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"If You Got a Forest, You Got Gold"

The Joys and Woes of Forest Use in Gyimes (Eastern Carpathians, Romania)

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Abstract: All over the world, rural communities developed mainly stable and sustainable, traditional (extensive) land use systems to manage natural resources. Resource management and related traditional ecological knowledge based on understanding of the functioning of the ecosystem help local communities to maintain important resources, like forests. Forest plays an important socio-economic role in the life of rural communities. Wood is one of the most elemental raw materials used in households, but its non-timber benefits play just as important a role.

We examined sustainable use of forests in a Csángó community in Gyimes region (Eastern Carpathians, Romania), providing insights into attitudes within folk forestry towards natural resources, driving forces, and changes in human relations with the forest.

Wood as a raw material is a resource that largely determines the daily life of the Csángó community, while non-timber products (e.g., forest grazing, forest fruits, herbs) play a complementary, yet important role in Gyimes life. The survey of forest flora and vegetation confirms that Gyimes farmers are familiar with the plant species that reach significant coverage in the canopy, shrub and herbaceous layers, they are well versed in the forest types occurring in the landscape, their dynamics, their most characteristic stages in the succession after felling. Overuse is an undisputed and acknowledged part of the forest-management, threatens social-ecological system-flexibility. As long as natural systems are able to renew themselves (forests can regenerate), there is chance for the further use of this important resource and in a broader context there is chance for the survival of the local community as well.

Keywords: forest management, traditional ecological knowledge, Eastern Carpathians, sustainable resource management

SOCIAL-ECOLOGICAL RESILIENCE AND SMALL-SCALE FARMING

All over the world, rural communities that farm traditionally (extensively) have mostly been operating land use systems that are stable and sustainable in the long term (Plieninger et al. 2006; Robson – Berkes 2011). These land use systems developed and maintained cultural landscapes that represent certain ecological,

cultural and aesthetic values (Agnoletti et al. 2014; Antrop 2005; Dorresteijn et al. 2015; Rist – Dahdouh-Guebas 2006). The forest patches enlaced with arable lands and grasslands which also play a very important socio-economic role in everyday life are important elements of these landscapes (Hegyi 1978; Petercsák 1992:5–6; Woitsch 2011).

The purpose of extensive farming is to ensure the quality and sustainability of the natural resources providing for the needs of rural communities (e.g., firewood, hay), along with the forest (Hartel et al. 2014:4). This primarily means the complex management of habitats and plant communities (e.g., Babai – Molnár 2014; Meilleur 1986; Molnár et al. 2015). The land use system is based on a dynamic, constantly expanding traditional ecological knowledge (Berkes 2012; Menzies – Butler 2006), and its stability and adaptive capacity are safeguarded by social (informal) institutions (Colding – Folke 2001; Molnár et al. 2015). The framework of land use is in many cases based on the high-level understanding of the functioning of the ecosystem (ecological understanding model: Turner – Berkes 2006) or on experiencing resource depletion (depletion crisis model: Berkes – Turner 2006; Colding – Folke 2001). Informal institutions do not generally develop where there are abundant resources that regenerate well (small fishing communities in Oceania: Colding – Folke 2001; Johannes 2002; spruce forests in Székelyland: Molnár et al. 2015).

For its wood and other benefits, the forest as a natural resource has played a very important role in the life of rural communities in Europe, as well as in Transylvania (e.g., Gimmi – Bürgi 2007:237; Woitsch 2011). This is indicated by Székely village acts (Molnár et al. 2015) or Saxon directives (Dorner 1910) as well as recurrent contemporary social debates (e.g., Lukács 2015). Wood is one of the most elemental raw materials of material culture (utensils, tools, dishes), but its non-timber benefits play just as important a role (Stryamets et al. 2015; Woitsch 2011:155–156). Contemporary forest use is characterized by the duality of traditional forest use based on local ecological knowledge and a materialistic approach focused on profit. We examine this ambivalent situation with the help of data collected in a Transylvanian Hungarian community, among the Csángó in Gyimes region, providing insights into attitudes within folk forestry towards natural resources, driving forces, and changes in human relations with the forest (cf. Johann 2007:55; Woitsch 2011:155).

AN EXTENSIVELY FARMING EUROPEAN RURAL COMMUNITY: THE CSÁNGÓS OF GYIMES

Extensive land use – heterogeneous mountainous landscape

Data related to the sustainable use of natural resources, particularly forests, was collected in Valea Rece (Hidegségpataka), a community of 2,340 in Lunca de Jos (Gyimesközéplok, Eastern Carpathians, Romania) (Varga E. *n.d.*; for more, see Babai et al. 2014).

The settlement is located within an extensive network of valleys formed by the river system of the Tatros. The bedrock of this mountainous area is sandstone (Pál-Molnár 2010), its climate montane-boreal, with an annual average temperature of 4–6 °C

(Pálfalvi 2001:166) and annual rainfall of 800–1200 mm (Ilyés 2007:45). Most of the mountains reach an elevation of 1250–1350 m (highest point: 1553 m; Naskalat), while the valley bottom lies at 850–900 m.

Due to the mosaic structure of the habitats, the flora of the area is extremely rich (Babai 2014; Pálfalvi 2001; 2010; 2012). As of now, research in the area has detected a total of 641 vascular plant species (Babai 2014).

