10% of the interviewees; ** by 10% to 20%; *** by more than 20%