

Forty Years of the Roztocze National Park

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Abstract

The article presents an outline of the history of nature conservation in Roztocze in the context of the establishment of the Roztocze National Park. It describes the main areas of the Park's activities connected with the conservation of Roztocze's natural and cultural heritage and making the Park area available for education and tourism. It also contains information about problems connected with the protection of this part of Roztocze.

Keywords: Roztocze National Park, "Roztocze" Transboundary Biosphere Reserve

Introduction

The forty years of the Roztocze National Park (RNP), the thirteenth national park established in Poland, is not much as compared with much older facilities of this type established both in Poland and throughout the world. Nevertheless, it is a long time or even a very long time in the life of those who established it and those who work here. This is a sufficiently long period to make an attempt at some summary. Before we do it however, the most important facts from its history should be presented which are described in a more detailed manner in numerous studies.

1 Environmental protection traditions in the Roztocze Region

Roztocze is a specific region in geological, climatic, landscape and cultural terms. This *narrow band of heights* stretching from the north-west to the south-east (Bartoszewski and Wilgat 2004), despite its central location in pre-war Poland, was very poorly explored in terms of its natural values before World War II. Thus, only experienced tourists and explorers knew its charm, apart from local inhabitants.

The situation changed only after World War II mostly owing to biologists from Poznań and Lublin and geographers from the latter young academic centre. The National Congress of the Polish Geographical Society held in 1954 especially contributed to the popularization of Roztocze. During the congress a two-day trip for 395 geographers from all over the country was organized on a special train along the Lublin-Zwierzyniec-Belżec route (Bartoszewski and Wilgat 2004). The exploration of Roztocze's nature resulted in the establishment of reserves to protect its most valuable elements. It should be remembered, however, that the "protective" traditions in this area are much older as they date back to the times of the Zamość Entail. It is enough to say that already at its beginning (towards the end of the 16th century) Jan Zamoyski established an animal refuge here by separating a fragment of the forest using an approx. 30-kilometre-long fence, 2,5 m tall, where bison, elks, and deer lived, among other animals, and since the 18th century there were also tarpans (Eurasian

wild horses)—a present from Stanisław Karnkowski, Archbishop of Gniezno. It was already the third such area in Jan Zamoyski's estate modelled on those belonging to the dukes of Mazovia (in Ujazdów), the Radziwiłł family (in Lithuania) or to the king himself, near Krakow and in Krzepice (Kotuła 1992). It cannot be considered a fauna reserve in the current meaning of this word, but despite this, it protected animals and contributed to the preservation of the tarpan for many years. Moreover, at the beginning of the 20th century, horticultural and forest nurseries were established in nearby Florianka which produced ornamental plants, including ones bred from seeds brought from other countries. They were used for the purposes of parks, settlements and towns in the entire Entail and also exported, mostly to Russia. The list of these trees and bushes included over 200 species in 1917 and some of them grow until today. Potatoes, carrots, peas and clover were also grown on this farm to feed forest animals (Matławska 1991). In 1934, the first nature reserve was established in Roztocze—*Bukowa Góra* (Lipiec 1995), and four years later, on the initiative of Waclaw Skuratowicz an ordinance was issued which protected predatory birds at the entail (Kotuła 1992), which had been still ruthlessly killed at the end of the 19th century (Matławska 1991).

2 Establishment of the Roztocze National Park

Already in 1939, the management of the Entail, which formally ceased to exist on 22 February 1945, created a project to establish a national park in Roztocze—it was to include the most valuable sections of forests together with the adjacent Turzynieckie Doły and a fragment of the Wieprz river valley situated between Krasnobród and Kawęczynek (Lipiec 1995; Pawłowski 2003; Wachniewska 1959). Unfortunately, the war foiled these plans.

