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The Pastoralism in the Silesian Beskids (South Poland): In the Past and Today

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Abstract

The Silesian Beskids (Poland), the westernmost part of the Carpathian Mountains is an area with long pastoral tradition. For centuries sheep grazed in clearings located among forested ridges have been an integral part of the mountain landscape and pastoral customs have become essential elements of regional cultural heritage. In the chapter, the history and the current state of pastoralism in the Silesian Beskids are presented. The specific pastoral system developed in the region, based on annual migration of flocks between summer highland and winter lowland pastures is described. Local breeds and specific regional sheep products are depicted. Furthermore, the importance of pastoralism for the environment, landscape and plant biodiversity is analysed and efforts to recover sheep grazing in the mountains after a period of a deep recession caused by social and economic transitions connected with the collapse of the communist system are presented. The approach to restoration of pastoralism is illustrated using a case study of a pastoral centre which combines traditional sheep grazing with cheese production, education and several activities to promote pastoral tradition.

Keywords: mountain areas, sheep farming, transhumance pastoralism, sustainable development

1. Introduction

The Silesian Beskids belong to the Carpathian Mountains, the second-longest mountain range in Europe. The system forms an arc throughout Central and Eastern Europe and stretches from the far eastern Czech Republic in the north-west, through Slovakia, Poland, Hungary, Ukraine, Romania to Serbia in the south. The range is roughly 1500 km long and covers the area of about 210 000 km².

The Silesian Beskids are located in the westernmost part of the Carpathians, in the border zone of the Czech Republic, Slovakia and Poland (**Figure 1**). The area borders with the Żywiec Basin in the east, the Żywiec Beskids in the south-east, the Little Beskids in the north-east and the Silesian Foothills in the north. The range covers an area of 561 km² and embraces two main ranges separated by the Vistula valley. The height of individual peaks ranges from 800 to 1250 m a.s.l. The highest peak, Skrzyczne, is 1257 m high [1].

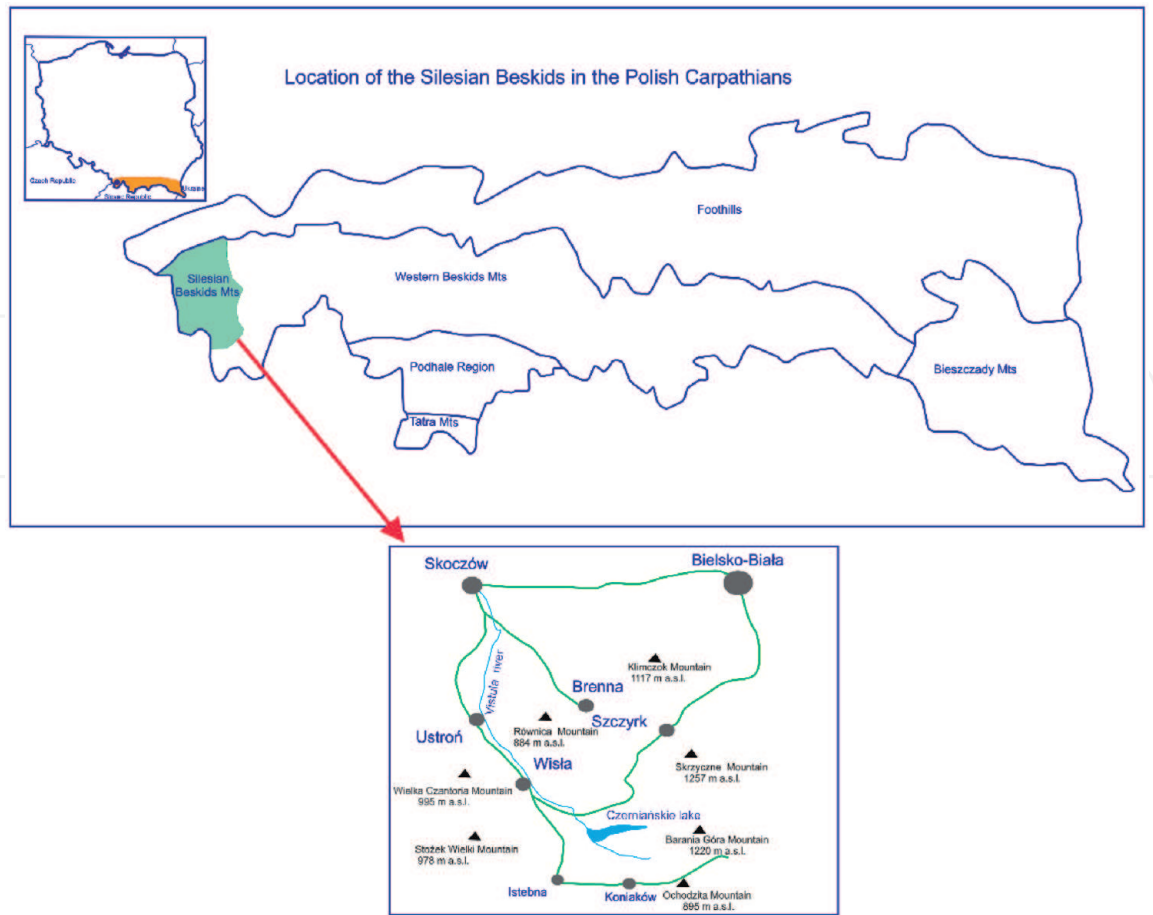


Figure 1.
Location of the Silesian Beskids in the Polish Carpathians

The Beskids are the mid-height mountains, characterised by extensive ridge forms with numerous flattening and deep valleys, with the longitudinal course (**Figure 2**). Their shapes result mainly from the geological structure which is dominated by the Carpathian flysch, i.e. alternately arranged layers of sandstone, conglomerates and slate.

