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Educational paths as an environmentally friendly form of sustainable tourism in Kuyavian-Pomeranian Voivodeship

Abstract: Due to their educational nature for children and adolescents and the protection of the components of the natural environment, educational paths play an essential role in developing sustainable tourism. They also influence regional tourism development and, indirectly, tourism and service infrastructure. The article examines the attractiveness of educational paths regarding tourism development and natural values. The paper indicates the elements of development that may contribute to the increase in tourist attractiveness and the volume of tourist traffic. A questionnaire survey and the scoring method were used to assess tourist attractiveness. The research results indicate that tourism development is vital to tourist attractiveness. The marked hiking route, equipped with amenities and information signs, ensures it is safe for tourists of all ages, regardless of the season.

Keywords: tourist routes, tourist education, ecotourist development, Poland

1. Introduction

An essential element of sustainable tourism is building the natural, economic and cultural potential through developing tourism aimed at the individual tourist with the sustainable use of regional resources (Stronza et al., 2019). A good example of promoting sustainable tourism can be educational paths, which, apart from their tourist and educational functions, can play an ecological role. Educational paths, as a form of getting to know the nearest natural and geographical space, shape tourists' attitudes by increasing the sense of responsibility for the condition of the most immediate natural, historical and cultural environments (González-Herrera and Giralt-Escobar, 2021). At the same time, teachers can use educational paths as additional didactic means, allowing learners to gain knowledge about nature, history and society (de Azeredo and Zaú, 2017). According to Wojtanowicz (2014), educational paths facilitate the movement of tourists around the region while promoting the protection of the natural environment and disseminating

knowledge about the region. They enable their recipients to have a targeted and conscious perception of the landscape, with its natural, historical or cultural components.

It should be emphasised that educational paths also influence regional tourism development and, indirectly, the development of tourist and service infrastructure. They increase the ecological awareness of the local community and help establish relations between the inhabitants and their region. Educational paths are part of the tourist infrastructure that differ in signage from traditional hiking trails. They are usually located in national parks, landscape parks and nature reserves. The differentiation between the names of educational paths results from the scope of activities undertaken while creating a tourist trail and the area's various natural and anthropogenic values. The organisation of educational paths affects the safety of tourists moving along the designated way. The path's development also influences the level of tourists' safety by equipping it with bridges

to facilitate crossing watercourses or shelters to protect tourists from rain (Podgórski et al., 2005). Educational paths can also be crossed by cultural trails, which enable tourists to get to know the cultural heritage of a given country or region. Cultural trails show the region's history, settlement development, culture, religion and tradition (Jezierska-Thöle et al., 2018).

The article examines the attractiveness of educational paths in terms of tourism develop-

ment and natural values. The paper indicates the elements of development that may contribute to the increase in tourist attractiveness and the volume of tourist traffic. The following research questions are asked in the paper:

1. What are the leading natural and anthropogenic values of educational paths?
2. Does the tourist management of educational paths meet the needs of tourists?

2. Area description, methods and studied material

The work's spatial scope covers the area of Kuyavian-Pomeranian Voivodeship in the central part of Poland. The region lies in the Odra and the Vistula basins, the feature which prompted the construction of the Bydgoszcz Canal. The most important forest complexes in the area include the Tuchola Forest, located in the northern part of the Voivodeship, and the Bydgoszcz Forest south of Bydgoszcz and Toruń, the largest cities in Kuyavian-Pomeranian Voivodeship (Kruczek, 2011). The forests are mainly pine plantations with low ecological requirements. The flora contains about 1200 species of higher plants (half the number of those in Poland), of which more than 70 are fully protected. It is worth mentioning that the Tuchola Forest has the former tundra and taiga vegetation (Podgórski, 1999).

