

## THE TRANSFORMATION OF THE NATURAL ENVIRONMENT OF THE POLISH AND UKRAINIAN BIESZCZADY MOUNTAINS DUE TO TOURISM AND OTHER FORMS OF HUMAN PRESSURE

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### Abstract

*The area of Bieszczady Mountains is the cross-border zone characterized by a great diversity in both policies and a level of economic development between the Polish and Ukrainian part of the region. Therefore, it exhibits a significant variation in the degree, form and character of anthropopressure. The main aim of the study is to compare the intensity of transformation of Polish and Ukrainian parts of Bieszczady Mountains and indicate the anthropogenic conditions existing in both countries. Four villages of Bieszczady were analysed – Solina and Wetlina in Poland and Sianki and Volosjanka in Ukraine.*

*The study, conducted using the point scoring evaluation method, showed large variations in the degree of anthropopressure in different localities. The area that has the lowest level of human impact is Polonina Wetlińska while the largest one occurs in Solina. Wetlina, Sianki and Volosjanka have a similar level of transformation.*

*Research areas located in the Polish part of Bieszczady are exposed to environmental changes primarily related to the development of tourism. In Ukraine, the pressure is observable due to unregulated water and sewage systems, a large accumulation of possessions with a traditional heating and highly developed railway network.*

**Keywords:** *anthropopressure; tourism; Polish Bieszczady Mountains; Ukrainian Bieszczady Mountains*

### Introduction

Contemporary transformations of the natural environment are the consequences of not only natural alterations but also occur as a result of intensive civilizational changes. For hundreds of years man has transformed nature and exploited its resources, often leading to irreversible changes in the environment. As a result of an uncontrolled growth of settlements and development of communication, irrational forest management and, above all, unbridled development of the industry many natural areas have been completely devastated.

Nowadays, due to the growing ecological awareness and promotion of healthy lifestyle, different measures aiming at the improvement of the environment and its protection were introduced. However, the issue of environmental protection is not understood uniformly because of differences in the economic development of individual countries. The area of Polish and Ukrainian Bieszczady Mountains might serve as an example of the region where the natural environment on both sides of the border is exposed to different pressures.

The study of interaction between man and the environment have become widespread in the '70 s of the twentieth century and is still discussed. Initially it focused on particularly arduous human activity - industry, settlement and communication. Cur-

rently, research in the field of anthropopressure includes also the less visible transformation of the environment caused for instance by tourism development.

Issues related to the violation of the natural balance of the environment due to human pressures were discussed, among others, by R. Czarnecki and I. Grzybowska (1976). Research carried out in Sandomierz district showed a high sensitivity of fauna flora and soil to the anthropogenic interference. Another author who focused on the matter was S. Chmielewski (1980) who made a detailed analysis of anthropopressure on urban areas and A.S. Kostrowicki (1970) who not only separated 10 stages of environmental transformation caused by man but also categorised those changes as suppletive, compensatory, reductive and destructive.

In recent years, the subject of environmental changes caused by anthropogenic pressure was studied by W. Widacki and D. Lubczański (1999), J. Balon (1991, 2001), M. Jodłowski (2001) and W. Maciejowski (2001). The natural environment of the western part of the Beskidy Mountains was analysed by W. Widacki and D. Lubczański (1999) who described the effect of human activities on the biotic components of the environment. W. Maciejowski (2001) presented the impact of changes in afforestation that had occurred in the catchment area of

