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Authors: Cosmin Marius Ivașcu, Kinga Öllerer, László Rákosy

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The Traditional Perceptions of Hay and Hay-Meadow Management in a Historical Village from Maramureş County, Romania



Cosmin Ivaşcu

PhD student, Babeş-Bolyai University, Faculty of Biology and Geology, Romania
ivascu.cosmin@hotmail.com

Kinga Öllerer

Researcher, PhD., Ecology, Taxonomy and Nature Conservation Department of the Institute of Biology, Romanian Academy, Romania
kinga.ollerer@gmail.com

László Rákossy

Professor, PhD., Babeş-Bolyai University, Faculty of Biology and Geology, Romania
laszlorakossy@hasdeu.ubbcluj.ro

ABSTRACT

Hay is still a fundamental resource for many Central and Eastern European traditional rural communities, as this is the only type of fodder used in winter time for the indoor feeding of livestock animals. To explore its current relevance for local communities, we conducted research in Ieud village, Maramureş county, in Northern Romania. The fourteenth-century documents clearly mention hay meadows as one of the most important land uses in the village, belonging to the local nobility. Due to the long history of animal husbandry and farming in the region, the locals from Ieud have developed a hay classification system based on dominant topography, land uses, slope exposure, dominant plant species and structure. Hay meadows are still managed traditionally, closely connected to several feast days, although the methods of hay monitoring and the timing of mowing are slightly different, thus proving the adaptability of traditional ecological knowledge. One significant difference between former and present management is that the meadows located at higher elevations and further away from the village are currently very rarely used for haymaking, most of them being used as pastures. Considering that these meadows are most valuable from a biodiversity perspective, we argue that appropriate policies and incentives are needed to support local communities in preserving traditional practices, maintaining their traditional ecological knowledge and promoting the valuation of ecosystem services.

KEYWORDS

traditional ecological knowledge, semi-natural grasslands, small-scale farming, mowing, grazing, ecosystem services



Introduction

Hay meadows are one of Europe's most valuable semi-natural ecosystems. In most European Union member states, they are managed almost exclusively for their conservation value (Dahlström *et al.* 2013), while in Eastern Europe their biodiversity is only a "side-effect" of their long-term traditional management (Babai and Molnár 2014). These semi-natural

ecosystems have had an important role in the subsistence of pre-industrial societies, providing fodder for livestock; especially during winter, hay continues to represent a fundamental resource for several local farming communities (Emanuelsson 2009).

In the historical region of Maramureş, northern Romania, hay and hay meadow management is still an important part of the local economy. Traditionally, agriculture and animal husbandry depend on each other and cannot exist in isolation; therefore, they form a whole, especially in the more remote



mountainous areas (Vuia 1964, Nicolson and Effendi 2013). Since animal husbandry is dependent on hay as fodder during winter, the communities have developed traditional ecological knowledge regarding hay meadow management and monitoring. Active traditional management based on this type of knowledge system is still present in Maramureş and it encompasses techniques long lost in most Western European countries (see Dahlström *et al.* 2013).

In our paper, we focus on the practice and knowledge related to hay meadow management in Ieud village, Maramureş county, Romania. This is part of a wider research on the ethnoecological knowledge sustaining traditional land-use practices, focusing on ethnobotany, ethnozoology, traditional forest use and pastoralism.

After a short history of hay management in the region, we describe the hay classification system used by the locals and the timing of activities related to haymaking. We present the different practices and terms used in the traditional hay management system and the monitoring and maintaining of the quality of the meadows. Our paper ends with some ideas on how traditional ecological knowledge and management could be included in rural development plans to foster the maintenance of the bio-cultural values of the region.