The vegetation of the Gyimes landscape consists of spruce forests (*Hieracio rotundati-Piceetum*), and to a lesser degree beech forests (*Symphito cordati-Fagetum*). The fragmentation and decline of the once continuous forest cover are due to the development of seminatural grasslands that ensured the feed requirements of livestock in winter (hay) and summer (pasture), i.e., the establishment of a mosaic cultural landscape defined by animal husbandry (forest cover is less than 30%; Babai 2014) (Ilyés 2001; 2007). The cleared meadows that formed in place of forests (acidic and mesophilic grasslands – *Arrhenatherum elatius, Festuco rubrae-Agrostetum capillary, Anthoxantho-Agrostietum capillary, Violo declinatae-Nardetum*) dominate two-thirds of the landscape (Babai – Molnár 2014; Babai et al. 2014).

Users of the landscape: Gyimes Csángós and small-scale farming

The Csángós in Gyimes are a Catholic, Hungarian-speaking community that settled in the area about 250 years ago (Hofer 2009; Ilyés 2007). Today the land use system developed in this young cultural landscape provides feed for the livestock of a 14,000-strong community (Babai – Molnár 2014; Babai et al. 2014; Ilyés 2007).

Even today, the semi-subsistence farming systems are still based on small-scale plant cultivation and animal husbandry (cf. Tudor 2015:31–32). The average size of holdings nears the 3.2–3.6 ha Romanian average (Knowles 2011; Tudor 2015). The main pillars of the economy are animal husbandry (dairy-producing cattle breeding), and the main agricultural crops are potatoes (*Solanum esculentum*) (Babai et al. 2014). Similarly, to 2,854 villages in Romania (Huband – McCracken 2011:60), the socialist transformation of agriculture in the Gyimes region took place only partially: forests and pastures were nationalized.

METHODS

The goal of the ethno-ecological research taking place since 2006 is to learn about the flora (Babai 2014), understand the biological meaning of local plant names and folk taxa (Molnár – Babai 2009), explore the names and ecological content of local habitats (Babai – Molnár 2009; 2013), and examine in detail the traditional (extensive) grassland management (Babai – Molnár 2014; Babai et al. 2014; 2015). The research also included traditional knowledge related to vertebrate animals (Babai 2011).

To explore the ecological knowledge and economic activity related to forests, we prepared semi-structured and structured interviews and questionnaires. A total of 48 people participated in the study (26 men, 22 women), all of them farmers (one forester), with a mean age of 56.3 years (the oldest informant was 87, the youngest 12). All

interviews were conducted in Lunca de Jos, Valea Rece in Hungarian. The interviews were recorded on a voice recorder.

The botanical survey of the flora of the forests was conducted through samplings (coenological relevees) of 100–400 sq m quadrants using the Braun-Blanquet method (Braun-Blanquet 1951). The shape of the sampling unit was adjusted to the shape of the forest patch. The dominance of plant species was determined in percent values. Then we compared the forest's botanical flora and the flora associated with the forest by the locals, and calculated the resemblance using the Microsoft Office suite (Excel) (Jaccard index). In the calculation of the index, the number of common species (C) between the two sets [folk flora (A) and coenological records species list (B)] is divided by the value derived by subtracting the elements of the common set (C) from the sum of the elements of the two sets (A+B): $I_{Jaccard} = C / (A+B-C)$.

In the text we list all species by their name used in Gyimes (indicated in italics), followed in brackets by their scientific name. Figure 1 provides the scientific, official Hungarian, and Gyimes names of all species included in coenological records and on the Gyimes flora list.

Quotes of are indicated in italics, and what various informants said are separated by the " / " sign.

Scientific name	Common name	Local name (Hidegségpataka)
	Tree species	
Picea abies	Norway spruce	veres fenyő
Abies alba	silver fir	fehér fenyő
Pinus sylvestris	Scots pine	lúcs
Fagus sylvatica	European beech	bikk, bükk
Acer pseudoplatanus	sycamore	jáhor
Betula pendula	silver birch	nyírfa
Salix caprea	pussy willow	rakottya
Populus tremula	common aspen	nyár
Sorbus aucuparia	rowan	kórus
Taxus baccata	yew	tisza
Cerasus avium	wild cherry	vadcseresznye

Shrubs		
Lonicera xylosteum	honeysuckle	csontfa
Daphne mezereum	spurge laurel	farkashárs
Rubus idaeus	red raspberry	málna
Rubus fruticosus	blackberry	szeder
Ribes uva-crispa	gooseberry	szőrös füge
Ribes alpinum	alpine currant	leánkafüge, vadribizli
Clematis alpina	alpine clematis	erdei felfolyó
Sambucus nigra	common elder	fekete bojza
Sambucus racemosa	red elderberry	piros bojza
Corylus avellana	common hazel	magyaró
*Spiraea chamaedryfolia**	elm-leaved spirea	gyüngyemény
Rosa canina agg.*	dog rose	hecselli
*Juniperus communis**	common juniper	borsika
Vaccinium myrtillus	bilberry	fekete kokojza
Herbaceous plants		
Oxalis acetosella	wood sorrel	erdei sósdi, madársósdi
Euphorbia amygdaloides	wood spurge	árior
Streptopus amplexifolius	twisted stalk	nyúleper
Lycopodium annotinum	bristly club-moss	serkefű
Galanthus nivalis	common snowdrop	hóvirág
Allium ursinum	wild garlic	vadfokhagyma, medvehagyma
Fragaria vesca	wild strawberry	berkeeper, piroseper
Fragaria viridis	creamy strawberry	tokos eper
Gentiana asclepiadea	willow gentian	gyertyánfű
Galium mollugo	hedge bedstraw	ragadvány

