Analysis of natural prerequisites for the development of ecotourism in nature conservation areas (on the example of the Pyryatynskyi National Nature Park)

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Abstract. This article presents a comprehensive analysis of the natural recreational resources of Pyryatinsky NNP, which are attractive for the development of ecotourism. To achieve this goal, the paper uses general scientific methods of scientific knowledge (analysis and synthesis from information sources), as well as the cartographic method. Recommendations for attracting more ecotourists have been formulated and an ecotourism bicycle route has been developed. To determine the period of maximum recreational activity, a phenological calendar of visits to the park’s protected area was created. The results of this study highlight that spring and summer provide the best conditions for a wide range of activities: animal and plant observation, walking along ecological trails, hiking, and representation of the entire natural complex of the Uday River floodplain. Species diversity in autumn and winter is much lower, so visitors are offered a range of activities including zoo ecotourism, landscape ecotourism, and aqua ecotourism. It is also worth noting that not all natural locations are easily accessible, as 40.1% of the land is covered by wetlands. The development of ecotourism within Pyryatinsky NNP is promising, given the significant species biodiversity and the fact that the NNP is part of the Emerald Network of Europe, including the world’s smallest flower plant, the wolfia. When studying a protected area to organise ecotourism, it is necessary to take into account the availability of tourist infrastructure – equipped recreational areas for tourists, rental offices, etc. Based on the above material, it can be noted that a favorable basis for the development of ecotourism in Pyryatinsky NNP is the following: location (proximity to Chernihiv and Kyiv regions; the administrative center of Piryatin city community in Lubny district; landscaped and «undeveloped» areas), biodiversity (attractive objects; river valley terraces), bioclimatic and environmental favourability. The park also has ecotourism routes and an educational eco-trail. Thus, the considered NNP as one of the ecotourism sites in Poltava region is an interesting place for environmental research. The practical significance of the study will allow involving stakeholders (local residents, business organizations) in active actions to develop ecotourism. The information presented in this paper will allow for certain decisions to be made when developing a park management strategy, as well as in the geographical distribution of guide training.

Keywords: ecological tourism, national natural park «Pyryatinsky», Poltava region, natural resources.

Аналіз природних передумов для розвитку екотуризму на природоохоронних територіях (на прикладі Національного природного парку «Пирятинський»)

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Анотація. У даній статті представлено комплексний аналіз природних рекреаційних ресурсів НПП «Пирятинський, що є привабливим для розвитку екотуристичної діяльності. Для досягнення поставленої мети у роботі використано загальнонаукові методи наукового пізнання (аналізу та синтезу з інформаційних джерел), а також картографічний метод. Сформовано рекомендації, щодо приваблення більшої кількості екотуристів та розроблено екотуристичний велосипедний маршрут. Для визначення періоду максимальної рекреаційної активності було створено фенологічний календар відвідуваності природоохоронної території парку. Результати цього дослідження підкреслюють, що весняний та літній періоди створюють найкращі умови для широкого кола діяльності: спостереження за звивинами та рослинами, прогулянок по екологічним стежкам, туристичних походів та репрезентації усього природного комплексу заплави р. Удай. Видове різноманіття в осінній та зимовий періоди є значно меншим, тому серед комплексу занять відвідувачам пропонується: зооекотуризм, ландшафтний екотуризм та акваекотуризм. Також варто зазначити, що не до усіх природних локацій можна дістатися безперешкодно, оскільки 40,1%
Introduction

As of today, an increasing number of people are becoming aware of the impact of their travels on the environment, making the topic of sustainable development of ecological tourism highly relevant. National parks and reserves worldwide are becoming increasingly popular destinations for tourists seeking to immerse themselves in nature while minimizing their impact on the surrounding environment. It is believed that the world’s first natural reserve was established as early as the 3rd century BCE on the island of Ceylon (Sri Lanka) during the reign of King Devanampiyatissa, and the first truly national park is Yellowstone, created in the USA in 1872 (Manyuk, V., 2014).

In 2023, many national parks continue to implement initiatives for ecological tourism, promoting environmental practices among visitors. In this direction, educational programs are being developed, issues related to attracting investments are being considered, and efforts are being made to create sustainable infrastructure (such as eco-lodges, bicycle paths, etc.). More attention is given to the use of renewable energy sources.