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Materials and methods

Maramureş is a geographically, historically and ethno-culturally bounded region in northern Romania, partially overlapping the current administrative unit of the same name. The natural state of its outstandingly biodiverse grasslands is preserved, with High Nature Value (HNV) sites dotting the region (Beaufoy *et al.* 2008, Fig. 1). Located on the Iza valley, the village of Ieud, first mentioned in the fourteenth century, has been included in the Natura 2000 network of protected areas

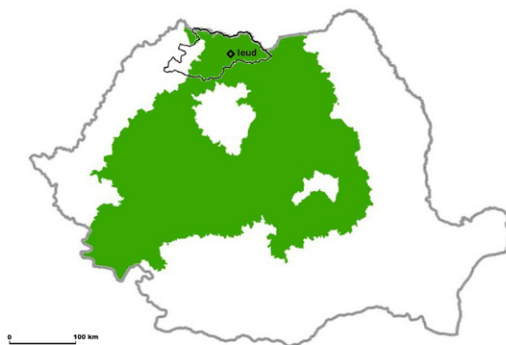


Fig. 1. The map of Romania, showing the high nature value regions in gray/green (colour version) (Paracchini *et al.* 2008), the black outline of Maramureş county, and the location of Ieud village.

(ROSCI0264 Valea Izei și Dealul Solovan) since 2007. The village renowned for keeping alive its traditional cultural heritage is also a UNESCO World Heritage site (included in the *Wooden Churches of Maramureş*).

Between 2014 and 2016, we have spent overall 65 days of fieldwork, trying to cover all seasons. In order to study the traditional ecological knowledge related to hay management, in our investigation we used a variety of methods, including botanical studies, semi-structured interviews and participant observation. We collected data from 28 interviewees, a total of almost 35 hours of interviews. Extensive conversations about hay and hay meadow management with a number of 16 persons from our local experts were complemented by participant observation. We had just one interviewee under the age of 20, the majority of our local experts belonging to the 30–60 age group (12 people), and only three being over 60 years old, three of them women. All are engaged in small-scale semi-subsistence farming, two of them used to work at the collective farm in the village, another two were employed as shepherds by the collective farm, and five of them also had several stints working in Western Europe.

Additionally, we consulted several medieval records concerning land management rules and regulations first published in 1900 by Ioan Mihalyi de Apşa (we used the 2009 edition, Mihalyi 2009) and some more records from his collection that were published only very recently

(Pop 2012) and literature data (Dăncuş 1986, Popa 1997) in order to obtain basic information about the history of haymaking in the region.



Results

The tradition of haymaking as reflected in historical records

In the Middle Ages, Maramureş was first an independent voivodship and later came under the rule of the Hungarian Kingdom, being transformed into a county or *comitat* (Popa 1997). During this time, several diplomas were released to the local nobility granting them ownership of villages or sometimes even of entire mountains. Most of the documents in this collection concern lawsuits and disputes about the boundaries of villages or estates of the nobles, therefore containing important information on the land use and the economy of the region during the fourteenth and fifteenth centuries. When marking the boundaries of entire villages, the fourteenth c. diplomas described a variety of lands, such as “*cum... terries arabilibus, pratis...*” (Lat.: “with arable fields and meadows”), “*...campus, pratis, silvis...*” (Lat.: “fields, meadows and forests”) etc. (Mihalyi 2009). These are among the first documents that clearly mention hay meadows on the present-day Romanian territory. The records clearly distinguish several types of land belonging to the villages or estates, which shows that these land types were important for the economy of that time (Popa 1997). The term *pratis* refers to a grassland or meadow, being translated as “meadow” by most of the authors (Dăncuş 1986, Popa 1997). From a 1456 document, we learn about a conflict between the royal guests from Câmpulung la Tisa and the Romanian nobles from Sarasău and Săpânța that led to the intervention of the king who urged his guests to respect the ancient boundaries and give back the lands: “*...terrarum*

certarum arabilium, silvarium, pratorum et fenilium...” that they had taken by force from two monasteries belonging to the two Romanian villages (Mihalyi 2009: 547). The word *fenilium* refers to a hay meadow, moreover the document mentions that the royal guests despite the ongoing lawsuit, started to harvest the fields, to use the forests and to mow the meadows (“*...terries arabili busuti, segetes quoque per ipsos exponens seminatas metere, prate quoque ipsa falcare, in grande preiudicium...*”), causing great damage to the rightful owners of the lands (Mihaly 2009: 547). In another document from 1511, there is a clear mention of the word *fenetis*, meaning “hay meadow”, among the property of a nobleman from Budeşti “*agris, pratis, pascuis, campis, fenetis, silvis...*” (Lat.: “crop fields, meadows, pastures, grassland, hay meadow, forests”) (Pop 2012: 53). From this it follows that hay meadows were documented as a valuable landscape element in Maramureş already in the fourteenth century.

