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DISCUSSION ARTICLE

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The Białowieża Forest controversy in the light of the world dispute in conservation biology

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Abstract. The controversy between naturalists and foresters on the management of the Białowieża Forest is one of numerous disputes in conservation biology. Cause of the dispute is a difference in stand-point on the purpose of nature conservation. Biocentrists (Soulé 1985) argue that the only goal should be to preserve natural processes as well as endangered ecosystems and species. Anthropocentrists on the other hand (Kareiva, Marvier 2012) support conservation as a need of mankind, that is, the sustainable support of ecosystem services with the protection of species and ecosystems simply being a side effect. Another important factor in the dispute is the management of bark beetle mass outbreaks. Foresters try to control this by removing the infested trees, but naturalists protest against this practice. However, in 2013, the European Commission clearly presented its statement in this regard (EU Guidelines on Wilderness in Natura 2000); and thus, the dispute has only shown that none of the debating parties are familiar with the EU guidelines.

According to the author, the more serious problem of messy organization of the Białowieża Forest conservation is rarely raised in the dispute. Multiple protected areas were established in the forest based on six different law forms for nature conservation and two forms of international origin. Such surplus of forms and areas leads to chaos and hinders the management of this valuable area.

Keywords: Białowieża Forest, naturalists vs. foresters, conservation dispute, Soulé and Kareiva, management of bark beetle outbreak, mess in conservation forms

1. Introduction

The passionate dispute over the Białowieża Forest has revealed widely divergent viewpoints as regards management issues concerning this valuable area. Extreme stances taken, on the one hand demand immediate establishment of the national park comprising the whole Forest's area – covered in most part with strict protection (Zarząd PnrWI 1995); and on the other hand, it is proclaimed that there is a need for leaving everything as it stands (Chałupka 2016; Sowa et al. 2016; Zientarski, Szmyt 2017). The dispute has also highlighted that the arguments come from various fields of occupation (Szwagrzyk 2016). The majority of arguments has been raised with reference to biodiversity (Matuszkiewicz 2011; Brzeziecki 2016; Wesołowski et al. 2016), however, no less important aspects, even if often overlooked in the discussion, concern social, organizational and economic issues related to a specific vision of management of the Forest area (Wesołowski et al. 2016, Co się dzieje w Puszczy Białowieskiej). To understand the dilemma and attempt to find a solution, one should move away from impolite appellations (Liziniewicz 2015; Wajrak 2017; Weiner 2016), happenings (Witkowska, Witkowski, 2016) or numerous declarations and statements (List otwarty… 2017; Stanowisko Instytutu… 2016), as there are meaningful matters to talk about, such as the values and arguments behind, as well as the hierarchy of values as perceived by society and people engaged in nature conservation (Szwagrzyk 2016; Zientarski, Szmyt 2017). It is only on the basis of the assumptions above, we can proceed to ask questions about what is appropriate or not about the management of the Białowieża Forest.

In our time, the conception of nature protection has undergone dynamic changes. The paradigm is the protection of biodiversity in all its dimensions (CBD 1992); yet, not fully successful nature protection endeavours lead to focusing attention on the issues other than those concerning just nature (Wilshusen et al. 2002). There is a growing conviction that despite many years of efforts, it has not been possible either to stop or even efficiently reduce the rate of extinction of species and degradation of ecosystems

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(Butchart et al. 2010), Nevertheless, the lack of dialogue with local communities or the expropriation of property due to nature protection goals are a thing of past (McShane et al. 2011; Olko 2015). Currently, the essential measure undertaken is the protection of ecosystems and their services, which is inherently associated with the protection of biodiversity (Kloor 2015).

The aim of this article is to look at the dispute about the Białowieża Forest from the perspective of the theory of nature conservation and related normative values, as well as to show how such disputes are resolved in other regions and countries. Besides, it is worth looking at the conflict in the context of spruce bark beetle outbreaks observed in other Central Europe's countries and attempts to solve this problem in strictly protected areas or in managed forests subject to the protection under the Natura 2000 ecological network.

