

ASTRO-TOURISM IN THE AREA OF THE POLISH-SLOVAK BORDERLAND AS AN INNOVATIVE FORM OF RURAL TOURISM

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ABSTRACT Astro-tourism is a new, niche trend in tourism, and its destination places are supposed to be free of the so-called artificial light pollution. The article presents examples and compares the activities offered by Dark Sky Parks and individual facilities providing services in the field of astro-tourism located on the Polish-Slovak borderland as an innovative offer of tourism in rural areas.
The analysis covered selected rural areas of Slovak Poloniny and Polish Bieszczady Mountains which, being free from excessive anthropogenic effects, are ideal for conducting astronomical observations, particularly at night.

Introduction

A negative phenomenon of polluting the sky with artificial light makes that in many places in the world observations of the starry night sky become difficult or even impossible. This applies particularly to urban areas and their immediate surroundings (Collison, Poe, 2013).

The night, star-studded sky which inspired people for ages has now been almost completely forgotten. In the increasingly light polluted environment it is no longer possible to observe the Milky Way, comets or some fainter stars. The Polish-Slovak-Ukrainian borderland is one of those areas in Europe where the night sky is still starry and thus creates an attraction for many people. This is a huge potential of this region, however, starry sky alone is not enough. It requires promotion and the employment of a series of measures to facilitate this encounter with the dark sky. These include such actions as preparation of appropriate infrastructure for the sky observations, tourist personnel training, education in the protection of the dark sky and actions aimed at preserving the natural state of the environment (*Szkolne Schronisko...*).

Astro-tourism as an innovative form of tourism

Astronomy-related tourism can be divided into four main types. The first one is connected with cultural and sightseeing tourism. It involves visiting facilities related to astronomy: planetariums, observatories, museums and others that relate to the development of this field of science, e.g. to the history of space exploration or the life and work of famous astronomers and astronauts. The second type of astro-tourism involves travelling to places where there is opportunity to observe ephemeral astronomical phenomena (like auroras, solar and lunar eclipses, comets and meteor showers). Since some of them, like auroras and eclipses are visible only in certain areas of the globe, tourists interested in this type of attractions have to find offers prepared by professional organizers. The third type of astro-tourism is visiting the areas with clear, dark sky. This is a new trend of tourism, and its genesis is associated with the phenomenon called light pollution. Areas in which it is possible to observe the sky free from light pollution represent the areas of dark sky protection. The fourth type of astro-tourism are cosmic space travels (Iwanicki, n.d.).

Iwanicki (2013) divides those who benefit from astro-tourism offer into three main groups. The first and possibly the largest group are school-age and pre-school children. Organized trips to places related to astronomy (screenings in the planetarium, visiting observatories, meteorites exhibitions) are an attractive complement to the educational process in the field of geography, physics and astronomy. At the same time children and youth visits to such places have also a positive influence on environmental education and on shaping their future interests.

Another group are nature lovers, frequently travelling armed with binoculars and telescopes with which they observe and photograph animals, plants or various landscapes. For this group the opportunity to see the starry sky – which is often different from what they see in their place of residence – can be an attraction on a par with other elements of nature.

The third group are enthusiasts who take interest in astronomy on an every day basis. As a rule, they have their own observation equipment (often very expensive), with which they travel, and what they want while observing is a transparent and free of light pollution sky (Iwanicki, 2013).

There can be also be distinguished a fourth group among the astro-tourists. Namely those who coincidentally, on the occasion of practising other forms of tourism found the offer of astronomical observations and take advantage of it.

The dark (starry) sky parks as innovative tourism products

The key facilities in the development of astro-tourism are the so-called dark sky parks, or starry sky parks. These parks' objective is to protect the starry sky from the pollution by artificial light produced by human civilization

and to inform local communities and tourists about the problem which the excess and improper lighting poses for nature and people. Furthermore, the creation and operation of such areas is aimed at the developing astro-tourism.