Herbaceous plants		
Pteridium aquilinum	bracken	ördögborda
Campanula patula, C. rotundifolia, C. trachelium	spreading bellflower, harebell, nettle-leaved bellflower	harangvirág
Chamaenerion angustifolium	rosebay willowherb	vészvirág
Myosotis sylvatica	wood forget-me-not	nefelejcs
Viola reichenbachiana	early dog-violet	ibolya
Antennaria dioica	mountain everlasting	mezei gyapár
Briza media, Festuca pratensis, Festuca rubra	quaking-grass, meadow fescue, red fescue	imola
Brachypodium pinnatum	tor grass	zablevel
Urtica dioica	stinging nettle	csihány
*Cirsium eriophorum, C. erisithales, Telekia speciosa**	woolly thistle, yellow thistle, heartleaf oxeye	medvesaláta
*Origanum vulgare**	oregano	ezerjófű
Alchemilla spp.*	lady's mantle-species	zsanika
*Leucanthemum vulgare**	ox-eye daisy	papvirág
*Helleborus purpurascens**	purple-flowered Christmas rose (hellebore)	eszpenz
*Tussilago farfara***	coltsfoot	podbállapi
*Petasites albus***	white butterbur	keptelán

Figure 1. Intersection of coenological records and the number of taxa considered forest species by the locals in Gyimes

* meadow species, which are present in the herbaceous layer because of forest grazing;

** species characteristic for spring-fens in the forest

RESULTS

The forest is a habitat that determines the character of the Gyimes cultural landscape and is very important economically as well. Wood as a raw material (firewood, timber, tool wood, etc.) is a resource that largely determines the daily life of the local community, while non-timber products (e.g., forest grazing, forest fruits, herbs) play a complementary role in Gyimes life.

The concept and interpretation of the forest in Gyimes

In the forest-perception of the people of Gyimes, forest types are determined by dominant and characteristic tree species:

> "what kinds of forests do you have around here? / We have beech (*Fagus sylvatica*) and birch (*Betula pendula*), then white pine (*Abies alba*) and red pine (*Picea abies*)." (KB 31 01 '08) // "How many types of pine forests do you have? / Of pine, these three, the red pine, white pine, and lúcs (*Pinus sylvestris*). These three pine trees. / But of pine forests, how many do you have? / That's it, these are all pine trees, they are forests, the difference is only that some are red pine, some lúcs, and some white pine. But these are all pine forests, there is only that much difference." (JA 27 01 '08)

It is interesting that the representatives of the herbaceous forest flora grow among the trees, not in the forest: the wood fern (*Dryopteris* spp.) grows "in rather shaded areas, among the forest" (FD 04 02 '08).

The botanical and folk botanical features of forests

In Gyimes there are two dominant forest types: "of forests, we have two types. Evergreen forests (*Hieracio rotundati-Piceetum*) and beech forests (*Symphito cordati-Fagetum*). 'Cause here there are none of those leafy (deciduous) forests, only beech trees. (...) There used to be birch forests, too, but there's few of those now, they only grow in patches" (TS 29 01 '08).

In the coenological records taken in the forest and on the list of species associated by the people of Gyimes with the forest, there are a total of 200 plant species, of which 179 were found during the coenological survey, while the people of Gyimes mentioned 72 typical forest species. The intersection of the two species lists (the common species) contains 51 species (25.5%) (Figure 1, Figure 2).

In the following we will present the most important of the 51 species that are considered dominant in the forests of Gyimes, based on both the botanical survey and the opinions of farmers in Gyimes.

The world of pine forests

The forests in Gyimes are dominated by the *red pine* (Norway spruce, *Picea abies*): "the red pine, it is most prevalent here in all forests" (PK 05 02 '08), spruce forests (*Hieracio rotundati-Piceetum*) are the most common types of forests in the landscape. Silver fir (*Abies alba*) is often mixed in, because "they (the red and white pine) are not separate" (JA 27 01 '08). Of the deciduous species, it is mainly the birch (*Betula pendula*) and the beech (*Fagus sylvatica*) that can be observed individually.

In the shrub layer, the poisonous spurge laurel (*Daphne mezereum*) and the fly honeysuckle (*Lonicera xylosteum*) – used as a whip handle for its extremely hard wood – are most common. Other typical shrubs are raspberries (*Rubus idaeus*), gooseberries (*Ribes uva-crispa*) and rowan (*Sorbus aucuparia*).

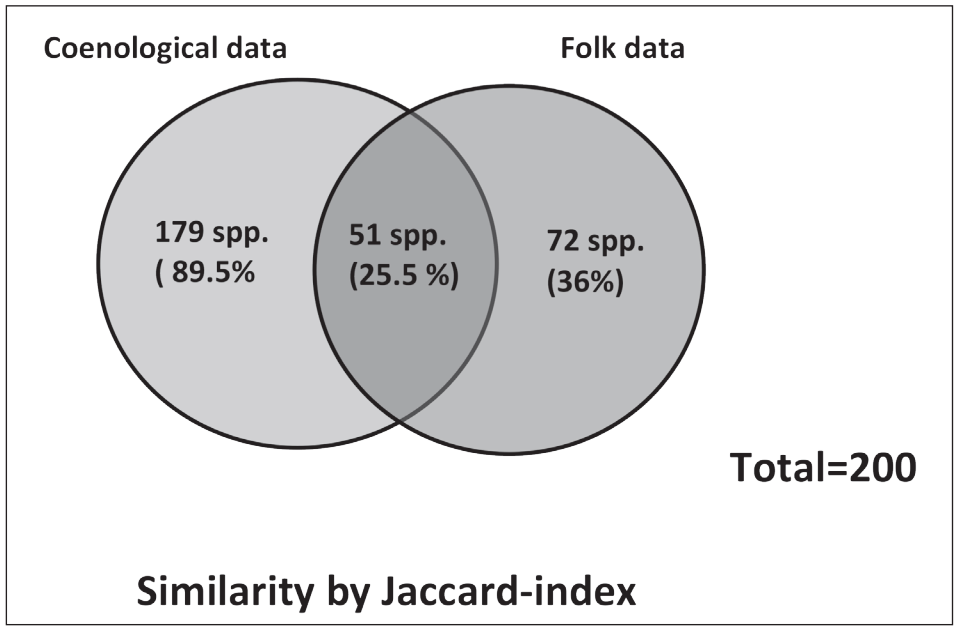

Figure 2. The number of species of plants in the coenological records, and the number of taxa considered forest species by the locals in Gyimes, and their intersection

The alpine clematis (*Clematis alpina*) represents a particular life form as it "sets out, and climbs the trees, creeps around them" (KB 31 01 '08).