2. Why is biodiversity protected?

The answer to the above question is not simple in any way. You can ask why you should deal with nature protection at all, if life on the Earth is extremely resistant to disasters and catastrophes (Raup, Sepkoski 1982), and the process of biodiversity recovery subsequent to devastation leads to greater species richness and structural and functional complexity of both ecosystems and the biosphere. Therefore, one of the eminent British ecologists noted that mass extinction caused by man has one undeniable advantage: it will open a new stage in the process of biological evolution on the Earth (Thomas 2015). However, the vast majority of ecologists believe that nature must be protected because the species' extinction rate is currently one of three – along with climate change and water contamination with nitrogen – unresolved environmental hazards destabilizing the functioning of the biosphere, faced by contemporary civilization (Rockström et al. 2009; Steffen et al. 2015). On the other hand, however, the majority of the abovementioned ecologists, has been divided into two different camps. The first (bio-/ecocentrists) refer to the increasing risk of degradation of the structure and function of the entire biological system, while others (anthropocentrists) focus on the threat to our civilization.

The ideological dispute turned into a severe conflict when it was necessary to answer the question – how to protect nature? It turned out that the two groups had contradictory and often mutually exclusive ideas with regard to the effective protection of biodiversity. Each group is in favour of their ideological leader, thus, it is important to present how the goals of nature protection are viewed by the leaders – Michel Soulé (biocentrist) and Peter Kareiva and Michelle Marvier (anthropocentrists).

3. Nature based biocentric concept by Michel Soulé

In 1985, Michel Soulé published his famous manifesto 'What is conservation biology?' in BioScience. The article provided the functional principles of nature conservation and its normative (ethical) basis. Soulé described the newly emerging field of knowledge (conservation biology), referred to as 'crisis discipline' to rescue nature, in a way human life can be saved based on knowledge on the biology of cancer. To guide the discipline of conservation biology, Soulé laid out four core principles, which he called functional postulates:

1. Most species are 'producers' of phenomena and evolutionary processes. This postulate assumes that natural systems, when stabilized, will operate differently from those influenced by man.

2. Next in order functional postulate is to pay attention to the scale of processes. In many ecological processes (perhaps all), there occur threshold phenomena, below or above which sudden chaotic changes may take place or the existing processes may be stopped. This happens when the system is too small or too large. In other words, ecological processes are in the middle range of the scale of processes in time and space. Floods or volcanic eruptions do not belong to the category of ecological phenomena. However, in spatially small fragments of ecosystems, some phenomena may be impeded.

3. Genetic and demographic processes are characterized by a discontinuity, defined as the threshold value. This value is strongly associated with the population size. Therefore, the next functional postulate points out that the probability of population survival relies upon its size.

4. Nature reserves are in a chronic state of imbalance (hazard) with regard to rare species and species with large body sizes. This applies, in particular, to small environmental islands, where extremely small populations of many species have to be artificially supported due to the permanent risk of extinction.

Soulé also presented four core values, that is, normative (ethical) postulates:

1. The diversity of organisms is good (valuable). The consequence of this postulate is that the extinction of the species and population is evil.

2. Ecological complexity is good. This postulate refers primarily to ecosystem intricacy and the complexity of ecological processes in natural ecosystems.

3. Evolution is good. If you accept that life is good, how can you remain indifferent to natural evolutionary processes? The only way to support this postulate is, according to the author, to preserve vast, natural ecosystems in as many places as possible.

4. Biodiversity has intrinsic value, irrespective of the use value. This normative postulate should be considered fundamental. This is where the author shows what a biocentric approach in nature conservation is. Other natural beings are protected because the values represented by any species or natural ecosystem cannot be degraded just because of the needs of our civilization. This concept is the ideological basis of the EU's Natura 2000 ecological network. Consistent with Art. 6 of the Habitats Directive, in Natura 2000 sites, only basic

human needs (e.g., safety) have priority over the protection of designated habitats and species (Directive 1979, 1992).

4. Anthropocentric concept by Peter Kareiva and Michelle Marvier

Notwithstanding the evidence that by implementing the concept of sustainable development, humanity imposes the supremacy of utilitarian (anthropocentric) solutions also in nature conservation, it was not until 2012 that a polemic with Soulé's ideas was published in BioScience. The authors of the article were no less outstanding scientists – Kareiva and Marvier – who entitled their manifesto: 'What is conservation science?'

The authors declare that at present, man dominates in the environment and it is impossible to separate other species' good from the well-being of humans. Conservation science deals not only with biodiversity and dynamics of natural systems, but also with social dynamics, as well as relationships between these systems and processes. This science still remains the crisis discipline, but it is based on a better understanding of reality, the progress of technology and up to date knowledge. The basic mistake of the concept pronounced by Soulé was to abridge the role of humans with respect to biodiversity. As stated by Soulé, the vast majority of human population are people threatening nature, whereas a small minority, mainly 'western' biologists, try to protect and prevent damage. The authors of conservation science are of the opinion that the issue should be perceived in a much broader sense.

