

ACADEMIA Ecology

WHISPERS IN

We talk to **Dr. Bogdan Jaroszewicz**, head of the Białowieża Geobotanical Station of the University of Warsaw, about how planned logging in the Białowieża Forest will damage not only the forest itself but also Poland's image around the globe.

ACADEMIA: Why has the Białowieża Forest ended up at the center of yet another controversy?

BOGDAN JAROSZEWICZ: I think the key lies in the way we think about the Białowieża Forest. If we treat it as a commercial forest, similar to many others in Poland, focused on the production of timber, then infested and dying trees need to be logged because they bring losses. From another point of view, it is the best preserved mixed deciduous forest in the temperate climate zone of Europe. We must be conscious of the fact that any intervention makes it less natural, and continuation of logging of stands which are of natural origin will irreversibly damage its naturalness.

It seems that current thinking is dominated by the idea that forests need to be managed, and that without human intervention they will be devastated by pests, fires and other threats.

Of course forests thrive without human intervention. This is very well visible for example in the Chernobyl zone – the forests there are flourishing and expanding. I blame the way in which foresters are trained in Poland for the recent approach to the Białowieża Forest. I'm a forester myself (by education) and I know the process. We were taught that forests should grow a given selection of species to make the best use of the local habitat conditions. The composition of forest regeneration is partially determined on the basis of phytosociological studies which reveal which tree species are best suited to certain types of soil. This model is modified to best meet our economic expectations, so if a forest composed of oak, hornbeam and spruce sprouts a silver birch, it must be removed because it



TROUBLE WITH THE BIAŁOWIEŻA FOREST

THE FOREST





“Bark beetles have existed and will continue to exist as long as spruce trees exist. They are a natural element of forest life,” says **Dr. Bogdan Jaroszewicz**.

is classified as a weed. It’s a very rigid approach which assumes that every deviation from the plan should be eliminated.

Fine, but what about bark beetles? From time to time we hear that dead wood found in the Strict Reserve in Białowieża is a breeding ground for them.

Bark beetles have existed and will continue to exist as long as spruce trees exist, and the spruce is the dominant species in the Białowieża Forest. Although molecular research reveals that the oldest spruces in the forest have a southern genotype, more closely related to the Carpathians than Scandinavia, they do grow there naturally. They have remained in the area since the days when the spruce range was split between the north and south during the last millennia.

Bark beetles are a natural element of any forest. In Siberian forests they return every century or so and actually bring about a regeneration: they kill old trees, bringing in more sunlight to the forest floor and encouraging growth of young trees. In any case bark beetles are always found in forests, not just during outbreaks. The difference is that between outbreaks they attack single trees, which in managed forests can be easily located and cut down before the infestation spreads. Additionally, if the tree is sufficiently strong

and healthy, it may be able to produce enough resin to drown the beetles in their burrows. It’s true enough that even a strong tree is unlikely to survive a mass attack, but the overall situation is far more complex. There are also parasites that attack bark beetles, their predators, entomopathogenic fungi growing in the insects’ bodies leading to their death... In fact, the more bark beetles, the more “enemies” they have, so each outbreak must end sooner or later.

That’s nothing new in epidemiology and ecology: no epidemic is able to kill all individuals. Some will always be resistant or prove able to fight the infection.

Of course! We can see this for spruce and bark beetles by comparing the part of the forest which has been protected since 1921 with commercial forests. Bark beetles appear in both at the same times. In commercial forest, infected trees are cut down, while in protected areas they are left intact. And what happens? In both cases gradation collapses at a similar time, after around three to four years. Additionally, the number of trees that die in protected areas is similar to those timbered by loggers. This means that cutting down infected trees has no ecological basis, as confirmed by publications comparing the course of gradation in sites where action is taken to combat bark beetles with those where this doesn’t happen. More details have been published by Professors Wojciech Grodzki and Jerzy M. Gutowski from the Forest Research Institute.