Among the examples of national parks that have successfully implemented sustainable tourism practices, New Forest Park (England), the Greening London network (England), and Norfolk Island National Park (Australia) stand out. In these areas, a «Leave No Trace» policy has been implemented, encouraging visitors to minimize their impact on the natural environment by taking their waste with them and causing no harm to nature. Additionally, tourists are encouraged to purchase local products and souvenirs from local tourist shops and markets, use public transportation, and travel on foot, by bicycle, or in electric vehicles. Participation in beach cleanup activities is also promoted, with discounts offered on park visits and guide services. Furthermore, a network of eco-friendly accommodations and eco-hotels is being established. Partnerships are formed with local organizations, such as collaborations with local schools to educate children about the importance of environmental conservation and sustainable tourism (New Forest National Park, 2023), (Norfolk Island National Park, 2023).

Therefore, sustainable development of ecological tourism is a key element in the development of national natural parks, whose policies should be directed towards ensuring the balanced development of tourism and nature conservation.

As of the beginning of 2023, Ukraine has a total of 8,889 territories and objects in the nature reserve fund (State Cadastre of Territories and Objects of the Nature Reserve Fund, 2023). There are 56 national natural parks, with 2 of them located within the studied region (Piryatynsky and Nizhnosulsky). The selected park for our research ranks 31st in terms of area, covering 12,028.42 hectares among all national parks in Ukraine. In 2009, in addition to the Piryatynsky National Natural Park, 16 more national natural parks were established in various regions of Ukraine.

Ukraine’s adherence to the sustainable development concept, coupled with the situation of the COVID-19 pandemic and military aggression from the Russian Federation, has set certain trends. Specifically, there is an increase in demand for domestic tourism, a search for options for nature-based recreation, and an avoidance of a significant number of vacationers.

The presence of various tourist routes (land and water routes) and recreational zones within the territory of the Piryatynsky National Natural Park has allowed for the satisfaction of the interests of various visitor categories. Many nature reserves in Ukraine (almost 900 objects) have suffered due to military actions, resulting in significant changes to the flora and fauna (Ministry of Environmental Protection and Natural Resources of Ukraine, 2022).
The Piryatynsky National Natural Park has all the necessary resources for the development of ecological tourism since the tourist product offered includes both the tourism and natural components. Moreover, its geographical location allows the park to attract visitors as a travel destination. The majority of visitors come from the Poltava, Kyiv, and Kharkiv regions. According to research from online sources, Poltava is one of the most mentioned locations for ecological (green) tourism in Ukraine, following Zakarpattia and Polissia.

As ecological tourism encompasses various sub-types (ornithological, ornitoecotourism, phytoecotourism, aquaecotourism, etc.), it allows for diversifying tourist activities and reducing the impact on the territory through the even distribution of people. Ecological tourism in Ukraine currently does not hold the foremost position compared to other types of tourism; however, it has the potential for development and expanding its geographic scope within the country, with a trend towards increasing revenues.

**Research material and methods**

The research methodology is based on the use of interdisciplinary methods of analysis and synthesis of information (analytical data collection, its generalization, and systematization) from official sources, including the websites of the National Natural Park, the Piryatin city council, and the Nature Reserve Fund of Ukraine. To study the history of the park’s establishment and its areas of activity, the Management Plan for the Emerald Object of the Piryatin National Natural Park and materials from interviews with scientific collaborators of the National Natural Park for the media were considered.

Representatives of the Geography Faculty and the National Scientific Center «Institute of Biology and Medicine» at Taras Shevchenko National University of Kyiv, including Abduloieva, Danko, Protsenko, and Podobailo (2017), have made a significant contribution to the study of the nature of the Pyriatyn National Natural Park (NPN). Publications on the park’s environmental monitoring are also authored by its employees, particularly during scientific-practical conferences (Bezpala, Churylovych, & Mylenko, 2020). The work titled «The Role of Rivers and River Valleys in the Landscape Sphere and Human Life (on the example of the Udai River within the Pyriatyn NNP)» by Davydenko and Shevchuk (2020) highlights the current natural conditions of the river valley. Seasonal animal migrations and features of territory colonization within the park are disclosed in the work by Kazannyk, Martiusheva, and Mylenko (2020), while the vegetation cover is explored by Kovalenko (2018). Vladimir Manyuk’s research (Manyuk, V., 2014), (Manyuk, V., 2015) delves into the role of the geological component in shaping Ukraine’s Nature Reserve Fund, historical aspects, and the preservation of geodiversity and biodiversity.
The potential opportunities and advantages of the Pyriatyn National Natural Park (NNP) for the development of various types of ecological tourism require more in-depth research.