The time scope of the study covers the latest research period, 2021/2022. Due to the occurrence of restrictions related to the Covid-19

pandemic, this period was particularly difficult for the tourism industry. The effect of these restrictions was, among other things, a decrease in tourist traffic along the educational paths of the Voivodeship. The point valuation method (BP) was used to assess tourist attractiveness (Latosińska and Nalej, 2018; Glapa et al., 2021; Czapiewska, 2021). This method allows for assessing the tourist attractiveness of a site, town, region, or area. In the scoring method used, the essential features in the area were selected, and the appropriate values matched, which constituted the influence of a given feature on the entire research area (Table 1). Then, the indexation coefficient was calculated according to the following formula:

$$Wsk_w = Mx/M$$

Mx - the number of points obtained from the valorisation of the evaluation field traits

M - the number of points possible to receive for all traits.

Table 1. The criterion for evaluating tourist qualities and the number of bonus points (source: authors own study; Cichoń, 2008; Cieszewska, 2017; Gonia and Jezierska-Thöle, 2022).

Evaluation criterion	Scoring scale	
Natural criterion - conditions for the development of tourism on the nature trail	Occurrence of protected plant species	yes - 1 pt; no - 0 pt
	Occurrence of animals under protection	yes - 1 pt; no - 0 pt
	Natural monuments	yes - 1 pt; no - 0 pt
	Water reservoirs, watercourses, lakes, springs, wetlands	yes - 2 pt; no - 0 pt
	Location in the Natura 2000 area	yes - 1 pt; no - 0 pt
	Location in the area of the National Park	yes - 1 pt; no - 0 pt
Infrastructure criterion - availability and adaptation of the nature trail for tourist and educational use	Information board with the name of the path	yes - 1 pt; no - 0 pt All boards - 2 pt Lack of several boards - 1 pt None - 0 pt
	Information boards on the didactic pathway	All boards - 2 pt Lack of several boards - 1 pt None - 0 pt

	Signpost marking the didactic path	yes - 1 pt; no - 0 pt
	Trail marking on the didactic path - directional signposts	yes - 1 pt; no - 0 pt
	Sheds, place for bonfire, trash garbage cans, benches, bridges, parking lot	yes - 2 pt; no - 0 pt
Criterion- forms of anthropopression	Garbage on the nature trail	yes - 0 pt; no - 1 pt
	Traces of campfires outside the designated area	yes - 0 pt; no - 1 pt
	Damage to vegetation	yes - 0 pt; no - 1 pt
	Damage to information boards	yes - 0 pt; no - 1 pt
	Trampled paths outside the route	yes - 0 pt; no - 1 pt
	Other forms of anthropopression: noise/unpleasant smell	yes - 0 pt; no - 1 pt
Maximum number of points to be obtained		27 pt

3. Theoretical Background

3.1. Educational paths as linear tourist infrastructure

Apart from typical hiking trails and bicycle, ski and water routes, there are also educational paths among the elements of linear tourist infrastructure (Wojtanowicz, 2014). They not only facilitate the movement of tourists around the area but also contribute to deepening the knowledge about the region's nature, geography and history. They are usually located in national parks, landscape parks and nature reserves. According to Ważyński (1997) educational paths are named differently, such as nature-forest or landscape paths, and are "a special type of walking paths intended for active recreation in the forest". As most educational paths have a regional range, they are mainly used by a local community. Thanks to promotional activities, tourists from neighbouring regions visit some of them (Podgórski, 199), Depending on the

natural and cultural elements, educational paths may take various names, such as natural, cognitive, educational, educational-natural, religious or cultural (Jeziarska-Thöle, 2006).

In Poland, the legal basis for the creation of educational paths results from two documents: the Act of 27 March 2003 on Spatial Planning and Development (Journal of Laws 2003, No. 80, item 717, as amended) and the Act on the Protection and Care of Monuments of 23 July 2003 (Journal of Laws of 2003, No. 162, item 1568, as amended). Regarding forest trails, legal issues are partially regulated by Art. 26, section 1 of the Act of 28 September 1991 on Forests (Journal of Laws of 1991, No. 101, item 444, as amended). This provision applies to making the forest available, among other things, for education and tourism.