The Silesian Beskids are located in the Carpathian climatic zone, in a temperate climate, shaped by polar and sea air masses. The climate is typical for medium-sized mountains and is characterised by low average air temperature, high precipitation and strong winds. The air temperature is determined by altitude, exposure and inclination of slopes. For the altitudes below 650 m, the average annual temperature

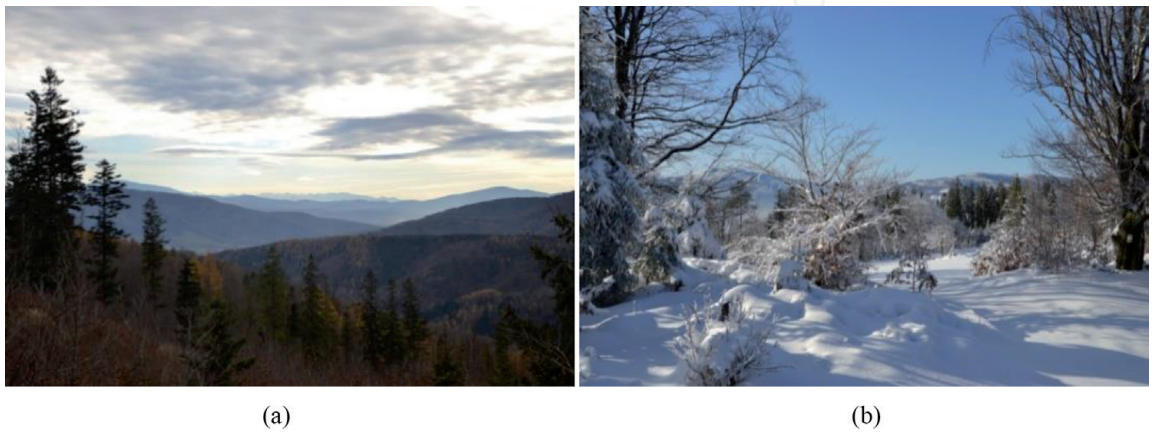


Figure 2.
Silesian Beskids landscape; (a) autumn; (b) winter.

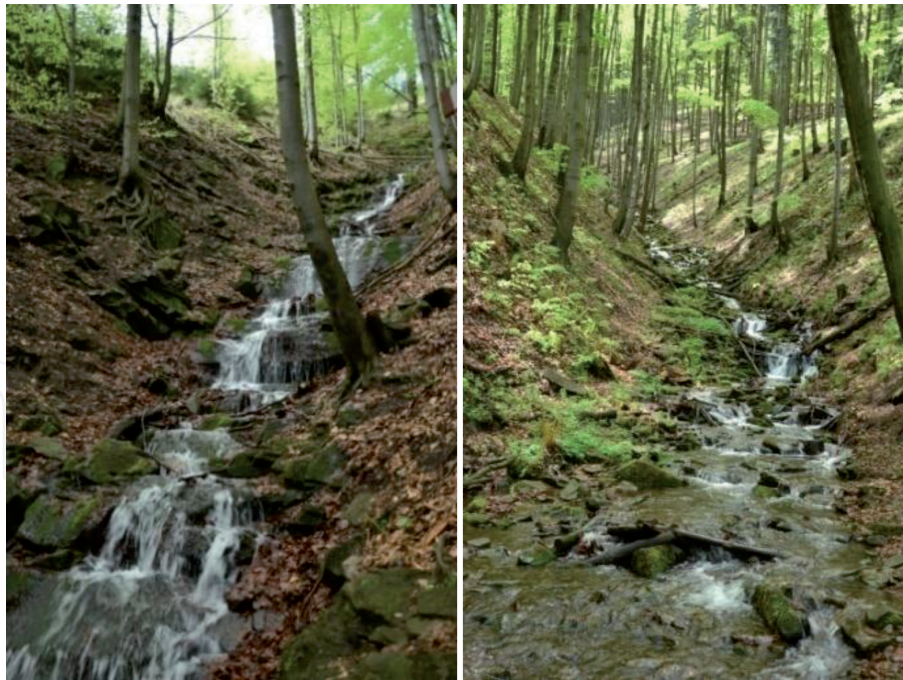


Figure 3.
Typical mountain streams flowing down the peaks.

is 6–8°C [2]. As the altitude increases, the annual air temperature drops by 0.5 for every 100 m. Temperature on the southern slopes is 1°C higher than on the northern slopes. The average annual rainfall is above 1350 mm, which is one of the highest in Poland and higher compared to other parts of the Beskids [3]. The high precipitation results from the area protruding westwards and its greater exposure to rain-bearing winds from NW and SW directions. In the autumn, as the temperature drops, the precipitation changes into snowfall. The first snowfalls are recorded in October and can sometimes last until May. The number of days with snowfall varies greatly year to year and may amount up to even 200 days in the year. The snow cover remains for many months and in certain years it may be even 2 m thick. In many years snow cover stays for a long time in landslide depressions or densely forested places, which delays the growing season [4]. Climatic and physiographic conditions, i.e. high annual rainfall, heavy snowfall, significant inclination of the slopes and poor permeability of the flysch result in a formation of a dense river network (**Figure 3**). There are numerous springs including springs of the Vistula - the largest Polish river [5].