We have been seeing press reports recently protesting the cutting down of old trees in the Białowieża Forest. Who decides which trees are chosen and how many?

Let’s start from the basics. Some of the Białowieża Forest is protected as a National Park and nature reserves, where no logging takes place, but there are also commercial areas where logging is done. The commercial areas are managed according to forest management plans which define how much timber is allowed to be obtained over a decade, and where exactly logging is going to take place. The most recent conflict stemmed from the fact that by 2015 the Białowieża Forest District, one of the three Districts managing the Forest, had already used its whole quota for the period 2012–2022 (63,500 m³), so it has applied for an additional quota of up to 188,000 m³, justifying it by the need to fight against bark beetle gradation. The annex to the forest management plan allowing for this expanded quota was accepted by the Regional Director for Environmental Protection in Białystok on 12 February 2016.

It’s hard to imagine 188,000 m³ of timber. How many trees is that? How many cubic meters is a single spruce, for example?

TROUBLE WITH THE BIAŁOWIEŻA FOREST

A large tree aged over a hundred years, approx. 35 meters tall and with a trunk diameter of around 50 cm represents approx. 3.5 m³ of timber, so we're talking about logging over 60,000 such trees. According to the decision by the Regional Director for the Environment, foresters can log only infested trees in this quota. Trees infested with bark beetles are identified by fresh scobs falling from the holes drilled by bark beetles. Such trees are marked on site and on maps as suitable for logging. However, this is difficult to implement in such a large area, since it would require people working almost constantly to mark all affected trees.

Because bark beetles are quick to infest?

That's right. Under suitable conditions, it takes a generation of spruce bark beetles between two and two and a half months to develop. But this doesn't mean that trees can only be identified at the time when new beetles hatch; during the vegetative season, they should be monitored almost constantly because trees can become infested at any time. This means that a tree identified as a healthy one may be infested the following day. We would need huge number of people working to identify all infested trees, which is simply impractical.

Supporters of logging claim that this only affects forests outside the protected areas – that is, not in the National Park or nature reserves.

That's true, but it's not as simple as that. Since June 2014, the entire Białowieża Forest has been listed as a UNESCO World Heritage Site. Although this doesn't grant it any legal protection, it is a highly prestigious distinction on an international scale. In early 2014, UNESCO asked foresters working in the area to designate zones and define general rules of management in each zone, such as allowing or banning logging. This rough management plan of the World Heritage Site was attached to the application to expand the Site's limits to the entire forest, and was one of the reasons why the application was accepted. Meanwhile, the proposed logging includes trees in zones designated as free of logging. If logging will take place, we are likely to face consequences on the international arena. UNESCO's response may be to place the forest on the List of World Heritage in Danger, and in an extreme situation it may even decide to remove it from the World Heritage List. The site spans international borders, so if the UNESCO status changes or is lost, we are guaranteed to face wrath from Belarusian authorities.

Does Poland's economy really require so much timber as to necessitate logging the Białowieża Forest? What is all this wood used for?

According to the report on the state of Polish forests, prepared by the General Directorate of the National Forest Holding, a total of 37.8 million cubic meters of

timber were logged in Poland in 2014. The amount keeps increasing as the demand for timber increases (a decade earlier, in 2005, the total volume of timber was around 10 million cubic meters lower). But we mustn't forget that the Białowieża Forest isn't an ordinary commercial forest. Sure, let loggers cut down as many trees as regulations allow at different sites – but the Białowieża Forest is unique and should be excluded from regular forest practices.

We frequently hear that if the Forest is no longer managed, it will have a negative impact on the lives of local residents.

