



This project explores the anthropogenic transformations of the Białowieża Primeval Forest (BPF) over the past 300 years, focusing on how human activities have impacted its landscapes and ecological dynamics. The novelty of the project lies in including an overlooked, yet crucial level of human intervention - the historical human impact on the forest hydrological system and the role of forest streams, rivers, and wetlands in maintaining ecological balance and biodiversity. The consequences of such impacts for the current state of BPF were not yet fully studied. However, they have the potential to build up and accumulate over time, resulting in spectacular events, e.g. the mass die-off of Norway spruce in BPF in 2017 and consequent heated discussion on the future of this unique forest. Therefore, our project offers an unique opportunity to make a significant leap in our understanding of anthropogenic transformations of the forest landscapes in the last 300 years.

Main Goals

The primary aim is to understand the historical interplay between human activities, water systems, and forest landscapes in the BPF. Specifically, the project seeks to:

1. Assess the extent of human-induced landscape changes before and after the advent of modern forest management.
2. Explore the ecological, economic, and cultural significance of changes to the forest's water systems over the last three centuries.
3. Predict how the BPF may respond to future challenges, including climate change and continued anthropogenic pressures.
4. Examine whether changes to river systems arose solely from direct regulation or were influenced by broader land-use transformations.

Methodological Approach

This interdisciplinary research integrates methods from environmental history, geography, paleoecology, hydrology, and ecology. Key activities include:

- **Historical Analysis:** Using archival records, cartographic data, and GIS techniques to reconstruct past landscapes and human impacts.
- **Geomorphology and Sedimentology:** Conducting fieldwork and laboratory analyses to study river channel changes and hydrological interventions.
- **Paleoecology:** Investigating peat cores and tree-ring data to reveal ecosystem responses to natural and anthropogenic factors.
- **Hydrological Modeling:** Applying the SWAT model to simulate past and future hydrological changes.

Research Team and Outcomes

The project is led by an experienced interdisciplinary team from the Mammal Research Institute, Polish Academy of Sciences (MRI PAS), Institute of Geography and Spatial Organization, Polish Academy of Sciences (IGSO PAS), and the Białowieża Geobotanical Station, University of Warsaw (BGS UW).

Expected outcomes include at least four publications in leading scientific journals, digitized resources for public and academic use, and public outreach materials, contributing to the broader field of environmental history and forest conservation. This research will provide a comprehensive understanding of the BPF's historical transformation, offering vital insights for managing and preserving this UNESCO-listed forest.