3.2. Educational paths as tourist education

First, educational paths play a vital role early in school education. Primary and lower secondary school teachers use them to implement educational curricula in nature, biology, geography and history (Smoleńska, 2019). Green schools run by foresters and forest inspectorate employees spread their passion for nature protection, teach the culture of communing with animals and learn about anthropogenic changes (Kądziołka, 2011). School groups and children with parents can observe selected features, pro-

cesses and natural phenomena and evaluate human activities in the forest, park or nature reserve. For other tourists, hiking along educational paths gives a chance to regenerate physical and mental strength through direct contact with nature (Gonia and Jeziarska-Thöle, 2022). People achieve it through contact with nature while walking and cycling, oxygenating the body with air free of pollutants, and the healing effect of essential oils secreted by conifers (Carrera and Bridges, 2006; Thöle et. al., 2020).

3.3. Educational paths as an element of sustainable tourism

Sustainable tourism manages the space and resources of natural and cultural heritage, preserving biodiversity and, at the same time, cultural integrity (Cymańska-Grabowska and Steblik-Wlazlak, 2011). It also meets the expectations of tourists and the local community, maintaining the regional natural and cultural potential. The educational trail is undoubtedly an element of sustainable tourism, as it combines education with tourist and ecologi-

cal functions, mediating in promoting respect for nature and a healthy lifestyle. The more so because educational paths are designed in national and landscape parks, forests, cities and suburban areas. In the latter, they contribute to the development of sustainable tourism due to the dissemination of historical or socio-economic issues and shaping pro-ecological attitudes (Szumińska and Kaczmarek, 2009).

4. Results

4.1. Valorisation of natural features

The nature and educational path of the “Jelenia Wyspa” is located along the Stążka, considered the cleanest river in the Tuchola Forest. It is a swampy area with peat bogs and various species of animals and plants. The peat bog there is a crucial element thanks to which researchers can learn about the history of the forest and the course of climate and hydrological changes, which makes it the most interesting feature in the Tuchola Forest. Rare, relict, and protected plants can be found in the surroundings of peat bogs located in the nature reserve “Bagna nad Stążką” (Boiński, 2011). The educational path called “Wypalanki Lake” takes its name from its course around the lake. The route passes a viewpoint from where one can see the panorama of the lake and its surroundings. The path allows the observation of forest habitat types, including several layers of vegetation of diverse tree ages and varied plant communities. The natural value of the “Zatoka” educational path is the process called resin-tapping. In the forest, it was discovered that several thousand years BCE, resin from conifers was obtained for various building and medical purposes. While walking along the path, one can see trees with trunks cut in a characteristic shape resembling a spike (Jastrzębski, 2010).

The path also has a vantage point at a very shallow spring, surrounded by lush and multi-species forest undergrowth. The educational path of the “Old Bydgoszcz Canal”, among the various habitats, offers protected

and endangered species of plants and animals. Most birds there are under strict protection. There are many trees on the route marked as natural monuments. There are as many as 59 of them, and some of them are even 200 years old. The protected plants include 13 species, seven of which are strictly protected. The endangered plants on the path are entered in the Polish Red List and the Polish Red Book of Plants (Ratyńska et al., 2010). Considering the natural values of the “Białe Błota” educational path, a mid-forest marsh can be distinguished. It is a permanently or periodically wet area covered with meadow and marsh vegetation. Such an environment is home to many species of animals and plants closely related to water, some of which are very rare and protected. Thanks to the swamp, the humidity of the neighbouring areas improves; it is also a watering place for animals (Bagniewska, 2013).