2. Pastoralism in the Silesian Beskids: history and present

Due to harsh climatic conditions, short vegetation period, steep slopes prone to water erosion, and lack of fertile agricultural land, the Beskids were uninhabited for a long time. The first settlers from the lowlands appeared in the region only in the 13th century [6]. The newcomers settled in the Beskid valleys, cultivated undemanding crops, mainly: rye, barley, flax, peas, and grazed cattle on lower-lying meadows.

About one-two centuries later, the Wallachian tribes appeared in the region. Their ethnic affiliation is not clear [7, 8]. In the Middle Ages “Wallachians” or “Vlachs” was the name used for pastoral people from the southern Balkans who led a semi-nomadic lifestyle. In the 13th century, the Wallachians started migration from the south, along the Carpathian Mountains. They continued until the 16th century, heading northwest up to the Silesian Beskids [9–12].

For several reasons, mainly economic and military, the Wallachian settlers could be attractive for local rulers. They were masters in mountain pastoralism and brought their pastoral know-how to new places [7]. Implementation of their ideas on sheep, goats and the specific breed of cattle grazing on mountain pastures and forests changed the social and economic reality in the vast area of the Carpathian Mountains [8, 12]. Sheep grazing in particular enriched the production profile and changed empty and less fertile mountain areas into lively pastoral settlements. The new activity created new tax collection opportunities for the land owners and generated higher income from the land. The Wallachians were not only experienced shepherds but also good artisans, highly skilled in carpentry, leatherwork and blacksmithing and were known to introduce and popularise innovative technique on rennet cheese manufacturing [7, 10, 11]. These innovations were easily transferred to and implemented by the local inhabitants. Together with innovations, the Wallachians passed on their own culture and pastoral lifestyle with different values and customs [13]. They also performed military-guarding function and served as police and border guards, controlling and securing strategic crossings through the mountains [10, 11].

The Wallachian transhumance involved the cyclical movement of herds between summer and winter pastures. This system was based on the natural difference in climate and vegetation between valley and mountain regions and assumed stabling and supplemental feeding practised only during the cold winter season [14, 15]. Animals were moved to highlands in spring to graze the lush forage in mountain clearings and in forests. In autumn the animals were brought down to permanent settlements into mountain villages.

The pastoral system implemented and spread by Wallachians was similar to other transhumance systems practiced around the world since animals were first domesticated, adopted and developed in different mountain areas in Europe [16]. The tradition of transhumance was common to all Mediterranean countries and for human and physical reasons was fully developed in the Iberian Peninsula [17]. According to recent archaeological studies conducted in Pyrenees in Spain, the system of altitudinal movements of sheep flocks was known already a few millennia before our era [18]. It was shown that sheep flocks with shepherds wandered from the pre-Pyrenean territories to the uplands to intermediate pastures placed between 1400 m and 1700 m a.s.l. After two months, the flocks were taken to higher grazing areas located above 2000 m a.s.l. On the way back in October the sheep were kept in intermediate pastures and after several weeks of grazing were taken to the lowland pastures.

In the Silesian Beskids, the traditional transhumance was modified and adopted to the local conditions [13, 19]. According to the local system, sheep were led into the mountains in the spring so that they would not use more fertile land in the village. In the early autumn, the animals were brought to the foothills and deeper valleys, where they were grazed in lowland fields. Then, the sheep were returned to the village, to their owners. In the early spring, after the lambs were born, the flocks were again grazed first in the valleys, in lowland pastures [12, 20].

The sheep were taken to summer pastures at the end of April, shortly after the snow had melted, just after the beginning of the vegetation season (**Figure 4a**) [12, 18–21]. In some regions the sheep were accompanied by whole families [12]. More frequently women and children stayed in the village in the permanent settlements, while the flock was put out to pastures by owners and male relatives [13]. In case of communal grazing, the sheep that belonged to various owners were brought together to form a bigger flock which was entrusted to hired shepherd called *baca* [12, 21]. The shepherd, assisted by a couple of helpers (*juhasi*) led the sheep to the pasture and was responsible for them during the whole summer. Joining sheep from



Figure 4.
 Sheep grazing on mountain meadow; (a) summer pastures; (b) wooden enclosures.

different owners and forming the flock took place right before its leave and was connected with some rituals, which according to highlanders' beliefs ensured good health and protection for both people and animals they were entrusted with.

The shepherd and his helpers led the flock into grasslands located in the highest parts of the mountains, sometimes several kilometres away from the village. They lived seasonally in the pastures in huts made from easily available natural materials, wood and stones. During the entire season *baca* looked after the flock and coordinated all pastoral activities, including daily milking and production of cheese. For milking, shearing and overnight the sheep were kept in periodically shifted wooden portable enclosures (**Figure 4b**) [12, 20, 22].

The sheep and the people stayed in the mountains for 16–23 weeks [13, 20, 22]. At the end of September, the flocks returned to the village. For the next few weeks, the sheep were taken to lowland pastures in the foothills, lower located valleys or were grazed on fields and meadows located nearby the farm as long as possible. After the onset of frost and deep snow the animals were kept inside the barns and fed with hay. During the winter, in January and February, the new-born lambs were fed indoors with their mother's milk and hay, to help them grow quickly to be ready to leave with the flock to the summer pastures [12].

