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Original Research

The Socioeconomic and Environmental Effects of Sustainable Development in the Eastern Carpathians, and Protecting its Environment

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Abstract

The rich cultural heritage of its Ruthenian and Ukrainian minorities and preserved natural ecosystems represent potential for the development of sustainable forms of tourism in the region of Poloniny National Park in the Eastern Carpathian Mountains. Social and political changes in the region during the 20th century led to land abandonment, emigration of young generations, and reforestation. Some socio-economic relationships clearly reflect global trends at the regional level. At the local level, we found a weak relationship between socio-economic parameters and the system of protecting the environment. If environmental protection is increasingly marginalized in the future, this may lead to the enduring perception among the inhabitants that it is unnecessary. Therefore, local inhabitants should be engaged in activities and cooperate with nature conservation bodies to improve and create new economic opportunities founded on nature-based tourism, which should not have an intense negative impact on the country and its values.

Keywords: Carpathian Mountains, demography, economy, land use, nature protection, Poloniny NP

Introduction

The Eastern Carpathian Mountains surrounding the tri-border of Slovakia, Poland, and Ukraine are populated by a mixture of ethnic groups including Slovaks, Ukrainians, Poles, Jews, and Gypsies, but it was the Wallachian colonization in the 15th and 16th centuries by shepherds and peasants known as Ruthenians (Russians) that most influenced the development of the landscape and greatly affected forests in the region [1, 2]. Agriculture was a traditional way of life in villages in the Bukovské vrchy Mts. for centuries. Long-term utilization of mountain meadows and pastures led to the development of unique, species-rich mountain plant communities [3]. Collaterally with the Wallachian colonization, the first mountain meadows, known as *poloniny*, emerged. The word *polonina*, of Ruthenian-Ukrainian origin, refers to semi-natural grassland formations above the timber line [1]. The *poloniny* grasslands are valuable from a nature conservation perspective due to their biodiversity [4, 5]. However, they are not the only outstanding natural asset in the Eastern Carpathians. Despite continuous exploitation of the region since the 14th century, some forest stands in less inaccessible areas have preserved their primeval character [6]. The richest beech forests are in Ukraine,

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including Subcarpathian Rus [7], but there are also several substantial fragments of virgin forest in Slovakia: Stužica, Havešová, Riabia skala, Rožok, and Udava [8]. They are unique examples of the development of terrestrial ecosystems and communities in the Holocene. Carpathian beech forests represent a globally significant natural gene bank of beech and associated species [9].

At the time of the first Czechoslovak Republic (1918-38), the region of Poloniny was one of its least developed areas. In the 20th century this territory was witness to three wars: World War I, the Slovak-Hungarian or "Little" War in 1939, and World War II [2]. This brought degradation of living conditions for the local people. As a result of the Little War, part of Poloniny was ceded to Hungary, leading to significant deforestation. The remaining virgin forest, mainly in Stužica, was saved from logging by the termination of World War II and the rearrangement of national borders, under which Transcarpathia became part of the Soviet Union (now Ukraine). This made access and economic use of land from the Slovak side very difficult [8].

Since World War II there have been three key policy-induced milestones of agricultural change in mountain regions [10, 11]: collectivization, a shift from central (state) planning to a market economy, and membership in the European Union. Societal change and economic development in Slovakia from 1948 to 1989 had significant influence on agricultural trends in the Poloniny region. Intensification took place – especially in lowlands, mountain valleys, and slopes around villages, where farm machinery had better access [12]. Collectivization (1970-89) led to a change of employment type from full-time farmers to hobby farmers. Many farmers were forced to commute to work in nearby urban centers with expanding industries [12]. The construction of Starina Reservoir also had a radical impact on the region in addition to postwar reconstruction and socialist construction in the 1980s. Seven municipalities with a total of 3,500 inhabitants were evicted to facilitate the reservoir's construction [2].

