

EFFECTS OF CURRENT ECOLOGICAL FACTORS ON PINUS SYLVESTRIS IN THE "BELOVEZHSKAYA PUSHCHA" NATIONAL PARK

E. Shavalda, E. Buško

*Belarusian State University, ISEI BSU,
Minsk, Republic of Belarus
e.shavalda@gmail.com*

In the modern world human induced and climatic factors severely affect all the components of the environment significantly harming vegetation, especially *Pinus sylvestris* (L.). Both mobile (i.e. vehicles) and stationary sources of pollution (i.e. industry and agriculture) contribute to anthropization. It is also worth mentioning the constantly changing environmental conditions and the emergence of a steppe, which is a new climatic zone in the southern part of Belarus. Belovezhskaya Pushcha due to its geographic location and the wind rose undergoes all the foregoing negative environmental impacts, the effect of which is likely to increase in the future.

Keywords: anthropization, climate, pollutants, Belovezhskaya Pushcha, *Pinus sylvestris* (L.).

Pinus sylvestris (L.) is the predominant tree species of Belovezhskaya Pushcha, but in current ecological conditions it undergoes a significant negative impact due to the climate getting drier and warmer, the growth and development of the most adapted to these climate plant species; and as a result of a pronounced technogenic impact stemmed from industrial regions of Germany and Poland and least from Belarus and Russia. In the future all these factors can lead to the elimination of pines from forest stands not only in Belovezhskaya Pushcha, but also throughout Belarus and surrounding countries [1].

Drying and natural succession of *Pinus sylvestris* (L.) gradually leads to it being replaced by *Picea abies* (L.), which periodically dries out massively due to climatic changes, which necessitates sanitary cutting. Consequently, frequent felling (sometimes even not quite rational) combined with the lack of pine reproduction have a negative effect on the forest ecosystem and beneficially affect the growth of the most adapted and aggressive vegetation. The current state of the pine stand is lower than satisfactory, which is caused by a reduced tolerance to environmental factors, the development of fungal phytopathologies, the low stand density, and the introduction of degree-indicators such as spruce and hornbeam [1].

Both Polish and Belarusian territory of Belovezhskaya Pushcha as well as almost the entire territory of Belarus, is a continuous zone contaminated with sulfur-containing substances, mainly coming through the border from industrial centers of Germany and Poland. With reference to heavy metals, only zinc (Zn) and lead (Pb) fully cover the territory, the remaining elements have a local distribution pattern [1, 2].

Due to its sensitivity to technogenic and anthropogenic factors, *Pinus sylvestris* (L.) is considered an important bioindicator. Pine needles are capable of uptaking and accumulating pollutants, thus the content of which can be determined. For example, a research undertaken previously studied the heavy metal content in two-year-old needles of *Pinus sylvestris* (L.) and revealed the indices far from toxic, however, the concentration of heavy metals in the samples from the western regions of Poland was slightly higher than in those from Belarus. This shows a significant contribution of Western countries' industry to the pollution of Belovezhskaya Pushcha. Furthermore, the zones with a relatively high concentration of heavy metals in forest vegetation were insignificantly small and located mainly near settlements and small industrial enterprises [2].

Thus, the problem exists both in the Polish and Belarusian territories of Belovezhskaya Pushcha and requires a solution.

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