In connection with the need to determine the possibilities for the development of ecotourism in the Pyriatyn National Natural Park (NNP), we conducted a mapping of the natural conditions of Lubensky district. We created a map titled «Natural Conditions of the Piryatin NNP, Lubensky District» using QGIS. The scientific-methodological approach was based on the use of data from the open-world map OpenStreetMap. According to this, we selected specific thematic layers (hydrography, herbaceous plants, orchards, forest belts, land use, and wetlands) that provide a general understanding and assessment of the natural state. The classification within each layer is the development of the authors who provided public access to it. The map we created is a tool that can assist in justifying decisions regarding the design of trails, observation points, visitor centers, and educational programs that emphasize the unique features and biodiversity of each of these landscape elements. Furthermore, these levels contribute to the promotion of ecotourism by identifying places where the preservation of natural resources and the environment is exceptionally crucial.

Given the map and the location of the natural park, it is evident that a significant portion of the area is occupied by reed and meadow swamps. Regarding vegetation, there is a notable presence of dense tall forests and meadow vegetation. Each layer with its various subtypes provides specific information, where hydrographic objects offer opportunities for various recreational activities such as boating and bird watching. Orchards provide a chance to showcase the agricultural and gardening traditions of the region while promoting sustainable farming practices. Forest belts are suitable for organizing hikes and observing wildlife, and land use can guide ecotourism planners in understanding the overall structure of land resources.

Therefore, the inclusion of thematic layers data fully reflects the diversity of the territory’s conditions and the types of activities that can be developed there. Although the methodology for creating the map is not based on existing classifications, the selection of a specific approach requires the endorsement of specialized terms and a certain gradation. Our proposed cartographic work is primarily intended to depict the features of the surveyed park area.

To expand the services offered by the park, an ecotourism route was developed using the AllTrails program.

**Results and their analysis**

The natural park was established on December 11, 2009, according to the Decree of the President of Ukraine. In 2016, the Emerald Object «Piryatinsky NNP» was created within the park territory (it is part of the Continental Biogeographic Region of Europe).

Given that ecotourism involves recreation in a natural environment, the conditions that facilitate or hinder leisure throughout the year are considered. First and foremost, attention should be paid to the hydro-meteorological conditions of the Poltava region, which allow visiting the natural park and observing various phenomena at different times of the year. Climatic indicators, analyzed according to the data from the Climatic Cadastre of Ukraine for meteorological station No. 57 in Poltava (Kadastr z klimatu Ukrainy), provide the following values for the summer and winter periods (see Table 1).

Analyzing the above given table, it can be stated that the summer period (from May to August) is the most favorable for ecotourism, spanning 111.1 days. A limiting factor during this period may be the relatively high number of rainy days, reaching 70.7 days (from June to September), as well as prevalent cloudy days, thunderstorms (primarily from May to August), and fogs in the autumn season. For the winter period (from November to March), the organization of ecotourism can span 5 months. Considering that the number of days with favorable temperatures (0 to -10°C) is 50 days, with 6 days having temperatures below -20°C. The number of days with snow cover amounts to 85, of which the number of days with a snow cover height within (10-50 cm) is 27.5. The probable number of days with air humidity limiting recreational tourist activities in the Poltava region is 105.8 days. The number of days with wind speed is 145.3 per season. The number of days with unfavorable atmospheric phenomena (cloudy days and blizzards), limiting recreational-tourist activities, is 157.4.

Examining the water bodies within the studied NNP, it’s worth noting that the Udai River (42 km) is interesting for observation during the winter-spring period. The onset of intensive snow melting begins in early March, and all ice phenomena conclude by the end of this month. The freezing process starts at the end of November, after which the thickness of the ice cover increases during the winter months. The freezing process begins at the end of November. The highest water temperature readings are recorded in July, reaching +21°C, and the temperature begins to decrease at the beginning of September.
The mentioned features are characteristic and also apply to two smaller rivers within the park – the Perevod River and the Ruda River. They are interesting, particularly for observation in winter and for recreation nearby in summer. Limiting factors for aqua ecotourism include persistent humic substances from bog origins and the extensive growth of algae (Prymak, Mylenko, 2013).

Among other hydrological features that can be utilized in ecotourism within the territory of the NNP, it is worth noting the presence of approximately 30 old lakes, swamps, flooded quarries (former extraction sites of lowland peat), and the Berezov-Orudske Reservoir. The last object can be used for boating. Waterlogged areas constitute 40% of the Piryatin NNP territory, serving as a limiting factor for accessibility to recreational and tourist facilities (Program of Cooperation with the National Natural Park «Piryatinsky»).

Park employees arrange various recreation zones, and operate 13 recreational facilities, 5 terrestrial and 1 water ecotourism routes, as well as 4 ecological trails (National Natural Park «Piryatinsky», official website).