The region has therefore seen a continuous population decrease since World War II up to the present time [12]. Currently, it is among the most sparsely populated and least developed regions of Slovakia. Its peripheral position, lying outside the routes of Pan-European multimodal transport corridors [13], a closed valley, population displacement, gradual abandonment of farming, economic recession, and changing lifestyles of young generations, as well as marginalization and backwardness (underdevelopment) have had significant effects on communities in the region, where use of the surrounding landscape has been predominantly agro-forestry [14]. Negative socio-economic development has contributed to the preservation of some habitats and rewilding of landscapes. For example, following the end of World War II, inhabitants of the Polish side of the Bukovské vrchy Mts. were displaced/resettled for military reasons [3]. Significant depopulation since the 1960s and 1970s was due to collectivization. Such social and political changes led to a state of gradual neglect and abandonment of meadows, accelerating the process of secondary succession, in growth, and reforestation [3, 4, 15]. Poor technical infrastructure, marginal location, and deficient employment opportunities led to land abandonment and emigration [16], especially of the younger generation. The aging population is gradually retreating from land-use management (farming), particularly at higher elevations.

The rich cultural heritage of Ruthenian and Ukrainian minorities [2] and the preserved ecosystems of natural beech forests and species-rich, semi-natural grasslands [4, 5] represent great potential for development of sustainable forms of tourism. The beginnings of regional (territorial) protection in the Eastern Carpathians date back to the 17th century. The first written record of a 'protected oak grove' with no timber harvesting is from the village of Stakčín in 1660 [2]. Protection of rare beech forest complexes began in the 1970s with the establishment of Bieszczady National Park (1973) in Poland and the Eastern Carpathians Protected Landscape Area (1977) in Slovakia [17, 18]. In 1992 these two areas were designated a Transboundary Biosphere Reserve within UNESCO's Man and the Biosphere (MAB) Programme [19]. Poloniny National Park was established in Slovakia in 1997 [20], and in 1998 the world's first trilateral Biosphere Reserve (BR) was established comprising Poloniny NP, Bieszczady NP, and Uzhanski National Nature Park in Ukraine [21]. In the same year, Poloniny NP received the prestigious Council of Europe's European Diploma of Protected Areas that is awarded to areas of outstanding scientific, cultural, or aesthetic qualities that are the subject of a suitable conservation scheme.

The situation in the Eastern Carpathians reflects present global trends resulting from pervasive socio-economic driving forces leading to spontaneous reforestation of abandoned mountain landscapes in Europe [22-25], which may represent a growing threat to biodiversity. Rural depopulation, land abandonment, and scrubbing over of the landscape has accelerated and consolidated in many mountain areas [26-29]. More broadly, land abandonment and rural depopulation [30, 27] represent the socio-economic trend in Western Europe [31], whereas in Eastern Europe land abandonment was associated with the transition process [32]. Generally, three processes currently dominate in the region: forest expansion, urban sprawl [24], and rural depopulation. Recent socio-economic trends in the whole trilateral region have led to increased forest fragmentation, more so in Slovakia and Ukraine than in Poland, mainly due to forest management [6]. Differences in disturbance rates among countries appear to be most closely related to broad-scale socio-economic conditions, forest management practices, forest policies, and the strength of institutions [30, 33].

There has been much recent discussion on the issue of population migration and depopulation of mountain regions, but quantitative estimates of these trends in relation to environmental protection are lacking. The aim of this study is to determine trends in socio-economic relationships in relation to the natural environment and its protection by means of a mutual assessment of socio-

economic parameters such as land use, demography, and economic revenues with data on nature protection.

Materials and Methods

The basic unit for assessing sustainable development is taken as the household. Therefore, a streamlined management of natural, cultural and economic resources and human potential at the local level is the key to ensuring sustainable development [34, 35]. We chose the Cadastral area as basic spatial unit. Various statistical data (data from government and non-government organizations) was linked to cadastral areas, which represent units of human settlements. Study area include the cadastral areas, which extend to Poloniny NP and its buffer zone (Fig. 1). We selected four groups of data in statistical analysis: regional political geography, regional demography, nature protection geography, and local economy.

Regional political geography represents data on land use obtained from the Land Registry Portal of the Slovak Republic [36]. Land Registry records total urban area and rural area and also total agricultural land (area of arable land, permanent grassland, gardens, and orchards), forest land, water sources, built-up areas, courtyards, and other areas.

Regional demography includes key indicators of demography such as population size and density, age structure by category (0-14 year olds, women aged 15-54, men aged 15-59, women over 55, and men over 60 years old), natality, and mortality. Demographic data were obtained directly from local governments in individual cadastral areas for 2012 (by questionnaire). Additional demographic information such as economic activity of citizens, the number and proportion of those unemployed, economically active and inactive, as well as information on education were obtained from the censuses of population and housing by the Statistical Office in 2011 [37].

