

IMPORTANCE OF MOUNTAIN RESERVOIRS FOR TOURISM CASE STUDY: PIENINY MOUNTAINS

Katarzyna DUDA-GROMADA*, Lóránt DÁVID**

Abstract: Mountain regions are valuable in respect of tourism, and have always enjoyed great interest. The creation of an artificial reservoir usually raises the attractiveness of a region. Above all, it makes new forms of tourism possible – such as water tourism. In this paper, opportunities for the development of tourism in the vicinity of mountain reservoirs are presented. The issue is discussed on a selected example from Poland.

Key words: active tourism, mountains, reservoirs, Pieniny

Practice of active and nature-based tourism in mountain regions

Active tourism as a product is defined as a set of services that are based on several tourism advantages aimed to fulfil all the needs of guests. The category of active tourism consists of water tourism (including rafting, canoeing, kayaking, flat-boating, paddling, motor boats, surfing, jet-ski, water-bob), bicycle-tourism, golf-tourism, fishing tourism, hunting tourism, hiking (incl. walking tours, highland hiking, cave-touring), horse tourism (incl. cross-country riding, mounted tours, coaching), ski tourism etc (e.g. extreme sports). Some doubt that fishing should be counted an active sport, but considering the whole process, it is clear that it demands a great deal of physical performance (Dávid –Michalkó ed. 2008). There are also different opinions on sport tourism and beach tourism as well (Table 1.).

Tab 1. - Tourism products of active tourism (Source: Michalkó 2004)

water tourism	fishing tourism	Horse riding tourism
bicycle tourism	hunting tourism	ski tourism
golf tourism	Hiking	extreme sports

Active tourism and nature-based tourism have several definitions among forms

* Department of Tourism Geography and Recreation, Faculty of Geography and Regional Studies, University of Warsaw, Poland.

** Department of Tourism and Regional Development, Faculty of Economics, Károly Róbert College, Hungary.

of alternative tourism (Puczkó-Rátz 2002). Nature-based tourism includes all the tourists who are interested in the surrounding nature. Hiking, mountaineering, zoological and botanical observations, nature photo, fishing, sailing, skiing, visiting national parks and eco-tourism are all parts of nature-based tourism in general. Most of them are active tourist activities, too. It is very important that these activities often take place in highland areas.

The openness of highland areas to tourism goes back a long time. The development of highland tourism is based on the utilization of the area's different resources. It is not only the mountains that have special landscape or ecological values. However, mountain areas are far the less-damaged landscapes, due to their special physical features (specific climate, steep relief, rich vegetation, etc.). The fact that upland areas are considered as „the most natural landscape” and that they are „identified as nature itself” led to the idealization and sometimes mythical adoration of the mountains. A mountain itself as a specific geographical object, can be defined by given criteria and parameters. However, its boundaries are hard to allocate because latitudes can affect these criteria and parameters. The functionality of the area can also distort the relations between lower and mid-high zones, according to their social and economical organisation. Higher mountain zones usually have different natural and cultural heritage.

The diversity and richness of tourism resources are based on these differences. Nevertheless, there are only a few highland areas that are rich in tourism products based on the resources mentioned above. These areas are mainly in developed countries; or mean „relatively close” highland areas. They are also on an uneven level of tourism development.

Nowadays, it is commonly acknowledged that tourism products can be divided into the following groups (Martínez 2003):

- snow tourism (alpine and cross-country skiing and newly fashionable snowboarding)
- „green tourism” (including visits to natural parks and national parks)
- tourism based on historical, cultural and art resources and traditions
- adventure tourism
- tourism based on upland water resources (pools, gills, reservoirs and thermal springs) like river rafting, fishing, balneology, etc.

The figures below show the importance of upland areas in the last two types of tourism (Fig. 1., Fig. 2.).