Table 1. Analysis of climatic conditions for recreational and tourist activities

<table>
<thead>
<tr>
<th>Weather station No 57. Poltava</th>
<th>Number of days with temperatures (15-25°C)</th>
<th>Months</th>
<th>In just one year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of days with T above 30°C</td>
<td></td>
<td>IV</td>
<td>V</td>
</tr>
<tr>
<td>15.0</td>
<td></td>
<td>2.7</td>
<td>16.4</td>
</tr>
<tr>
<td>Number of days with temperatures (0 – -10°C)</td>
<td></td>
<td>IX</td>
<td>X</td>
</tr>
<tr>
<td>6.3</td>
<td></td>
<td>-</td>
<td>1.8</td>
</tr>
<tr>
<td>Number of days with snow cover</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Probable number of days with relative humidity less than 30% and more than 80% for the summer period</td>
<td></td>
<td>IV</td>
<td>V</td>
</tr>
<tr>
<td>8.5</td>
<td></td>
<td>10.4</td>
<td>7</td>
</tr>
<tr>
<td>Probable number of days with relative humidity less than 30% and more than 80% for the winter period</td>
<td></td>
<td>IX</td>
<td>X</td>
</tr>
<tr>
<td>6.8</td>
<td></td>
<td>7.8</td>
<td>17.7</td>
</tr>
<tr>
<td>Number of days with snow cover height within (10-50 cm)</td>
<td></td>
<td>IX</td>
<td>X</td>
</tr>
<tr>
<td>-</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Probable number of days with wind speed greater than 6 m/s for the summer period</td>
<td></td>
<td>IV</td>
<td>V</td>
</tr>
<tr>
<td>18.1</td>
<td></td>
<td>15.7</td>
<td>11.3</td>
</tr>
<tr>
<td>Probable number of days with wind speed greater than 6 m/s for the winter period</td>
<td></td>
<td>IX</td>
<td>X</td>
</tr>
<tr>
<td>11.9</td>
<td></td>
<td>15.0</td>
<td>17.8</td>
</tr>
<tr>
<td>The number of days with precipitation exceeding 30 mm per day (thunderstorms/fogs/blizzards/cloudy days) for the summer period</td>
<td></td>
<td>IV</td>
<td>V</td>
</tr>
<tr>
<td>6.4</td>
<td></td>
<td>7.8</td>
<td>10.1</td>
</tr>
<tr>
<td>The number of days with precipitation exceeding 30 mm per day (thunderstorms/fogs/blizzards/cloudy days) for the winter period</td>
<td></td>
<td>IX</td>
<td>X</td>
</tr>
<tr>
<td>20.7</td>
<td></td>
<td>17.6</td>
<td>20.5</td>
</tr>
</tbody>
</table>
The location of the NNP in the forest-steppe zone creates a corresponding ecotourism potential, characterized by dense vegetation along the rivers (see Figure 1).

Within the nature conservation area, there is one landscape and general zoological reserve, seven hydrological reserves, as well as one park monument of garden and park art, a natural monument, and each reserved locality. Among the interesting natural objects for ecotourism, the top 10 include Local significance botanical reserve «Shkurativsky», featuring fragments of feather grass steppe; Masalsky Island (ancient oaks); Reserved locality «Kukvin» (floodplain swamps within the Udai River); Village Berezova Rudka (local natural monument, botanical park, Zakrevsky family burial pyramid); Natural monument «Burty» (ramparts of the ancient Rus settlement Polkosten); Banks of the Udai River (attractive slopes and the river’s current contribute to kayaking); Natural monument «Stary Shlyakh» (part of the ancient Chumak trade route from Pryluky to Pryiatyn); Botanical monument «Oleksandrivsky Dub» (botanical monument of local significance, estimated age 350-400 years); Reserved locality «Yary-Poruby» (growth of the forest in deep ravines and gullies, population of forest orchids, forest lilies); Entomological reserve «Hryshivka» (insects listed in the Red Book of Ukraine).

The aforementioned natural potential serves as the foundation for phytotourism and the development of ecotourist routes, which are designed by the employees of the nature reserve.