The idea of protecting dark skies arose in the 90s of the twentieth century. The first area protecting the dark sky was established in 1993 in Hudson Lake State Recreation Area (State Hudson Lake Recreation Area) in the state of Michigan in the United States, and the first dark-sky park was created in the Canadian Reserve Torrance Barrens in 1999. Within several years a lot of dark-sky parks have been created. They are located mainly in Canada, the United States and Europe (Rapavý, Begeni, 2011). The main postulate for the creation of the parks was the claim that the landscape of a night sky should be regarded as the same asset protected by the law as mountain, marsh, peat bog landscapes, especially at a time when the original dark sky in Western countries is very rare (Iwanicki, 2013).

In Poland, and also in Europe, the first dark-sky park, created from the ground up and with astro-tourism in mind, was established in 2009 in the Jizera Mountains, as part of the Astro Jizera project. The Jizera Dark-Sky Park, with an area of 75 km², is also the world's first cross-border park of this kind. The attractions awaiting tourists in the Jizera DSP include simple astronomical instruments and a hiking trail (4.5 km long) designed to represent the solar system in a scale of 1 : 1,000,000,000 (Iwanicki, 2013).

Materials and methodology

This article is descriptive. Its purpose is to present the possibilities of developing an innovative tourist offer in the outlying rural areas. This offer can become astronomical tourism, which is becoming increasingly popular. Existing solutions to the use of the dark sky in the development of tourism in rural areas are shown in the examples of two dark sky parks – in the Bieszczady Mountains in Poland and in Polonina in Slovakia. At the same time, the analysis offers the possibility to compare the astro-tourist offer in Poland and Slovakia.

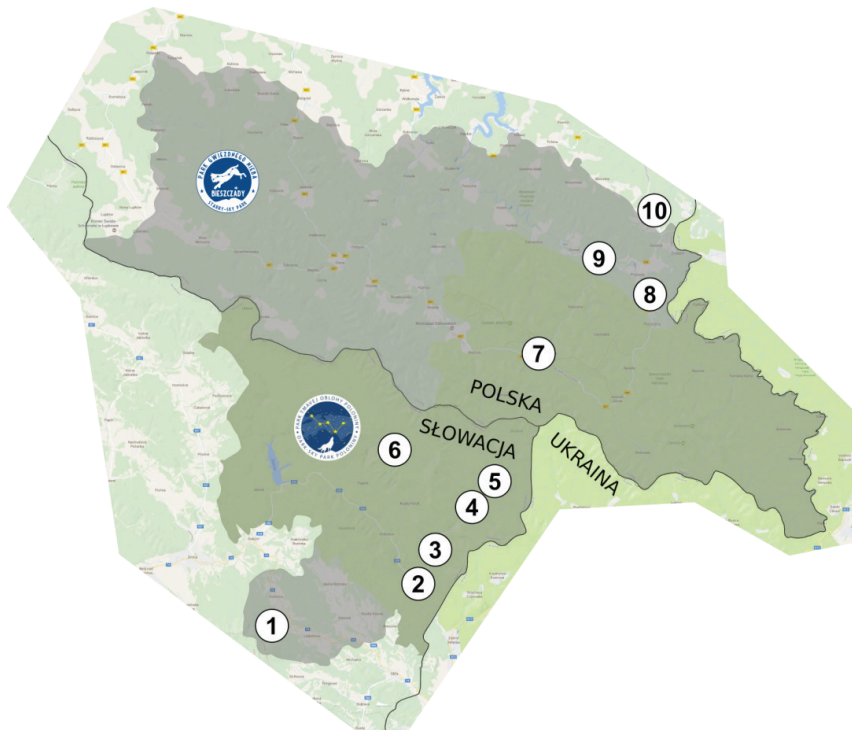
The study was based on an the analysis of available literature, websites (*Gwiezdne Bieszczady*; *Slovenský Zväz Astronómov*; *Park tmavej oblohy Poloniny*), field observations and data from the observatory in Kolonica and the partners of *Bieszczady Starry Sky Park*.