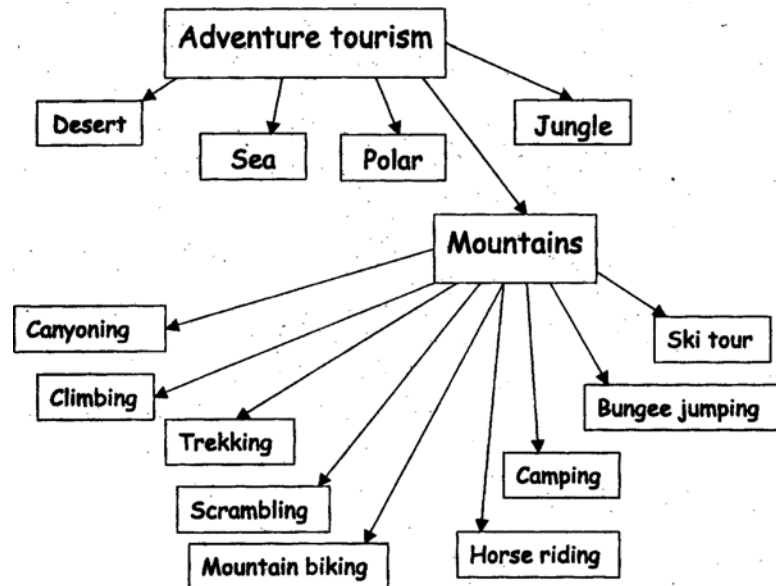


Fig. 1. - Diversity in adventure tourism (Source: derived from Hudson 2003)

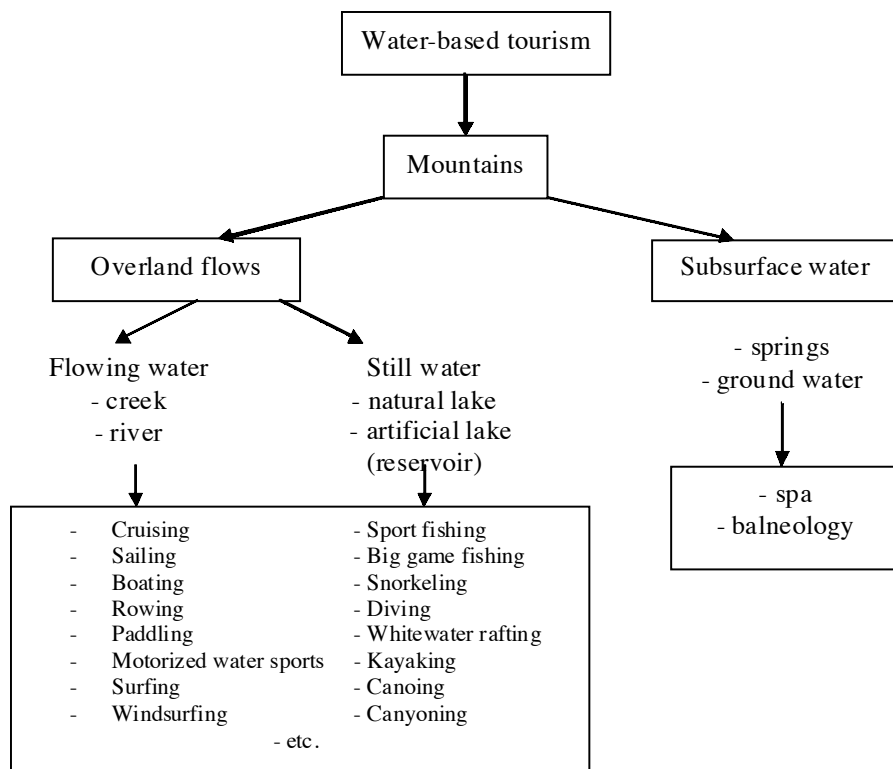


Fig. 2. - Diversity of water-based tourism in mountains (Source: original, Dávid 2009)

Reservoirs are very important for tourism in mountain and lowland regions, too. By the completion of new reservoirs in the mountains the prospects of water-based tourism and other activities will develop in any regions. In wider dimension these reservoirs could be suitable for multiple purposes as well. In this paper we present an extremely interesting sample from Poland.