Firstly, the protection is an expression of human values. Human positions and reasons are aimed at shaping the world for future generations. Recognizing human actions and attitudes in relation to nature is crucial for its protection; however, till now, this dimension has been neglected in conservation biology.

Secondly, diversity is not the only purpose of conservation measures. Human life and means to live are connected with nature protection activities. The authors point towards the cases when the establishment of protected areas causes worsening of socio-economic conditions of local communities. Obviously, the majority of human population benefits from protected areas, but there are also those who are clearly losing. Hence, the relations and connections between local communities and managers of protected areas require more attention. In addition to biological sciences, modern nature protection must also benefit from social knowledge, business management, anthropology, politics and many other areas of humanistic sciences.

Kareiva and Marvier show how there has been a change in the environmental, social and economic context, which is currently in force in nature protection. In the time of one generation (since 1985), the human population has increased by 40%, and a significant part of this growth has taken place in the areas with high biodiversity. Only this fact shows how difficult it will be to reconcile the needs of the growing population with the need to protect biodiversity. During the same period, energy consumption has significantly increased, as well as the concentration of carbon dioxide in the atmosphere, which translates into an increase in the average temperature on the planet by approx. 0.5 °C. At the same time, the area of transformed ecosystems has also enlarged. Currently, over 40% of ecosystems comprise pastures and cultivated crops related to human nutrition.

The recent period has also brought positive changes. Since 1985, the protected inland area has increased from 6.5 million km^2 to over 16 million km^2, and marine protected areas have increased from less than 1 million km^2 to over 8.1 million km^2. This has been a huge effort, but the increase in the protected area will not ensure the reversal of negative trends towards biodiversity degradation in the face of increasing human pressure, even more so as societies and politicians are less likely to support efforts to protect biodiversity. In support of this thesis, the authors show changes in the social support index with regard to economics and environmental protection. In 1984 – 61% of respondents were in favour of environmental protection at the expense of economy, and in 2011, only 26% declared so. The urban population is no longer interested in wildlife, especially children who are more and more interested in the computer-based virtual world.

In the discussion with the concept of Soulé (1985), Kareiva and Marvier (2012) propose their own postulates, to be understood as practical guidelines for nature conservation rather than the guiding principles of a normative nature.

Now, there exist no natural systems. The study of the planet show that traces of human presence have been documented in all places in the world. The current period of the Earth's history has been called anthropocene (Lewis, Maslin 2015), and human activities as regards various aspects of the environment prevail over the activities of all other species. More than 100 years ago, Western civilization proposed protected areas free of human influence, where local residents were simply displaced and excluded from decision-making processes. Nowadays, it turns out that these natural areas also require intervention to maintain the existing system or realize their conservation objectives.

According to the authors of the concept, the fate of man and wildlife is linked to and depends on the same factors, such as clean air, clean water, food resources and shelter. Many factors that harm human well-being are also harmful to wild nature. Ecosystems that depend on pure water, food and medicine are also the ecosystems where other species live. The protection of nature is, on the one hand, the protection of the intrinsic value of biological systems, and on the other – the protection of the values that sustain our lives and welfare. The human population, like all nature, endures at a significantly increased level of risk.

Nature is amazingly resistant. Nonetheless, this does not mean that the ecosystem will recover under human pressure, or that all ecosystems are equally resilient. Today, you can no longer distribute the phrase 'think globally – act locally', because our local efforts in nature conservation can be di-

sturbed by global trends, such as: climate change, pollution, cutting forests for agricultural purposes, international trade and its impact on the spread of invasive species, or else poaching in Africa and the need for rhinoceros horns in China. Therefore, wildlife advocates should be as much interested in the provisions of the World Trade Organization (WTO) as they are in the establishment of new protected areas.

Striving for success based on the protection of natural ecosystems is becoming increasingly unrealistic. Activists in the field of nature conservation must understand that humans are part of biological systems and can also live in wild forests and in their close vicinity. In such places, the protection should cover both local communities and biodiversity. Now, there are necessary complementary strategies, combining the protection of ecosystems and species with the needs of people who live nearby, harvest crops and hunt.

Experts and practitioners working in nature conservation should go beyond their traditional activities and get interested in economic development, poverty, unemployment and environmental rights. They also have to cooperate with large corporations and not just condemn them. A small number of corporations have great opportunities to obtain resources, produce food, transform landscape, and so on. Corporations are the 'key species' in the global ecosystem. The purpose of cooperation with corporations is to improve their current activities and change the habits that are unfavourable for nature.

