Towards the Anthropocene peatlands and forests – old-growth forest loss in Western Poland initiated peat growth and peatland state shifts

Mariusz Lamentowicz, Sambor Czerwiński, Monika Karpińska-Kołaczek, Piotr Kołaczek, Mariusz Gałka, Piotr Guzowski, and Katarzyna Marcisz

1Adam Mickiewicz University, Poznań, Faculty of Geographical and Geological Sciences, Laboratory of Climate Change Ecology, Poznań, Poland (mariuszl@amu.edu.pl)
2Department of Geobotany and Plant Ecology, Faculty of Biology and Environmental Protection, University of Łódź, 12/16 Banacha Str. 90-237, Łódź, Poland
3Faculty of History and International Relations, University of Białystok, 15-4 Białystok, Poland

During European states' development, various past societies utilized natural resources, but their impact was not uniformly spatially and temporally distributed. Considerable changes resulted in landscape fragmentation, especially during the Middle Ages. Changes in state advances that affected the local economy significantly drove the trajectories of ecosystems' development. The legacy of significant changes from pristine forests to farming is visible in natural archives as novel ecosystems. Here, we present two high-resolution, densely dated multi-proxy studies covering the last 1000 years from peatlands in CE Europe. In that case, the economic activity of medieval societies was related to the emerging Polish state and new rulers, the Piasts (in Greater Poland) and the Joannites (the Order of St. John of Jerusalem, Knights Hospitaller). Our research revealed rapid deforestation and subsequent critical land-use transition in the high and late Middle Ages and its consequences on the peatland ecosystem development. The shift from the old-growth forests correlates well with raising the local economy, deforestation and enhanced peat initiation. Along with the emerging landscape openness, the wetlands switched from wet fen with open water to terrestrial habitats. Both sites possess a different timing of the shift, but they also show that the catchment deforestation caused accelerated terrestrialization. Our data show how closely the ecological state of wetlands relates to forest microclimate. We identified a significant impact of economic development and the onset of intensive agriculture processes near the study sites. Our results revealed a surprisingly fast rate at which the feudal economy eliminated pristine nature from the studied area and led to intensive nature exploitation in the Anthropocene. In consequence, its activities led to the creation of novel peatlands types.