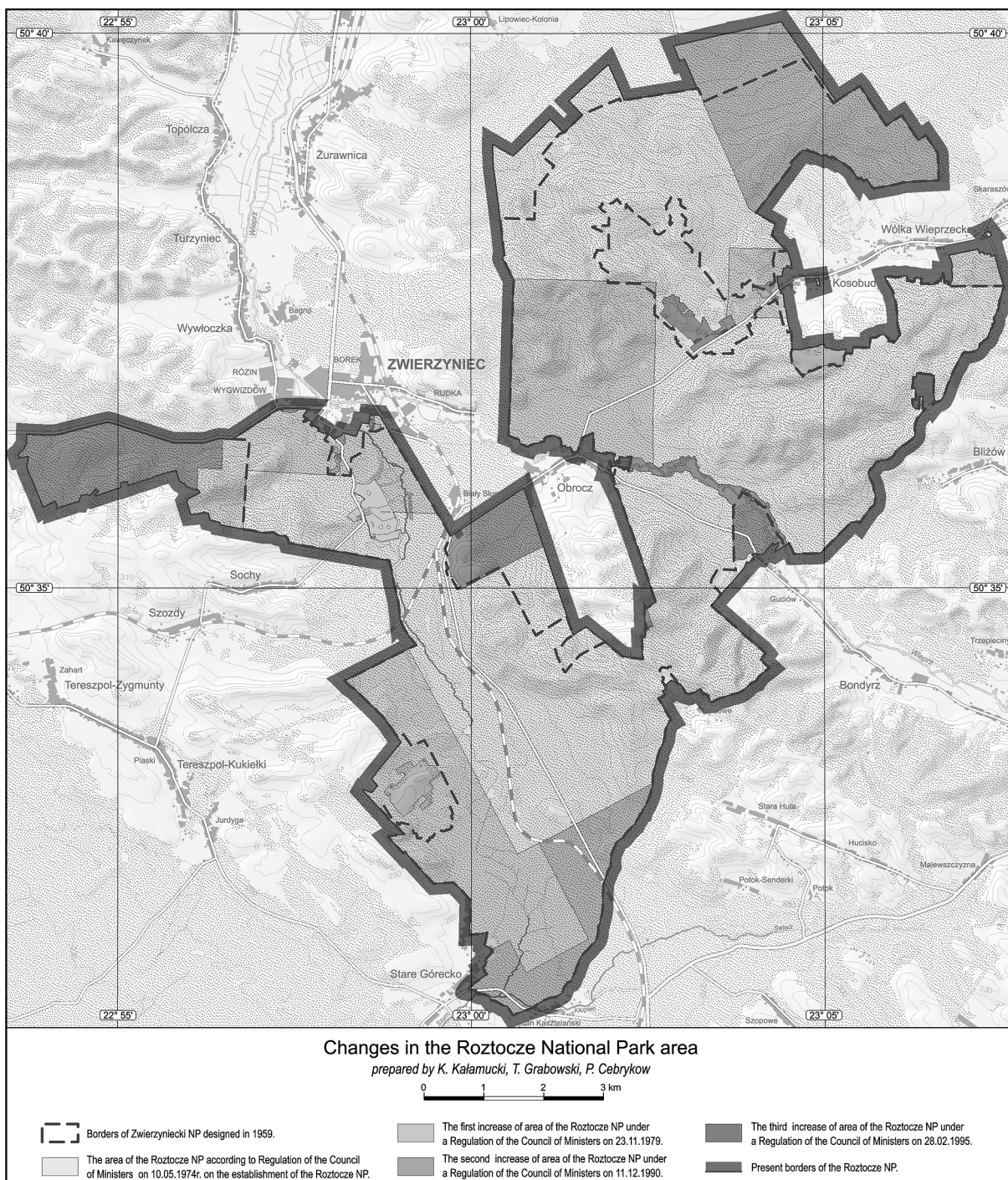
After the liberation, two Maria Curie Skłodowska University in Lublin employees returned to this concept—Dominik Fijałkowski and Krystyn Izdebski (Fijałkowski and Izdebski 1959), and their initiative was supported by many people and organizations (Fijałkowski 2003; Kotuła 1992; Lipiec 1995). Support was also granted by the Voivodship Nature Conservation Committee in Lublin chaired by Tadeusz Wilgat at the time as well as the Lublin press. The role of Aleksandra Wachniewska, who was a member of the State Nature Conservation Council since 1949, in the establishment of the Park cannot be omitted (Matławska 1991). Her activities were described in *Kurier Lubelski* by a well-known journalist, Aleksander Leszek Gzella in July 1966: “Aleksandra Wachniewska, a visual artist living in Zwierzyniec, is one of the keenest proponents of the establishment of the national park in the area of the Zwierzyniec and Kosobudy forests. Her private archive contains over 30 various letters just from this year to the Minister of Forestry written by eminent scientists and social activists about the establishment of the national park. The last document was created a few months ago. It was signed by 17 visual artists from all over the country” (Gajewski 2014; Gzella 1966).