As said by Kareiva and Marvier (2012), the idea of nature conservation is to achieve a balance between human development and the protection of biodiversity. Nowadays, it is necessary to combine the postulates of the biocentric concept, which aims to safeguard the durability of evolutionary and ecological processes to maintain the intrinsic values of species and ecosystems with the anthropocentric standpoint that emphasizes the necessity to preserve the internal needs of ecosystems and species at the same time as fulfilling the needs of human population. In practice, however, the requirements of our population are met at the expense of the needs of other species. Even though rapid extension of protected areas on the Earth has been observed, the process of accelerated extinction of species and degradation of the biological structure of living systems continues to progress. Although the first symptoms of slowing down of these processes have already been observed, we are still far from acknowledging that our natural environment is in a state of dynamic equilibrium.

In contemporary disputes regarding biodiversity protection objectives, one can no longer abstract from the interests and views of local communities, as well as from the values other than those biological, such as the good of species or preservation of evolutionary processes. The anthropocentric position, similar to the idea expressed by Kareiva and Marvier (2012), is currently represented by researchers from the USA (Wilshusen et al. 2002) as well as Europe (Miller et al. 2011). It should be emphasized, however, that the vast majority of naturalists, including significant authorities in nature conservation (Oates 1999, Terborgh 1999), stand on the ground of biocentrism. Yet, the dispute between the two views has been growing stronger (Khoor 2015).

5. Management of the Białowieża Forest in the light of world's disputes on nature conservation

The above brief introduction shows that the disputes over the Białowieża Forest concern the same issue, and result from poles apart understanding of nature conservation purposes. Proponents of natural values (biocentrists) recognize as the superior goal the protection of biodiversity and the preservation of natural processes in the area of the Forest. Their arguments are based on the assumption that all other management objectives with respect to the Forest are secondary tasks that must subside (forestry) or be subordinated (tourism) to the protection of biodiversity and natural evolutionary processes. For biocentrists, the ideal solution would be to extend the National Park to cover the whole area of the Forest, where at least 70% of the area would be subject to strict protection without any human interference (Szwagrzyk 2016). According to this position, forest management in the Białowieża Forest should be permanently abandoned. Just a small area could be left under active protection, where there would be allowed active transformation of ecosystem species composition, maintenance of non-forest enclaves, population regulation and elimination of certain alien species.

The other party of the conflict, associated with the anthropocentric view as regards nature conservation (including the author of this paper), assumes that the primary objective of nature conservation is to ensure sustainability of ecosystem services provided for current and future generations. One of the most important ecosystem services, but not the only one, is biodiversity. The aim of the protection is to connect development with the protection of nature and make its use in such a manner so that it does not degrade. In this understanding of nature protection, the needs of people —stakeholders living in the protected area and benefiting from it – are important. These are nature conservation staff, foresters, local residents, tourists, scientists and members of ecological non-governmental organizations. The leitmotif is re-establishment of ecosystem services and the widest possible use of them. However, the only stakeholders, who by their actions do not lower the values and the rank of this valuable object, should be entitled to use its richness.

In this context, it is worth to consider answering the question: how to protect biodiversity in managed forests of the Białowieża Forest?

The management of a protected area depends on its value. More valuable the area is, more often there are applied access restrictions. Societies around the world are slowly getting used to this and gradually lose interest in an object that is not shared or is available in a very limited form. We unconsciously create specific ghettos of nature, managed by someone on our behalf (Grimm et al. 2008). An important driving force of mo-

dern civilization is the creation of large urban centres, specific human ghettos, where human needs definitely dominate over the needs of other species. Cities are connected by fast railways and highways. These phenomena perpetuate the division into two realities – social and natural – unfavorable for nature conservation. Kareiva and Marvier (2012) write about it.

The creators and continuators of the concept of the EU's ecological network Natura 2000 are aware of the above described processes. Therefore, an important assumption of this concept was the intentional establishment of network fragments in the areas used by the agricultural and forestry sectors. Already at the stage of the network creation, meetings of stakeholders discussing protection means/measures and the borders of a new Natura 2000 site were organized in many European countries (the author's own experience gained during the training on establishing the Natura 2000 network in France). Nevertheless, the question still remains: Were the consequences of the collision of two opposing management objectives with regard to these areas fully understood? It seems not. This is evidenced by the numerous conflicts settled by the European Court, together with the lack of systemic solutions, which are substituted by implementing local solutions and issuing information on good practices (EU Guidelines ... 2013, EU Farming ... 2014, EU Sustainable tourism ... 2001). Among the recommendations, it is worth drawing attention to the case of the Bavarian Forest, where bark beetle outbreak in the Natura 2000 site concerned both forests located in the area of the National Park and adjoining managed forests (Müller 2011, Lehnert et al. 2013). When, despite the strenuous efforts of foresters, the outbreak expanded from the Park to the neighbouring tree stands, it turned out that the local community, tourists and forest owners had a different vision of the forest than naturalists from the Park. These people opted for the green forest, not the hectares of dead spruce stands (Müller 2011). The matter quickly gained political significance. The European Commission, unprepared for solving the problem, commissioned the development of separate procedures for the national park and for commercial forests (EU Guidelines ... 2013). According to the Commission, the guidelines should apply in all analogous cases, and the recommendations are outlined below.