Results

On the Polish-Slovak borderland there are two dark sky parks – *Bieszczady Starry Sky Park* and *Poloniny Dark Sky Park* (Figure 1). As mentioned earlier, the two parks were established in order to protect the areas from growing artificial light pollution, to educate residents and tourists on good forms of lightning and to develop tourism based on astronomical observations.

Both in Poland and Slovakia, there are no regulations that specify the functioning of the dark sky parks (Bury, 2014), which entails that any such sites can be established only through local agreements between particular, mostly local institutions (Iwanicki, 2013).

Poloniny Dark Sky Park (further referred to as *Poloniny DSP*) was created as the Slovakia's first, and Europe's fourth area of this type (Kołomański, n.d.). It covers 48,519 ha and is located mainly within the Poloniny National Park and its buffer zone (Rapavý, Begeni, 2011). The park encompasses 15 villages where the average population density does not exceed 7 inhabitants/km².



Map legend: 1. Observatory in Kolonické sedlo, 2. Ulič, 3. Uličské krivé, 4. Zboj, 5. Nová Sedlica, 6. Runina, 7. Brzegi Górne, 8. Stuposiany, 9. Dwernik, 10. Lutowiska.

Figure 1. *Bieszczady* Starry Sky Park and *Poloniny* Dark Sky Park on the Polish-Slovak borderland

Source: own work based on: <https://www.google.pl/maps>; <http://www.gwiazdnebieszczady.pl/granice-parku>; <http://poloniny.svetelneznecistenie.sk/wordpress/wp-content/uploads/DSP1.png>.

The main facility within the *Poloniny* DSP is astronomical observatory in Kolonica (and precisely on Kolonické sedlo) opened in 1999. It is also the park's information centre and the only institutional unit in the area that propagates astronomy and astro-tourism and annually organizes several cyclical, thematic events:

1. *Astrostáž Variable* – the event organized in July since 2006, the aim of which is to improve the observation skills, especially among young astronomy lovers from Slovakia, the Czech Republic, Poland and Ukraine.
2. *Perseids* – the event organized since 2005 in the first half of August in the village of Runina with the intention to observe the Perseids shower.
3. *Astrobikers* – the event that combines a passion for astronomy with bike rallies in the area of Vihorlat and Bukovské vrchy. It is organised since 2007 in the month of July.
4. *Kolos* – international scientific conference, organized periodically in December since 2004.
5. *Kolofota* – astro-photography seminar, organized since 2005 in the months of March or April.
6. *Spring Astronomy Day* – held in Ulič in April or May.

In 2016, the observatory in Kolonica was visited by around 7 thousand people, which undoubtedly shows a great interest in astronomy and is the reason for expanding further this service and astro-tourism events.

What is more, astronomical facilities in the area of *Poloniny* DSP include (Figure 1):

1. "Under the Dark Sky" Educational Path (the village of Nová Sedlica) – the route running around 1.2 km displays five main information boards about light pollution and the need to protect the night environment. Additionally, tourists can test their environmental knowledge in a quiz on the boards.
2. "Memorial to the Victims of Light Pollution" (the village of Zboj) – six boards informing about the degree of light pollution and its negative impact on the fauna and flora and humans.
3. Knyahinya Meteorite (the village of Zboj), a European rarity located adjacent to the above-mentioned memorial to the victims of light pollution. It is a replica of a meteor (scale 1: 2), which in 1866 broke up into pieces, partly in the vicinity of the village Zboj. The largest portion fell to the place called "Čorni mlaky" (now Ukraine, but historically the area of the village Zboj) with the crater (Begeni, Rapavý, 2016).
4. The 49th parallel north (the village of Uličské krivé) – the information board presenting selected places in the world through which runs the parallel.
5. The Information board "*Asteroid Poloniny*" and a model asteroid (the village of Ulič) – the board contains general information about asteroids and the asteroid "Poloniny".
6. "Doors to Poloniny" (the village of Ulič) – a project which promotes the Poloniny National Park and the Dark Sky Park.
7. Starina water reservoir – an information board presenting the problem of light pollution and its effects on the human body, flora and fauna.