Although the volume of timber obtained from the Białowieża Forest has fallen from approx. 150,000 m³ per year between 2002 and 2011 to 48,000 m³ per year between 2012 and 2015, there haven't been any reports of local logging or timber processing companies going bankrupt. And let's not forget that in 2014 just half of the extracted timber remained in the local market, where it's used by residents as building material or fuel. The rest was sold further away, to paper mills and laminate flooring factories. In my view it wouldn't make any difference to the industry if it used timber from any other forest. In any case, no one is seriously suggesting the introduction of a strict logging ban across the entire forest. People always need wood, but I'm convinced that it's possible to reach a compromise between their requirements and protecting the forest. And it's not as though local residents benefit all that much from logging; the National Forests employ locally just over 100 people across the entire Białowieża Forest, and their salaries don't depend on the intensity of logging. The only people who could lose out are lumberjacks. However, as with most businesses, logging companies are selected through a bidding process, so there is no guarantee that the work would be carried out by local workers anyway.

So what's the actual problem, if increasing the number of trees being cut down doesn't bring real benefits?

In part it's the legislation covering forestry, which commits forest managers to counteract any catastrophic events, including plagues of pests. As such, the head of the Forest District has a duty to log infested trees, since it's the only known way of containing outbreaks of bark beetles; if the logging limit is reached, they must apply for an extension.

Would excluding the Białowieża Forest from the Forestry Act solve the problem?

The only attempts made so far involved expanding the Białowieża National Park. However, it is very problematic, because according to Polish nature conservation act, this can only happen with the approval of the local authorities. And since they are

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is a specialist in the ecology of natural forests. He long served as the deputy director of the Białowieża National Park and is a member of the Polish Ranger Association and the European Bison Friends Society. He works in education and promotion of Białowieża Forest's natural and scientific value.

afraid it could bring some restrictions in use of the forest, it isn't a popular idea. In any case the local authorities see benefits in resisting the expansion, because projects such the "Contract for the Forest" – a program outlining economic support for the Białowieża Forest financed by the Ministry for the Environment in 1999 and 2000 – have provided them with funding of several million zlotys to be used locally on improving sewerage works, building schools, etc. In 2010 the Environment Minister offered local authorities almost 100 million zlotys to expand the National Park, which was turned down even though this expansion was only going to concern areas which are already nature reserves. It's clearly worthwhile maintaining the status quo.

How do you see the future of the Białowieża Forest?

There seemed to be a way out of the impasse in 2006 when the late President Lech Kaczyński appointed a special committee to resolve the problem. It con-

cluded its work with a bill proposing to grant the entire Białowieża Forest the status of a National Park. Another bill provided for compensation and financing for the entire region as a result of the expansion of the National Park. However, neither bill reached the Sejm. As one of the members of this committee I believe that a far better solution would be to introduce an amendment to the environmental protection act introducing a new status of environmental protection as Natural World Heritage Sites. We could then ensure that forests are covered by conservation regulations agreed alongside UNESCO, and exclude such sites from the Forestry Act.

It sounds simple...

I'm afraid it's likely to be difficult to implement for political reasons. Unfortunately, if the current Environment Minister sticks to his guns and expands logging, we are likely to face another controversy resembling the one involving the Rospuda Valley. ■

Prof. Rafał Kowalczyk

conducts research in ecology, behavioral ecology and conservation and management of animal populations. In 2001, he defended his doctorate on the ecology of badgers in the Białowieża Forest. He is the co-author of over 60 scientific publications. He is currently conducting projects on the history, foraging ecology, and management of bison and moose populations.

We talk to Prof. Rafał Kowalczyk, Director of the PAS Mammal Research Institute in Białowieża, about how we can improve the situation of the bison population in Poland without resorting to culling.

ACADEMIA: In January, Poland's General Directorate for Environmental Protection issued a permit for the cull of 35 bison. This followed an incident when an animal injured a resident of the village of Kowela in the Podlasie region, although the Białowieża National Park has been issuing culling permits every year. In December 2015, the National Council for Environmental Protection, whose members have since been dismissed, unanimously opposed regulating the bison population through culls.

RAFAŁ KOWALCZYK: We have tried to draw attention to the fact that when it comes to bison culls, there are no reliable expert opinions or public controls. The situation is extremely worrying, since the bison is a strictly protected species by Polish legislation and as part of the Habitats Directive.