Within the national park (and supposedly – in nature reserves), the Commission recommends leaving forest without any interference. The following activities are recommended in the remaining area:

1) The area adjacent to the national park, at least 300 m wide, should undergo rapid reconstruction of tree stands (connected with cutting spruce stands), in order to prevent further spreading of spruce bark beetle, as it has been shown that 95% specimens of this species do not pass over more than 300 m (EU Guidelines ... 2013).

2) In managed forests, at a further distance from the national park boundary, there is recommended traditional control of spruce bark beetle, that is, cutting down already infested trees and laying out log traps.

It seems that both Polish foresters and naturalists do not know the recommendations by the European Commission regarding spruce bark beetle outbreak in Natura 2000 sites (EU Guidelines ... 2013). If they knew, then the disputes would probably concern the technical details of tree stand protection measures, and not the fundamental argument over cutting trees in the Forest.

Other important aspects of the dispute over cutting down dying spruces in the Białowieża Forest, are: the need to leave behind an appropriate amount of deadwood and no cuttings performed in the stands with more than 10% of trees who are over 100 years old (the so called: 'Wesołowski's casus').

Up to date studies with regard to the impact of tree cutting on biodiversity and not sufficient amounts of deadwood left behind in forests have shown that the latter leads to the reduction of biodiversity in the entire system. Recently, a review article (Müller, Bütler 2010) has been published in the European literature, which analyses the threshold numbers (minimum and maximum) of dead trees per unit area, which secure the endurance of various plant, fungi and animal taxa. It turns out that the numbers are very divergent, both for habitats and systematic groups. In numerous literature sources, deadwood volume ranges have been postulated from 10–80 m^3/ha for lowland boreal forests to 10–150 m^3/ha for mixed montane forests, and the most frequently suggested values range from 20–30 m^3/ha for lowland coniferous forests, through 30–40 m^3/ha for mixed montane forests to 30–50 m^3/ha for oak-hornbeam forests.

Buitler Sauvain (2003) carried out a study in the upper montane zone in the Alps, and stated that to preserve a viable population of the three-toed woodpecker who requires standing deadwood in spruce forests, at least 5% of standing dead trees should be left behind in the forest. Under the conditions of stands studied by this author, this means $\geq$ 18 m^3 deadwood/ha, hence, at least 14 standing dead trees with the diameter $\geq$ 25 cm per 1 hectare.

In this context, it is worth recalling forest data from Sweden, where on average only a few m^3/1 ha of deadwood is left behind (Jönsson et al. 2016). The authors state that such a small amount of deadwood, despite the increase in its volume by 25% in the last 15 years, does not adequately protect biodiversity of the studied ecosystems. In view of that, the authors call for a change in this respect, in the policy and forest management principles now in force in Sweden.

Coming back to the Białowieża Forest, it is worth noting that the dispute is limited only to managed forests. In this respect, the tensions involving the economic and protective functions are getting stronger. The EU recommendations referred to above (EU Guidelines ... 2013) and numerous quoted publications suggest the necessity for forest managers to reconsider their previous activities. The first 'Forest Promotional Complex' (Puszcza Białowieska) in Poland was established in the Białowieża Forest, with the aim to show model forest management, performed in such a way that it does not cause loss of biodiversity and richness of the whole ecosystem. The author of the present

paper believes that it would be meaningful if the State Forests rethought their policy and priorities regarding the Białowieża Forest. It is no longer enough to rely upon tradition and – as seen from the viewpoint of foresters – appropriate management of the Białowieża's ecosystems. In the Białowieża Forest, the objectives of foresters' activities should be much more ambitious, and at the same time, better adjusted to the Natura 2000 ecological network, that also covers forests managed by the Forest Districts administration. In this context, two questions arise, the answers to which require the experimentation to find the best solutions for forestry practice:

1. How to manage the forest, so as to keep an appropriate number of old and dying trees for continuous supply of deadwood amount, sufficient for maintaining forest biodiversity (Müller, Bütler 2010), and at the same time – not to jeopardize realization of economic targets.