It would have seemed that the park establishment was just a formality in such a situation. The reality proved to be different. Fifteen years of great efforts passed from the presentation of the concept to the establishment of the Roztocze National Park (RNP). They were described by many authors and mostly the originators of the project to establish the park (Fijałkowski 1969; Fijałkowski and Izdebski 1972, 1974, 2009). The times were not favourable for the establishment of national parks, which, in the opinion of the authorities, were obstacles to rapid economic development. Initially, the attitudes of the majority of the inhabitants of Zwierzyniec and surrounding areas were not favourable as they were afraid of difficulties in using forest resources which were easily accessible at the time. Ultimately, however, the long-term efforts led to the establishment of the Roztocze National Park in 1974. The newly established park was smaller than planned as only 4 800,65⁽¹⁾ ha from the following forest districts: Bukowa Góra, Horodzisko, Jarugi and Kruglik were protected (Matławska 1991).² Successively enlarged during the subsequent years,³

1. [In the journal (in both Polish and English texts) European practice of number notation is followed—for example, 36 333,33 (European style) = 36 333.33 (Canadian style) = 36,333.33 (US and British style).—Ed.]

2. See also: Rozporządzenie Rady Ministrów z dnia 10 maja 1974 r. w sprawie utworzenia Roztoczańskiego Parku Narodowego. DzU z 1974 r. nr 21 poz. 120.

3. See: Rozporządzenie Rady Ministrów z dnia 23 listopada 1979 r. zmieniające rozporządzenie w sprawie



Map 1. Changes in the Roztocze National Park borders. Authors: T. Grabowski, P. Cebrykow, and K. Kałamucki

it has reached a surface area of 8 481,76 ha. Changes in the RNP surface area are presented in the enclosed map.

Considering hazards for the Park's environment related to external factors, especially because its borders were excessively elongated in relation to the occupied area (Wilgat 2004), a buffer zone was designed for it already before the RNP establishment. Although such a buffer zone could not have been formally recognized at the time due to the lack of a legal basis, the administrative

utworzenia Roztoczańskiego Parku Narodowego. DzU z 1979 r. nr 27, poz. 159; Rozporządzenie Rady Ministrów z dnia 11 grudnia 1990 r. zmieniające rozporządzenie w sprawie utworzenia Roztoczańskiego Parku Narodowego. DzU z 1990 r. nr 88 poz. 510; Rozporządzenie Rady Ministrów z dnia 28 lutego 1995 r. w sprawie Roztoczańskiego Parku Narodowego. DzU z 1995 r. nr 23 poz. 124.

authorities acknowledged its existence. Owing to this, the RNP was the first in Poland to have a buffer zone already at the time of its establishment. The buffer zone was designated again in 1981 together with the approval by the Voivodship National Council of the RNP development plan which was prepared under the supervision of Jan Smogorzewski (Grabowski and Bielak 2013).⁴

3 Park's characteristics

According to (Wilgat 1995), the RNP has a special geological, geographical and geobotanical location. In addition, it is characterized by specific landscape (Kałamucka and Grabowski 2013), diversified lay-of-the-land (Harasimiuk 1995; Harasimiuk and Brzezińska-Wójcik 2013), a mosaic of soils (Dębicki et al. 2013; Uziak 1995), a specific climate (Kaszewski and Siwek 2013; Warakomski 1995), a water system different from the surrounding areas (Michalczyk and Bartoszewski 2013; Michalczyk and Wilgat 1995), high diversity of plant, mushroom and animal species (Fijałkowski and Izdebski 2009; Lorens et al. 2013; Marczakowski, Stachyra, and Tchórzewski 2013; Wójciak and Mułenko 2013) and the close vicinity of the limits of the natural ranges of many species including: the beech, fir, large-leaved linden and the sycamore (Bartoszewski and Wilgat 2004).