Nature protection geography consists of data on nature protection and various protected areas (e.g. national nature reserves, NATURA 2000 sites, Dark Sky Park, UNESCO World Heritage Site) and cultural sites (especially wooden churches). These data were obtained from the Slovak Heritage Office [38] and the state list of protected areas [39]. Poloniny National Park itself is around 28,458 ha and its buffer zone has an area of 10,633 ha. A total of 2,290 ha are included in nature reserves.

The **local economy** represents data on revenues from forestry, hunting, tourism, water management, and taxes.

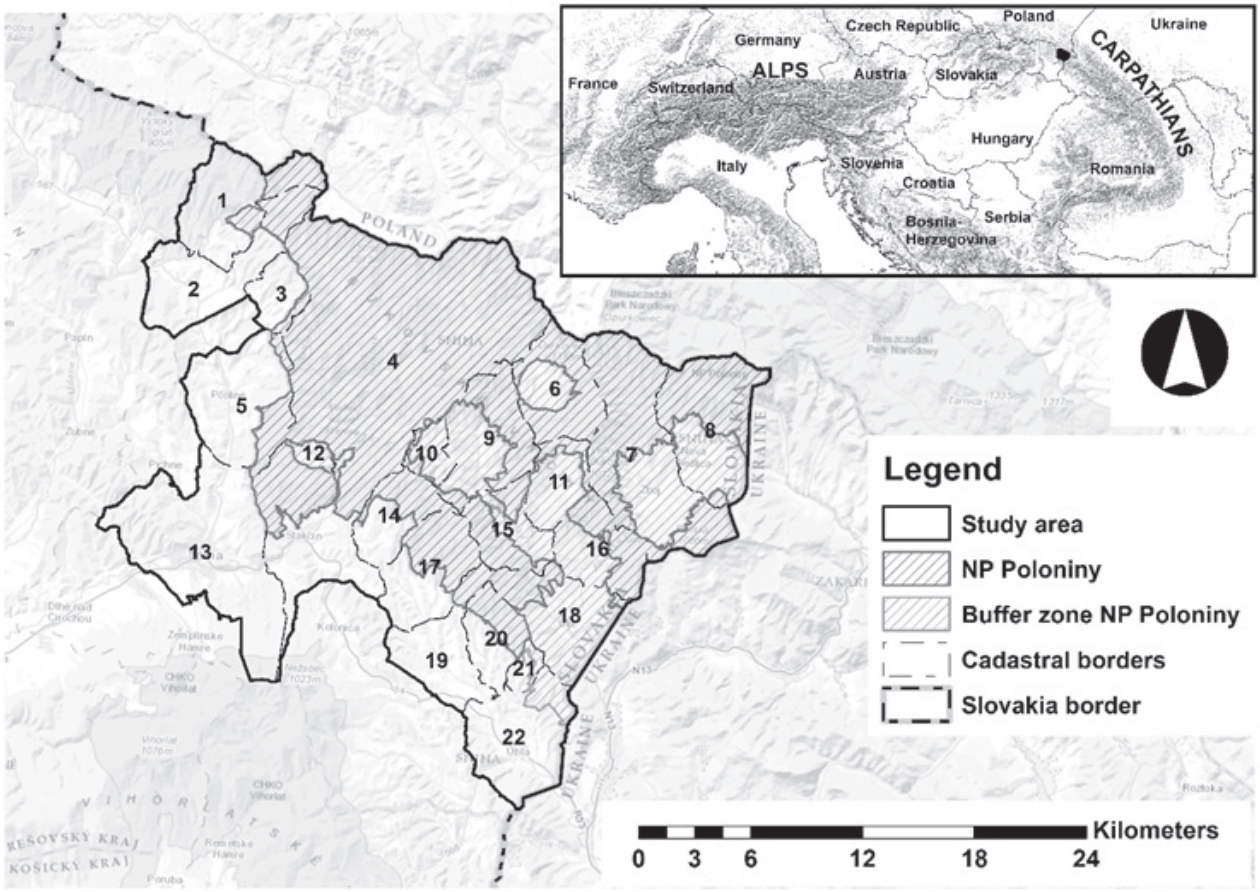

Fig. 1. Study area (49° 02'07.90"N; 22°19'39.62"E).
[1 - Osadné, 2 - Hostovice, 3 - Parihuzovce, 4 - Stakčín, 5 - Pčoliné, 6 - Runina, 7 - Zboj, 8 - Nová Sedlica, 9 -Topoľa,10 - Príslop, 11 - Ruský Potok, 12 - Jalová, 13 - Snina, 14 - Stakčínska Roztoka, 15 - Kolbasov, 16 - Uličské Krivé, 17 - Kalná Roztoka, 18 - Ulič, 19 - Klenová, 20 - Ruská Volová, 21 - Brezovec, 22 – Ubľa]

We selected industries whose revenues could be determined from the basic spatial unit (cadastre). Revenues from agriculture could not be identified, because agricultural land is managed by local forestry companies whose jurisdiction extends beyond cadastral boundaries. To calculate forestry revenues, we multiplied data on timber harvesting [40] by the average price of timber as specified by the state forests enterprise (timber harvesting in areas afflicted by a calamity was multiplied by the price of firewood). Hunting revenues are composed of membership fees, sales of game meat, hunting fees, and other revenues as listed in the hunting database of the National Forestry Centre for 2010 [41]. Tourism revenues represent revenues from accommodation and catering. The latter were calculated from the number of visitors to each settlement and a minimum price of €3 per person paid for lunch. To calculate accommodation revenues we used information on capacity and average prices in each community as found on the internet and a percentage usability coefficient. Data on capacity and visitor rates were obtained directly from local representative bodies/municipalities in individual cadastral areas (by questionnaire). Water management revenues were calculated for only a few villages with connections to the public water supply. Revenues represent the invoiced amount of drinking water at a price of €1.57/m^3. Data on revenues f rom shared taxes (such as local taxes and local fees, taxes for accommodation, rent of buildings, and municipal waste and taxes on forest and agricultural land) were obtained from local representative bodies.