Settlements in the mountains and infertile or border areas were often established under Wallachian law (*Ius Valachicum*), regardless of the ethnicity of the settlers. The law guaranteed the settlers free movement, they could leave the settlement without the permission of the landowner, carry weapon and pay taxes or tribute in the products of pastoralism: sheep, skin, wool, and cheese instead of serfdom [7, 10]. From the 16th century, most of the Silesian Beskids belonged to the Habsburg Empire. Initially, due to the lack of other ideas for using the mountainous grounds the Empire gladly supported the pastoral economy and made mountainous terrain available for grazing [12]. Sheep products were highly appreciated and guaranteed the highlanders a reasonable income. During prosperity, in order to expand the grazing area forests were cut and new mid-forest clearings were created [11, 19]. The prosperity lasted until 1853, when a law abolishing the peasants' right to use the manor's forests was established. Landowners began demanding high payments for the right to graze animals in the mountains, as they were destroying the forest stand which became a source of valuable raw materials and fuel for the growing industry. The fees for renting pastures increased [12] and further deforestation of the mountains was forbidden [11, 19, 22]. The community summer grazing became less profitable and gradually began to decline. This situation remained unchanged until the end of the Habsburg rule, till the end of the First World War. Attempts to regulate the rights of highlanders to mountain pastures and the rules for their use introduced

after the war by government representatives of the newly created Polish state did not result in the revival of the pastoral economy [19]. Similarly, actions of communistic authorities after the Second World War failed too. In addition, new state borders drawn after the War separated pastoralists and their flocks from traditionally used pastures and fodder sources [22]. The situation worsened again drastically after the fall of communism in 1989 and the economic transition from the central to market economy. The economic changes associated with the drastic decline in demand for wool products caused sheep to disappear from the mountains [11].

After the collapse of the pastoral economy and a period of deep crisis, a regional project *Owca plus* aiming at renewing sheep grazing in the Silesian Beskids was implemented [23]. Oriented mainly towards cultural and environmental aspects, the project was financed by the local government of Silesia. Parallel to this project, other regional projects supporting sheep grazing in other parts of Carpathian Mountains were initiated. In addition to regional projects, a national program for the protection of genetic resources of local breeds was launched. The implementation of the projects coincided with the accession of Poland to the European Union and was in line with the EU priorities regarding multifunctional agriculture, related to the Common Agricultural Policy (CAP) as well as to the idea of sustainable development [24, 25]. In the same time EU funds were launched to support sheep farming. As a result of all projects the interest in pastoral economy in Poland slightly increased and in the 2018 the sheep population reached 270 000 [26]. In the same time a slow recovery of sheep grazing in mountain pastures was observed.

3. Mountain sheep and their products

3.1 Sheep breeds

Zackel sheep, brought to Poland from the southern Europe by the Wallachian tribes, are raised in the Beskid Mountains until today [27]. Zackel is a large group of sheep, which includes several local breeds. The group is widely spread in Central-Eastern and Southern-Europe, especially in the Balkans and Carpathian Mountains [28]. It is an undemanding primitive breed and is characterised by high resistance to diseases and harsh climatic conditions. The sheep are strong and well adapted to long treks and steep, hardly-accessible mountainous pastures. Moreover, they are distinguished by their longevity, strong mothering and herding instinct. The animals are rather small in size, possess a bare head and slight convex profile with a long and thin tail (**Figure 5a**). Thanks to their long neck and narrow mouths the sheep can eat scant vegetation in the pastures. Rams have long spiral horns, while

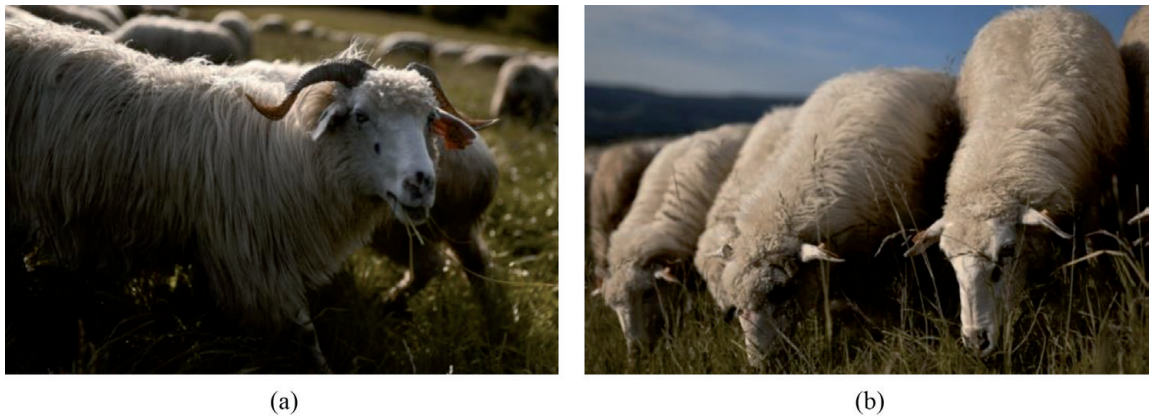


Figure 5.
Mountain sheep: (a) Zackel Sheep; (b) Polish Mountain Sheep.

ewes can be either horned or polled. The height of the adult sheep is ca. 60 cm at the withers and their weight can reach the maximum of 30–35 and 45–60 kg for ewes and rams, respectively.