The nature of the Park was described by eminent specialists in numerous publications, the majority of which have been collected and are available at the library of the Museum and Education Centre (OEM), hence, we are going to remind readers of only some facts connected with it as well as actions taken to protect it. The natural resources of the park include, according to the most recent data, 924 vascular plant species, which constitutes approx. 33% of all species found in Poland (Grabowski and Kałamucka 2013). According to Grądziel (2004), their total number “is usually higher than in other national parks of a similar size situated in lowlands and is only slightly worse than mountain parks which are rich in flora species.” Mountain species are a very interesting element of the flora, including approx. 30 vascular species and a similar number of bryophytes. Among lowland national parks, a similar share of such species is observed only in the Ojców National Park and the Świętokrzyski National Park (Grądziel 2004). Approximately 200 taxa of bryophytes, 160 lichen taxa and 50 algae special which constitute 22%, 11% and over 2% of taxa recognized in Poland, respectively (Grabowski and Kałamucka 2013). As many as 81 vascular plants and 25 bryophytes which occur here are protected, just like 25 species of fungi and 6 vascular plants are listed in the Polish Red Book of Plants (Radliński, Lorens, and Zubel 2011).

However, the forests which occupy 95,5% of the RNP area are its most valuable element. Forty two tree species grow here, which form 21 various associations and 2 communities. They are mostly natural, especially beechwoods growing on fertile soils—21,2% (Tittenbrun and Radliński 2011). According to Kałamucka and Grabowski (Kałamucka and Grabowski 2013), mostly coniferous trees grow in the Park—pinewoods 56% and firwoods 20%. A slightly different picture was obtained by counting trees on 314 circular surfaces selected in afforested parts. Here, the share of pine trees was approx. 33%, fir trees—17%, spruce trees—5%, and, among deciduous species: beech trees—24%, hornbeam trees 7%, and oak trees 6% (Tittenbrun 2013b).

The majority of forest communities are characterized by excellent or at least high natural value, hence they are strictly protected, while the others are covered by active or landscape protection (Tittenbrun 2013a). The best preserved parts of the forest were excluded from the treatment programme for 20 years, which will make it possible to follow natural biocoenosis regeneration processes. A 40-year tree stand reconstruction plan was developed for three areas which occupy approx. 890 ha with pine trees which are not appropriate for the occupied habitats (Głaz, Żybura, and Kraczek 1998). These parts of the forest proved to be the most susceptible to wind and snow which sometimes cause severe damage. In total, the Park's losses caused by trees damaged by snow and wind are estimated at 175 000 m³ of wood. The most severe losses were caused by snow in 1999, which damaged several thousand pine trees with a volume of approx. 83 000 m³ (Kotuła, Reszel, and Strupieniuk 2009).

4. See also: Plan Zagospodarowania przestrzennego RPN i obszaru otaczającego. Uchwała WRN w Zamościu z 7.X.1981 r., Dziennik Urzędowy Wojewódzkiej Rady Narodowej w Lublinie w Zamościu nr 8 poz 337.

The Park also boasts of rich fauna as 3 300 invertebrate species and 330 vertebrate species live there (i.e., approx. 10% and 46% of species present in Poland). 24% of protected fish species can be encountered here, approx. 50% birds and mammals, 67% amphibians and as many as 70% of the reptiles (Stachyra et al. 2011). Protection covers 316 species, 76 of which are listed in the Polish Red Book of Animals, 20—in the list of endangered animals prepared by the International Union for the Conservation of Nature and 130 are protected by international conventions (Grabowski and Kałamucka 2013).

The richness of animals found in the RNP, including game, causes problems as their numbers are beginning to exceed the critical level which makes it necessary to take actions aimed at reducing their numbers. Natural selection is performed by wolves—approximately 10 wolves live in the area at present. The vicinity of grounds available to hunters resulted in the attempts of the Directorate of the RNP to create a protective zone in the part of the buffer zone for game.