The development of the herbaceous layer depends on the density of the forest: "where the forest is dense, there is no lawn to grow grass. Where the forest is sparse, it's turfy, the grass grows there" (TE 01 02 '08). The herbaceous layer is often dominated by wood sorrel (*Oxalis* acetosella, *oxalidetosum* subassociation): "there is a lot of it here, in our woods" (TS 29 01 '08). The people of Gyimes most often associate this species with spruce forests (Figure 3): "in more shaded places, and beneath the spruce trees, where there are spruce forests" (FD 04 02 '08). Wood spurge (*Euphorbia amygdaloides*) is a common herbaceous plant, occurring primarily in the more open, less closed forests: "in sparse forests, not in the dense ones, where the forest is more piddly" (JA 27 01 '08). Other common species are the club-moss (*Lycopodium annotinum)*, the edible twistedstalk (*Streptopus amplexifolius*), and the black bilberry (*Vaccinium myrtillus*). The latter is less often associated by the people of Gyimes with forest habitats because "where the forest is dense already, it is there, too, but it will not produce fruit there" (TE 01 02 '08).

A vanishing species in pine forests is the yew (*Taxus baccata*): "it only grows in piney areas" (JGy 02 02 '08); it "resembles the white pine, but differs in leaves. Its leaves are flatter and wider than the white pine's ... so it is needle-leaved, too. It is very rare around here, there are some, but very, very few" (JGy 08 02 '08).

The world of beech forests

The area of beech forests (*Symphyto cordati-Fagetum*) dwarfs in comparison to spruce forests, although once there were larger populations in the landscape, "a long time ago

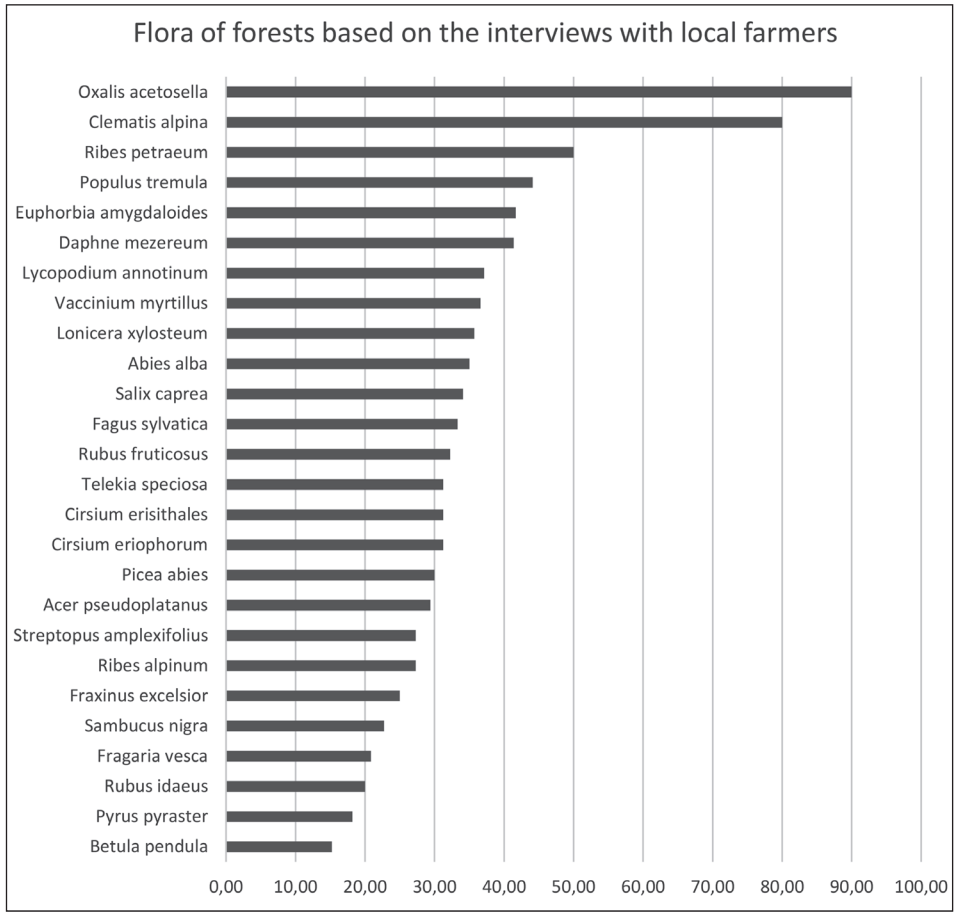

Figure 3. The flora of forests and forest edges, based on the perception of the local farmers (percentage of all habitat-mentions during 30 structured interviews about 150 different plant species - above 10 %)

there were such huge forests of those..." (BE 04 02 '08), which have, however, almost entirely disappeared by now because of overuse. So today the beech has a marginal role in the canopy: "around here there are none in extended areas, as beech-only forests, just mixed with pine" (FD 04 02 '08). Typical species in the canopy layer of the remaining small-scale patches of beech forest are the beech (*Fagus sylvatica*), but Norway spruce (*Picea Abies*) and silver fir (*Abies alba*) are common as well. Rare species is the wild cherry (*Cerasus avium*), the rowan (*Sorbus aucuparia*) and the sycamore (*Acer pseudoplatanus*). In the shrub layer, spurge laurel (*Daphne mezereum*), fly honeysuckle (*Lonicera xylosteum*), and gooseberry (*Ribes uva-crispa*) are typical – similarly to pine forests. In the herbaceous layer of beech forests, there are few herbaceous plants that have a local name. One such is the snowdrop (*Galanthus nivalis*) and the rare wild garlic (*Allium ursinum*).