The sheep are covered by the open wool coat of considerable density, with long locks falling on both sides of the trunk. The typical colour of the fleece is white. Dark spots may occasionally appear around the eyes, at the mouth and ear ends. Three types of fleece fibres form under, intermediate and guard fractions. The thick guard hair of the outer coat provide physical protection against snow, prolonged rain and injuries, while the soft undercoat ensures the necessary thermal insulation [29]. The wool collected from different animals differs considerably in terms of fibre thickness, weight ratio of fractions, and content of coarse fibres [30].

In many countries, the usefulness of Zackel sheep was repeatedly improved through cross-breeding with other more noble breeds [31, 32]. In the late 19th and the early 20th centuries, several attempts of improving Polish Zackel were undertaken. For a long time the results of the cross-breeding were unsatisfactory due to decreased immunity, reduced fertility and lower wool quality. The considerable refinement of the breed was achieved only after the Second World War by the cross-breeding of Zackel ewes with Friesian rams and Transylvanian Zackels. In this way a new breed: Polish Mountain Sheep was produced (**Figure 5b**).

The Polish Mountain Sheep maintained Zackel's adaptability to steep pastures and harsh climatic conditions as well their low feed requirements, longevity, high resistance to diseases and adjustment to extensive production systems. Through the use of Friesian rams the characteristics and yield of wool were enhanced. The goat type and numerous core hair observed in Zackel sheep were displaced and the fibres of the inner coat were lengthened. Simultaneously, the wool became thinner and achieved better physical parameters [33]. Thanks to Transylvanian Zackels, certain body conformation traits were improved. Crossbreeding also led to a significant increase in body weight and milk yield. Compared to the Zackel sheep, the body-weight for adult sheep was approximately 10 kg greater and reached 60–70 kg for rams and 45–50 kg for ewes.

The Polish Mountain Sheep is distinguished by light and harmoniously built trunk, supported by rather thin and strong limbs and a cut, narrow rump. The head is light, with a straight profile, usually horned in rams, less frequently in ewes. The sheep are covered with an open coat with a characteristic dorsal section. The coat covers the sheep's belly, limbs at least to the ankles and head to the line of the eyes. For the majority of the sheep, the coat is white. Occasionally, brown or black colour variations are encountered. The fleece forms double coat consisting of a soft, insulating undercoat coupled with a hard outer coat. Additionally, the fleece has a significant amount of a thick and brittle kemp.

3.2 Sheep products

Sheep raised in the Beskids, both Zackel and Polish Mountain Sheep belong to versatile breeds reared for meat, wool and milk. For years, all sheep products were effectively used and provided existence for highlanders' families.

Sheep meat, both lamb and mutton, was an important element of the highlanders' diet, eaten mainly during festive periods and important family events. In other parts of Poland, where pork and beef were more popular, mutton was underestimated. Nevertheless, mountain sheep grazed on natural pastures rich in herbs, unfertilised, with diverse botanical composition of the sward produced meat with less fat, containing biologically active substances and with the preferred profile of fatty acids [34]. Because of its pro-health properties, despite the lack of national tradition in mutton consumption and certain prejudices stemming from the communist past,

sheep meat is more and more appreciated. Domestic and foreign consumers show growing, special interest in meat obtained from lambs aged less than 60 days, for which the weight of carcasses ranges from 4 to 8 kg. These lambs are fed only with mother's milk and hay, which results in minimal fat content in the meat. The meat is light pink and has a soft, elastic and pliable texture. It is delicate, succulent, its aroma similar to venison.

The wool is obtained by shearing, which is usually performed twice a year in the summer, outside on pastures and in the winter, before littering, in the fold. For the Zackel sheep, the weight of grease wool ranges from 1.5 to 2 kg. For Polish Mountain Sheep the greasy fleece is heavier and may reach 2.5 kg for one shearing. Wool obtained from both breeds is coarse and not uniform, its properties are much worse in comparison to fine merino wool used for the production of luxury apparel fabrics. Despite poor quality and relatively low price, for many years wool was the most precious sheep product generating the highest income for the sheep owners. During prosperity, it was processed under industrial conditions and used for manufacturing blankets, carpets and other carded products. A significant amount of wool in the form of loose fibres was used as filling of quilts and sleeping bags. Wool was also used by the handicraft sector and often processed using old, traditional methods passed on from one generation to the next. In this way, felt, and cloth used for the production of different elements of traditional highlander dress: pants, hats and gowns were obtained. Additionally, wool was widely used to produce hand spun yarns used to knit traditional highlander sweaters and socks. In the last decades, together with economic transitions and the appearance of competing products made from synthetic fibres the demand for wool products has rapidly decreased and the interest in mountain wool both from the textile industry and the craft sector has dropped heavily. Consequently, mountain wool has drastically lost its economic value and the costs of sheep shearing have outweighed the price of wool. Several attempts to use wool in an unconventional way as fertilisers [35–38] and soil reinforcement [39] or for production of thermal and acoustic insulating materials [40–42] and geotextiles [43] have not, so far, gained greater importance. Therefore, wool is now treated as a troublesome waste of sheep breeding, which is buried out on the fields, stored without being scoured or deposited in local, not always legal, landfills.