A different problem pertaining to animals is reintroduction of species which used to live in this area. Reintroduced species include such as the beaver which thrives here or the lynx and other species which were encountered in the post-war period, and which are no longer encountered—such as the western capercaillie and the Aesculapian snake. The return of the representatives of the former fauna is connected with the return of the konik (Polish primitive horse)—the symbol of the RNP. As mentioned above, its ancestor—the tarpan occurred wildly in the Zamoyskis' refuge until 1806 (Kotuła 1992). Then, the last tarpans interbred with local horses. Over a half a century later the first koniks (4 mares and 1 stallion) were brought from Popielno in 1982 (Kaproń, Stachurska, and Słomiany 2013). They were kept in the area of Echo ponds on approximately 36 ha. This area was regularly increased on a regular basis until it reached a surface area of 180 ha (Kotuła, Reszel, and Strupieniuk 2009). Additionally, a Konik Stable Breeding Centre was opened in Florianka in 1996 (Kaproń, Stachurska, and Słomiany 2013). It has its successes—August 2013 at the 14th National Championship of the Konik Breed, the Nap stallion gained the champion title and the diploma of the Minister of Agriculture and Rural Development while the Hera mare was ranked fifth.

To keep the non-afforested areas in the appropriate condition, avoiding the mowing of vast areas, a flock of Polish lowland sheep of the Uhruska variety was brought to the RNP (30 ewes and two rams) in 2010, while the first red and white-backed cattle were brought to the park in 2012 (Gruszecki et al. 2013). Both species will not only help to keep the appropriate growth, they may also become a tourist attraction and the Park will additionally contribute to the preservation of local animal species which is recommended in the conclusions from the Earth Summit in Rio de Janeiro (in 1992).

4 Activities for the science and the local community

It is possible to solve problems connected with the best preservation of the Park's nature only when its environment is very well known. This aim is achieved by comprehensive research which has been conducted since the 19th century—i.e., before the establishment of the RNP until the present. Their scope and directions are broadly presented in a study by Stachyra and Maciejewski (2013).

In 2008, the Chief Inspector for Environmental Protection, the Marshal of the Lubelskie Voivodship, the President of the Voivodship Environmental Protection Fund and the Water Economy in Lublin, Rectors of the Maria Curie-Skłodowska University, the Catholic University of Lublin, the Lublin University of Technology and the University of Life Sciences in Lublin and the Director of the RNP signed a letter of intent supporting the location of the “Zwierzyniec-Biały-Słup” Science and Education Centre in former facilities of the Forest Transport Centre (OTL) (List intencyjny potwierdzający poparcie dla utworzenia i prowadzenia Centrum Naukowo-Dydaktycznego „Zwierzyniec-Biały Słup” 2008). The Medical University of Lublin and the University of Rzeszów joined the initiative in 2010 (“Wspieramy rozwój...” 2010; Borowiec 2010). The 9th National Base Station for Integrated Natural Environment Monitoring ROZTOCZE (ZMŚP) has been operating in the carefully modified OTL rooms since 2012. Its task involves following the condition of the environment and changes which occur in it. The results of measurements of a range of parameters

are published on the RNP website and submitted to the ZMŚP operating at the Adam Mickiewicz University in Poznań.

The protection of ecosystems and also in-depth knowledge of their functioning is only one of a range of tasks to be performed by the Park's Directorate and Science Council. It was very important to develop good relations between the RNP and the local community. It must be remembered, as mentioned before, that the concept of the Park establishment was not welcome by a lot of inhabitants of adjacent areas and enthusiasts of the project were few. Therefore, a favourable attitude of the local community had to be gained, amongst other things, by failure to execute the prohibition to penetrate the forest areas. It was decided that inhabitants' hostility would do more harm than local damage to the undergrowth by a relatively low number of people. More attention was paid to the behaviour of the growing number of tourists. In this case, Rzutoczańska Konna Straż Ochrony Przyrody [Rzutocze Mounted Nature Conservation Guards] proved to be very helpful. The guards wear uniforms and the name of the 25 Uhlan Regiment. From 1985 its patrols have been inspecting trails and paths in the summer, disciplining unruly visitors without punishing them however.



Fig. 1. Rzutoczańska Konna Straż Ochrony Przyrody [Rzutocze Mounted Nature Conservation Guards]. Photo by Paweł Marczakowski

A lot of efforts have been made to make local inhabitants feel responsible for the state of the natural environment. And those efforts were successful. Long-term systematic actions have brought excellent results. A survey conducted in 2000 showed that after 26 years of the RNP existence as many as 93% of the respondents had a favourable attitude towards the Park (Reszel, Gosztyła, and Anasiewicz 1995). It should be added that a change in the attitude of the local community was influenced not only by the Directorates' reasonable policy but also by measurable benefits which appeared together with the growing numbers of tourists visiting the Park, which is the main attraction in the area. Zwierzyniec has gained the most as it derives specific economic benefits from tourism (Grabowski and Bielak 2013).