Examining the park’s vegetation for ecotourism purposes, it is worth noting that the greater appeal of observing the phenological phases of plants occurs during the spring-summer season (Kovalenko, 2016). The forest area of the National Nature Park (NNP) constitutes 19.2%, and a significant part of the park’s vegetation consists of aquatic plant communities (common reed, broad-leaved cattail, amphibious bistort, blooming from June to July). Among the red-listed and rare species are floating fern, common bladderwort, and white water-crowfoot (May to July) (Hetman, 2020). For swampy areas, characteristic species include small bladderwort, marsh stitchwort, and bog rosemary (blooming from May to July). Among the tree species, oak, hornbeam, ash, and lime dominate, and the flowering and fruiting period (April to September) is particularly interesting within the context of phytocotourism. In the herbaceous layer of oak-pine forests, you can find wood lily, Sumy feathergrass, and broad-leaved sundew (blooming in May). In the valley of the Udai River, rare forest species can be observed, such as clubmoss, round-leaved pearbush, and wintergreen. In the areas of meadow steppes and

Fig. 2. Natural conditions of the «Piryatinsk» NNP, within the Lubensky district
broad-leaved forests, the following species have been preserved: spring adonis, neglected garlic, creeping bellflower, and yellow-wood anemone (blooming from March to June). It is worth noting that many plant species in the park are truly valuable, as it is home to the world’s smallest flowering plant – Wolffia, as well as the sundew and Luzula fauna, which are protected by the Bern Convention.

The fauna of the National Nature Park «Piryatynsky» is characterized by a large number of species, with their habitats extending to wetland areas (European otter, marsh turtle, red-bellied snake). The rivers within the park also host valuable species of interest for zoocotourism, including the European mink, grass snake, common dace, and common roach.

A high degree of biodiversity is characteristic of the Udai River and to a lesser extent of the Perevod and Ruda rivers.

The park’s water bodies are home to 32 fish species, including 8 listed in the Bern Convention and 3 in the Red Book of Ukraine. Some fish species are of interest for recreational fishing (Abduloieva, Vasheniak, Kovalenko, Lasak, Seffer, 2018).

Insects play a significant role in ecotourism, with approximately 583 species identified. Butterflies contribute a large portion to this group, with 131 species, many of which are listed in the Red Book of Ukraine and protected by the Bern Convention. Notable representatives include the Teleia Blue, Polyxena Emperor, and Oak Eggar butterflies.

The current territory of the park is home to a diverse range of bird species (174 species), with the number varying during migratory seasons. Among the wintering species, notable ones include the Lesser Kestrel and Grey Shrike. During the migration period, species like the Greater Spotted Eagle and Long-legged Buzzard can be observed, while migratory species include the Marsh Sandpiper, Ruff, and Short-toed Snake Eagle. Considering the role of the Udai River as an ecological corridor, numerous migratory bird species pass through the park. Notable locations for ecotourists include the Trib and Dakhnovye sites, where birds from the floodplain forest can be observed.

Moreover, within the «Deymanivsky», reserve, an ornithological tower has been installed for birdwatching enthusiasts. Additionally, the natural park features special feeding areas for hoofed animals such as roe deer and moose, as well as designated areas for birds and insects. Among the insect inhabitants of these areas, including the so-called «insect dwellings», are butterflies, wasps, and beetles, with the best time to observe them is from May to June. In terms of the time of day, dawn and dusk are the most favorable for observing the animals residing in the park, offering a chance to witness various phases of their daily activity.

A visitation calendar for the natural park has been developed based on the provided data on plant cover, wildlife, and types of ecological tours that can be conducted during different seasons (see Table 2).

The types of tourism listed in Table 2 are selected according to the classification by Dmitruk (2009) (see Fig. 3).

When selecting vegetation for ecotourism representing the natural areas of the park, the focus was on the most interesting species of each natural complex, as well as those listed in the Red Book of Ukraine.

Regarding plant groups, it is worth noting that the spring-summer period demonstrates the bud break, flowering, and fruiting of the main part of the plants,

**DIRECTIONS IN ECOTOURISM**

<table>
<thead>
<tr>
<th>Archeocological</th>
<th>Ethnoecological</th>
<th>Landscape-ecological</th>
<th>Zoocological</th>
<th>Hydroecological</th>
</tr>
</thead>
<tbody>
<tr>
<td>contributes to the knowledge of the history of interaction between man and the natural environment.</td>
<td>introduces specific ethnic groups, their traditional way of life, peculiarities of nature use.</td>
<td>focused on learning about nature as a set of genetically and historically determined natural complexes.</td>
<td>introduces the behavior of various species of animals in natural conditions.</td>
<td>contributes to the knowledge of water ecosystems of swamps.</td>
</tr>
<tr>
<td>History ecological</td>
<td>Geoecological</td>
<td>Ecospoecological</td>
<td>Ecobotanical</td>
<td>Ecodiving</td>
</tr>
<tr>
<td>is aimed at learning about the modern history of interaction between man and the natural environment.</td>
<td>is aimed at learning the patterns of development of the natural environment.</td>
<td>reveals the specifics of formation and development core ecosystems and species characteristics of animals of the underground world.</td>
<td>is focused on learning the reasons for the biological diversity of the plant world.</td>
<td>is aimed at learning about the biological diversity of the underwater world.</td>
</tr>
</tbody>
</table>