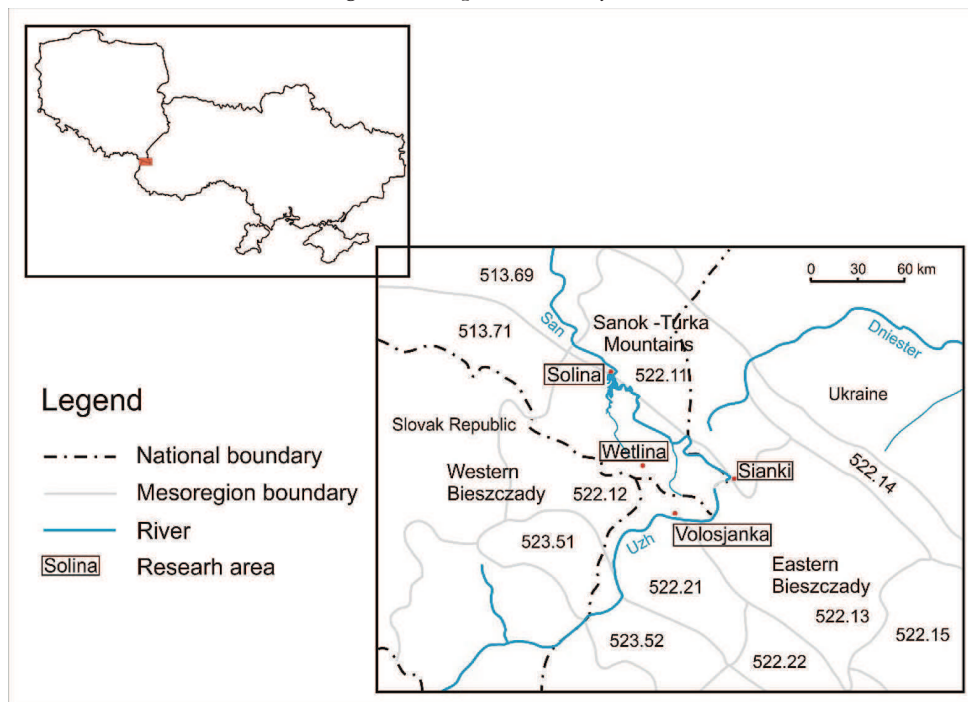
Wilsznia River in Beskid Niski on the dynamics of morphological and hydrological processes within it.

The impact of tourism on mountain areas is often a matter of heated debate both in Poland and other countries. J. Balon (1991, 2001) analysed the human impact on the environment of mountain catchments. The main anthropogenic factors observed in Białka Valley are: summer and winter tourism, mountaineering and traffic. The issue of the impact of tourism on the environment was also analysed by M. Jodłowski (2001) who indicated hiking as a form of tourism that causes the biggest changes in the natural environment. T. Davies and S. Cahill (2000) presented a report on the effects of the tourism industry development in the United States which analysed the impact of mountain tourism on particular components of the environment. A similar topic was studied by U. Sunlu (2003) who paid particular attention to the negative impact of tourism settlement, particularly in mountainous areas.

Protected areas are covered by environmental monitoring, on the basis of which it is possible to carry out detailed analyses of anthropopressure. By analysing the data it is possible to start activities concentrated on increase the effectiveness of environment protection. Since the early 90's at the Bieszczady National Park, systematic measurements and laboratory analysis was conducted. Unfortunately, in Ukraine, due to the limited budget, research at the protected areas are carried out selectively and with less regularity (Kopacz 2000). Despite of the Polish - Ukrainian cooperation in the framework of UNESCO East Carpathian Biosphere Reserve, analyses of intensity of human pressure in both side of Bieszczady Mountains are rarely topic.

The aim of the article is an attempt to compare the transformation degree of Polish and Ukrainian Bieszczady Mountains and indicate the anthropogenic determinants for both countries. Four Bieszczady Villages were analysed - Solina and Wetlina in Poland and Sianki and Volosjanka in Ukraine (fig. 1).

Figure 1. Map of the study area



Source: own figure based on J. Kondracki (1978)

## The method

The assessment of human impact on the natural environment of Bieszczady was based on field research during which the type and intensity of anthropopressure was determined. The main manifestations of human activity in Bieszczady are tourism (including infrastructure), settlement, communication, agriculture, grazing, industry and forestry. The point scoring evaluation was used to determine the intensity of human pressure mainly due to the presence of non-comparable factors. The method involves assigning point values to particular environmental features. The final assessment or grouping of grading fields is done by adding the number of points assigned to particular features which are

taken into consideration (Richling 1982). The main steps of this method are: classification, scoring points and qualification.