The presence of the Park not only activates the region for tourism but it also brings other benefits. National parks are obviously situated at a certain distance from administrative and economic centres, hence, they belong to the largest local employers. This is the case for the RNP which employed 45 persons in 1974 including 7% with higher education and at present it provides employment to 80 persons, out of whom 57% hold a university diploma and 3% — a doctoral degree. They constitute considerable intellectual potential in the small town of Zwierzyniec and influence a lot of local activities. Nobody doubts the need for the existence of the Park now and, what is more, suggestions for its enlargement are beginning to appear (Schodziński 2009).

Forty years of the RNP include continuous actions aimed at raising funds for its statutory activity, including the implementation of tasks including: "Development of a Park protection plan," "Making available the natural and cultural resources of the RNP," "Improvement and stabilization

of water relations in the Świerszcz stream catchment areas,” “Reconstruction of forest systems,” “Development and modernization of the educational base,” “Continuation of conservative breeding of the konik and lowland Uhruska sheep” and many others. In total, there have been over 80 such activities in the years 1991–2014. At the same time, the Park’s facilities were improved. In the years 1981–1991, 2013–2014, an old historic building built in the years 1880–1890, the former residence of the Zamoyskis’ plenipotentiary was renovated and now houses the offices of the RNP directorate. 14 gamekeeper’s lodges and forester’s houses were renovated with low-pollution heating systems. This group also includes the Roztoczańska Konna Straż Ochrony Przyrody [Roztocze Mounted Nature Conservation Guards]—the Dębowiec gamekeeper lodge as well as developments in Florianka where the konik stable breeding centre is situated as well as a “Forest Chamber.” Its interior is equipped with original historic equipment and one can become familiar with the living and working conditions of Zamość Entail foresters.

All of these actions require money which will not be provided by the Ministry’s subsidies and the Park’s own funds. Therefore, the RNP Directorate keeps acquiring funds from various institutions. In the years 1991–2013, approx. PLN 20 million were acquired for the creation of new facilities, adaptation and equipment of rooms from the National Fund for Environmental Protection and Water Management and over PLN 500 thousand from the Eko Fundusz foundation. The Voivodship Fund for Environmental Protection and Water Management in Lublin also provided some funds. There were also other sponsors, including: Ministry of Science and Higher Education, Bank Ochrony Środowiska (BOŚ Bank), Zwierzyniec Municipality.

The commissioning of the Museum and Education Centre on the Park’s 20th anniversary (in 1994), which was especially designed and built for this purpose, was exceptional at the time. After 15 years of activity, the building was modernized. It houses a professionally prepared natural exhibition, a library, scientific laboratories and a conference room for showing films and delivering lectures. There are so many forms of the Centre’s activity that it is impossible to mention them all—they have been described in many publications (Grabowski 2007; Marczakowski et al. 2009; Świeca et al. 2013). The most valuable ones include regular contests, exhibitions, lectures, presentations with regional and national reach.

The park has also published a lot of scientific, popular science and popular works devoted to nature and the history of this area. The *Malarka Roztocza* album about Aleksandra Wachniewska is one of the less typical but extremely interesting ones (Gajewski 2014). Also, a large number of films, calendars, postcards, brochures, maps and guides greatly appreciated by tourists have been prepared by OEM employees. Thus, it can be concluded that the Centre’s existence, as it is used not only by tourists but also by the local population, especially young people who can participate in all events it organizes has significantly contributed to natural education and changes in the community’s attitude towards the RNP, which is confirmed by results of surveys (Reszel and Gosztyła 2003).