Hay perception and categorization

Animal husbandry and agriculture are nowadays the most important activities that support the livelihoods of the locals from Ieud. As part of these subsistence activities, haymaking and hay meadow management are indispensable elements of practices related to animal husbandry. The local community has developed considerable knowledge about hay and hay meadow management to ensure the survival of their animals during late autumn and especially winter. Based on this knowledge system, they have kept hay meadows productive in the long term, creating an equilibrium between haymaking, grazing and the manuring of meadows.

The locals have several classifications of hay, according to several types of criteria, including topographical origin, slope exposure, structure, and characteristic dominant species. These criteria are not exclusive as additional criteria may be



applied to describe more precisely the type of hay (Table 1; see also Ivaşcu and Rákosy 2016).

The aftergrass that grows after the first mowing by scythe is known as *otază*, appreciated as high-quality hay. It grows

Name	Local name	Origin	Characteristics
According to topographical criteria			
garden / cultivated hay	<i>fân de grădină / sămănătură</i>	found near the village	is subcategorized according to the dominant cultivated species: - <i>trifoi</i> (<i>Trifolium</i> spp.) - <i>luțarnă</i> (<i>Medicagosativa</i>) - <i>ghizdei</i> (<i>Lotus corniculatus</i>).
lowland hay	<i>fân de șesuri</i>	natural hay that grows on the more flat areas around the village	usually seen as not so good quality hay, depending on the terrain
hilly hay / mountain hay	<i>fân de deal / fân de munte</i>	the hills and ‘mountains’ belonging to the village, not the distant mountains to which the shepherds go out with the animals, outside the limits of the village (Maramureşului and Pietrosul Mountains)	is subcategorized by some locals into: - low quality (<i>fân rău, fân slab, fân săc</i> – ‘poor hay, bad hay, dry hay’), located on the top of hills or more open spaces - good quality hay (<i>fân bun, fân de preluță</i> – ‘good hay, glade hay’), grows in open spaces near forests
marsh hay	<i>fân de mociră</i>	marshy areas	a very bad quality hay in which the dominant species are <i>pîpirig</i> (<i>Juncus</i> spp.) and <i>rogojână</i> (<i>Carex</i> spp.), used to feed only the horses
terrace hay	<i>fân de moină</i>	nowadays it refers mostly to the hay harvested from a terrace	according to older people, this type of hay is the hay that grows after a field (<i>moină</i>) is left to rest for a year or more. Younger ones assimilate <i>moină</i> with the field between two terraces
According to slope exposure			
front hay	<i>fân de faţă</i>	hay that grows on terrains with southern exposure	it is usually seen as good quality hay (<i>trifoi, dulce, frunzos</i> – ‘with clover, sweet, leafy’)
rear hay	<i>fân de dos</i>	hay that grows on lands with northern exposure	seen as very bad quality hay (<i>fân săc, fân rău, fân slab</i> – ‘poor hay, bad hay, weak hay’)
According to structure or the dominant species			
dry hay	<i>fân săc</i>	predominantly grasses, various species belonging to the <i>Poaceae</i> family	
stiff hay	<i>fân bâtos</i>	hay with unpalatable thick-stemmed grasses, like <i>Nardus stricta</i> or <i>Deschampsia</i> sp.	
sweet hay	<i>fân dulce</i>	with sweet taste and smell, preferred by the animals, often due to the presence of <i>Salvia pratensis</i>	
leafy hay	<i>fân frunzos</i>	hay richer in dicots, usually in the upper meadows	
weak hay	<i>fân slab</i>	without leaves, hollow straw, <i>Festuca</i> spp.	
clover hay	<i>fân trifoi</i>	hay with dominant <i>Trifolium</i> spp.	
Nardus hay	<i>fân pârlăcos</i>	one of the worse kinds of hay, very low quality, with dominant <i>Nardus stricta</i>	
hedgy hay	<i>fân rogojânos</i>	hay with dominant <i>Carex</i> spp.	
lettuce hay	<i>fân lăptiuos</i>	with dominant <i>Lactuca</i> spp. and <i>Taraxacum officinalis</i>	

Table 1. The hay classification system used by the local community from Ieud, Maramureş.



only on manured fields, gardens, meadows and the hills near the village.