Reservoirs for tourism

Artificial water reservoirs located in mountain areas are of particular importance both for the development of tourism and for the socio-economic development of the municipalities in which they are located. In principle, every artificial reservoir in the Polish Carpathians is used for tourism and recreation, since it creates very good conditions for them. Sites that can be used for tourist and recreation activities directly related to water, such as bathing, sailing, or kayaking are the focus of the greatest attention (Sroczyński 2006). One should point out that tourists visit the reservoir areas not only for water-related activities, but also for other forms of tourism, e. g. for sightseeing in the surrounding areas. For this reason, the proximity of mountains is an extraordinary attraction. This is confirmed by research conducted near Lake Solińskie and Lake Żywieckie in Poland. The representatives of the local authorities of the municipalities within which these reservoirs are located believe that the greatest attraction of their area is exactly the combination of water and mountains (Duda-Gromada, Dudek-Mańkowska 2008).

In this study, a selected water reservoir in the Polish mountains will be presented. From among water reservoirs located in the Polish Carpathians it was decided to present Lake Czorsztyńskie, and for two reasons. First, in close proximity of the reservoir the mountain range of Pieniny is located, distinctive not only among Poland's landscapes, but also in the world. The rank and the natural value of the Pieniny mountains is confirmed by the Pieniny National Park established on their area*. Second, Lake Czorsztyńskie was created relatively recently, which allows to trace the changes of the tourist traffic, which are the basis for conclusions about the importance of the lake for the tourism attractiveness of the region.

The history of the construction of the Czorsztyn Dam goes back to the beginnings of the 20th century. At that time, energy cross-sections for each river in the Galicia province were determined, that is, places where the construction of a dam would result in the best energy efficiency. For the Dunajec River, one of such cross-sections was precisely Czorsztyn (Dąbrowski 1989). Starting in 1905, numerous plans of management of the upper Dunajec river

* *The Pieniny National Park was established officially on the strength of the directive issued on 12 May 1932 by the Minister of Agriculture of the Republic of Poland.*

using reservoirs have been created. The first plan for a reservoir in Czorsztyn was created shortly before the Second World War; the reason for it was a 1934 flood which had catastrophic effects. But the next serious decisions were taken only in 1965, when the plan was approved. Finally, the construction started in 1970 (Łaski 1997). One of the reasons why the construction of a dam in this place was delayed were numerous protests. The opponents feared that unique values of the Dunajec valley will be destroyed – values that were the product of many specific features of the natural environment.

The Complex of Water Reservoirs Czorsztyn-Niedzica together with the compensation reservoir Sromowce Wyżne was completed and put into operation in July 1997. It is a complex project with multi-fold purpose. The main goals of the construction of the dam were, first of all:

- the increase of the minimal flow of the Dunajec and Vistula rivers;
- the increase of the available resources of the Dunajec river to the extent that would allow to control the water management for the needs of the regions with water shortage (mainly the Cracow agglomeration);
- the lowering of the flood-wave peak to protect the Dunajec valley below the reservoir and to protect the Vistula valley below the Dunajec river;
- the production of electric power using pro-ecological methods (Łaniewski 1997).

The reservoir complex consists of the main reservoir Czorsztyn-Niedzica and the compensation reservoir Sromowce Wyżne. The retention reservoir has been created by damming the waters of the Dunajec river by the main dam, dividing the valley at the height of Czorsztyn-Niedzica. A hydropower electric plant (pumped-storage), of 75 MW power, is located near the dam. The front wall of the dam dams the water to 534.5 m at most, creating a reservoir of capacity 234 million m³ and length over 10 km. With the normal damming to 529 mH, the capacity of the reservoir is 170 million m³ (Tab. 1). The volume of water between these two levels of damming is the flood-protection reserve of the reservoir Pawlikowska-Piechotka 1997 (Tab. 2.).