Methods of spatial analysis available in ArcGIS 10.1 program were used in order to develop the point scoring evaluation maps of the given area. The basic field was a grid of 200 m x 200 m squares. Due to the very diverse availability of materials from both Poland and Ukraine and the need to unify the accuracy of the research both areas were analysed using 1:50000 scale maps.

On the basis of the identified human impact on the environment, the criteria of scoring were determined: land use, settlement and communication, tourism and forestry. Each criterion in the particular group was assigned with a certain number of points. It should be noted that positive and negative points were assigned.

## Criteria for a point scoring system

### Land use

According to D.L. Armand (1980) land use is a process that changes the original natural environment into a technical system. This process reflects the transformation of the original landscape into so-called cultural landscape (Isaczenko 1976).

During the process of point scoring five types of the land use were set out and assigned with values according to their percentage of space covered in the basic field. Points for the particular type of the land use are added together so as in order 100% surface coverage (Table 1).

The first group includes forests with ecotone zone. At this stage, the degree of naturalness of forests and tree structure compliance against a habitat were not considered. The next type are waters, understood both as streams and reservoirs, natural and artificial. Due to the difficulty in determining the intensity of human pressure at areas covered by waters, there were excluded from the analysis (values at 0 points). Another group consisted of meadows and pastures but also clearly dominant forest glades. The next group included arable land along with wasteland and orchards. Technical grounds were in the last group. The areas entirely covered with forest had the highest values.

Table 1. Points for the type and percentage of land use

Percentage of coverage	Forests	Waters	Meadows and pastures	Farmlands and orchards	Technical Utilities
1-25%	1	0	1	1	-1
26-50%	2	0	1	1	-2
51-75%	3	0	1	0	-3
76-100%	5	0	0	0	-4

Source: own table

### Tourism

The research includes the most popular forms of tourism such as hiking, downhill skiing and water sports which are popular throughout the Reservoir Solina.

The analysis covered both the individual elements of the tourist infrastructure as well as the density of hiking trails (Table 2). The lowest value (-3 points) was assigned to accommodation and catering (hotels, guesthouses, restaurants, bars, taverns, pubs, etc.), ski slopes and water sports facilities which are associated with a strong human pressure on the natural environment. Hiking chalets, campsites, hiking trails and huts were admitted -2 points as they were recognized as elements of tourist infrastructure of lower human pressure impact.

The degree of a land coverage by tourist routes, which is a direct reflection of the intensity of tourist traffic, was also assessed. As in the case of roads, four classes (I-IV) of traffic density were identified. The first identified class includes the value from 0 to 0.5, the second between 0.5 and 1 while in the third class there are values in the range of 1-2. The fourth class has values greater than 2. Due to the fact that it is difficult to deter-

mine the absolute border of negative impact of tourism on the environment, the study assumed that the whole area directly in contact with the tourist trails is subjected to its negative influences. The higher density of trails, the number of points given is lower (0 points for class I and -3 points for IV class).

Table 2. Points for the elements of tourism infrastructure and a tourist route density

Tourist infrastructure	Valuation points	A tourist route density	Valuation points
Hotel, guesthouse, restaurant etc.	-3	I class (0-0,5)	0
Hiking chalet, campsite	-2	II class (0,5-1)	-1
Hut	-1	III class (1-2)	-2
Hiking trail	-2	IV class (>2)	-3
Ski slope, water sports facilities	-3	-	-

Source: own table

### Settlement and communication

The development of settlements and communication generates strong pressure on the natural environment. The lowest valued (-3 points) was assigned to buildings with high floor area ratio understood as large-surface and multi-storey residential or commercial architecture. A single-family housing, especially of high density, has a negative impact on the environment. Such areas received -2 points while low density areas were rated as -1. The basic fields without any buildings were rated 5 points – the highest value. Points were awarded according to the dominant element within the analysed basic field (Table 3).