The calendar of traditional hay meadow management in leud

Ensuring the good condition of hay meadows is crucial and their management implies several stages and various practices, summarized in Table 2. Though mowing is their main use, depending on the stage of the vegetation regrowth, animals are sometimes allowed to roam on the hay meadows in certain months.



Fig. 2. A special hoe (*sapa de laz*) is used for cleaning the meadows of unwanted vegetation. Photo credits: Cosmin Ivaşcu

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Activity	cleaning, incl. removal of stones, suppression of mosses, ferns and flattening anthills		cleaning, raking old leaves manure is spread out scattering of hayseeds burning of old vegetation (not a general, and a relatively new practice)		mowing of the lower areas (gardens) grazing		mowing of the lower areas (arable fields, village meadows) grazing	mowing of the upper meadows (≥1000 m) cutting shoots of unwanted woody species	hay is left to dry haystacks are made grazing after the 14 th (the Feast of the Cross)		cleaning manure is brought out in the field to decompose grazing (October–November 8 th , the celebration of Archangels Michael and Gabriel)		

Table 2. Schematic calendar of traditional hay meadow treatments in leud, Maramureş.

The first management practice is to clean the meadow of stones, anthills and deadwood (incl. twigs and branches), usually called *curăţatul ierbii* (grass cleaning). It is done in winter or late winter, or even spring, depending on the weather and it is meant to ensure optimal conditions for mowing. Anthills are flattened or cut with a special hoe (*sapa de laz*) and are usually put on the baulk that marks out the neighbour’s meadow. Stones also are put there. Furthermore, sprouts of unwanted trees and shrubs are cleared using the same type of hoe (Fig. 2). Spring cleaning also implies raking away old alder *Alnus* sp. leaves; their bitter taste lowers the quality of the hay. This is done in March in the lower meadows and in April in the hilly areas. Hazel *Corylus avellana* and oak *Quercus* sp. leaves were previously gathered and dried in stacks and used as leaf hay, a practice that

no longer exists. Furthermore, in order to avoid encroachment and the development of unwanted woody vegetation, the shoots of these species are cut in summer (during the Fast of St. Mary, August 1–14), when the regrowth capacity is decreased due to the torrid weather.

After this work is finished, the meadows are manured. For this purpose, already in autumn or winter, manure is spread on the field and left there to decompose. Locals suggest that the older the manure, the better for meadows. Manure that was left out on the field for two years or more is called *mraniţă*, and it is considered the most appropriate both for fields (i.e. arable and crop) and meadows. Fresh manure is also used, but locals claim that this type of manure will eventually wither the hay or crop, if the summer is very hot and dry. This is probably related with the excessive amounts of nitrogen found in fresh manure,



whose toxic effects are further enhanced by the heat.

The following work on the meadows is the breaking up of manure with the harrow (Fig. 3). Thorn bushes are bound after the harrow and big stones are used on it as weights. This way, manure is evenly dispersed all over the meadow or field. The next step is the scattering of hayseeds, followed occasionally by grazing.



Fig. 3. Spreading manure with the harrow and thorn bushes. Photo credits: Cosmin Ivaşcu

Mowing is done after close monitoring of the condition of the hay. It is usually done from bottom to top, starting from the gardens and moving towards the hills, depending on certain feast dates and the phenophases of the plants. Mowing respects the division of the village in three almost equal levels. The first level (*mejdele de jos*) corresponds to the lands near the village, consisting of arable fields and meadows. The second level (*mejdele de mijloc*) is further away, consisting of hilly areas with small patches of secondary forests and meadows (in the past there were arable fields here as well). The third level (*mejdele de sus*) corresponds to the altitudes of 1000 m and above, nowadays these meadows are used mostly as pastures.