Fig. 3. Directions of ecotourism developed in natural areas. Source: Compiled by the authors.
contributing to the development of phyto-eco and landscape tourism. In the autumn-winter season, phases of fruit ripening and leaf shedding can be observed, for example, in oak-hornbeam and pine cultures. The animal world is represented by a diverse range of mammals, fish, insects, and birds, forming the basis for the development of zoocotourism, ornithocotourism, observing various seasonal phenomena in their lives (migration, breeding, etc.). It can be seen from the developed calendar that the life cycle of most species begins in spring and summer when they enter the mating, nesting, egg-laying, spawning periods, etc. In the autumn-winter period, you can observe the appearance of offspring for certain species (fawn, Eurasian otter) and the wintering or migration of birds.

The phenological calendar was developed to introduce first-time eco-tourists to the park’s territory and its representative plant and animal species.

Table 2. Visitation Calendar for «Piryatynsky» Natural Park

<table>
<thead>
<tr>
<th>Types of ecotourism</th>
<th>Autumn</th>
<th>Winter</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>September</td>
<td>October</td>
<td>November</td>
</tr>
<tr>
<td><strong>Landscape ecotourism</strong> (Dmytruk, 2009)</td>
<td>Fruit ripening in oak and hornbeam forests. The fruiting of the Iva xanthifolia. The appearance of fruits in Asclepias Syrian (as a result of insect pollination).</td>
<td>Ripening of the fruit Epipactis helleborine, Lycopodium clavatum.</td>
<td>The appearance of the first ice on rivers, swamps, and ancient lakes. Dropping of leaves on trees (oak-hornbeam and pine crops)</td>
</tr>
<tr>
<td><strong>Zooecological tourism</strong></td>
<td>Castor fiber harvests woody fodder for the winter. The molting period is coming to an end in the forest ferret (the best view of the fur of the animal).</td>
<td>The flight of birds: Gavia arctica, Grus grus, Hieraetaeum pennatus.</td>
<td>The flight of birds: Alcedo athos, Asio flammeus, Botauro stelleris, Chlidonias leucopterus, Chlidonias niger, Circaetus gallicus.</td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>January</td>
<td>February</td>
</tr>
<tr>
<td><strong>Landscape ecotourism</strong></td>
<td>Freezing of water in the park’s rivers, lakes, and swamps. Ice drift on the Uday, Slopip, Perevoz, and Ruda rivers. Bud formation Potamogeton blunt dwarfism (grouping).</td>
<td>Landscape points are water bodies of the park (rivers, lakes, swamps, and reservoirs).</td>
<td>Wintering: Parus major, Lutra lutra harvests fish under the ice. Hunting in the snow Mustela erminea.</td>
</tr>
<tr>
<td><strong>Zooecological tourism</strong></td>
<td>Wintering: Parus major, Lutra lutra harvests fish under the ice. Hunting in the snow Mustela erminea.</td>
<td>Wintering Circus cyaneus, Falco columbarius, Lanius excubitor.</td>
<td>Lutra lutra breeding season.</td>
</tr>
<tr>
<td></td>
<td>March</td>
<td>April</td>
<td>May</td>
</tr>
</tbody>
</table>
**Phytoecotourism**

<table>
<thead>
<tr>
<th>Month</th>
<th>Significant Plant Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>June</td>
<td>Flowering Vinca minor, Carex heleonastes, Falcaria vulgaris, L. Martagon, Orchidaceae, Epipactis helleborine, Neottia nidus-avis, Platanthera bifolia, Platanthera chlorantha, Typha latifolia, Pyrola rotundifolia, Chimaphila umbellata, Calamagrostis epigejos, Tragopogon urcainicus, Potamogetoneta obtusifoli, Sagittaria sagittifolia. The flowering period of thladiantha is doubtful (red cucumber). Oenothera biennis blooms (blooms at sunset). Emergence of buds and collection of Bidens frondosa. Flowering Echinocystis lobata.</td>
</tr>
<tr>
<td>August</td>
<td>Ripening of white and yellow Nymphaea Alba fruits (grouping). Fruiting Stipa Capillata and Stipa Pennata (grouping). Flowering Bidens frondosa.</td>
</tr>
</tbody>
</table>