We used these data to compile a matrix that was standardized and statistically analyzed. A principal component analysis (PCA) correlation matrix (a multivariate technique) was used to extract potential relationships between variables. Principal components are linear combinations of original variables; each axis is statistically orthogonal to the other. Integration of the variables enabled us to follow different phenomena more or less dependent on each other. We used several variables and evaluated seven principal phenomena in the Poloniny region (see results, Tables 1 and 2).

Results

The most important set of relationships in the area of Poloniny NP (explaining 42% of the total variance of the data) is the phenomenon of population concentration in cities and larger towns (PC1). The urban centers of Snina and Stakčín have greater proportions of young people and higher population growth than rural communities. Revenues in urban areas are obtained mostly from taxes, payment for water resources, and tourism. Revenues in rural settlements, with a greater proportion of seniors and lower population growth, are mainly from forestry. The proportion of protected areas and the existence of environmental protection were not related to this phenomenon (i.e., the State Nature Conservancy does not affect the demographic processes in the landscape, either negatively or positively).

Activities in the rural landscape (PC2, 18% of total variance) are characterized by land use in rural areas and forest management. Revenues from rural areas are mainly from forestry activities, while there are lower revenues from taxes or tourism. This phenomenon is independent of demography and the proportion of the population that is economically active. The study site and the existence of the national park are dependent on land in rural areas, especially forest land. On the other hand, the size and location of national nature reserves (NPR) and nature reserves (PR) are independent of size or locations of rural areas. Generally, the overlap of protected land, forest, and agricultural land in relation to land use change creates a risk of harm to protected areas.

The next phenomenon (PC3, 8% of total variance) is characterized by the extent of agricultural versus forest land. Cadastral areas with more agricultural land have higher natality and more children, but also higher unemployment. In settlements with a greater proportion of forest land the first signs of revenues from nature-based tourism are evident, but total revenues in the region have no connection to this phenomenon. Also, this phenomenon is irrelevant to protected areas.

The ratio of men to women (PC4, 6% of total variance) is irrelevant to protected areas. The area of the national park (PC5, 5% of total variance) is irrelevant to socio-economic and demographic variables, apart from the fact that natality in settlements is lower than mortality. This phenomenon is unrelated to revenues in the region. The existence of national nature reserves (NPRs) and nature reserves (PRs) in the region (PC6, 4% of total variance) is irrelevant to socio-economic and demographic variables. This phenomenon is unrelated to revenues in the region.