The ley and the hay near the village are mowed first, garden hay is mowed sometimes even in May, and the meadows near the

village around the feast of Saint Peter (June 29th). When this holiday approaches, the locals usually know that they can start mowing the hay near the village (*mejdele de jos*). The second level (*mejdele de mijloc*) is mowed usually at the end of July, around the feast day of *Sânt-Ilie* (Saint Elijah, celebrated on July 20th). The third level (*mejdele de sus*) is mowed starting in August and continuing through September, sometimes

even in October and later, depending on the household's abilities. This practice is very rare today. This labour-intensive work requires that entire families leave the village to go up on the hills where they spend between a couple of days and one or two weeks mowing. The older people stay behind in the village to watch after the household, while all the others, including the children, leave for the upper meadows with food, horses, or sometimes even

with a cow to start mowing before the shepherds return with the animals from the alpine pastures. This practice is called *mers de mas*, meaning going and staying overnight on the upper meadows; for this purpose, a small shelter, a tent (*cort* is the local name for this structure), is built from hazelnut branches (Fig. 4) and covered with



Fig. 4. Traditional tent (*cort*) made out of hazelnut trees and covered with nylon (not hay anymore), used by shepherds on a high meadow (*mejdele de sus*). Photo credits: Cosmin Ivaşcu

hay. At the entrance of this shelter, there is a fire for cooking, keeping the family members warm, and also scaring away wild animals.

After the mowing is done, the hay is left out to dry on the ground and is later gathered into haystacks. Some of these are transported into barns and others are left on the fields. The haystacks on the middle and upper meadows are fenced with sticks and branches from different woody species, so that the wild and domestic ruminants would not damage them (Fig. 5).

Hay monitoring

Monitoring the hay is an active practice, since the phenophases of the plants are used to determine the best time for mowing. Therefore, along with the other landmarks, like the feast of Saint Peter and Saint Elijah, plant phenology is used as a reference. The plant species traditionally monitored to determine when hay mowing



Fig. 5. Barred haystack on a middle meadow (*mejdele de mijloc*).
Photo credits: Cosmin Ivașcu



Fig. 6. A fully ripened *Rhinanthus* sp., indicating the optimal time for mowing.
Photo credits: Cosmin Ivașcu

could begin is rattle *Rhinanthus* sp., called *clocotici* in local speech (Fig. 6). The local expression *când sună clocoticiul* (literally, when the rattle rattles) was used to signal that hay mowing could begin. Today, when *Rhinanthus* “rattles”, it is a sign that the hay is over ripened and it is a bit late for mowing. *Rhinanthus* sp. is still used to monitor the hay, but mowing starts when its fruits are not yet fully ripened.

The hay is usually left on the ground to dry up, and only for cultivated hay has there been developed a structure (*jărăzi*) for this purpose (Fig. 7). The vegetation that remains (cut stems), protruding from the ground, is called *pocireș*.

After the hay has dried up, haystacks are usually built on the meadow which now has become a *cosaștină* (newly mowed land), and left there. They are gradually brought





Fig. 7. Drying cultivated hay on *jârâzi* and old manure - *mranîţă* (center) on a low meadow (*mejdele de jos*). Photo credits: Cosmin Ivaşcu



home, or to the temporary shacks (*colibe*) in the fields, with carts, where they are used for the indoor feeding of the animals. During harsh winters, the locals used to form convoys of horse-drawn sleighs and had to make their way through the thick snow of the upper meadows with shovels to reach the haystacks. The hay is stored in special buildings, *şopru* (Fig.8). Usually good quality hay and second grass are kept separately from the other hay.



Fig. 8. Unloading hay into a barn (*şopru*). Photo credits: Cosmin Ivaşcu

Maintaining the quality of the hay meadow

The local people have developed a meadow management and restoration system based on hayseeds. In local speech, hayseeds are called *stroh*, which is supposed to have been borrowed from the German language, where it means “straw” (Ştef 2011). Hayseeds are used by locals for their medicinal properties, but they are also an important resource for the regeneration of hay or grass. They are gathered from inside the barn or under the rack and stored in sacks. After cleaning the meadows of anthills, hayseeds are spread over the bare soil to facilitate vegetation renewal and improve the quality of the grass by oversowing. Hayseeds are spread also over eroded terrains to increase the rate of vegetation recover.