The benefits of a forest

The utilization of timber

The forests of Gyimes are dominant sources of timber used for different purposes. The tree species with the most versatile and most common utilization (e.g., firewood, tool wood, lumber) are the beech (being depleted) and the Norway spruce (*Picea abies*): "pine wood is made into furnishings, windows, doors, fences (and slats, too). They make buildings, houses, farm structures, that's what the pine trees are used for" (VK 08 02 '10). In terms of furniture making, "beech wood is more valuable. One is that it is for furniture manufacturing" (VK 08 02 '10).

One of the key benefits of forests is firewood. Beech as "fuel is first class, it's the best" because "it's a hard wood, it lasts a long time in the fire, heats very well" (VK 08 02 '10), but the Norway spruce, the most common tree species, is used for this purpose in the greatest amount: "in general, here we mostly have pine trees" (VK 08 02 '10).

For making tools, they use primarily deciduous tree species: "beech, and sometimes there's birch, too. For tool wood, the birch is very good" (VK 08 02 '10). Sycamore (*Acer pseudoplatanus*) is also made into tools: "it's a soft wood. In the past they carved it into troughs, wooden spoons, everything" (KB 31 01 '08). But the Norway spruce is also suitable as tool wood: "young pines are made into rake handles, 'cause the pine wood is light, and stakes for beans" (PK 07 02 '09). For wagon rods, birch and beech are suitable: "birch trees are cut, many of them for horse rods. And the young beech tree, we call it beech *figó*, it is used for making horse rods" (VK 08 02 '10). Of the softwoods, the pussy willow (*Salix caprea*) is most commonly used as a pitchfork handle" (JP 31 01 '08).

The wood of the yew (*Taxus baccata*) is extremely valuable, which, due to its hardness, is used to make nails: "shingles were nailed with yew nails. That wood was so strong that it could be hammered into the wood" (TS 29 01 '08). Silver fir (*Abies alba*) is utilized as a Christmas tree because "it doesn't lose its pins as soon as the red pine" (JP 31 01 '08). From fly honeysuckle (*Lonicera xylosteum*), "they made whip handles, and when there were still oxen, yoke sticks for the yoke" (TS 29 01 '08).

Non-timber products

Besides timber, the forest provides many other ecosystem services (wild berries, mushrooms, herbs, foliage feed, etc.) to the Gyimes community.

Once an important benefit, beech mast grazing has appeared in the first half of the 20th century along with the larger beech forests. The extensive beech forests still alive in memories used to be roamed by the pigs and turkeys (!) of Gyimes farmers (the beech mast was also fit for human consumption): "the pigs went out, there were so many, so many beech masts, and we collected them. And we dried them, and in winter, oh, how good it was to eat them! (...) Sometimes we didn't even have to fatten them, they gained weight when there were many beech masts. And its bacon was so good" (BE 04 02 '08).

In years of extreme drought there is less hay and aftermath, so the leaf-fodder provided by the forests plays an important role in the overwintering of livestock. For cattle, leaf-fodder is only dearth feed: "some poor farmers that could not produce enough hay, in the winter they went out and cut off the spruce branches, and the cattle ate those" (BE 14 02 '10). The sheep, however, love spruce foliage, it makes their wool more beautiful: "the

sheep need it for their wool. The sheep [eat] this green branch, this green bough, 'cause the wool grows better. Great food for the sheep" (TT 11 02 '10).

Forests are also important autumn grazing areas: "there was good grass in the forest, and there it wasn't burned (by the sun), 'cause we've had some heatwaves. There the grass didn't even get burned, it survived there, and the cattle grazed on it very well in the autumn" (KP 06 02 '09).

The forest provides food not only to animals but also to people, although these play merely a supplementary role in the diet. Several species of forest flora are suitable for human consumption (fruit, leaf). Fruits can be collected mainly in clearings ("*perilous site*"), especially in the second year following the cutting, when the raspberries bear fruit: "there were so many raspberries like litter. We picked the raspberries, cooked the compote. There it was, if we needed raspberries, if we needed strawberries..." (LG 07 02 '09). Commonly collected fruits: raspberries (*Rubus idaeus*), blackberries (*Rubus fruticosus agg.*), wild strawberries (*Fragaria vesca*), gooseberries (*Ribes uva-crispa*), mountain currants (*Ribes alpinum*), and bilberries (*Vaccinium myrtillus*).

Mushroom picking is also an important activity in Gyimes, especially in spring and autumn, when they gather large quantities of a variety of fungal species [e.g., chanterelle (*Cantharellus cibarius*), king mushroom (*Catathelasma imperial*)].

The tart leaves of the wood sorrel (*Oxalis acetosella*) commonly found in forest undergrowth quench the thirst of forest goers: "it's happened that we were felling the trees, and the water was far away, we did not have any water, and there was wood sorrel, and we ate it, and then our thirst was quenched" (TE 01 02 '08). Much rarer is the twistedstalk (*Streptopus amplexifolius*), the fruits of which "can be eaten. But in the summer it is not good, rather it is good, and I have eaten this, in the winter when it ripens (in the hay) and is edible" (TE 01 02 '08).