At present, sheep product which has the highest economic importance is sheep milk. Sheep are milked by hand, twice a day during grazing on the mountain pastures. The milking begins after weaning the lambs and lasts from May until October, around 150 days per year. An ewe produces about 70 litres of milk yearly. It has high nutritional value and contains 15–20% of solids, 4.5–9% of fat, and 4.5–7% of protein. Moreover, the milk is rich in water-soluble vitamins, has a beneficial fatty acid profile and is more calorific than cows' milk [44–47]. It is used for the production of traditional local cheeses, the most known are: *bundz*, *bryndza* and *oscypek*, registered as regional products under the EU regulations.

Bundz is a cottage cheese with mild and gentle flavour, which is the first product made of clotted milk. The cheese is white or white with a shade of aquamarine (**Figure 6a**). Fresh *bundz* is sweet taste due to natural lactose in milk. Lightly salted and left for several days becomes sour and mature and produces characteristic holes well visible in its cross-section.

Crushed, grounded and salted mature *bundz* is used to make *bryndza*. *Bryndza* is creamy or semi-spreadable, of white to grey in appearance and sharp and salty taste. *Oscypek* is a hard smoked cheese made from salted sheep's milk with an acceptable addition of cows' milk of Polish Red breed (max. 40%). The cheese has a characteristic spindle-like shape, weights between 600 and 800 g and measures between 17 and 23 cm (**Figure 6b**). It has a unique spicy, slightly salty taste and glossy, yellow to light brown colour.



Figure 6.
 Traditional sheep's cheese made in the Silesian Beskids: (a) *bundz*; (b) *oscypek*.

All these cheeses are made using traditional methods passed on from generation to generation. First, raw milk is poured into a container, slightly heated and mixed with a rennet. During heating and mixing milk proteins coagulate forming the curd which then is brewed for a few minutes at a temperature of about 70°C. When making *bundz* the curd is strained and pressed on the canvas in the form of big lumps. In a further step, the lumps are hung on the walls to dry and set aside for up to two weeks to mature. To produce *oscypek* the curd must be kneaded in the bucket and torn into portions. The cheese blocks are repeatedly kneaded and brewed in hot water. During kneading the cheese is formed into a characteristic double-sided cone shape with a cylindrical central part decorated with traditional patterns. The spindle-shaped cheese is soaked for a night in a brine-filled barrel, dried and smoked for a few days above a fire.

4. Vegetation of the Silesian Beskids

In connection with large differences in altitude above sea level and the related changes in climatic conditions three altitudinal vegetation zone are distinguished in the Silesian Beskids.

The lowest vegetation zone up to 550 m a.s.l. is the foothills. At present, the zone belongs to the most transformed areas of the Silesian Beskids, which is heavily populated and includes a large deforested urban and rural area. There are many buildings, an extensive network of roads and many crop fields, which spread to the edges of the forest on mountain ridges. Only 26% of the zone is covered with forests. They form small patches of deciduous and mixed woods consisting of oak *Quercus robur*, lime *Tilia cordata* and hornbeam *Carpinus betulus*. The forests occur mainly along watercourses and on hills not used for agriculture.

The lower and upper mountain forest zones at altitudes between 550 and 1250 m a.s.l. are heavily forested. Trees cover up to 60% of the area and currently consist mostly of Norway spruce *Picea abies* monocultures (70%). The spruce stands were formed at the expense of lower montane primaeval forest, composed of spruce *Picea abies*, beech *Fagus sylvatica* and fir *Abies alba*. Currently, these natural forests cover less than 1% of the area and are protected as nature reserves [47].

The composition of the forest stands changed in the second half of the 19th century as a consequence of high demand for wood. In that time, to increase wood yield the intentional reforestation with the spruce, as the most cost-effective species, was performed. Spruce wood was considered universal and was used in large

volumes for the construction of the expanded Carpathian railway network and other industrial applications [48]. Introduction of spruce on a large scale caused the shortage of seeds which had to be imported regardless of their provenance. Due to the lack of local seeds, allochthonous seeds from the surroundings of Innsbruck and Steiermark, other parts of the Austrian Habsburg empire were used [49]. As a result of monocultural reforestation and planting the allochthonous seeds, the forests have become more susceptible to diseases and pest attacks. The consequences have been well visible in recent years, since the beginning of 21th century, as gradual drying-off and decay of trees caused by an outbreak of the spruce bark beetle *Ips typographus* has been observed [50] (Figure 7).

Apart from the monocultures of spruce stands in the lower forest zone of the Silesian Beskids there are patches of deciduous forests. The most common communities are fertile Carpathian beech wood *Dentario glandulosae – Fagetum* and acidophilic montane beech wood *Luzulo nemorosae – Fagetum* (Figure 8).

In addition to extensive wooded areas on mountain ridges, mid-forest clearings of various sizes occur. The clearings are extremely valuable habitats and play an important role as refugia of biodiversity. The most valuable meadow and pasture plant communities include *Arrhenatheretum elatioris*, *Gladiolo-Agrostietum capillaris*,



Figure 7.
Infected forest in Skrzyczne region (the highest peak of the Silesian Beskids).



Figure 8.
Beech forest in the Silesian Beskids.