The last significant phenomenon (PC7, 3% of total variance) is characterized by the existence of nature-based tourism and revenues from it. In cadastral areas with a greater proportion of protected areas, revenues from tourism begin to rise. This phenomenon is independent of regional demography. On the basis of all seven phenomena identified, nature protection status is irrelevant to demographic characteristics in the region, and nature conservation has a minimal effect on the socio-economic relations of the population in the region surrounding Poloniny NP.

Discussion

Some of the trends observed in Poloniny are also seen at the European or regional (Carpathian) levels. In particular, population migration and concentration in cities and larger towns is a global trend of the 21st century. Local demographic trends since World War II have shown a continuous population decrease [12]. These trends have led to land abandonment – a contentious issue within Europe [32]. From a global perspective, emigration and spatial movement of populations is often determined by location and specific social, economic, political, and environmental conditions [42, 30]. Emigration and land

Table 1. Eigenvectors for the seven most important components.

	PC 1	PC 2	PC 3	PC 4	PC 5	PC 6	PC 7
Total variance in %	42	18	8	6	5	4	3
Area in hectare	-0.523	-0.818	0.146	-0.054	-0.154	0.083	-0.026
Area in m² (GIS)	-0.523	-0.818	0.146	-0.054	-0.154	0.083	-0.026
Area - urban area	-0.991	0.054	-0.066	0.039	-0.006	-0.004	0.005
Area - rural area	-0.495	-0.834	0.152	-0.055	-0.155	0.082	-0.028
Arable land	-0.861	0.074	0.183	0.038	0.310	-0.188	-0.067
Garden	-0.615	-0.329	0.116	0.230	0.225	0.050	0.240
Grassland	-0.503	-0.725	0.326	0.027	0.003	-0.029	-0.163
Agricultural land	-0.680	-0.577	0.322	0.040	0.100	-0.077	-0.145
Forest land	-0.434	-0.858	0.093	-0.069	-0.209	0.110	0.000
Water areas	-0.412	-0.812	0.280	-0.087	-0.141	0.178	0.020
Build-up areas	-0.989	-0.099	-0.009	-0.022	-0.078	0.069	-0.005
Other areas	-0.665	-0.631	0.295	-0.146	-0.049	0.080	-0.052
Settlements area in m²	-0.523	-0.818	0.147	-0.053	-0.152	0.080	-0.028
Urban rate in %	-0.705	0.613	0.226	0.057	-0.046	0.035	0.065
Rural rate in %	0.705	-0.613	-0.226	-0.057	0.046	-0.035	-0.065
Land use rate in %	-0.412	0.175	0.320	0.028	0.584	-0.344	-0.085
Garden rate in %	0.110	0.457	0.558	0.319	-0.197	0.212	0.242
Grass land rate in %	0.213	0.434	0.711	0.249	-0.296	0.055	-0.176
Agriculture land rate in %	0.066	0.478	0.785	0.252	-0.090	-0.053	-0.180
Forest land rate in %	0.032	-0.502	-0.800	-0.185	0.067	0.028	0.165
Water area rate in %	-0.416	-0.590	0.283	-0.023	0.236	0.002	0.369
Built- up area rate in %	-0.744	0.459	0.088	-0.335	-0.007	0.170	0.081
Other area rate in %	-0.235	0.327	0.459	-0.463	0.222	0.133	-0.194
National park area	-0.227	-0.893	0.185	-0.124	-0.239	0.113	-0.068
Buffer zone area	0.181	-0.077	-0.257	-0.206	-0.384	-0.496	0.446
Nature reserves area	-0.038	-0.449	-0.083	0.323	0.065	0.584	0.447
National NR area	0.073	-0.292	-0.263	0.017	-0.438	-0.472	-0.220
National park rate in %	0.143	-0.726	-0.314	-0.074	-0.184	-0.251	-0.157
Buffer zone rate in %	0.315	0.330	0.164	-0.113	-0.628	-0.121	0.402
Nature reserves rate in %	0.096	-0.122	-0.211	0.361	0.144	0.507	0.550
National NR rate in %	0.125	-0.163	-0.320	0.049	-0.386	-0.528	-0.214
Number of inhabitants	-0.953	0.233	-0.141	0.029	-0.078	0.049	-0.063
Density	-0.926	0.349	-0.103	0.032	-0.056	0.013	-0.039
Male	-0.953	0.232	-0.142	0.032	-0.077	0.048	-0.064
Female	-0.953	0.234	-0.141	0.027	-0.076	0.048	-0.063
Males aged 15-59	-0.951	0.237	-0.145	0.032	-0.078	0.049	-0.061
Female + 55, Male + 60	-0.959	0.210	-0.135	0.022	-0.083	0.045	-0.063
Natality	-0.946	0.263	-0.140	0.035	-0.078	0.037	-0.053
Mortality	-0.961	0.224	-0.113	0.055	-0.086	-0.001	0.013