2. How to determine the volume of dead trees needed to secure the endurance of rare species along with vital and stable populations that feed on/live in deadwood. The rationale for forest managers should not include just evaluating the structure of metapopulation of key or umbrella species from various taxa, but should also refer to safeguarding species migration between their right and proper habitats.

Furthermore, there is another, equally important, and poorly recognized aspect, which concerns both managed and protected forests. This concerns the boundary between the protected area and the managed forest. The issue has been and will be a source of many conflicts and accusations exchanged between the parties involved, with reference to causing damage and/or degradation of ecosystems and tree stands. On the part of foresters, we hear that outbreaks of many so-called pests occur in managed forests due to the lack of control of these species' populations in protected areas. Then again, foresters are blamed for neglecting invasive species in managed forests, which spread in the national parks and nature reserves as a result. The National Park can do little or nothing on its side of the border. This is the consequence of the status of strict protection area, where limited activities are allowed only in the area designated for active protection – no more than implementation of conservation tasks concerning individual species or anthropogenic ecosystems. Much more can be done in a managed forest. You can shape the species and spatial structure, age, as well as the number of dead trees in the stands, or you can support otherwise eliminate alien (invasive) species of trees and herbaceous plants. You can also experiment with the creation of corridors or barriers to migration and dispersion of many species of animals. This is nothing more than elaboration of recommendations for actions in managed forests, toward reducing conflicts and increasing biodiversity. However, in order to solve such problems, the forests comprised by the Forest Promotional Complex 'Puszcza Białowieska' must be exempted from economic schemes, especially those that hinder innovative activities of foresters.

The author of the article is convinced that many bright foresters will add their own ideas and suggestions to the list of postulates for the Forest Promotional Complex. If foresters were to act this way, departing from the schematic management of a 'forest farm', no reasonable person would question the need for the presence of the State Forests and foresters in the Białowieża Forest. The experiment carried out could lead to the development of new recommendations for managed forests protected under the Natura 2000 network, and the actions undertaken would gain not only favour, but also strong support from the European Commission. Looking ahead, the recommendations developed for managed stands in the Białowieża Forest could serve as guidelines for all the Natura 2000 sites that form a common forest tract embracing the national park and managed forests. Foresters in the Białowieża Forest have already taken action in this direction, creating the so-called reference forest areas in forests managed by the Forest Districts (Trębski 2016). The proposed measures would probably involve less logging in the Białowieża Forest, thus, there could be projected a long period of financial deficit in the Forest Districts. Then, the projects aimed at reducing threats to biodiversity should be financed to a large extent from the EU funds. Towards the end of these considerations, it is worth noting that in European literature these problems have been actively discussed (Lehnert et al. 2013, Müller 2011, Zýval et al. 2016). In addition to the cited publications from the Bavarian Forest (Lehnert et al. 2013, Müller 2011), postulates regarding the interpretation of forest management in the event of natural disaster and bark beetle outbreak are signalled from the Bohemian Forest (Zýval et al 2016). Moreover, scientists and experts call attention to the management of Natura 2000 sites as inadequate to the ongoing climate change (Araújo et al 2011), as well as to the growing conflict between economic objectives and those concerning nature conservation in areas under the Natura 2000 network (McShane et al 2013, Müller 2011). These circumstances require fast recommendations by the European Commission regarding the ecological network management, as the status of species protection in Natura 2000 sites is uncertain, and in dynamically changing environment, there is a progressively rising risk to the conservation status of natural habitats and species (Araújo et al 2011, Zýval et al 2016).

6. Is the Białowieża Forest appropriately protected?

The Białowieża Forest is undoubtedly the best protected area in Poland, at least administratively. There is no scrap of forest here that would not be legally protected, often in many different ways. In total, not counting the protection of species, there are 4 types of large-scale objects established under the Nature Conservation Act and 2 forms established under the international conventions or agreements. One area (Forest Promotional Complex) was established under the order of the Director General of the State Forests (Table 1). The latter is not a form of nature protection; however, its designation was associated with the declared development towards the protection of nature and environment (List otwarty ... 2017).