Table 3. Points for the type of settlement

Build up areas	Valuation points
Buildings of high intensity	-3
Compact buildings of low intensity	-2
Buildings of low intensity	-1
Lack of buildings	5

Source: own table

The impact of settlement on the environment can also be examined via a communication network. The point scoring of this indicator was conducted on the basis of a road rank in the communication system and road density understood as a direct reflection of the intensity of traffic (Table 4). If the basic field has roads of different ranks, each of them will be subjected to separate evaluation.

Road density is the ratio of the length of roads to the surface of the basic field (Potrykowski, Taylor 1982). Basing on the calculated density of the road network it is possible to identify four classes of road coverage (Table 4). Due to the difficulty in determining the absolute border of exhaust and noise impact on the environment, the study assumed that the whole area directly in contact with the communication line is subjected to its negative influences.

**Table 4. Points for road rank in the communication network system and road network density**

Road rank	Valuation points	A road network density	Valuation points
National road	-3	I class (0-0,5)	0
Regional road	-2	II class (0,5-1)	-1
Hard-surfaced roads	-1	III class (1-2)	-2
Forest path	0	IV class (>2)	-3
No roads	2	-	-

Source: own table

The last analysed manifestation of the settlement process is a group composed of a number of elements which have a negative impact on the environment (Table 5): petrol stations (-3 points), parking (-2 points), cemeteries (-1 point), fixed sources of wastewater (-3 points) unauthorised dumping grounds (-3 points) railways (-2 points) and forest railways (-1 point) as well as constant sources of gas, dust and noise associated with low emission (-3 points). The occurrence of any of these elements grants negative points during the point scoring evaluation.

**Table 5. Points for other elements of technical infrastructure**

Technical infrastructure	Valuation points
Petrol station	-3
Parking	-2
Cemeteries	-1
Fixed sources of wastewater	-3
Unauthorised dumping grounds	-3
Railways	-2
Forest railways	-1
Constant sources of gas, dust and noise	-3

Source: own table

## Forestry

The point scoring for this factor was examined by taking into consideration both positive and negative aspects of forest transformation (Table 6). The positive factors – a presence of natural forest and a tree structure in accordance with a habitat were rated the highest value (5 points), but on the other hand, cutting down trees for industrial purposes was assessed as a negative factor. Depending on the type of a forest removal process values ranging from -3 to -8 were granted. A mass logging, which uses heavy-duty equipment for logs transport, was considered the most intense.

**Table 6. Points for the type of forestry**

Forestry	Valuation points
Natural forest	5
Tree structure in accordance with a habitat	5
Cutting down trees for industrial purposes	from -3 to -8

Source: own table

## The results of point scoring

On the basis of the research, five classes representing the level of anthropopressure in the Bieszczady were set out (Table 7). The classes were identified in accordance with literature (Sołowiej 1987; Balon 1991). Class I represents the largest level of human pressure, while class V the lowest. The results of the point scoring ranged from -29 to 23 points.

**Table 7. The level of the natural environment transformation**

Anthropopressure classes	
I. Huge transformation	-29 – (-)18
II. Large transformation	-17 – (-)8
III. Medium transformation	-7 – 5
IV. Small transformation	6 – 12
V. No transformation	13 – 23

Source: own table

Areas which presented a huge transformation were classified as class I (-29 – (-)18 points). The areas are characterised by a high level of human pressure which is visible mainly due to a high density of housing, a high level of road coverage and a presence of numerous examples of technical and tourist infrastructure. Moreover, the aforementioned areas lack environmental factor that might balance the negative impact of human activity. The highest percentage (10,5%) of areas which have large environmental changes was identified in Solina (Table 8). This high level of human pressure is related to a well-developed tourist, commercial and communication infrastructure. The town centre is entirely covered by high-density housing, usually of large building volume, which is a major source of low-emission heating during the season. Class I areas are also present in the other analysed towns but covers a significantly smaller percentages of the land – Wetlina 3,98%, Volosjanka 2,71%, Sianki 1%.