Cirsietum rivularis, *Hieracio-Nardetum* (**Figure 9 a**) and *Carlino-Dianthetum deltoidis* [51]. These plant associations are phytosociological identifiers of natural habitats demanding protections as Natura 2000 areas [52]. Moreover, the clearings are the sites with many rare and protected plant species such as *Carlina acaulis* (**Figure 9b**), *Colchicum autumnale*, *Dactylorhiza majalis*, *Epipactis palustris*, *Gentiana asclepiadea*, *Gladiolus imbricatus*, *Gymnadenia conopsea*, *Platanthera bifolia* [53].

Since the 16th century the clearings had been used as summer pastures, mainly for sheep. In the following two centuries, in the period of quick development of mountain grazing, parts of the forest stands were cut down. As a result, the existing clearings were enlarged and numerous new clearings were established. In the next centuries until the mid-20th century, when the pastoral activity declined and intentional reforestation was performed, the area of mountain clearings slightly decreased. The next rapid decrease of the clearing surface took place at the end of the 20th century, in the period of social and economic transitions connected with the almost complete cessation of sheep grazing. In this time as a result of ecological succession, the clearings began to overgrow with shrubs and trees (**Figure 10**) [54, 55].



Figure 9.
The valuable plant communities and species on mountain clearings in the Silesian Beskids Mts: (a) priority habitat of *Hieracio-Nardetum*; (b) protected species *Carlina acaulis*.



Figure 10.
Mountain clearing overgrown with shrubs and trees.

The process of overgrowing clearly shows the great importance of sheep grazing for the maintenance of mountain clearings and protection of their precious plant communities. It is known that sheep eat plants selectively, choosing species with soft leaves and avoiding those with a xeromorphic structure. As a result, sheep inhibit the growth of tall grasses such as *Lolium perenne*, *Phleum pratense*, *Festuca pratensis* and others, prevent the expansion of cosmopolitan weeds and the succession of shrubs and trees. Trampling of pastures by sheep improves the humidity and air content in the top layers of the soil. This creates favourable conditions for the development of phytophilous and thermophilic meadow and grassland species, which are very valuable elements of biodiversity [56]. Sheep may carry seeds of even 85 plant species, attached to the wool around their neck and breast [57]. By moving around pastures sheep spread seeds of xerothermic species and contribute to increasing the species diversity.

It was clear that restoration of pastoral activity in the Silesian Beskids would be a great opportunity to preserve and protect mountain clearings, their precious plant communities and biodiversity as well their unique landscape values.

5. Case study

An example of actions aiming at restoration of pastoralism in the Silesian Beskids is the activity of the Centre of Regional Produce. The centre was founded by Maria and Piotr Kohut and is located in the mountain village of Koniakow, Istebna municipality, in the eastern part of the Silesian Beskids, in the border zone between Poland, Czech Republic and Slovakia. The centre was opened in 2003. Since then, it has been involved in several activities including sheep grazing, production of cheese, sale of sheep products, education and promotion of the pastoral culture. The centre grazes a big, as for Polish conditions, flock which counts over 1000 sheep, the vast majority of it owned by Kohut family. For several years, the size of the flock has been systematically growing from 500 in 2010 to 1000 in 2020. Grazing is carried out traditionally on a nearby, non-forested Ochodzita mountain, at 895 m a.s.l., famous for its beautiful panorama and vast resources of green forage (Figure 11).

The specification of sheep grazing carried out by the centre is presented in Table 1.

The sheep milk is used to produce traditional cheeses which are manufactured in a traditional way in the village. During one season from April until September,



Figure 11. Panoramic view from the Ochodzita mountain; (a) to the south; (b) to the north.

Grazing	
Localisation of pastures	Mountains: Ochodzita, Barania Góra, Magurka Radziechowska Villages: Koniaków, Kamesznica
Ownership of pastures	Private, about 300 land owners
Shepherds (<i>bacha</i>)	High qualified with very large professional experience, master exam in the profession of <i>Baca</i>
Helpers (<i>juhas</i>)	8 persons - Hutsul highlanders from Ukraine experienced in sheep grazing
Shepherd dogs	Tatra Shepherd Dog, Bernese Mountain Dog
Sheep number	Total: 900–1200 sheep divided into two flocks: 1. milk ewes; 2. ewes with lambs
Ownership of sheep	500–600 sheep belong to Kohut family; the remaining to 25 owners
Sheep breed	Mainly white Polish Mountain Sheep with small number of colour variety; small number of Zackel Sheep and Romanian Tsurkana Sheep
Pastures	Natural mountain vegetation not fertilised chemically
Watering	Water drawn from natural sources
Overnight keep	The sheep spend nights in pastures, in wooden portable enclosures
Grazing time	From late April/early May until late October
Milking	
Milkyield	Daily average yield 0.7 l milk per ewe
Frequency	Twice a Day
Number of workers	6–7 persons
Milk processing	Milk transported to the Centre for processing
Products	Different kind of sheep cheeses: <i>oscypek</i> , <i>redykołka</i> , <i>bundz</i> , <i>bryndza</i>
Lambing	
Time	Winter–spring period: January, February
Fertility	Reproductive performance: 1–2 per ewe
Shearing	
Time	Sheep sheared twice a year, in summer and winter
Greasy fleece weight	1.5–2 kg of greasy wool

Table 1.
Specification of grazing carried out by the Centre of Regional Produce in Koniaków.

approximately 50 000 litres of milk are obtained. One portion of the milk is used for the production of 100% sheep cheese. The annual production of this cheese is approximately 5 000 kg, which at the retail price per kilogramme of 10 Euro gives the production value over 50 000 Euro. The second portion of milk is mixed with cow milk and is applied for manufacturing a smoked cow-sheep cheese. The production of mixed cheese reaches yearly 3 500 kg and its value approaches 60 000 Euro. In 2008, the smoked cheese *oscypek* received the EU certificate for the protected regional products (Protected Designation of Origin). Other cheese, smoked *bryndza*, received the prestigious award in the culinary competition for the best Polish regional products.