In some cases, i.e. unproductive or weedy lands, regular management practices fail to improve the quality of the vegetation, so the locals plough it and spread hayseeds on it, this practice being called *schimbatul ierbii* (changing of the grass). This is a practice that renews the vegetation of a meadow, thus cultivating a field with natural hayseeds. Currently people use hayseeds in a different way – after a construction has been finished and the soil is bare or muddy, hayseeds are spread all over these courtyards, to renew the grass. The sowing is usually done only by hand.

Mosses, ferns and the mat grass *Nardus stricta* are decreasing the quality of the hay, therefore several practices are related to their suppression. Mosses grow on the northern hillsides, and grazing in combination with trampling is seen as the best practice to reduce moss cushions on these hay meadows; this is also used against *Nardus stricta*. The locals from Ieud use three practices to control the spread of the eagle fern *Pteridium aquilinum*: regular mowing, removal by hand and *o baţi* (literally *beating it*), hitting the adult ferns with a stick until

the tops of the ferns are broken, which results in the drying of the plants. More recently, burning is also used for suppressing ferns – they are picked from the rest of the hay that is already cut, and fire is set to the pile of ferns.

The burning of old vegetation in spring, *pârjol*, is a fairly recent practice in the management of the meadows and fields. The majority of locals have a negative opinion of this practice, firstly because fire is highly unpredictable and hard to control; there are also examples of barns and houses that have been reduced to ashes due to unattended grassland fires. Second, some of the locals believe (especially the shepherds) that fires are altering the quality of the hay on the meadows or the quality of the grasslands. In their opinion fire will destroy the gentle, good quality vegetation, but will not harm the unwanted plants, especially weeds, in fact it will help them spread, eventually turning a good quality pasture or meadow into one with very low yield.

Grazing is also part of the traditional practice system used for hay meadows, animals being left to roam after the hay has been cut and haystacks have been made. Therefore, sheep, cows and horses are usually grazing all over the areas where the crops have been harvested, meadows being no exception in this sense. This is a practice that is said to improve the quality of the grass because the animals also manure the fields while grazing them. This type of grazing is done in two phases, the first one in late winter and early spring, when the young grass has sprung up, and the second in autumn after the crops have been harvested. Intensive grazing in corrals is sometimes applied to control unwanted vegetation (Fig. 9), this method being especially used to suppress *Nardus stricta* and the various *Carex* spp. The success of this method does not consist in the grazing, but in the intensive trampling and manuring done by



Fig. 9. Wooded and pollarded meadow, haystacks and a sheep corral are also visible. Photo credits: Cosmin Ivaşcu

the animals enclosed in the corrals.

The clearing of unwanted woody vegetation around the Fast of St. Mary (August 14th) is a method also used for the suppression of the invasive species black locust *Robinia pseudoacacia* from the meadows, another method is called in local speech *ciungit*, i.e. striping the bark from the trunk and leaving the tree to dry out.



Fig. 10. A wild apple tree (*Malus sylvestris*) left to grow on a mowed meadow. Photo credits: Cosmin Ivaşcu



Certain woody species are acknowledged for the quality of the grass that grows around them. Alder, hazel and sycamore *Acer pseudoplatanus* are therefore left to grow in the meadows, their lower branches being removed to raise the canopy, which thus grows in height and does not shadow the grass nor hinders mowing (Fig. 9). Hazel leaves were previously also used for fodder. On the contrary, grass does not grow well under birch *Betula* sp. and oak *Quercus* sp., therefore these are removed from the meadows. Wild apple and pear trees (Fig. 10) are also left to grow undisturbed; however, after they reach a certain height, they are moved to the edge of the meadow or to the gardens and then grafted.