Areas classified as class II (-17 – (-)8 points.) can be described as the ones with a large level of environmental transformations (Class III). Similarly to the first category, those areas are characterised by a large level of transformation caused by human activities; however, there are some manifestations of the natural environment. The highest percentage (13,8%) of such areas is again present in Solina. In contrast to the already discussed class, Sianki has a large concentration of areas with high transformation (12% of the total area). The percentage of the covered space in the towns of Volosjanka (7.83%) and Wetlina (6.32%) is significantly smaller.

Areas in the range between -7 and 5 were classified as area with medium transformation. The impact of anthropopressure is visible mainly due to the presence of farmlands and pastures or tourist or technical infrastructure. Class III has the highest percentage in Volosjanka, Solina and Sianki. In Sianki, the areas of moderate human activity pressure covers about 50% of the analysed territory. This group includes mainly areas where trees were removed in order to lay railway tracks, farmlands and low density housing plots. The analysis took into consid-



eration a field along the regional road and a logging site. In the other towns the coverage of moderately transformed areas was smaller – Volosjanka 47,6%, Solina 34,2%, Wetlina 29,5%.

Class IV (6 – 12 points) represents areas of small environmental changes. Areas included in this class has high environmental values interfered by the introduction of low impact tourist and technical infrastructure (forest paths, a small amount of tourist trails) or by extensive agriculture – mainly pastoralism. Interestingly, the highest occurrence of this class is seen in Solina (25%). A similar result is visible in Volosianka (23,8%). Wetlina is on the third place (20,4%) while only 17% of Sianki can be classified as are with small transformation.

Areas where anthropopressure is negligible were assigned to class V. They included all the basic fields that scored 13 points and more. These are primary forests and wooded areas characterised by a forest stand that is in compliance with the habitat. The percentage of the areas that are characterized by a lack of visible human pressure is close to the average results of the point scoring. The largest percentage of the area that was categorised as class V is in Wetlina (39.8%), mainly on the slope of Połonina. These areas are covered with untransformed forests which has some features of primary forests. Low-density hiking trails are the only type of anthropopressure factors in this area. The smallest percentage of the aforementioned areas was in Solina (16,4%), Sianki and Volosjanka have respectively 19% and 18,1%.

**Table 8. The percentage area of particular classes of anthropopressure for the analysed places.**

Anthropopressure classes	Wetlina	Solina	Volosjanka	Sianki
Huge transformation	3,98	10,5	2,71	1
Large transformation	6,32	13,8	7,83	12
Medium transformation	29,5	34,2	47,6	51
Small transformation	20,4	25	23,8	17
No transformation	39,8	16,4	18,1	19
The average score of the anthropopressure	8,5%	4,6%	0,57%	3,1%

Source: own table

## Discussion of anthropogenic determinants in Polish and Ukrainian Bieszczady Mountains

The use of the point scoring evaluation to assess the degree of the environment transformation allowed indicating the areas with the largest and smallest intensification of human pressure. The area with the lowest level of human pressure is Połonina Wetlińska. The largest environment pressure takes place in Solina. The towns of Wetlina, Sianki and Volosjanka have a similar level of transformation which may indicate a lack of significant differences of anthropopressure in Polish and Ukrainian Bieszczady Mountains. However, the human impact on the environment in the countries concerned is completely different in nature.