The area through which the educational path “Dolina Dolnej Wisły-Fordon” runs belongs to the European ecological network Natura 2000, which works to protect nature and designates areas that ensure migration and genetic exchange of species. The path is designed to protect mainly natural habitats and wild birds. Such water birds can be found in the oxbow lake area (Korczynski and Misiewicz, 2003). In the forest along the “Miradz” nature trail, some trees are marked as natural monuments. They show impressive size, age and other individual features. On the path, such trees include old

pedunculated oaks and a few chestnut trees, rowans and limes. The area along the path is filled with mid-forest marshes, which create an environment of various species of plants and animals in the forest that are constantly associated with water. Such a marsh environment, together with a specific plant community, leads to peat formation followed by peat bog. Along the path, one can observe small water reservoirs, which favour the development of animals and plants and increase biodiversity (Jezewski, 1996). Valorisation of natural elements showed that the educational path “Dolina Dolnej Wisły-Fordon” received the most points (5 points), while the forest educational path “Białe Błota” the least (1 point). Based on the obtained

results, it is noted that the most common natural value among the educational paths refers to water bodies: lakes, rivers, wetlands, springs and watercourses. They are undoubtedly attractive for tourists, creating a beautiful landscape with green forests. Another aspect of nature is the presence of protected plants and animals with species rarely found in other forest areas, making educational paths unique in this respect. The valorisation shows that the paths do not always have to run through the protected area to be marked out and created; also, the mere presence of natural monuments does not contribute to creating an educational path (Table 2).

Table 2. Valorisation of natural elements of didactic paths (source: own research)

Tourist attractiveness of selected didactic paths (points)							
Nature criterion	Jelenia Wyspa (1)	Jezioro Wypalanki (2)	Zatoki (3)	Stary Kanał Bydgoski (4)	Białe Błota (5)	Dolina Dolnej Wisły-Fordon (6)	Miradż (7)
Occurrence of protected plants	yes - 1	no - 0	yes - 1	yes - 1	no - 0	yes - 1	yes - 1
Occurrence of animals under protection	yes - 1	yes - 1	yes - 1	yes - 1	no - 0	yes - 1	no - 0
Natural monuments	no - 0	no - 0	no - 0	yes - 1	no - 0	no - 0	no - 1
Water reservoirs	yes - 1	yes - 1	yes - 1	yes - 1	no - 1	no - 1	no - 1
Location in the Natura 2000 area park	no - 0	no - 0	no - 0	no - 0	no - 0	no - 1	no - 1
Location in the area of a landscape	yes - 1	no - 0	yes - 1	no - 0	no - 0	no - 1	no - 0
Total	4	2	4	4	1	5	4