You have also spoken out about the fact that the Council's opinion has been ignored.

That's right. Even though the Council is an advisory board to the Ministry of the Environment, neither the

minister nor institutions such as the General Directorate for Environmental Protection are obliged to seek the Council's opinion on proposed culls or include such opinions in their decision-making. However, we feel it is our duty to respond to worrying events affecting the natural environment in Poland. We could not stay silent when we heard the proposals to cull not only sick or suffering individuals, but also old animals who have "fulfilled their role in the population." Such an approach is common in animal breeding and livestock science, and it is regarded as one of the greatest threats for the species by the International Union of Conservation of Nature (IUCN).

Are bison actually dangerous?

Of the 45 documented incidents of bison attacking people in the Białowieża Forest, 86% were provoked by the person – perhaps they got too close, or even deliberately tried to startle the animal. The majority of the incidents involved people working with bison professionally, such as nature photographers or employees of the Białowieża National Park. In their cases

TROUBLE WITH THE BIAŁOWIEŻA FOREST

the attacks rarely involved goring, since they are very familiar with bison behavior. This is not the case in interactions between bison and local residents, who might attempt to chase the animals away by shouting and prodding them with sticks when they enter their fields. Fortunately there have been no fatalities reported so far. Of course some bison have a tendency to enter farmyards and fields, since they know they will find plenty of food there. But those individuals should be caught and transported to other locations rather than being culled. It's also important to educate people so they know how to behave if they encounter a bison.

How many bison are there in Poland?

There are over 1200 bison living wild, and another 200 at various breeding centers, zoos and private farms. Poland is home to a third of the global population of wild bison and over 90% of bison in the European Union. This places a great responsibility on our country in terms of protecting and conserving this species. Poland played a key role in the restoration and reintroduction of bison, with a reserve created in the Białowieża Forest after the First World War.

Who looks after the bison in the forest and nearby?

In the Białowieża Forest, it's generally agreed to be the Białowieża National Park. In the Borki and Knyszyn Forests and Bieszczady Mountains the role is performed by the State Forests administration, while in the Western bison are looked after by the Western Pomeranian Nature Society. Unfortunately, existing legislation doesn't make it clear whose responsibility the animals are. Formally the duty lies with the Regional Directorates for Environmental Protection, but – for example – the Białowieża National Park monitors bison within its boundaries as well as in the part of the Białowieża Forest administered by the State Forests and beyond. This frequently causes problems in terms of responsibilities and competencies of individual services.

Are bison found exclusively in forests?

It has long been believed that they are a forest species, since they have survived until the present day in just those habitats; this was why when they were reintroduced, they were released into forests. However, forests aren't ideal for such large herbivores. There's certainly plenty of food between May and September, but between October and April there's a real scarcity. Bison eat shoots, but they require high volumes of food and they are adapted to feeding on grass, as revealed by their wide mouths, teeth with high crowns resistant to wear, and a distinctive digestive system. This means that if they have the option, they choose



“If we know the carbon isotope concentration in animal bones, we are able to reconstruct their foraging habits,” says **Prof. Rafał Kowalczyk**.

forest clearings, meadows and river valleys with plentiful food.

Is that what their original habitats are likely to have been?

That's right. We are conducting research into the history of the species to learn about their original habitats through stable isotope analysis. The concentration of isotopes in animal bones reflects the isotopes found in their food, and plants of the same species growing in the open and in forest shade have a different concentration of carbon isotopes. If we know the carbon isotope concentration in animal bones, we are able to reconstruct their habitat, so we are searching for bison bones in museums across Europe.