Bieszczady Starry Sky Park (further referred to as *Bieszczady* SSP) was created in 2013. Its creation was a response to the Slovak initiative of establishing the *Poloniny* DSP. The park area covers 113,846 ha (the second largest park of this kind in Europe) and includes the *Bieszczady* National Park and two landscape parks: San Valley Landscape Park and Cisna-Wetlina Landscape Park. This is the second dark sky park in Poland.

Astro-tourism lovers in the park can find here the following attractions (Figure 1):

1. Natural starry sky: thousands of stars, zodiacal light, Gegenschein, "airglow" and comets, meteor showers, and sometimes even the aurora borealis; the possibility of observing the spots and other phenomena on the solar disk.
2. Information Centre of the *Bieszczady* SSP in Stuposiany, commune Lutowiska (the building of the School Youth Hostel). The Centre serves to promote the information about the objectives and activities of the *Bieszczady* SSP and is a venue for presentations and astronomical displays. The Centre is equipped with professional telescopes to conduct day and night observations, the room is equipped with multimedia and dozens of tables with photographs related to astronomy. In addition, the Centre's offer includes organization of presentations, displays, observations, lectures and astro camps.
3. Observation terraces – sites prepared for astronomical observations using one's own equipment are located in: Lutowiska (scenic point), Stuposiany (at the School Youth Hostel) and in Brzegi Górne (parking lot at the Przełęcz Wyżna). With the terraces there are information boards about astronomy and sky maps as well as horizontal sundials.
4. Sundials of different design, three painted analemmatic sundials by the observation platforms, one horizontal stone sundial in a parking lot at the church in Lutowiska and one armillary sphere at the School Complex in Lutowiska.

5. "Holidays under the stars". Summer holiday astronomical displays led by an astronomer, with professional equipment available on site to observe the night sky. At the beginning of each demonstration there is a multimedia-based lecture about the leading topic of display. The displays start at 22h every clear night and are held under the open sky in one of the observation points: Przełęcz Wyżna or Dwernik. The choice of location depends on weather conditions.

Astro-tourism in Bieszczady has been enlisted on the European Route of the Starry Sky – EU Skyroute. The south-eastern corner of Poland is promoted as one of the seven most attractive places in Europe with astro-tourism offer (*EU Sky Route...*, n.d.).

Both parks are located in rural areas, located peripherally in relation to the large urban centres. The network of agritourism farms is well developed only in the eastern part of the Polish Beskid Mountains, where around 250 agritourism farms can be located (Mitura, Buczek-Kowalik, 2016). Within the Slovak mountain region of Poloniny agritourism is practically non-existent. Seasonally, accommodation is offered there in several farms in the villages of Kolonica, Runina, Ulič and Nova Sedlica and astronomical observation lovers can sleep mainly in tents, for which the park designated 6 camping places.

Some of the agritourism farms in the commune Lutowska have started to cooperate with the *Bieszczady SSP* and added to their tourism offer astronomical observations. These are:

1. Agritourism farm "U Lestka" in Dwernik – observations of the night sky (the farm is equipped with its own telescope).
2. Dolistowie in Dwernik – observations of the night sky (the farm is equipped with their own telescopes), workshops in landscape and night photography "Bieszczady day and night" (outdoor photography and astronomical workshops).
3. The lodge "Magoda" in Lutowska – the stars observation in offer (displays and workshops).
4. The guest house Rusinowa Polana in Dwernik – workshops and astronomical displays.

Conclusions

In rural areas, free of light pollution, astro-tourism may constitute an attractive form of leisure activity and exploration. Agritourism farms, especially those located in remote areas can enrich their offer with the observations of the night sky, observations of the Sun or workshops in astro-photography.

Astro-tourism-related observations are an innovative tourism product and this type of product is offered only by individual agritourism farms, all within Polish territory. In Slovakia astro-tourism is developed primarily by way of planetariums and observatories.

The Polish-Slovak borderland, with the existing dark (starry) sky parks, is a suitable area for the creation of cross-border astro-tourism products. The only thing it requires is the development of agri-tourism infrastructure (accommodation and catering) in Slovakia.

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