4.2. Valorisation of anthropogenic elements

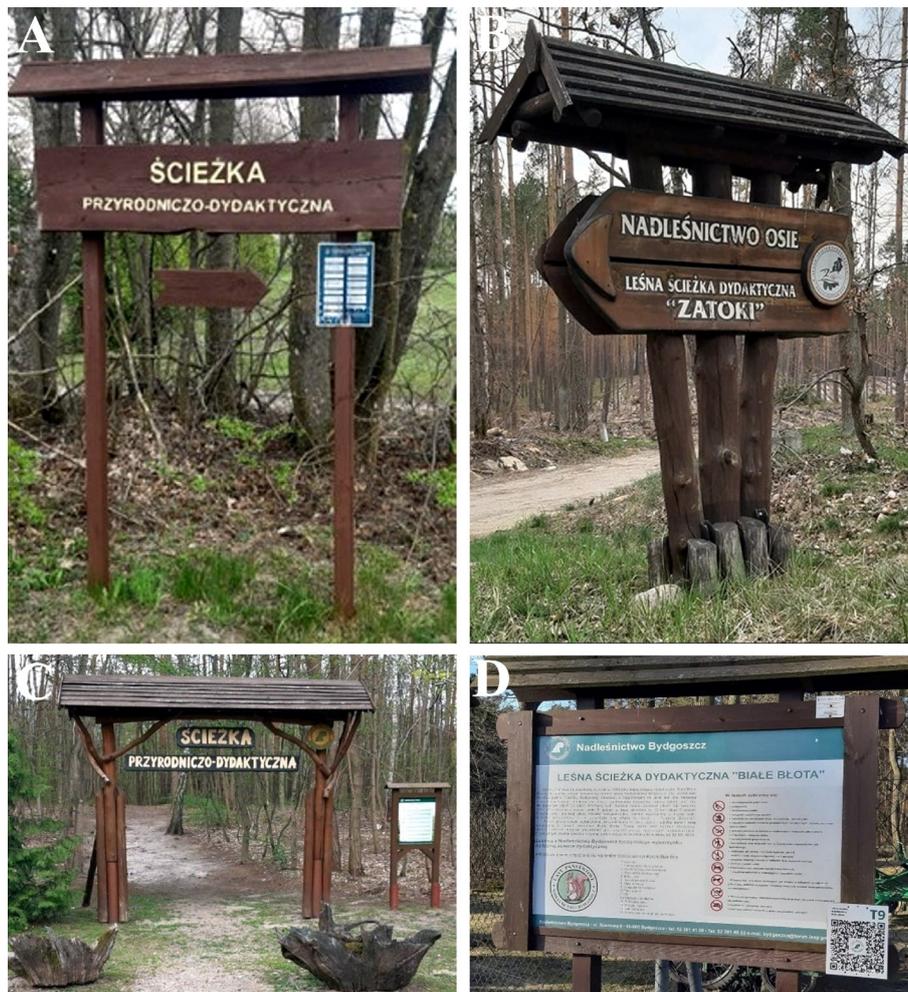
To assess the educational paths' anthropogenic values, the appropriate number of points was assigned to its elements. The selection of points and the list of anthropogenic values, including the development of tourist paths, are presented in Table 3.

The valorisation of anthropogenic elements shows that the forest-nature educational path “Jelenia Wyspa” and the forest educational path “Wypalanki Lake” received the most points (11 points each), while the least “Dolina Dolnej Wisły” (5 points). Information boards with the

name of the educational path are of great importance along the nature trail. Except for path No. 6, the routes were marked with signposts to help tourists reach the following stations. Only on two educational paths (No. 2 and 3) is a signpost showing drivers how to reach the educational path. People travelling by car could stop in the parking lot located by the path, except for path No. 4. Most paths have benches, bridges and shelters for travellers, and a viewpoint was created. There were litter bins and campfire sites on four educational paths (Fig. 1).

Table 3. Valorization of anthropogenic elements of nature trails (source: own reaserch)

Tourist attractiveness of selected didactic paths (points)							
Infrastructure criterion	Jelenia Wyspa (1)	Jezioro Wypalanki (2)	Zatoki (3)	Stary Kanał Bydgoski (4)	Białe Błota (5)	Dolina Dolnej Wisły - Fordon (6)	Miradz (7)
Information board with the name of the nature trail	1	1	1	1	1	1	1
Information boards on the nature trail	2	2	1	1	2	1	2
Sheds	1	1	1	0	1	1	1
A place for a bonfire	1	1	1	0	0	0	1
Trash garbage cans	1	0	0	1	1	0	1
Benches/seats	1	1	1	1	1	0	1
Bridges/bridges	1	1	0	1	1	0	1
Viewpoint	1	1	1	0	1	1	0
Parking	1	1	1	0	1	1	1
Signpost marking the nature trail	0	1	1	0	0	0	0
Signpost marking the trail on the nature trail	1	1	1	1	1	0	1
Total points	11	11	9	6	10	5	10

**Figure 1.** Signposts and signage for nature trails: A. Forest didactic path „Jezioro Wypalanki”, B - Forest didactic path „Zatoki”, C - Nature and didactic path “Miradz”, D - Forest didactic path „Białe Błota” (photo by N. Woźniak, 2022)

4.3. Valorisation of anthropopressure forms

The valorisation of anthropopressure forms showed that the lowest number of points was obtained, in turn, by the educational and nature path “Zatoka” (1 point) and the educational path “Dolina Dolnej Wisły-Fordon” (2 points). The low number of points obtained proves the devastation of nature by tourists (Table 4).