**Water tourism, Contemplation of destinations and plants, animals, Landscape ecotourism.**

<table>
<thead>
<tr>
<th>Month</th>
<th>Key Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>June</td>
<td>Ecotourism route «Natural and cultural sights of Pyryatyn region»; Ecotourism route «By the picturesque Udai»; Ecotourism route «Journey through Berezovorudsk Territory».</td>
</tr>
<tr>
<td>July</td>
<td>Ecotourism water route along the Udai River «Kroty-burty»; Educational eco-trail «Island of Masalsky». Berezovorud reservoir (raft on watercraft); Ecotourism route «Scenic landscapes of the Pyryatyn region».</td>
</tr>
<tr>
<td>August</td>
<td>The appearance of white stork chicks (Ciconia ciconia). The appearance of a new offspring of a Gils glis, Clanga clanga, Zootoca vivipara. Anax imperator Leach breeding season. The beginning of the migration for Mil-vus migrants.</td>
</tr>
</tbody>
</table>

The authors of the publication subjectively analyzed the park’s natural complexes, reviewed necessary information (images of specific species, life cycle phases, etc.), and selected the most interesting species for inclusion in the calendar.

In addition to the activities mentioned in the table (observing the phenological phases of plants/animals; ecological walks), potential ec-tourists can also observe elite horse breeds, as one of the local entrepreneurs leases meadows for their grazing on the park’s territory. It is worth noting that horseback riding has a significant impact on the soil, and vegetation, and can lead to structural changes (expansion of trails, reduction of aesthetic value, etc.).

Within this eco-tourism object, an eco-tourist can get closer to the local gastronomic culture by visiting the Lelyakivska cheese factory, located on the territory of the National Natural Park. Additionally, they can explore the works of craftsmen in embroidery, carving, and other folk crafts such as carpet making, pottery, and decorative painting.

Cultural and ethnographic features within this park are represented by the following objects: a century-old windmill (village Deimanivka), the Zakrevsky estate (village Berezova Rudka), a burial mound and well in the locality «Yari-Poruby», an 18th-century church (village Povstyn), and an 18th-century cathedral (city Pyryatin). Interesting locations in the Pyryatin district also include 194 archeological monuments, 117 historical sites, 3 artistic sites, and 5 architectural sites.

Annual ethnofestivals are held, including «Svichchynne vesillia» (Berezova Rudka village, September 14), «Drevo rodu kobzarskoho» (Berezova Rudka village, late July), «Osiannye zoloto» (Berezova Rudka village, September), Kruchanski zabavy (Velyka Krucha village, late August), and Kalynovi huliania (Hrabarivka village, late May).

The areas of the economic zone within the National Natural Park are used for mowing hay and grazing livestock and do not represent a particular interest for ecotourists. Considering that the park administration offers only a few bus routes (with a pedestrian section up to 5 km) and a water route (up to 65 km), a new bicycle ecotourism route has been proposed to facilitate quick movement between attractions (see Figures 3 and 4).

Additionally, this mode of transportation allows smooth movement on roads, and hills, overcoming small water obstacles, and aligns with the concept of sustainable development of ecotourism, helping to reduce CO2 emissions in the region.

The route thread passes through the following settlements: Pyryatin city (starting/ending point), Vysoke village, Kharkivtsi village, Kaplyntsi village, and Zamoshtische village.

Among the objects to showcase are: the botanical reserve «Masalsky Island» (eastern outskirts of Pyry-
Additional objects along the route include the botanical monument «Chereshchaty Oak», the Cathedral of the Nativity of the Blessed Virgin, the Memorial of Eternal Glory, the hostel «Piryatin», the recreational facility «Vysokye» (a place for relaxation), a local farm, and the reserved area «Kukvin».

The route is designed considering the average speed of movement of 18-22 km/h and does not exceed the optimal load norm (approximately 40 km per day), as it is 37.3 km. The most interesting time for traversing is during spring, summer, and autumn. The approximate time to complete the route, considering designated stops and the opportunity to visit reserved areas, is 6-8 hours.

Among the objects on the route, the «Kharkivetsky» hydrological reserve stands out, which is particularly attractive in spring when the marsh cinquefoil, white water lily, and other species representing the flora of eutrophic bogs are in bloom. In this area, one can also observe the nesting and migration of certain representatives of fauna (waterfowl and marsh birds). Additionally, there is the longest wooden bridge in Ukraine (356 m, late 19th century, Kaplyntsi village), where an ecotourist can make a photo stop.

Throughout the entire route, tourists can see forest plantations, swamps, and water bodies within the national park.