Table 1. Spatial forms of conservation of nature and environment in the Polish part of the Bialowieża Forest (List otwarty... 2017, slightly changed)

Protected area	Area (in hectars)	No of elements	Date of establishment (enlargerment)	Source
Białowieża Forest	150 582			1
Polish part of Białowieża Forest	62219			1
Białowieża National Park	10517	1	1932	2
Nature reserves	12215	23		3
Natura 2000 (PLC 200004)	63148	1	2004	4
Landscape Protection Area	78538	1	2005	5
Biosphere Reserve Białowieża	92400	1	1970 (2005)	6
World Heritage Site Białowieża Forest	141885 (PL + BY)	1 (2)	1979 (2014)	8
Forest Promotion Complex Białowieża Forest	52600	1	1994	7

Sources:
http://puszcza_bialowieska.republika.pl/publikacje/liczby.htm; http://www.ochrona-przyrody.edu.pl/parki-narodowe/bialowieski-park-narodowy; https://pl.wikipedia.org/wiki/Kategoria:Rezerwaty_przyrody_w_Puszczy_Bia%C5%82owieskiej; http://obszary.natura2000.org.pl/index.php?s=obszar&id=71; http://bip.bialystok.uw.gov.pl/Show_Item.aspx?ID=3245; http://bpn.com.pl/index.php?option=com_content&task=view&id=1845&Itemid=312; http://www.bialystok.lasy.gov.pl/lesny-kompleks-promocyjny-puszcza-bialowieska-; http://whc.unesco.org/en/list/33.

Even with that many forms of nature protection, the Białowieża Forest has not yet been adequately safeguarded. The spatially overlapping forms of nature protection cause organizational and competence chaos (Grodzki 2016), whereas contradictions between conservation objectives for individual protected areas generate substantive conflicts. The attention to inconsistency and confusion all around the protection of the Białowieża Forest has been also drawn by Perkowski (2015), Sowa at al. (2016) and Zientarski and Szmyt (2017).

The role of UNESCO should also be clarified. This organization has received from the Polish authorities two submissions, substantially different and incompatible in terms of the requirements for the protection and management of the Forest. The previously established Biosphere Reserve divides the Forest and neighbouring areas into three zones, with the transition zone divided into two subzones – the zone with negligible economic use – situated close to the National Park, and the zone located further away from the Park, where forest management could be carried out without considerable restrictions (Mirek, Witkowski 2017). However, in accordance with the concept of the object of the World Heritage of Humanity, virtually the whole area of the Forest should be subject to safeguarding of natural processes and the protection of biodiversity (List otwarty ... 2017).

Analogous inconsistencies can be noted when analysing the management plans of the National Park and Natura 2000 sites. The National Park as a rule comprises the area under strict protection. This means that there is no human interference allowed both on the scale of the entire ecosystem and individual species. Natura 2000 is focused on particular habitats and species, which often requires active protection measures undertaken regarding the habitats as well as the specific species.

In the context of the protection of forest habitats and species, a number of questions should be answered:

1. In view of constant drainage of the Białowieża Forest and water quality deterioration (Janek 2016), is it necessary to undertake revitalization of previously regulated watercourses throughout the entire Forest, and to abolish routes that divide forest units – so as to equalize the water levels and reduce outflow rates?

2. Is it necessary to strengthen spruce population and uphold different age classes of spruce stands in order to preserve vital populations of the three-toed woodpecker and other bird species in the interior of the Forest? The case of the Bavarian Forest shows substantial decrease in population numbers of specific bird species, subsequent to a radical drop off in the share of spruce in stands (Lehnert et al., 2013). A similar process is also signalled from the Białowieża Forest (Czeszczewik, Walankiewicz 2016).

3. To what extent should be populations of large herbivores interfered, so that the increase in their numbers would not threaten the ecological stability of the whole Forest, as was done in the past (Nowak 2016).

The above questions indicate serious doubts regarding the project of turning the whole Białowieża Forest into the National Park, where the strict protection area will cover over 70% of the Forest (Szwagrzyk 2016).

Apart from the ecological dimension, legal, social and economic aspects should also be taken into account. Both foresters and naturalists know perfectly well that the current legal system does not allow for expanding the National Park without the consent of the local community. At the present time, it is acknowledged worldwide that without the participation of stakeholders, including local residents and foresters, new

forms of nature conservation cannot be designated, which has been accentuated also by UNESCO (Polski Komitet ... 2017).

To sum up this chapter, it should be re-emphasized that presently, the whole Białowieża Forest is protected (Table 1). Hence, the dispute is not about nature conservation itself, but about the protection mode: whether the Forest can be protected while being utilized, or should the Forest be used as it is in the National Park, where any form of its use is associated with the conservation tasks, implemented not for economic purposes. At this point, it is worth quoting the highly balanced voice of Szwagrzyk (2016). This author summarized the essence of the dispute and perfectly exposed its basic elements. He noted that in Poland, as well as around the world, there has been observed a gradual and irreversible change of social and environmental priorities.