There were traces of fires in places not designated for that type of activity, litter nearby, missing and damaged information boards along the path, and the path itself was neglected. Branches

and trees that lay along the path caused difficulties in the passage and damage to the nearby vegetation. Damage to information boards was a frequent form of anthropopressure on the paths. Another problem was the damage to the vegetation and the well-trodden paths beyond the main route. On some paths, one could see traces of fires outside designated areas, an unpleasant smell caused by a sewage treatment plant nearby permeated the air, and litter was visible due to the lack of waste bins (Fig. 2).

Table 4. Valorization of the intensity of forms of anthropopression (source: authors own study)

Tourist attractiveness of selected nature trails (points)							
Infrastructure criterion	Jelenia Wyspa (1)	Jezioro Wypalanki (2)	Zatoki (3)	Stary Kanał Bydgoski (4)	Białe Błota (5)	Dolina Dolnej Wisły - Fordon (6)	Miradzy (7)
Trash on the nature trail	1	1	0	1	1	1	1
Traces of campfires outside the designated area	1	1	0	1	1	1	1
Damage to vegetation	1	1	0	1	1	0	1
Damage to information boards	1	1	0	0	1	0	1
Trampled paths outside the route	1	1	0	1	1	0	1
Other forms of anthropopression: noise/unpleasant smell	1	1	1	1	1	0	1
Total points	6	6	1	5	6	2	6



Figure 2. Forms of anthropopression: A - damaged information board - Stary Kanał Bydgoski, B - trash around the campfire site - Zatoki, C - obstructions along the path route - Zatoki (photo by N. Woźniak, 2022)

4.4. Assessment of attractiveness using the scoring method

Considering all the elements affecting valorisation, points were calculated for each educational path and entered in the last column of the table (Table 5).

Table 5. Valorisation coefficient of tourist attractiveness (W_{at}) (source: authors own study)

Tourist attractiveness of selected nature trails (points)							
Specification	Jelenia Wyspa (1)	Jezioro Wypalanki (2)	Zatoki (3)	Stary Kanał Bydgoski (4)	Białe Błota (5)	Dolina Dolnej Wisły -Fordon (6)	Miradz (7)
Valorization of natural elements							
Total points	4	2	4	4	1	5	4
Valorization of anthropogenic elements							
Total points	11	11	9	6	10	5	10
Waloryzacja form antropopresji							
Total points	6	6	1	5	6	2	6
Valorization of natural and anthropogenic elements - total max 27 points							
Total points	21	19	14	15	17	12	20
Valorisation coefficient of tourist attractiveness (W_{at})							
0.0 - 0.33 low							
0.34 - 0.66 average	0,8	0,7	0,5	0,5	0,6	0,4	0,7
0.67 - 1.00 high							

Following the adopted research procedure, the maximum number of points was 27. Based on the obtained points for each path, the Watt attractiveness index was calculated, ranging from 0.8 for “Jelenia Wyspa” (high level) to 0.4 (medium level) for the “Dolina Dolnej Wisły-Fordon”. The largest share of paths was on the average level. The forest-nature educational path “Jelenia Wyspa” achieved the most points. It was distinguished by high tourism development and had all the natural and anthropogenic elements mentioned above, influencing its attractiveness to tourists. The path in the area of the “Bagna nad Stążką” reserve is home to protected species of plants and animals. The nature educational path “Miradz” was ranked second. There were no forms of anthropopressure on the path. The lack of a vantage point did not decrease its attractiveness. Another attractive tourist path was “Wypalanki Lake”, with a vantage point from which tourists can observe the landscape of the forest surrounding the lake. There are elements of tourism development on the path; however, litter bins are located only at the beginning and end of the path. The “Białe Błota” forest educational path showed the absence of