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Discussion

The local people from Ieud recognize 16 categories of hay (excluding the three types of garden hay), classifying it according to terrain type, slope exposure, structure, and dominant species. Their classification system excludes the good hay/ bad hay binomial; most of these categories are compound and reflect the high diversity of the local environment. For example, *hilly hay* can be of high quality or of low quality, depending on the topography and local conditions. In another study published in 1975 and summarizing the findings of 20 years of research on the ethnobotanical knowledge of the people from Breb village, also situated in Maramureş, the researchers found that the local people recognize around 22-24 types of hay, according to quality, origin and species composition (Antal and Antal 1975). Not only that the locals from Breb distinguish more categories of hay, but some of these categories reflect a highly detailed knowledge of hay, for example: *fân de pădure* (forest hay), *fân de tufă* (hazel hay), *fân de arin* (alder hay) etc., which have not been found in Ieud, presumably explained by the difference between the landscapes and the land use practices in the two

villages. Other categories of hay from Breb are: *moale* (soft), *aspru* (rough), *săc* (dry), *ţăpos* (spiny), *încăcios* (hard to swallow), *colbos* (dusty), *drodos* (wiry), *piros* (with a lot of couchy grass – *Agropyron repens*), *pârlăgos* (the term might be referring to either uncultivated, weedy land, or a certain weed) (Antal and Antal 1975). There are five overlapping categories, found in both studies: *fân de grădină*, the cultivated hay; *fân de moină*, the hay that grows after a field (*moină*) is left to rest for a year or more; *fân de mociră*, a bad quality hay from marshy areas; *fân săc*, dominated by grasses; and *fân trifoios*, one of the best hays, the one with clover. Though not representing a different category of hay as in Breb, locals from Ieud recognize that the hay grown around alders and hazel is of very good quality. *Iarbă moale de arin* (soft alder grass) is the name given to the grass that grows around alders. The species that grows around hazel and is enhancing the quality of the hay is *Melampyrum nemorosum*. Despite such differences, major stages and practices are similar, showing also several analogies with the management systems from more distant areas, like the one documented in Ghimeş, Eastern Carpathians, Romania (Babai and Molnár 2014).

The timing of mowing still respects the traditional calendar, and starts around the feast of St. Peter (June 29th), when the nearby meadows and gardens are mowed, followed by the hill meadows around the feast of St. Elijah (July 20th). The mowing season ends on the upper meadows located further away from the village (*mejdele de sus*), which are mowed starting in August. Very few people are still making hay on these upper meadows, the traditional management system being gradually replaced by grazing in the remote areas.

Vegetation condition and optimal timing for mowing are monitored traditionally, based on the phenology of *Rhinanthus* sp. This practice of using the ripening of rattle to indicate when the hay is ready has been reported also for other European regions,



including Scandinavia (Tunón *et al.* 2015). Currently, the hay is mowed when the plant is not yet fully ripened, but in the past it was done when the plant was fully ripened and its dried fruits would make a rattling sound. This difference is due to reasons that concern milk production. In the past, hay was not as abundant as today, and mowing would start when *să coace fânul* (hay was ripe). Other expressions like *fân lung* (long hay) along with *să albea fânul* (the hay whitens) would mean that the plant species in the hay would have reached their final phenophase, and mowing could proceed. The animals would eat the older hay (*fân lung*) more slowly, resulting in a lower milk production, but the animals would survive the long winters. Keeping the animals alive, with low or no milk production, was a strategy to cope with insufficient hay. Tree leaves (mainly hazel and oak) and different cereal straw were also used as winter fodder.

Currently, hay is mowed before reaching its full phenophase, because hay shortage is no longer a problem for the families still practicing animal husbandry. As many of the villagers are working abroad, they leave their meadows to be mowed for free by those who remain, just to prevent them from growing wild. Therefore, nowadays the locals can focus more on the quantity of milk production, which brings the time for mowing forward. This however can result in some nature conservation conflicts, mowing dates having a strong influence on the genetic diversity and reproductive success of several species of conservation interest (Nakahama *et al.* 2016), including *Rhinantus* sp., reportedly threatened by decline in Central Europe as a result of first cuts being shifted to earlier dates (Blažek and Lepš 2015).