*Tab. 2. - Technical parameters of the reservoirs
(Source: Pawlikowska-Piechotka 1997, p. 41)*

Features of the reservoirs	Czorsztyn-Niedzica	Sromowce Wyżne
Reservoir capacity incl.: compensation storage dead storage	234,5 mln m ³ 133,5 mln m ³ 36,5 mln m ³	6,7 mln m ³ 5,4 mln m ³ 1,3 mln m ³
Surface of the flooding: maximal minimal	1335 ha 415 ha	95 ha 69 ha

As we have mentioned, Lake Czorsztyńskie is located in close proximity to the distinctive range of the Pieniny mountains (Kostrowicki 1972). Its highest peak, Trzy Korony [Three Crowns], rises to 981 mH. The range is surrounded by higher mountain ranges: from the south, by the Tatra mountains (Rysy 2499 m), from the north by the Beskid mountain ranges of Lubań (1225 m) i Radziejowa (1265 m). Numerous curiosities of animate and inanimate nature, accumulated in the Pieniny mountains, historical and cultural sites, distinctive beauty of the landscape and in particular the unusual charm of the Dunajec River gorges, but also therapeutic properties of the mineral waters and a mild climate attracted the society's attention to this unique in its kind mountain region. For that reason, the region has been, for many years, one of the most popular tourist regions in Poland. The great richness of the natural phenomena attracts to the Pieniny mountains not only tourists, but also scientists. The geological phenomenon of the Pieniny mountains, containing many complicated issues, has attracted the geologists' attention for over 150 years (Smólski 1955). The mountains have been a veritable testing ground for scientists from many disciplines. Apart from that, the nature and landscape, historical and cultural sites, interesting events, and innumerable legends and sagas have inspired writers, musicians, and painters.

The specific geological structure of the Pieniny mountains, where hard limestone rocks break through the cover of soft shales, marls, sandstones, and conglomerates, is the reason for their unusually varied and contrasting relief (Smólski 1955). Bold rocky forms with steep slopes occur here next to gentle, rounded forms (Zarzycki 1982). Characteristic for the landscape of the Pieniny mountains are bare cliffs emerging from the forest, isolated rocks and, contrasting with them, rounded surfaces of hummocks, or gentle slopes covered with meadows. The slopes of the Pieniny mountains are asymmetric, which played an important role in the formation of flora and fauna. From the north, the slope is gently inclined and divided by a dense network of valleys, while the south slopes are very steep. In many places they are almost vertical rocky walls, furrowed with numerous ravines whose course reminds of tectonic fissures and cracks. Valleys cutting through the south slopes of the Pieniny mountains have a completely different form as compared with the stream valleys on the south slopes.

Specific morphology, distinctive microclimate, varied substratum and various petrographic composition of the rocks have created a variety of biotopic conditions not to be encountered anywhere else in such a small area. In the conditions created, life of many plant species and associations, with various life requirements, had been made possible. Among the most interesting and most characteristic elements of the Pieniny mountains flora are endemic plants,

among them: Korean chrysanthemum (*Dendranthema a. Chrysanthemum zawadskii*), and the species *Taraxacum pieninicum* and *Erysimum pieninicum*.

The fauna in this region is also rich and varied. The boar, the deer, and the roe deer occur in the region of the Pieniny Spiskie mountains. After World War II wolves returned, and every few years short stays of bears are observed. The region is inhabited by foxes, hares, badgers, martens, and lynxes. In the natural reserve Zielone Skałki one can occasionally see wild cats. The Czorsztyn and Niedzica castles are home to around 14 species of bats. The varied terrain creates advantageous conditions for birdlife. According to the Polish Academy of Sciences, the avifauna consists of 161 species.

The most characteristic features of the Pieniny mountains relief is the Dunajec valley which can be divided into three tracts. The first and shortest is the gorge tract between Czorsztyn and Niedzica, now within the reach of the lake. The second tract runs from Niedzica to Czerwony Klasztor, where the valley forms two large bends. The third tract is the picturesque gorge between Czerwony Klasztor and Szczawnica. Here the valley is narrow and winding: at the distance of 2.5 km (measured in straight line) the river forms seven large bends and has 9 km length (Zarzycki 1982). The unique tourism values of this tract have been exploited to organize raft trips. First mentions of rafting go back to the first half of the 19th century. Since then, the rafts have somewhat changed. Nowadays, they are built of five boats joined together, and the bow part is lined with spruce twigs. In 1934, the Polish Association of the Pieniny Mountains Raftsmen was created; it organizes the raft trips. Although the distance to Szczawnica, as measured in the straight line, is 6.7 km, the route of the raft trip is 15 km, due to the numerous bends of the river. During this unusual tourist trip the tourists can admire many characteristic rises of the Pieniny mountains (e. g. Sokolica, Trzy Korony). Moreover, the raftsmen, being excellent raconteurs, tell many legends and stories related to the individual places. The Dunajec raft trip is the greatest tourist attraction of the Pieniny mountains of world renown. When rafting, we have an opportunity to tour the Pieniny National Park in a very original and atypical manner. The trip lasts around 2-3 hours and can be made from April until October.