forms of anthropopressure, which contributed to obtaining a high position. However, the path does not show high natural values, and there are no protected species of animals and plants. According to the scores, the next place was taken by the educational path in the park by the “Old Bydgoszcz Canal”. The main problem with the path was the lack of a parking site. The path was marked following the accepted rules for marking educational paths, and there were species of animals and plants under protection on its route. The disadvantage of the path was a few damaged information boards or even the lack of them. The least attractive tourist path among the respondents was the educational path “Dolina Dolnej Wisły”. At the beginning of the trail, tourists may be deterred by the unpleasant smell of the nearby sewage treatment plant. No litter bins or benches were visible along the route, so tourists would leave the marked path and destroy the vegetation. The information board was missing in one place, and the others were damaged. The path was the only one without signposts on the route. This trail has many natural values and is located in the Natura 2000 area, but it is neglected and requires control.

5. Discussion and Conclusions

The research results show that tourism development is essential to tourist attractiveness. A marked hiking route equipped with amenities and information signs ensures tourists of all ages are safe to travel, regardless of the season. The names of educational paths stand out from other trails, and each has something unique on its route. These routes are varied thanks to information boards, places for camping and rest, campfire sites and viewpoints. It leads to an increase in tourists' interest in the trail and the willingness to visit a given place, not only for the path but also for broadening the knowledge of nature and the region. For many tourists, being among nature is a form of relaxation and leisure. Natural values, including natural monuments, the presence of protected plants and landscape parks, are often the basis for creating an educational path. However, they do not constitute an element determining its formation. Educational elements promoting forest protection and knowledge about the region and its history are equally important (Antczak, 2007).

In European countries, cultural, architectural and environmental protection elements are essential when choosing a place to create an educational path (Durdić et al., 2019). In Spain, nature protection is promoted on educational paths along with the legacy of the historic Way of St. James (Santos, 2002). In Italy, paths combine elements of architecture, culture and landscape, and in Serbia, tradition and ecotourism. In Trentino, Italy, the landscape as an educational space is used to develop social participation, cooperation and regional responsibility (Cepollaro and Zanon, 2022). Similarly, in Lithuania, educational paths aim to promote regional tradition and modernity (Pozzi and Minotti, 2020). In former East Germany, educational paths, as a form of regional promotion, are particularly important for revitalising rural areas degraded by the dominant agrarian monoculture from the past (Jeziarska-Thöle, 2006; Zalewski, 2008; Knolle and Vladi, 1999).

Educational paths also influence the development of ecotourism, i.e. sustainable development of tourism with respect for the natu-

ral and anthropogenic environment (Wilczek, 2004; Trombadore, 2004). The distinguishing feature of ecotourism is adjusting the volume of tourist traffic to the tourist capacity of a given area. Usually, individual tourists, as well as groups of school trips, move along educational paths. An essential element of ecotourism is the protection of the values of natural and cultural heritage. A good example of ecotourism activities is the protection of wetlands. The wetlands on the "Zatoka" forest educational trail are protected as ecological lands (Cymańska-Grabowska and Steblik-Właźlak, 2011). They are rare and constitute a valuable water reservoir for the surrounding trees. Because they were excessively afforested, it undercut the entire water management in the forests. Therefore, their main task is to keep these objects unchanged and prevent their reforestation. It is worth emphasising that educational paths are, at the same time, an essential element of education. They offer direct contact of children and adolescents with nature, including the plant and animal world, and support the development of sensitivity to the problems of the natural environment.

The conducted research led to the selection of the following recommendations. Educational paths should be promoted more widely among tourists, who often use the Internet to find where to spend their free time. On some websites of forest districts, detailed information about the routes of educational paths is available. However, finding it is not always easy. Additionally, a small educational path folder might be developed and attached to the generally available downloadable materials on the local websites of the commune and poviat offices. As part of disseminating information about the existing paths, it is possible to develop leaflets about the routes and deliver them to nearby accommodation or catering facilities. The improvement of tourist infrastructure may contribute to the increase in tourist attractiveness. One of its most essential elements is the availability of information boards in English due to the growing arrivals of foreign tourists to Poland.

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