Table 1. Continuation

Male rate in %	-0.056	-0.262	-0.356	0.671	0.319	-0.105	-0.085
Female rate in %	-0.112	-0.033	-0.147	-0.737	0.384	-0.003	0.043
Rate in age 0-14 in %	-0.334	0.024	0.659	0.094	0.161	-0.159	0.004
Female rate 15-54 in %	-0.572	-0.207	0.242	0.094	0.491	-0.222	0.042
Male rate 15-59 in %	-0.122	-0.209	-0.327	0.670	0.160	-0.162	0.174
F rate 55/M rate 60 in %	0.492	0.216	-0.192	-0.470	-0.406	0.269	-0.123
Natality rate in %	-0.188	0.198	0.630	0.342	-0.335	-0.214	0.158
Mortality rate in %	0.331	0.268	0.176	0.537	-0.571	0.083	0.098
Unemployed	-0.965	0.206	-0.112	0.015	-0.071	0.041	-0.047
Economic inactive	-0.954	0.228	-0.141	0.030	-0.077	0.049	-0.066
Economic active	-0.951	0.238	-0.144	0.029	-0.080	0.047	-0.062
Higher education	-0.945	0.250	-0.154	0.035	-0.083	0.059	-0.071
Unemployed rate in %	0.139	0.246	0.580	-0.496	-0.071	0.019	0.238
Econ. inactive rate in %	0.480	0.174	-0.219	0.080	-0.046	0.620	-0.264
Econ. active rate in %	-0.480	-0.174	0.219	-0.080	0.046	-0.620	0.264
Higher education rate in %	-0.685	-0.336	-0.009	0.303	0.278	-0.099	0.028
Forest revenues in €	-0.491	-0.818	0.166	0.002	-0.142	0.149	-0.093
Hunting revenues in €	-0.367	-0.757	0.191	-0.238	-0.126	-0.018	0.142
Tax in €	-0.939	0.261	-0.166	0.033	-0.084	0.049	-0.073
Water s. revenues in €	-0.962	0.178	-0.127	0.014	-0.108	0.078	-0.057
Tourism revenues in €	-0.934	0.265	-0.191	0.040	-0.108	0.037	-0.035
Revenues in total in €	-0.928	-0.298	-0.013	0.017	-0.147	0.123	-0.091
Forest revenues rate in %	0.844	-0.283	0.063	0.266	-0.012	0.084	-0.259
Hunting revenues rate in %	0.163	0.158	0.086	-0.769	0.055	0.092	0.209
Tax rate in %	-0.752	0.438	-0.061	-0.414	0.050	0.030	0.074
Water supply rate in %	-0.892	0.146	0.022	-0.093	0.030	-0.094	0.252
Tourism rate in %	-0.652	0.174	-0.316	0.040	-0.157	-0.274	0.427

abandonment in the Poloniny region are associated with poor technical infrastructure, a marginal location, and deficient employment opportunities [16].

We consider the key to reversing the decline as the involvement of local communities in the economic process: nature-based tourism in rural landscapes, sites of spiritual significance, local sources, craftsmen, volunteers, traditional activities (e.g. honey production), folklore, architecture, spiritual culture (churches provide spiritual value and a sense of identity), and cross-border cooperation. Már [43] from the Szekeler Fruit Association began the Green Social Enterprises project in Romania to safeguard old varieties of fruit trees in a traditional way and produce high added-value products. Within three years, 5,500 local people had benefited from the initiative. Environmental and cultural heritage were combined as a business asset for the benefit of local communities with a vision of generating 40% of the annual budget of the owner NGOs by 2020. This would represent 1,000 jobs, 500 local producers involving 1,000 employees. Suitable development does not work without the involvement of local people. In Romania the understanding of forest management in protected areas has also changed. Within 33 days 106,000 people signed a petition calling for all virgin forest to be placed under protection (to stop fragmentation, illegal logging, invasive species, etc.). In Gorgany Nature Reserve and Hutsulchyna NP in Ukraine, tourist activities based on natural heritage and living traditions have been created [44].