Although Pieniny are built of limestone, typical karst processes and phenomena do not occur here. Except for shallow niches, there are no runnels, sinkholes or caves here. The reason for that is the complicated structure of the geological unit of Carpathians known as the Pieniny Klippen Belt*, within which the Pieniny

* The Pieniny Klippen Belt forms an arc open toward the south. It divides two large structural units of the Carpathians: Inner Carpathians, south of the belt, and Outer Carpathians (flysch), north of the belt.

mountains are located. Due to this structure, the Pieniny mountains are in general well watered. Moreover, each flat is covered with rock-waste and vegetation facilitating the weathering processes and consolidating the waste-mantle. This contributes to the filling of the cracks, and thus the action of water cannot cause the development of karst forms (Smólski 1955). As a result such forms of tourism as caving are impossible here.

The large variety of relief makes the area attractive for tourists. One can encounter such forms of relief as high hills, isolated rocks and picturesque passes or ravines. These elements made up an exceptional landscape value. Hence, the relief predisposes the area researched for such forms of tourism as hiking, cycling, sightseeing or educational, while the presence of a protected area (the Pieniny National Park), for – at least – ecotourism.

Mountain tourism is based on two main elements of tourist management, that is, on tourist trails (already mentioned) and accommodation facilities. These elements have to create a cohesive network, which allows for choosing freely the area for a hiking trip, its course and duration. Hiking can be done during most of the year, from mid-April until mid-November or until the first snowfall (Mikołajczak 1976).

The Lake Czorsztyńskie region has rich natural and landscape values. Of particular attraction is the protected area, that is, the Pieniny National Park. From the point of view of nature protection the most disadvantageous feature of tourism is its mass character. For that reason, measures aiming at its restriction are taken in national parks. Also, certain forms of tourism are not allowed in such areas. Hiking and (hill)walking are activities recommended in national parks. Within the Pieniny National Park, there are hiking trails, which form a cohesive, well-developed network. They are linked together and lead both to hostels and to localities with accommodation facilities. The rich network of trails makes it possible to create a large number of varied hiking trips; every tourist can choose freely the trip course depending on his/her individual preferences. Of particular landscape value are: the highest peak of Pieniny, Trzy Korony, and the Sokolica mountain. Both are important scenic points, offering beautiful vistas. From Trzy Korony we can admire the Dunajec valley, the characteristic spatial layout of localities near Lake Czorsztyńskie, and the reservoir itself. Moreover, we can also admire the panorama of the Tatra Mountains, and – in case of foggy weather – a very picturesque “sea of fog”. Watching the Dunajec Gorge from the Sokolica peak, on the other hand, admired by tourists from the whole world, provides many positive aesthetic experiences. Here one can see pines with their characteristically wind-bent trunks. Additionally, the tourists’ attention in this region is attracted by ravines and by numerous plant species, unique in the country and even in the world.

The region discussed is also exceptionally attractive for tourist cycling. The most interesting in this respect is the area around Lake Czorsztyńskie, where a bike trail of length ca. 40 km, called the Gothic Bike Trail, has been marked out. When cycling there, one can admire picturesque landscapes and the reservoir, called the "Carpathian Sea". The localities encountered along the trail are rich with numerous historical monuments representing architecture specific for the region of Podhale. On this trail, on the reservoir shore, the "Tourist Settlement Czorsztyn" is located, where many architectural monuments from the flooded localities have been moved. Also, the tourist can visit the castles at Czorsztyn and Niedzica. The Czorsztyn castle is a defensive structure of the mountain type, with its layout adapted to the shape of the mountain on which it had been erected. The courtyard of the lower castle is surrounded by fragments of the fortified walls and of the north-eastern corner tower. The remnants of the upper castle take up the summit of the steep Castle Mountain (588 m a. s. l.) and rise to ca. 53 m above the surface of Lake Czorsztyńskie. The lower parts of the castle go back to the 13th century, while the upper ones, to about 1620-1635. From the terraces, made accessible for the tourists, there is a magnificent view on the lake and the Pieniny mountains. The Niedzica castle, on the other hand, stands at an altitude of 556 m a. s. l. and about 35 m above the surface of Lake Czorsztyńskie. It is one of the most valuable historical monuments of defensive architecture in Poland. The first documented mention of the castle comes from 1325. Nowadays, the castle is taken care of by the Association of Historians of Art. From 1993, hotel rooms have been for rent in the castle and a restaurant is in operation.