The resin of the Norway spruce (*Picea abies*) (locally called *tar*) "was picked and chewed by the people. Here, when they were still weaving in those times, to have saliva, they chewed the *tar* all the time so that they would have saliva and they could moisten the yarn" (KP 06 02 '09). Of its cone and fresh shoots syrup was made.

A plant typical of sparse forests and forest edges and commonly utilized in veterinary medicine is the wood spurge (*Euphorbia amygdaloides*), its brew used for treating horse injuries: "especially for horses, if they get a wound, and to keep flies off. They brew a tea from it, and wash the wound" (FD 04 02 '08).

Not only the flora but also representatives of the forest fauna got a role in the diet. Besides large game, "doe, deer, wild boar, its meat is also delicious, rabbit" (LG 07 02 '09), which today are scarce, several species of small mammals and birds were also consumed: the wood grouse (*Tetrao urogallus*) ["it was big like a turkey, and we ate its meat." (LG 07 02 '09)], the hazel grouse (*Bonasa bonasia*), and of the small mammals the red squirrel (*Sciurus vulgaris*) ["we pulled off its coat and grilled it" (LG 07 02 '09)].

Forest dynamics and management

The clearing emerging after the forest has been cut down is usually taken over by a series of characteristic plant associations dominated by a specific species. The process (succession) is well known by Gyimes farmers, and they even name a number of characteristic stages.

The location of the forest clearing, the glade, is called the "*perilous site*": "where the forest is cut down and they don't collect the branches, there they call it peril" (TS 29 01 '08). The clearing is first overtaken by wild strawberries (*Fragaria vesca*) – a strawberry glade (*Fragario-Rubetum*): "the wild strawberry here in the fresh clearing. Already when the forest is cut, it is crawling in, swarming in. And then it remains there for up to a year" (BE 04 02 '08). Soon, the strawberry glade is overtaken by raspberries – a raspberry glade (*Rubetum idaei*): "the raspberry is taking over, and then the strawberry begins to disappear" (BE 04 02 '08).

After five or six years, the raspberry glade is also further transformed: "[the raspberry glade] takes long to die out, it just grows old and dwindles" (BE 04 02 '08), while "other bushes sprout, they start to grow, they give shade, and so the raspberry completely disappears" (PK 05 02 '08). Raspberries are replaced first by a young forest dominated by pioneer tree species (*Populus tremula, Betula pendula, Salix caprea*): "when the raspberry glade has died out, the pussy willow (*Salix caprea*) starts growing, and birch trees, and those young spruce trees. (...) So that it becomes a thicket. Such a one that you can't even walk through it" (KB 31 01 '08). The main features of pioneer deciduous species are sudden, rapid and vigorous growth and rapid disappearance after a few decades: "when the forest is felled, when they had cleared it, the first to grow are those: pussy willows and raspberries. The willow soon covers the clearing, but then when the forest grows, it remains in the shade, then it dies out" (TS 29 01 '08).

Over time, in the area dominated by pioneer deciduous species, "spruce trees take over, and when they grow tall enough to cast a shadow, underneath them everything, all the rest dries up" (PK 05 02 '08). Thus, pioneer forests are gradually replaced by young, dense spruce forests: *bezseny* – "all those small spruce trees together, they grow so one can't even cross between them. It's dense. It grows thick, because the cones of large trees drop so many seeds, and they all sprout" (FA 05 02 '09).

In extremely dense spruce forests, the process known as self-thinning begins: "the forest that grows freely, was not planted, it grows so dense, like hemp (this is the *bezseny*). And it grows up, it kills off the weaker ones, they dry out, only the robust ones, they grow up, and then it will become a beautiful timber forest" (VK 08 02 '10).

The spruce that grows during the first self-thinning becomes so-called '*trifle*': "when the *trifle* grows to six or seven meters, that's when it can become a rake handle first" (GyJ 29 01 '08). *Trifle* then develops into a so-called '*stake*' forest, which provides stakes for a fence: "when they pass two meters, they begin to grow sticks, they said in olden times that's when they're good for a fence" (GyJ 29 01 '08). As the *stake* forest continues to grow, it becomes a so-called '*beam*' forest: "the *beam* forest, it has twenty-six, twenty-seven, twenty-eight centimeters at the trunk, which is good for building houses" (VK 08 02 '10). If the forest is still not cut down in this stage, it becomes a '*pillar*' forest, which provides the appropriate timber for lumber: "the *pillar* forest is the one that goes to the gangsaw. Sixty-seventy centimeters in diameter, that's a pillar forest. That has the highest value" (VK 08 02 '10).

According to the majority of Gyimes farmers, cultivating forests that provide good quality wood does not require treatments:

> "it just developed, we did not have to artificially intervene. So it was naturally quite beautiful. You see, I experienced this myself, it was a pasture, but grazing ceased, and spruce trees grew

there. (...) That is beautiful, I do not do anything to it. I let it be as it is naturally, let it grow, and it will only become beautiful. (...) Didn't need to thin anything there." (JGy 12 02 '09)

A few consider some treatment (thinning, trimming) necessary so that the forest may grow properly: "everything needs a little curing. The forest, if it grows very dense, it will not grow to be beautiful" (FA 05 02 '09).

Protection of forests

For the people of Gyimes, the forest is an important natural resource, and the diversity of its benefits and the depth of ecological knowledge regarding the management and dynamics of forests also indicate this.

The relationship between Gyimes farmers and forests is an ambivalent one. They highly appreciate the forest as a provider of numerous benefits and ecosystem services, the only resource that could be monetized in recent years. At the same time, the forest is one of the greatest threats to the clearcut meadows so important for their livestock, which they have to battle day after day so as to retain the meadows and pastures: "where there are forests around, there they come shortly, the seedlings, and if you do not destroy those, the pasture will be lost" (PK 07 02 '09). In the once forest-dominated landscape the regeneration of woody vegetation types works well – for now – and it is natural to the locals: "the pine forest domiciliates itself, the wind carries the seeds, wherever they fall, these seeds survive" (FD 04 02 '09).