## Tourism

Anthropopressure on the Polish side of the Bieszczady is a direct result of the intensive development of tourism. It started to develop at the end of the interwar period. Due to the low availability of communication and poor infrastructure the area did not gain popularity among tourists. After the World War II and until the mid-50s, due to political reasons, the tourism on the area was virtually non-existent (Krygowski 1973). Nowadays, the most popular forms of tourism in the Bieszczady are hiking, skiing and - within the Solina Reservoir - water sports. This area, especially on the Polish side, has well-developed commercial base. These are mainly accommodation and restaurants, shops, parks, ski lifts, beaches and entertainment centres. Among the ecological consequences of tourism one should mention: qualitative and quantitative changes of fauna and flora, water and air pollution, noise, natural resources exploitation and landscape devastation (Hunter Green, 1995).

As far as the visitors of the Bieszczady are concerned, the most popular form of tourism is hiking. The whole analysed area is covered with numerous hiking trails with more or less developed infrastructure such as hostels, shelters, benches, platforms and railings. The Bieszczady National Park has more than 130 km of tourist paths (2.26 km/km<sup>2</sup>) ([www.bdpn.pl](http://www.bdpn.pl)) while the Uzhansky National Park has up to 90 km of trails (4.35 km/km<sup>2</sup>) ([www.unpp.com.ua](http://www.unpp.com.ua)).

Pedestrian traffic has been analysed by R. Prędko (1999, 2004, 2009, 2012) for several years now. The data has been collected continuously since 1997 at 18 checkpoints via “daily survey of tourist traffic”. In 2009 the traditional system of data collection was supplemented with automatic recorders located at key points on major routes and roads. The number of tourists visiting the Bieszczady National Park is growing from year to year. Currently, this figure reaches about 500 thousand tourists annually. The Uzhansky National Park does not carry out any monitoring of tourist traffic. However, due to the small amount of tourists, it is estimated that negative impact of tourism on the environment is virtually non-existent (Kopacz 2000).

The most common form of pressure caused by hiking is trampling the vegetation within and close proximity to the trail that leads to the intensification of natural morphogenetic processes and transformation of the shape of the mountains. Tourists are partly responsible for the destruction of the vegetation cover, loosening and breaking of the substratum and the movement of loose pieces. Areas without vegetation are subjected to increased morphogenetic processes that lead to further fragmentation of the layers of soil, which will result in inhibition of plant succession, and deepen roads and hiking paths (Gorczyca, Krzemień 2010). Due to the elimination of the sod and plant litter, the following processes are intensified: erosion by water - mostly a surface runoff, steep slopes flush and deflation on the mountain passes made of shale which is known for its low resistance. The severity of erosive processes is particularly visible during the spring thaw and spring-summer torrential rains. In addition, the paths extending makes them more vulnerable to the frost weathering and needle ice activity during the autumn and winter (Prędko 2001). Over the past several years the

number of tourists on trails in Bieszczady has been increasing steadily which is the main reason for the extensive degradation in mountaintop areas, trail crossroads and mountain passes (Gorczyca, Krzemień 2009; Prędko 2005).

The Bieszczady Mountains are not the most popular ski resort both in Poland and Ukraine. Nevertheless, ski lifts located in the area are visited by a large number of tourists every year. Actively operating ski lifts are located in the villages: (Polish) Bystre, Cisna, Kalnica, and (Ukrainian) Werchne, Volosjanka. There are also closed ski-lifts in Bukowiec, Huzela, Karliki, Polańczyk, Solina, Ustrzyki Górne and three ski-lifts in Volosjanka (Kučera 2011; [www.umwp.podkarpackie.pl](http://www.umwp.podkarpackie.pl)). Moreover, the Polish part of the Bieszczady developed water tourism at the storage reservoir in Solina which has been functioning for over 40 years. Solina reservoir shoreline, which reaches 150 km, is the most developed tourist base in Podkarpacie region and attracts many water sports enthusiasts. Sailing centres, marinas, kayaks and pedal boats rentals and beaches are located all around the lake ([www.umwp.podkarpackie.pl](http://www.umwp.podkarpackie.pl)).