A hundred years ago, natural world of the Forest was degraded by logging and the bison disappeared from this area. Yet, this dramatic period of history of the Forest has already been forgotten. Currently, the importance of the Forest as a valuable protected area has increased, while its significance decreased in the context of wood production in the country. The author also noted that the reversal of priorities was quickly assimilated by metropolitan communities, whereas the local community is still convinced that wood production in the Forest has priority, more so because for many local residents, work in the Forest is the main source of income (Szwagrzyk 2016). It follows that scientists and non-governmental organizations are not the only entities who contribute to the management of the Białowieża Forest, therefore these stakeholders should not be only ones to decide about the fate of the Forest. As shown by the observations of the same conflicts in the Bavarian Forest (Müller 2011), the local community also has its own opinion and an attempt to bypass this group in the decision-making process may end in a serious and long-lasting conflict.

In the Białowieża Forest, the area of strict protection should be enlarged, but at the same time, managed forest stands should not be eliminated, but be maintained to pursue conservation objectives in concert with economic objectives. It is important that all stakeholders decide, not only scientists and members of non-governmental organizations.

7. Conclusions

1. The dispute between naturalists and foresters about the way of managing the Białowieża Forest is part of a global dispute about the goals and methods of nature protection. This is a dispute about values. It is impossible to determine whether biodiversity is an intrinsic value or is a key value for human needs. In a dispute, both parties occupy very conservative positions. For naturalists, the only solution is to expand the National Park, so as to strictly protect the whole Forest's area. However, the majority of foresters see no reason to enlarge the existing National Park or change the way of management in the area of the Forest Promotional Complex 'Puszcza Białowieska'. Increasing the protected area does not reverse the threat to species and habitats. If this was the case, the rapid growth of inland protected areas to over 16 million km^2 would successfully hold back – or at least significantly reduce - the loss of many taxa. On the other hand, however, increasing tree felling in managed parts of the Forest will also not bring to an end the processes that have been the result of climate change factors. The dynamic balance between spruce and bark beetle has been permanently eradicated, and therefore, solid spruce stands cannot succeed in the forests of central Europe, both in lowlands and in low altitude mountainous terrains (Müller 2011; Seidl et al., 2015).

2. Recognizing that now man lives in a new geological period – anthropocene – in which he is the driving force of changes on the Earth, enforces abandoning the concept of ecological balance in its classic form, as the only permanent situation is the situation of directional change caused by man. Therefore, strict protection areas become the areas of documentation of changes more than the preservation of the existing state of affairs. When establishing such areas, one should be aware that the dynamics of external factors, such as climate, alien species, and increasing dynamics of local populations, are working towards relative destabilization of strictly protected areas. This does not mean that such areas should not be designated, but we should forget about their unchanged structure and functioning. In the future, it will not be the same as it is now and here.

3. Changes occurring in the biosphere also instigate a necessity to change the orientation of foresters. The multi-functionality of forest management that is important for the future is still largely the subject of declarations rather than actions. While the environmental and social objectives in this new forest management option are increasingly well implemented (e.g., tourism and recreation), the environmental objectives are perceived as secondary. This is particularly evident in the example of leaving enclaves of old stands and the volume of dead trees in managed forests.

4. The protection of the Białowieża Forest cannot focus solely on biodiversity issues. There are many stakeholders who want to participate in the decision-making processes, and there is no reason for naturalists to think that only they know better. More so because the current richness of the Białowieża Forest is still largely in its managed parts, in spite of their intensive use for at least a century.

5. In the Forest, an agreement forum is lacking, where all interested parties could freely present their opinions and exchange arguments. In this respect, the Białowieża National Park is in a neutral position, and perhaps this is where the discussions should take place, the outcomes of which should be widely accessible.

6. It is risky to persuade local residents that the way to carry on is investing in tourism. In Małopolska, the process of increasing conflict over the mountains has been observed for a long time. The development of tourism and recreation is often limited by nature conservation, especially in the areas under the Natura 2000 network. This means that tourism development

has its limitations, and this may also affect the Białowieża Forest region as well as its residents in the future.

7. Currently, the conflict in the Białowieża Forest is being pushed towards politics and positions of the parties regarding the dispute are tightening. It does not serve either nature or the local community, as well as the image of Poland in Europe and in the World.

Conflict of interest

The author declares no potential conflicts.

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