We know that in the early Holocene, following the glaciation of between 9,000 and 12,000 years ago, bison lived on open tundra-steppe. As time went on, they were forced into more forest habitats. This was partly driven by the expansion of forests due to increased temperatures and rapid expansion and growth of the human population and development of Neolithic agriculture. Over the centuries, large herbivores such as bison and aurochs gradually disappeared from Europe. The bison were fortunate to have survived until the 15th century, when the Białowieża Forest and other forests in present-day Lithuania first became

protected, and people inadvertently created good conditions for them by mowing meadows in river valleys. They also fed on hay collected for cattle. This supplementary feeding caused their numbers to increase from 300 individuals in the 18th century to over 1500 by the 19th century. Additionally, during the days of the Russian tsars, forest glades were created especially for bison, providing them with high-quality feed and suitable habitats. Bison living in forests forage in meadows, river valleys and forest clearings, and in winter they venture into farmland where they feed on rape and winter cereals.

So bison have depended on humans for a long time.

They have, but if we want them to function as a wild species we should strive to find them habitats where they can survive with minimal human support. Such an experiment was conducted in the Netherlands, where bison were released into a fenced-off coastal zone: sand dunes covered with grass and small clumps of trees. They turned out to manage perfectly well without supplementary feeding, and they have been breeding and thriving. Intensive supplementary feeding results in improved survival rates and higher breeding rates. Until recently, the Białowieża Forest was home to several winter herds numbering up to 100 individuals; they spent almost six months in relatively small areas near the feeding sites. Living in such close quarters creates ideal conditions for increased parasitic load; the eggs of parasites are excreted, then the dung gets spread via the hooves to the hay on which the herd feeds. Animals also tend to breed with members of their own herd. It's possible to prevent the formation of large herds in such small areas. As part of the project LIFE "Conservation of Bison in the Białowieża Forest – The Land of Bison," coordinated by the PAS Mammal Research Institute, we have been able to disperse the large winter herds, and now the largest number no more than 60 individuals.

Does that mean we should help bison become more independent?

That's right, but instead, every year several cull permits are issued in Poland. There are fewer bison than the critically-endangered black rhinos, and yet tens of individuals are killed in Poland every year, and there is even mention of holding commercial hunts! Meanwhile moose haven't been culled since 2001 even though they have game status, cause significant damage to forests, and number around twenty thousand.

Who carries out the culls?

Permits are issued to managers of individual populations. In the Białowieża Forest, they are experienced employees of the national park, while in other regions they are hunters, who frequently pay for shooting bison.

Perhaps it also helps that bison is a highly valued trophy?

Of course! But why are we allowing the culling of this unique species, which is the symbol of nature conservation in our country? Culling permits specify that aggressive or sick individuals should be shot as a priority, although it would be far better if the population dynamics were controlled by natural factors. For example, if the frequently excessive feeding were to be limited, the weaker individuals would die, and their carcasses would in turn feed numerous rare birds and mammals. Biologists suggest a science-based approach known as adaptive management. It involves formulating the aims of species conservation, planning and implementing appropriate actions and monitoring their effects. If they are positive, the activities are continued, if not, they need to be modified. It's important to prevent the threats rather than magnifying them.

Are the aims of bison conservation well-defined?

We have the example of beavers, whose protection has run out of control.

We have a tendency to introduce protection of a species before actually thinking about what's involved. So there are continually ideas about introducing bison into new forest areas, even though we know they are not optimal habitats. Such plans assume from the outset that the animals will be supplementarily fed. In smaller forests, their numbers must be kept low, which is not biologically justified due to inbreeding and demographic instability of small populations. If the assumed numbers are exceeded, the additional animals will be culled as part of commercial hunts. But how can the bison be an icon of conservation if bison steak is served in restaurants? Many local districts base their regional marketing strategies on the presence of bison in the area. However, if they are essentially treated as livestock, that can hardly be seen as a conservation success we can be proud of. A far better idea would be to introduce bison to areas such as former military ranges. They are diverse terrains including forests and open habitats with very few settlements, which minimizes the risk of the animals encountering humans. Species management should focus on finding suitable habitats and shifting efforts and finances away from supplementary feeding to minimizing conflicts with humans through education, securing meadows and trapping and resettling aggressive individuals. The bison can be a wild animal, and if the conditions are right, they require very little human support.

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