An important characteristic feature of Pieniny, from the point of view of cultural tourism, was the interpenetration of cultures. Since the region is close to the border, migrations of population were possible. The region had been inhabited by Poles, Slovaks, Hungarians, Germans, Jews, and Ruthenians, which had determined the characteristic traditions, customs, and culture — nowadays an additional tourism asset of the region. The characteristic and the most numerous group of local people were the Highlanders (Górale).

The development of agrotourism is also worth mentioning. The region is not industrialized or urbanized; on the contrary, the settlements are mostly small localities, villages. Soil conditions are also not very advantageous. As a result of all this, the local population seeks other opportunities to earn a living. That's why agrotourism is a great opportunity to improve the standard of life. In many households there are already rooms for rent for tourists and therefore there are many possibilities to find accommodation.

Since the natural and cultural resources, as well as tourism traditions in the Pieniny mountains constitute their greatest value, while the conditions for the development based on agriculture or industry are non-existent, the basis for the development should be tourism and recreation. Since the region analysed is very attractive for tourists and tourists are very interested in it, as a result the tourist infrastructure is well developed here. The multitude of tourist trails with varied course, well developed accommodation facilities (consisting, among other things, of hotels, hostels, tent sites) and catering facilities, as well as a transport network, make it possible for tourism to develop. On the other hand, unique natural values resulted in the creation of protected areas, first of all, of the Pieniny National Park. Because of that, some forms of tourism are significantly restricted.

As we have mentioned previously, an important (and new) object in the landscape of the area investigated is Lake Czorsztyńskie. Apart from its role in water management, its impact on tourism is also very important. It is undoubtedly conducive to such forms of tourism as kayaking and sailing, but it also results in an increasing number of tourists visiting this area. This is confirmed by the analysis of the change of the number of people using accommodation facilities in one of the municipalities (Łapsze Niżne), within which a large part of the reservoir is located (Figure 3.). The indicator analysed grows from around 3 000 people using the accommodation facilities in 1995 to almost 12 000 people in 2007.

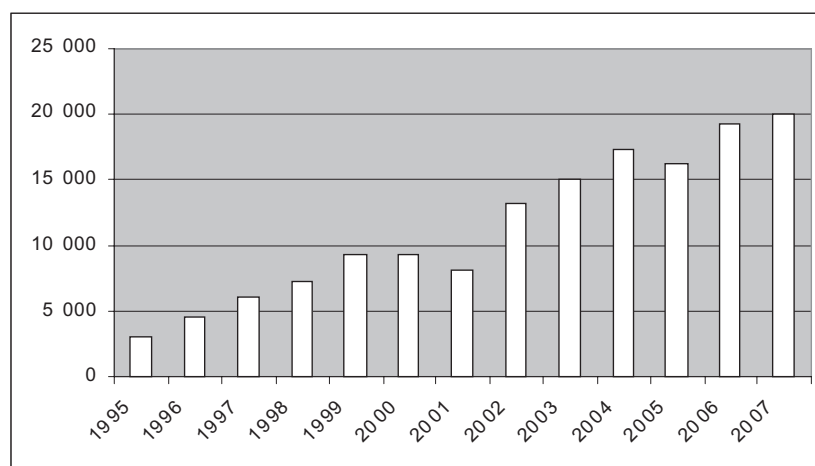


Fig. 3. - Number of people using accommodation facilities in the Łapsze Niżne municipality in 1995-2007 (Source: Author's own study based on the Bank of Regional Data GUS [Central Statistical Office] (www.stat.gov.pl))

Summary

To sum up, one should state that the presence of an artificial water reservoir, the characteristic features of the natural environment, as well as the presence of protected areas, are conducive – above all – to the development of specialized forms of tourism. The best area for hiking is the Pieniny National Park; for cycling – the loop around Lake Czorsztyńskie, and for water tourism – the lake itself. Considerable development opportunities exist also for agrotourism, which was noticed both by the local population and by the local authorities. In almost all localities there are agrotourism farms, or lodging for tourists is offered.