The development of tourism leads to changes in land use because of the introduction of tourist facilities like hotels, guest houses and entertainment centres. Tourist settlement causes irreversible changes in the natural environment due to the transformation of soil cover and relief, lowering groundwater levels, deforestation or creating large water-tight surfaces. In addition, tourist urbanization causes the transformation of the spatial arrangement of towns and rural areas into highly urbanized landscape due to the introduction of large multi-storey buildings or tourist complexes that include facilities of collective recreation. Those buildings attract other examples of tourist infrastructure (catering and commercial facilities, traffic routes, ski areas, hiking trails) and permanent settlements (Mika 2004; Kurek 2007). There is no exact data on the number of accommodation, catering and other commercial facilities within the Bieszczady Mountains. Central Statistical Office in 2012 provides information about 31 collective accommodation establishments in the Bieszczady district and 67 in the Lesko district. According to the data nearly 167 thousand people visited those facilities in 2011. Moreover, the 2012 report says that the Bieszczady district had 103 agritouristic farms and 60 guest rooms while Lesko district offered 307 agritouristic farms and 124 guest rooms. On the Ukrainian side of the border, within the Uzhansky National Park, there were 8 hotels, guesthouses and resorts (Kučera 2011).

### Other types of pressures

Anthropopressure in the Ukrainian part of the Bieszczady is associated primarily with the development of settlements. The largest problem is the unregulated waste water management and a large concentration of households with a traditional heating system which use coal as a fuel. Another major problem is the out-dated system of forest management, especially the use of heavy equipment for logging and skidding (utilizing horses or machines) which leads to the development of erosion processes (Kopacz 2000).

Since the 15<sup>th</sup> century, forests of Bieszczady have been influenced by strong human pressure mainly due to logging in order

to obtain space for the settlement. In the first half of the 19<sup>th</sup> century a mass production of potash (sodium carbonate) from wood ashes began. The largest concentration of potash production existed in the forests located at the source of the San River. The production of potash has begun to gradually decline since the 70's of the nineteenth century. There is no data on the amount of produced potash. The scale of this activity can be seen in the town of Beniowa where, as a result of burning of approximately 12000 m<sup>3</sup> of wood, one can find 20 ha meadows or in the town of Sianki where the neighbour forest was wiped out completely. The areas obtained as a consequence of the logging were used as pastures and farmlands (Augustyn 1999).

The human activity not only affects the amount of forests but also influences its structure and composition. In the first half of the 20<sup>th</sup> century, especially after the WWII, a large-area mass logging, which caused a significant reduction of forest areas, was a common practice. The areas were later on used as hay meadows, pastures and wastelands. What is more, the selective logging of valuable species of deciduous and coniferous trees led to the impoverishment of the floristic composition of the area which is now covered with low-demanding beech forests. The discussed forestry includes also the process of afforestation with spruce monoculture which proved not to be stable. This has led to the transformation of beech and fir and beech forests into unstable spruce monocultures. Irrational forest management resulted in a significant decrease in the number of tree species, changed its age structure and disturbed the forest strata. What is more, the biological diversity was lowered in both monoculture and anthropogenic communities (Stojko 2002; Kucharczyk, Przybylska 1998; Wolski 2007).

In Poland, the slow process of forest regrow has taken place since the second half of the twentieth century. As a result of Operation Vistula a lot of agricultural land was abandoned which resulted in pine, alder and spruce forest succession. In later years, forest thinning was applied and pioneering species were introduced. The later contributed to the creation of multi-species structure of the forest which is more resistant (Kucharczyk, Przybylska 1998). The forests of the Ukrainian side of the Bieszczady were exposed to the process of human pressure for a longer time. After the World War II, due to the difficult economic situation of the country, a mass logging continues utilizing Uzhansky railway which was laid in the second half of the nineteenth century. Until the end of the 60s the planting of spruce monocultures has taken place but the idea was abandoned because of disastrous forest windfalls (Stojko 2002).