Our results, like those of Kušová et al. [45] relating to biosphere reserves in the Czech Republic, show that there is no statistically significant difference between protected areas and their surroundings in terms of objectively measured parameters describing material well-being. Nor do the inhabitants of protected areas feel themselves handi-

Table 2. Factor scores for individual variables (settlements, villages).

Principal components according to settlements							
Settlements	PC 1	PC 2	PC 3	PC 4	PC 5	PC 6	PC 7
Osadné	1.796	-1.355	-2.450	3.796	1.236	4.353	2.696
Hostovice	0.330	-0.688	0.974	2.389	1.896	0.108	-0.352
Stakčín	-6.781	-13.169	3.150	-1.043	-1.597	1.604	-0.251
Parihuzovce	2.951	1.127	-1.773	1.792	0.705	1.759	-2.033
Runina	2.398	-1.077	-3.831	0.264	-1.451	-1.595	0.222
Pčolinné	-0.012	-0.778	1.478	1.290	1.658	-0.372	-1.311
Zboj	1.275	-2.645	-1.868	-1.483	-1.536	-0.470	-0.792
Nová Sedlica	1.690	-1.396	-1.953	0.656	-2.982	-3.198	-1.021
Topoľa	1.931	-0.685	-1.598	-0.428	-0.426	-0.187	0.658
Príslop	3.248	2.623	-0.128	0.057	-1.313	1.943	-1.068
Ruský Potok	2.264	0.853	-0.188	-0.529	0.014	-0.270	2.063
Jalová	2.907	5.311	6.325	2.880	-4.678	0.529	0.316
Snina	-21.896	5.255	-2.052	0.401	-0.680	0.430	-0.519
Stakčínska Roztoka	1.353	0.448	-0.714	0.717	1.457	-0.847	-1.238
Kolbasov	2.554	-0.292	-2.537	-0.306	-0.345	-0.162	0.866
Uličské Krivé	2.130	0.167	-0.360	-1.057	-0.279	-0.438	-0.489
Kalná Roztoka	0.626	-0.204	0.295	1.118	1.799	-1.572	-1.026
Ulič	-1.660	0.696	0.615	-0.410	0.447	-2.689	3.930
Klenová	-0.338	0.967	3.758	-0.181	3.284	-1.180	-1.104
Ruská Volová	2.117	0.433	-0.076	-1.129	1.157	0.198	-1.128
Brezová	2.623	3.864	0.256	-6.731	-0.303	2.783	-0.222
Ubľa	-1.506	0.546	2.677	-2.063	1.936	-0.726	1.805

capped. For local stakeholders, support for agriculture is essential in such landscapes, favouring farming activities with positive impacts on natural values and biodiversity, as well as local livelihoods and forms of agro-tourism attracting visitors to the region and contributing to its economic growth [16]. Understanding the residents' perspective can facilitate policies that minimize the potential negative impacts of tourism development and maximize its benefits [46].

Settlement structure in the Poloniny region is characterized by small residential settlements of 50-500 inhabitants set in rural landscapes and the towns of Stakčín and Snina. An aging population trend is visible not only in Poloniny, but in general [47], due to changes in health care, values and lifestyle – especially the rural-to-urban migration of young people in search of employment opportunities, where the main economic revenues from forestry and agriculture are insufficient in current circumstances. The birth:death ratio is decreasing in all settlements of the Poloniny region. In some villages more than 50% of inhabitants are more than 55 years old. The male:female ratio is also decreasing and children under the age of 14 are almost absent. This phenomenon is closely related to unemployment, which is very high.

Based on the concept of ecosystem services [48-50], revenues from forestry represent 77% of all revenues in the area of Poloniny NP in 2010 [51]. Cadastral areas with more agricultural land have higher natality but also more unemployment. The town of Snina is the centre of socioeconomic development. Population migration to Snina creates positive perspectives for environmental protection, but on the other hand creates pressure on rural areas. Social and environmental problems in cities generate migratory movements from ‘large’ to ‘small’ areas, a process characterized by Antrop [52] as the third stage of urban development.