During the summer period, in addition to the above information, you can add annual festivals held in Piryatin: «Ancient Piryatin» (early July) and «Queen of the Gas Station» (late July). Besides, various city contests and celebrations are organized.

If we consider this route throughout the seasons, spring months are the most suitable for visiting cultural and educational landmarks (the Cathedral of the Nativity of the Blessed Virgin Mary, the Memorial of Eternal Glory in Piryatin), the botanical monument Chereshchaty Oak (age 300 years), various spring festivals. On Masalsky Island, you can see the endangered flora of aquatic and forest vegetation in the valley of the Udai River, ancient oaks, and rare plant species, as well as the lakes along the Udai River, the reserve area «Kukvin» (spring flowers, migratory birds, steppe areas, deep ravines), the hydrological reserve «Kharkivets» (blooming of marsh cinquefoil,
snow-white water lily, and other species representing the flora of eutrophic swamps, observation of nesting and migration of certain fauna representatives – waterfowl and marsh birds).

In the summer months, Masalsky Island is interesting for its diversity of flora and fauna, the reserve area «Kukvin» (plants listed in the Red Book, floodplain swamps), the hydrological reserve «Kharkivets» (blooming of the insect-eating plant common sundew, medicinal plants such as marsh fern, which matures in August). Among the fauna, you can observe the grey crane, crested newt, and white-winged tern (July).

The autumn period is interesting due to the colorful diversity of landscapes (Masalsky Island, the reserve area «Kukvin» – forested areas acquire yellow-red coloring, gradually shedding leaves and allowing you to see the pine forest of the pine terrace of the Uday River). There is also partial freezing of hydrographic objects (Uday River), the hydrological reserve «Kharkivets» (the period of the end of flowering of most plants in September on swampy meadows, hibernation of mountain hares, grey partridges).

It is worth considering that in winter, this route is limited due to natural obstacles (impassable territories, swamps, watercourses) and technical challenges (frequent tire punctures, special equipment for winter riding).

**Conclusions**

- The «Piryatin» National Natural Park (NNP) is a promising destination for the development of ecotourism and other forms of recreational-tourist activities due to its several unique features:
- The possibility of carrying out recreational and tourist activities throughout the year based on the «Piryatin» NNP.
- The best period for observing the phenological phases of plants and the life cycle of animals is during the spring and summer months when it is possible to take hiking and water ecotourist routes and visit historical and cultural sites.
- Forests, wetlands, and meadow steppes become the main objects of interest for ecotourists in the autumn-winter period.
- The NNP contains an ample number of attractions in the context of ecotourism, including picturesque landscapes, rich biodiversity of flora and fauna, cultural and historical monuments, lakes, and locations for active recreation.
- The unique features of the park allow for the implementation of an eco-educational component of tourist activities according to the season by observing water and shoreline flora and fauna (gray crane, blooming Salvinia natans), as well as getting acquainted with the culture and creativity of local craftsmen (structures by Opanas Slastion and the Holy Protection Church).
- The development of ecotourism in the NNP is progressing slowly due to insufficient information about resources and services, as well as a low level of promotion of the NNP as a tourist destination.
- To enhance the attractiveness of the NNP, we recommend a series of measures:
  - Disseminate information on ecotourism (routes, annual calendar of special events) through social media platforms such as Facebook, Instagram, Twitter, and YouTube.
  - Utilize localized keywords (hashtags) in the park administration’s informational publications to increase interest and encourage visitors to share their experiences.
  - Add a thematic section to the website regarding the park’s compliance with ecotourism criteria, highlighting biodiversity conservation measures, climate change initiatives, and more.
  - Expand interaction with potential visitors through online meetings with park representatives, developing thematic videos showcasing the recreational and psychological impact of visiting the park, and conduct online contests, and promotional campaigns.
  - Organize virtual tours and install web cameras for opportunities for remote study of ecosystems.
  - Create an interactive mobile application based on an electronic database of phenological monitoring. This app could allow users to record various stages of plant and animal development, track their locations, and monitor changes in biodiversity against the backdrop of global climate change. A similar program, Nature’s Notebook, is used in U.S. national parks, helping park staff identify the appearance of invasive plant species or make conclusions about morphological changes.
  - Develop an informational guide application with details on hiking routes and a comprehensive description of park locations and objects.
  - Produce souvenir products related to the park’s nature and culture, such as traveler badges, clothing, posters, and local crafts.
  - Establish cooperation with local tourist companies to create eco-friendly tourist proposals, including guided tours on approved paths to minimize negative environmental impact.
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