Besides the everyday battle for the survival of pastures, in the past two and a half centuries two great waves of deforestation swept through the forestlands of Gyimes. The first came in the first half of the 19th century, following the settlement of a larger population, when the development of grasslands necessary for animal husbandry took place, creating the grassland-forest ratio characteristic to this day.

The second wave of deforestation intensified after the regime change. When the forests and pastures were nationalized in 1959, only the meadows remained in private hands: "everyone kept the meadows, the pastures were taken, and the forests" (FD 04 02 '09). The management of forests was assumed by the state forestry: "it belonged to the state. There were no private forests, everyone's were taken away" (VK 08 02 '10). Forestation took place under state forest management, and some of the pastures were afforested: "in the Cheau-world, the good pastures were planted with seedlings. It was also mandatory, you had to, you didn't get your token for firewood unless you went sapling-planting" (FA 05 02 '09).

Timber theft has already started in this period, even though the system was still "very strict" (VK 08 02 '10). In addition to the legally harvestable amount of wood, everyone obtained what was yet necessary: "back then there were more forests. We had to steal, but it was terrifying. Now they wiped them out and soon there will be none" (VK 08 02 '10). And why did they need the wood? "We did not steal for anything other than for building and for fuel, it had to be obtained for that, there was no other place to get it" (VK 08 02 '10).

With the collapse of communism, after 1989 chaos reigned due to messy land tenures: "theoretically, everyone knew how much they had, where it was, what it was like. And

then when they gave them back, everyone insisted on getting their own back. But there are a great many litigations, quarreling" (FD 04 02 '09). The uncertain situation resulted in the overexploitation of forests, the escalation of timber theft. This was partly due to disorderly land tenures and weakened inspections, which were unable to forestall timber theft. The other reason is to be sought in the economic and social crisis following the regime change, when "after the Cheau-world, somehow the people were taking (the wood), 'cause there was nothing else to grab, and while there was wood, they monetized (FA 05 02 '09). By this time

> "It has become a way of life [tree theft], for many it is their livelihood. They are stealing the forest, selling to the patrons (entrepreneurs). They live from it, they make money from it, if there are no jobs, there is nothing, and thus the forest is being cleared. As it became a democracy, everybody set out for the woods, and they made money from it, so the forest was very very depleted." (VK 08 02 '10)

Thus, a substantial part of the forestland "wandered off" the mountainside into the valley's (often illegal) sawmills, to be then transported, processed as lumber, from the valley whose inhabitants are now sometimes hard-pressed to obtain even firewood: "soon there will be no forest to get firewood from" (BE 05 02 '09).

The destruction progressed until the usable forests around the settlement were exhausted: "Today we're at a point where whatever we still do have is in such an inaccessible place that it is hard to get to. In easier areas, where there is better access, there it is ... it is ruined" (VK 08 02 '10). The lack of timber is already perceived in everyday life, causing serious difficulties: "We know very well that our forests are doomed. And we continue to annihilate them. Unfortunately, that's how it is, for how long, I don't know. This is unfortunate, that we do not appreciate them. The people are forced into it, because it is their livelihood. But it does not lead to any good for anyone" (JGy 02 02 '08).

The warning signs raise awareness about the needs of future generations: "when a man has his own, he has to ration it a little bit, 'cause you never know what the world will come to. There are children still, they will need something too" (FD 04 02 '09). After all, the forest is a slow-growing, long-term resource: "a pine needs about thirty five-forty years to be such that you can build a house from it 'cause it can be used for construction. And the *pillar* forest, the circumference needs to be sixty-seventy centimeters, and it takes about a hundred years" (VK 08 02 '10).

DISCUSSION OF RESULTS

The forest is a very important natural resource for rural communities, and so it is for the people of Gyimes as well (cf. Woitsch 2011:155). The survey of forest flora and vegetation confirms that Gyimes farmers are familiar with the plant species that reach significant coverage in the canopy, shrub and herbaceous layers (Babai 2014). They are well versed in the forest types occurring in the landscape, their dynamics, their most characteristic stages in the succession after felling, the world of beech and pine forests. The memory of traditional forest use is still alive, even though in practice the economic pressures and demands override it. Memories of former forest use are of great importance

because, in large parts of Western Europe, traditional knowledge related to forests and forest use has disappeared (Rotherham 2007:101–102).

Wood, a determining factor of everyday life, is equally important in private and industrial use (Johann 2007). Beyond selective cutting (different species fit different purposes) and timber extraction meeting local needs, the desire to make money by taking advantage of the continuous, high market demand brings on a larger-scale extraction of timber – leading to overuse, temporarily eliminating the relationship between forest use and socio-cultural values (Johann 2007:60).

Gathering activities exploiting the forest's resources focus on non-timber products (e.g., wild berries, mushrooms, beech mast for human consumption, etc.) (Petercsák 1992:115) and are diverse and important in Gyimes, as they have been in all of the forest-dominated (mountainous) landscapes examined in the Carpathian Basin (e.g., Bakony: Hegyi 1970:448–449, 1978; Balaton-highland: Vajkai 1941; Bükk: Barsi 1987:62; Petercsák 1992; Gerecse: Gunda 1938:213; Göcsej: Bödei 1943:73–75; Gömör: Márkus 1941; Paládi-Kovács 1988; Bodnár 1988:735; Bődi 1999; Kalotaszeg: Kruzslic 2007; Mátra: Petercsák 1992; Pálosné 2000; Zemplén: Ujváry 1957; Petercsák 1992; Zselic: Füvessy 1997:209–210; Dénes et al. 2012). These food and herbal sources are significant in many parts of the world to date (e.g., Brazil: Riberio et al. 2014; Mexico: Hernández-Barrios et al. 2014; South-East Asia: Uprety et al. 2016; Solomon Islands: Furusawa et al. 2014).