Protected areas in the popular imagination are ‘places without people’ [53]. If the importance of environmental protection is increasingly marginalized in the future, this may lead to the enduring perception among inhabitants of such protection being unnecessary. This is a mistaken perception in contemporary society. In spite of our finding

that the national park is irrelevant to socio-economic and demographic variables and rural-urban migration, higher population growth on the periphery of protected areas can be seen across ecoregions, countries, and continents, showing their value to local residents [54]. Protected areas may increase economic prospects by increasing access to finance, providing benefits for rural residents. However, if the local system is ineffective or does not exist, there is a negative impact.

Protected areas have a substantial impact on interactions between birth:death dynamics and biotic factors influencing them [55]. For rural residents living in need, the existence of PAs has a negative effect on life. Such people relocate and search for economic resources, infrastructure, and land tenure elsewhere: a massive rural-urban migration is ongoing around the world. According to Sholte and de Groot [56], birth:death ratios are influenced by the strength of the economy, ecosystem services, and infrastructure developed in the region. They identified three basic general models of motivation to move to PAs: frontier engulfment, attraction, and incidental. In the frontier engulfment model, the population at the periphery of a PA based in a still-intact (or remote) area can grow under the influence of an influx of workers in incoming extraction companies (logging, mining, farming). In the attraction model, the population grows as a result of job opportunities in tourism or conservation projects. The third category, incidental mechanisms, includes the influence of random factors (e.g. conflict, disaster). The different models and various stages of frontier engulfment call for different ways to fund and manage PAs that include consideration of their relations to rural and urban populations. PAs have a positive impact on employment in nature-based tourism, relieving pressure on the forestry sector where employment is decreasing, suggesting the importance of alternative employment. Low population density with an absence of local services make it hard to create viable employment opportunities [57]. The market for nature-base tourism is increasing faster than traditional tourism, at a rate of 10–30% per annum [58]. Tourism development is uneven regional development. Our results support the assumption that villages situated near hiking trails and sites of cultural and natural heritage report higher tourism revenue than those in more remote villages. On the other hand, tourism development also has negative impacts on waste production or sewage outflow from touristic facilities situated in protected areas [59].

For protected areas, challenges are presented by the questions of balancing nature conservation with tourism, integrating community development in conservation, and, more importantly, assuring local people that conserving natural areas is beneficial not only for the State but also for local communities and institutions [60]. The amount of shared taxes for accommodation and municipal waste also depends on the tourism situation in the municipality: more tourism equates to higher tax revenues for the municipality. Revenues from shared taxes for renting land and buildings depend on acreage. Creation and expansion of nature reserves, where shared taxes are not paid, results in decreased tax revenues. This loss could be compensated by developing nature-based tourism. The relationship between tourism, livelihood, and conservation is dynamic and complex [61]. Bezák and Halada [62] provided several socioeconomic and institutional recommendations for future management measures in Poloniny NP: implementation of measures for agro-environmental support, involving local small- and medium-sized enterprises and farmers in agricultural/ environmental support schemes; establishing closer cooperation between local stakeholders, farmers, NGOs, and nature conservation institutions; supporting cross-border cooperation and formation of local information centers; and informing local people via local government about possible support for tourism.

Stakeholder meetings can be a useful way to gain an understanding of stakeholder views [61] and to initiate a debate about the transition of European mountain areas from ‘less-favoured’ agricultural landscapes to ‘highly-valued’ environmental landscapes [63]. The institutional framework for sustainable mountain development has a very strong regional dimension, with numerous active institutions and organizations. The diversity of their structure, legal status, and set of stakeholders demonstrates that a wide array of models is already available [64]. ‘Sound environment’ and ‘well-preserved nature’ can be considered as two principal attributes of the territory [45]. Local communities must be able to empower themselves to face the challenges of rural development. Thus, self-reliance is the key to successful empowerment [60]. Therefore, it should be local people who engage in activities and also cooperate with nature conservation bodies to improve and create new economic opportunities founded on nature-based tourism, which should not have an intense (negative) impact on the country and its values.

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