Within the RNP, as well as other national parks, visitors can use only designated trails to minimize the negative impact of tourist traffic on the environment and show its most interesting fragments at the same time. In addition, to make a visit to the park something more than a mere walk in the forest, special illustrated guides are prepared which take into account the specificity of the 9 individual educational paths with a total length of nearly 18 km. They are complemented by hiking trails (approx. 53 km) and cycling trails (approx. 18 km) (Anasiewicz 2004; Świeca et al. 2013). The fact that have all received positive opinions from tourists during surveys conducted at different times is very satisfactory (Reszel and Gosztyła 2003; Świeca et al. 2013). A transparent website encourages them to become familiar and to broaden their knowledge on the RNP.⁵

The only important problem which has not been solved over the forty years of the RNP’s existence is the railway routes crossing the Park. Initially, they included the Zawada-Bełżec line and a narrow-span railway route between Biłgoraj and Zwierzyniec. The tracks which could now be a tourist attraction were disassembled before the Park was established and regular railway tracks were built in 1971 which were extended to reach Nisko and Stalowa Wola in 1971–1976. As if

5. See: <http://www.roztozczanski.pn.pl/>.

this was not enough, a year after establishing the RNP, the government decided to construct a broad-track Sulphur and Ironworks Line (LHS) to transport iron ore from the USSR and sulphur in the opposite direction. Without considering other possibilities, the route was designated along the existing Biłgoraj-Zwierzyniec line. The efforts of numerous scientific and social institutions, such as PROP, LOP, Wojewódzki Komitet Frontu Jedności Narodu, PTTK, Polskie Towarzystwo Leśne, as well as ministries appointed to protect the environment and the press did not help and the tracks were built in 1976–1979 without considering the damage it would cause to the environment in the RNP (Wilgat 1997). Hazards caused by the LHS have decreased recently as a result of a lower number of goods, but they may increase at any time if it will be possible to use the line for transcontinental transport from Western Europe to East Asia. And such concepts have already appeared. There exists a resolution of the Lubelskie Voivodship Parliament assuming a change of the railway route outside the RNP,⁶ but its implementation is not very likely.

Recently, for the first time since the beginnings of the LHS, Spółka PKP Linia Hutnicza Szerokotorowa (this is how the LHS abbreviation reads now) took action aimed at minimizing the negative influence of the railway on the environment (Grabowski and Bielak 2013). However, it does not change the fact that it will cut across the Park's ecosystem.



Fig. 2. Railway tracks crossing the Park. Photo by Łukasz Sędlak

At present, a new threat to the RNP has appeared. Drillings are planned in the buffer zone of the Park in search of shale gas. This is surprising as Roztocze is mostly covered by the Natura 2000 program and the Transboundary Biosphere Reserve is being planned here.

Conclusions

The Park area is a specific centre of protected areas in Roztocze, including those which are part of the Natura 2000 network. It is also a very valuable element of the Polish part of the projected Polish-Ukrainian Biosphere Reserve (Chmielewski 2013; Fijałkowski and Izdebski 2009; Kotuła, Reszel, and Strupieniuk 2009; Lorens and Stachyra 2013). Its establishment does require a lot of work, but the first specific actions have already been taken. In October 2013, Zdzisław Strupieniuk, Director of the RNP received a letter from the Ministry of the Environment, which started with the following words: “Please accept the task to be performed in 2014 by the Park, the final result of which will be documentation justifying submission of an application to UNESCO to create the “Roztocze” Transboundary Biosphere Reserve” (Zalewski 2013). In 2014, the RNP with the participation of scientists from Maria Curie Skłodowska University in Lublin, Poland, and Ivan Franko National University in Lviv, Ukraine, developed and submitted to the Minister of the Environment a nomination form for the “Roztocze” Transboundary Biosphere Reserve (Grabowski 2014).

6. See: Uchwała sejmiku województwa lubelskiego Nr XLV/597/02 z dnia 29 lipca 2002 r. w sprawie uchwalenia Planu zagospodarowania przestrzennego województwa lubelskiego. Dz. Urz. Woj. Lub. nr 107 poz. 2449.

Forty years of the existence of the Roztocze National Park is really over a half a century of efforts of several generations to establish it and then enlarge it and preserve its natural, scientific, educational and recreational value. There is no doubt that its establishment has been needed. Not only to protect Roztocze's natural heritage but also to reconcile social expectations with the needs of the environment. The RNP's experience so far proves that harmonious co-existence of nature and people is possible. Hopefully, it continues this way, because, as Jan Gwałbert Pawlikowski, one of the authors of the first environmental protection act in Poland, wrote nearly 100 years ago "nature is the source of forces, a component of useful matter for the human economy and, finally, it is the home of humans" (Pawlikowski 1920).

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