The role of coniferous forests in Gyimes animal husbandry does not reach the level of significance highland deciduous forests dominated mainly by oak or beech, play in forest grazing, leaf-fodder or pannage (cf. Petercsák 1988; 1992:101–114). Leaf-fodder also plays a rather complementary role in Gyimes, just like in the Hegyköz (in case of insufficient hay harvest) (Petercsák 1977:295). The less significant role of pine forests utilized as livestock pasture shows well that while animal husbandry in villages in Zemplén in the late 19th century operated in 67% average forest cover (Petercsák 1981), in Gyimes in this period there was about 30% forest cover, which is stable to this day, as it is grasslands that are the main scenes of animal husbandry here (Babai et al. 2014).

The timber utilization of forests fluctuates. Overuse is inevitably followed by lower use, renewal processes coming to the fore. The people of Gyimes have a detailed knowledge of the vegetation changes of this cyclical process (cf. Gadgil et al. 2003). The well-known functioning of regeneration may be the reason for the lack of informal institutions and ideas related to the protection of the forest as a resource (cf. Berkes – Turner 2006; Molnár et al. 2015). The negative perception of overuse does appear in the interviews, yet they continue this exploitative forest management until the source is almost completely exhausted, secure in the knowledge of its good regeneration capabilities. According to Petercsák (Petercsák 2010:41), when the forest is abundant, the free use of forests is in place. However, this leads to a lack of resources in a short period of time, and since we are talking about a slowly regenerating plant community, the overuse could result in a timber deficiency for 30 to 40 years. This is why the perception of the value of forests appears in the interviews: "if you got a forest, you got gold."

In Gyimes and throughout Szekelyland, due to the ubiquity of pine forests, their use is not restricted by community rules (in Kászon/Caşin, of the 898 Village Acts related to ecosystem services, including 300 related to forests, not a single one addresses pine forests – Molnár et al. 2015), although the spruce can be considered a culturally key

species (cf. Garibaldi – Turner 2004). Regulations are primarily focused on the more rare deciduous forests (Imreh 1973; Molnár et al. 2015). The protection of the latter is more important because in the spontaneously regenerating forests of the larger clearings of mountainous areas, deciduous tree species are suppressed (Johann 2007:58) and barely renewed (Gimmi – Bürgi 2007). The proportion of deciduous species in Gyimes also decreased, and regrowth is dominated mainly by *Picea abies* seedlings.

The forestry experience of Gyimes farmers focuses primarily on the production of timber of appropriate quality. Unlike on hayfields, in the forest they prioritize natural regeneration (cf. Babai et al. 2014). German type of forestry has been recommending artificial renewal since 1863 (Johann 2007:58). Timber utilization is extremely versatile. In many local communities, disturbance is a current, adaptive management method (Davidson-Hunt – Berkes 2011:65), but in Gyimes, no treatment is done in the forests, to ensure non-timber benefits. At the most, they are sometimes thinned, trimming the trees to improve the conditions of forest grazing. Interestingly enough, raspberry glades (*Rubetum idaei*), ensurers of important forest benefits, are never treated. They do not slow down the succession process of the clearing vegetation, thus extending the life of the raspberry glade stage, a practice which, in the case of berry-type stages, is well known among North American First Nations communities (Johnson 2010).

Due to poverty and lack of employment opportunities, in the marginal (mostly mountainous) areas small-scale, subsistence farming has been preserved well into the early 21st century (Hartel et al. 2014; Tudor 2015), becoming the most important survival strategy (Tudor 2015). In the Ceauşescu era, farming served as a wage supplement alongside one's industrial job in Miercurea Ciuc (Csikszereda) for the production of good quality and large quantities of food, especially dairy and meat. The drastic and rapid changes occurring after the regime change, the collapse of communities, the rise of individualism, the weakening of local formal and informal institutions, and the lack of cooperation posed serious challenges for these communities (cf. Hartel et al. 2014; MacDonald et al. 2000; Reif et al. 2008:18). After the regime change, the majority of the people in Gyimes lost their jobs in the city, so the family farms re-emerged as the only opportunity for a livelihood. The obvious possibility of earning money lied in the timber in the forests (cf. Johann 2007).

The existence of adequate ecological knowledge and knowledge transfer mechanisms (Johann 2007:55; Reyes-Garcia et al. 2004), despite weakened community regulations, was incapable of curbing the intensified selfishness of individual interests, the careless handling of the easily monetizable forests. The erosion of sustainable forest management based on tradition (continuous forest cover, usability both now and in the future) (Johann 2007:55) entailed not only the loss of knowledge but also the loss of biological diversity.

Due to longer cycle periods, the cyclical operation of social-ecological systems is not so well-known (Berkes et al. 2003). The collapse and reorganization, renewal, and recovery of the system form parts of the cycle. It is important, however, that the cyclical processes can only function if the system's flexibility is maintained, so that the system's self-identity survives (Folke et al. 2003). Thinking in cycles does pop up in the use of forests in Gyimes, but overuse, which is now an undisputed and acknowledged part of the system, threatens its flexibility. As long as the system is able to renew itself, the forests will regenerate, and the chance for the further use of a very important resource and the survival of forest species remains.

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See biography of **Dániel Babai** at the end of guest editors' foreword: Ecological Anthropological Research in Hungary, at page 29.