REFERENCES

- DĄBROWSKI P. (1989), *Ochrona przyrody w pienięskim pasie skałkowym* [Nature Protection in the Pieniny Klippen Belt], Oddział Akademicki PTTK, Kraków.
- DÁVID LÓRÁNT-MICHALKÓ Gábor (2008), *A Tisza-tó turizmusa* [Tourism of Lake Tisza], Magyar Turizmus Zrt., Budapest, 224p.
- DUDA-GROMADA K., DUDEK-MAŃKOWSKA S. (2008), *Promocja turystyczna a sytuacja gospodarcza gmin położonych nad wybranymi zbiornikami retencyjnymi w Polsce* [Tourism Promotion and the Economic Situation in Municipalities Located near the Selected Retention Reservoirs in Poland] [in:] Mazurkiewicz L., Kowalczyk A. (eds.) *Społeczności lokalne a turystyka. Aspekty społeczne, kulturowe, ekonomiczne* [Local Communities and Tourism. Social, Cultural, Economic Aspects], Akademia Wychowania Fizycznego, Warszawa, pp. 187-198.
- HUDSON, S. (2003), *Sport and Adventure Tourism*; The Haworth Hospitality Press, New York-London-Oxford, 324p.
- KOSTROWICKI J. (1972), *Polska [Poland]*, Wydawnictwo Arkady, Warszawa.
- ŁANIEWSKI J. (1997), *Czorsztyn*, Gospodarka Wodna, 12, pp. 384-390
- ŁASKI A. (1997), *Zbiornik czorsztyński – historia projektu* [The Czorsztyn Reservoir – History of the Project], Gospodarka Wodna, 13, pp. 391-393
- MARTÍNEZ J. L. (2001), *A turizmus területi erőforrásai* [Territorial Resources of Tourism], PhD dissertation, Gyöngyös-Pécs.
- MICHALKÓ G. (2004), *A turizmuselmélet alapjai* [Basics of Tourism Theory] – Kodolányi János Főiskola, Székesfehérvár, 218 p.
- MIKOŁAJCZAK Z. (1976), *Turystyka kwalifikowana* [Qualified Tourism], Centralny Ośrodek Informacji i Reklamy Turystycznej, Warszawa.
- PAWLIKOWSKA-PIECHOTKA A. (1997), *Wpływ budowli hydrotechnicznych na środowisko naturalne i kulturowe* [The Impact of Hydropower Plants on Natural and Cultural Environment], Instytut Gospodarki Przestrzennej i Komunalnej, Warszawa.
- PUCZKÓ, L. and RÁTZ, T. (2002), *Impacts of Tourism: An Introduction*. Häme Polytechnic: Finland.
- SMÓLSKI S. (1955), *Pieniny. Przyroda i człowiek* [The Pieniny Mountains. Nature and Humans], Zakład Ochrony Przyrody PAN, Kraków.
- SROCZYŃSKI W. (2006), *Studium form i mechanizmów degradacji środowiska w systemach rekreacyjnych brzegów jezior zaporowych południowo-wschodniej Polski* [A Study of

Forms and Mechanisms of Environmental Degradation in Recreational Systems of the Shores of Water Reservoirs in South-Eastern Poland], Wydawnictwo IGSMiE PAN, Kraków.

ZARZYCKI K. (1982), *Przyroda Pienin w obliczu zmian* [Nature of the Pieniny Mountains in the Face of Changes], Państwowe Wydawnictwo Naukowe, Warszawa-Kraków.

www.stat.gov.pl (accessed on 14. Feb. 2009)