The centre sells sheep cheese, mutton and other regional products in its shop. The main clients are tourists, local food sellers, as well as restaurant and hotel representatives. The average annual value of goods sold in 2017–2018 amounted to 250 000 Euro of which approximately 70% originated from the sale of sheep's cheese.

As a member of the National Network of Educational Farms, the Centre offers lectures and workshops which popularise the pastoral culture among the local community and tourists (**Figure 12**). The educational classes present traditional cheese making methods and wool spinning techniques. The classes are very popular among schoolchildren, students and adults, so the number of participants in the last five years has reached 10 000.

In addition to educational activity, the Centre takes numerous efforts to sustain the pastoral tradition and cultural heritage in the local community and promote them in the Polish society. Each year, the departure of sheep to pastures and their return to the village is connected with several rituals, which became important social events attracting a growing number of tourists (**Figure 13**). Sheep grazing in the mountain pastures make the mountain landscape more attractive and



Figure 12.
Social activity of the Centre in Koniakow; (a) cheese market; (b) cheese production workshops.



Figure 13.
Ceremonial leave of the flock to the summer pasture.

extensively promote the Silesian Beskids region. Through implementation of the Polish-Slovak interregional project and establishing the Transhumance Pastoralism foundation, the promotional activity of the Centre extended beyond the Polish border. In 2013, to co-memorise Wallachian migration through the Carpathians the foundation organised a sheep hike. As part of the project, Piotr Kohut and 300 sheep travelled 1200 km from Romania through Ukraine to Poland. The hike was accompanied with several social events, which significantly recalled and promoted the pastoral tradition on the international level.

Through its rich activity, the centre provides several work places. In addition to the owners, it employs shepherd helpers for sheep grazing and cheese production, seasonal workers for hay harvesting, sales workers and instructors for educational workshops. The shepherd helpers are usually recruited from Hutsul highlanders from Ukraine, while others come from the local community. The total employment in the high season reaches 15 people.

6. Conclusion

The beginning of sheep grazing in the Silesian Beskids dates back to the 16th century. The implementation of the pastoral economy transformed the social and economic reality of the mountain villages. The development of the specific pastoral system based on annual migration of flocks between summer highland and winter lowland pastures enabled rational use of natural local resources. Sheep have transformed hitherto inaccessible mountain areas and made human life possible.

For the next two centuries, the pastoral economy was developed, experiencing a relatively long period of prosperity. Sheep were the main source of livelihood and the basis of the economic existence for many highlander families. All sheep products: wool, milk, meat and skin, were greatly appreciated, possessed high economic value and generated reasonable income. Pastoral activity greatly influenced the landscape and contributed to the establishment of new mid-forest clearings with rich plant communities. Shepherding had also impact on the local architecture with wooden huts used by the shepherds in mountain pastures becoming the permanent landscape element. The pastoral economy drove the development of methods for manufacturing sheep's cheese and processing the wool. For years, the traditional methods were applied and faithfully passed on to the next generations. In connection with the pastoral activity, several customs and rituals were established. All components of the pastoral activity became important elements of the cultural heritage of the region.

From the mid-19th century sheep grazing in the Silesian Beskids was becoming less profitable and the importance of the pastoral economy and its influence on social life of mountain communities was systematically decreasing. At the end of 20th century, after the collapse of the communist system, sheep almost disappeared from the mountains. The restoration of the pastoral economy required decisive action and implementation of several regional and national projects focused on preserving the landscape values, preventing mountain clearings from overgrowing with shrubs and trees, protecting the precious habitats and protecting the cultural heritage of the region.

After several years of implementing these programs, the first positive impacts are visible. The projects became tools to protect, restore and promote sustainable use of the terrestrial mountain ecosystems, stop and reverse land degradation and halt biodiversity loss. The population of sheep grazed on mountain clearings has increased considerably. The existing flocks have been enlarged and some new flocks grazed in earlier abandoned pastures have been formed. Simultaneously, the

projects showed that sheep grazing is not just a matter of enthusiasm or a hobby, but rather the natural activity within the region, which can generate economic income. Through various educational and promotional activities of foundations and pastoral centres, the pastoral traditions have been popularised. The activities attract tourists, who are more and more interested in tasty regional sheep products and the cultivation of pastoral tradition.

Based on the results these projects, one can conclude that restoration of the pastoral economy in the Silesian Beskids is not only possible but absolutely necessary. The restoration of pastoral economy fits several European Sustainable Development Goals (SDG) and brings many economic and social benefits. The current activities need to be continued and supported with new initiatives including appropriate legal regulations, subsidies and further projects.

Acknowledgements

The research leading to these results has received funding from the Norway Grants 2014–2021 via the National Centre for Research and Development.

Conflict of interest

The authors declare no conflict of interest.

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