The current state of the Bieszczady environment was affected by herding which has been developing in these areas since the fourteenth century. This development was caused not only by the inflow of Vlach shepherds but also the fact that the area has difficult natural conditions for farming development. Wooden ash was commonly used as a fertilizer while barren fields were converted into pastures. Mountain meadows were used for oxen grazing while sheep could be grazed closer to farmlands. The systematic increase in acreage of meadows and pastures was seen in the Bieszczady to the early nineteenth century. The collapse of the herding was associated with socio-economic and ownership changes as well as the introduction of

chemical fertilizers which made wooden ash fertilizer obsolete. Before the World War II, pastures were present on the slopes of the northern Połonina Wetlińska, Połonina Caryńska and southern parts of Halicz and on the top of Kińczyk Hnylecki – Ruski Put hill (Kubijowicz 1926).

After the World War II, Ukraine experienced a period of a large-scale herding development. The aim of newly founded Kolkhozes was to increase the number of stock by animal refinement and land fertilizing. In the early 90s, the ineffective agricultural structures were replaced by new forms of pastoral activity - family (private) type and mixed (kolkhoz-private) type. The first one was a typical private business which still can be seen operating in some towns and villages while the second was a kind of transitional form between kolkhoz and private entrepreneurship (Gudowski 1997). Currently, 49-62% of the areas of the Ukrainian part of the Bieszczady are covered by meadows and pastures. Most of them are extensively used for grazing (Tsaryk, Kyyak, Horban, Reshetylo 2008) In Poland, pastures represent only 2.4% of the all agricultural land of Podkarpackie Province (<http://rzeszow.stat.gov.pl>).

Ambiguous laws are considered one of the main Ukrainian problems. A characteristic feature of the Ukrainian legislation is the lack of common regulations for designated forms of environment protection and a high inconsistency of conservation plans for different forms of protected areas. Due to that fact, important issues, such as building permits, a size of sanitation cutting or standards for gathering and hunting for scientific purposes are often neglected (Maryskevych, Shpakivska, Didukh 2007).

## Conclusions

The Polish part of the Bieszczady Mountains is exposed to the pressures associated with the development of tourism. Both Wetlina and Solina have well-developed tourism, commercial,

service and communication infrastructure. The tourism is also a major threat for Bieszczady National Park. The Park features an extensive network of tourist trails for hikers, bikers and horse riders which are used by 500,000 visitors every year (Prędko 2012).

The anthropopressure in the Ukrainian part of the Bieszczady has a completely different character. The human impact caused by tourism is virtually non-existent. The pressure on the environment manifests itself through the unregulated water and sewage systems as well as large concentration of households with a traditional heating system and highly developed railway network. Moreover, a large number of unauthorised dumpsites and logging sites were found within the borders of the analysed villages.

A large variation between the Polish and Ukrainian Bieszczady is primarily due to the difference in the economic development of both countries. In Ukraine, the legislation, which often contradicts the basic tenets of nature protection, is also considered as a problem. Protected areas are characterized by a lack of common regulation and high inconsistency of conservation plans. The activity of the local community - illegal logging and grazing, poaching and gathering - is a separate issue. This is due to not only poor economic conditions and low level of environmental education but also poor performance of the Ukrainian State in the field of compensation and low enforcement (Maryskevych, Shpakivska, Didukh 2007).

The level of the anthropogenic pressure of the Polish part of the Bieszczady (outside the Bieszczady National Park) is characterized by a greater intensity; however, thanks to the normalization of the legislation and high ecological awareness of inhabitants it is possible to reduce the degradation of the environment. The process of the human pressure limitation in Ukraine is more complicated and largely based on the change of the inhabitants' mind-set.

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