An interesting practice is the spreading of hayseeds (*stroh*) on the low quality meadows, which have previously been ploughed, but also on eroded terrains, ditches and places with bare soil. A similar practice was documented in another ethnic community in Transylvania, the Csángos

(Babai and Molnár 2014).

Most of the meadow management practices used nowadays in Ieud, including manuring, clearing away the shoots, bushes and stones are traditional methods which have been used every year for centuries. There are however minor changes in the materials used, i.e. hay being replaced by nylon in the tents (*cort*) built on the upper meadows, or the purpose of some activities, i.e. these tents are nowadays used by shepherds, not by the families who move up to these meadows for the mowing period. Another such change occurred also in the use of hayseeds, currently used not only to improve the quality of the meadow, but also to stimulate vegetation growth on former construction sites. In addition, there are also new practices arising. Setting fire to the old vegetation in early spring is a fairly new practice and is seen as a negative trend by most of the locals, many of whom consider that it is altering the quality of the grass. Across Europe, burning is increasingly seen as an alternative method to the traditional and more labour-intensive vegetation removal (reviewed by Valkó *et al.* 2014). Though questionable because of its long-term effects on the vegetation, including the facilitation of some undesired woody, ruderal and/ or potentially invasive species (Öllerer 2014), burning is considered the best method to suppress ferns, mosses and also *Nardus stricta* in hay meadows from Ghimeş (Babai and Molnár 2015). Similarly, burning has been lately applied to control ferns in Ieud, but only as an additional method. Locals tend to disapprove of its use “the land is burning and a rare and dry grass is coming out [...] it is not good for the animals.”



Conclusions

We showed that hay is still an important ecosystem service product for the local community from Ieud, part of which is still practicing animal husbandry. Most of the

traditional practices are still active today and used on a large scale. Despite this, the date of mowing has changed slightly and so did the purpose and methods of some particular works, as a result of changing local conditions and needs, proving that traditional ecological knowledge is an adaptive knowledge system (Berkes 2008). Since now there is plenty of hay and there is no need for supplementing it with leaf hay and the straws of various cereals, mowing starts earlier, in order to increase the milk production. However, the risk of abandonment is imminent, as many locals reported that they do not make hay anymore, but rather leave their meadows for others to use freely, just to prevent them from “growing wild”. Additionally, new management methods are gradually introduced, like the burning of the old vegetation in early spring.

Traditional management systems have been shown to have a major role in generating and maintaining biodiversity (Beaufoy *et al.* 2008, Dahlström *et al.* 2013, Babai and Molnár 2014, Öllerer 2014, Horak and Safarova 2015). In addition, such systems contribute to the socio-cultural, ecologic and scenic value of the rural landscapes (Ivaşcu and Rákosy 2015). Our study area is recognised for its high nature value, being also included in the Natura 2000 network of protected areas. Initiatives that support and promote the maintenance of its present land-uses, including the management system presented here are therefore crucial for sustaining its natural-cultural value in the long run. The patchy pattern of meadows mowed in different months, and the works that take place at different times of the year imprint the characteristic mosaic-like character to this landscape considered of outstanding beauty (Nicolson and Effendi 2013).

Maramureş is strongly affected by labour migration to Western Europe, which raises several socio-economic, cultural and nature conservation issues. Similarly to the preservation of the built

heritage, for which abandonment is the major cause of gradual decay, it has been shown that uninterruptedness, i.e. the continuity in management, is of key importance for biodiversity (Reitalu *et al.* 2010). Furthermore, the continuity of biodiversity-maintaining traditional practices is less an economic challenge than the implementation of costly conservation measures to restore biodiversity (Shen 2012). For this reason, we consider that a forward-looking active management, fostered by appropriate policies and incentives, is needed to support the local communities in their use of traditional practices as well as in maintaining and sustaining traditional ecological knowledge and promoting the valuation of ecosystem services. Such an approach would both benefit the region from a socio-economic perspective, keeping the labour in place and contributing to its development and knowledge transfer and would safeguard the internationally renowned cultural and biodiversity values of the landscape.



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