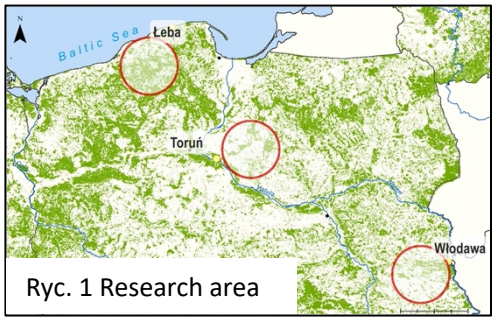
MIRECLIM - the climate of peatlands and its changes as a result of hydrological disturbances

Peatlands are very valuable ecosystems, as they occupy only approx. 3% of the land surface and store approx. 30% of carbon. These ecosystems often act as microrefugia, that is, places with favorable local conditions that enable species populations to survive beyond their main distribution. Microclimatic conditions are often mentioned as one of the main reasons for the survival of relict species in niche locations, however, *Sphagnum* peatlands have not been the subject of extensive research in this area so far.

In Poland, the projected increase in air temperature will also cause an increase in evaporation, with not significantly changing atmospheric precipitation, which may result in a gradual lowering of the groundwater table, as well as more and more frequent episodes of drought. This can negatively affect peatland ecosystems that are fed by rainwater or shallow groundwater, causing them to overgrow. This, in turn, will change the habitat conditions, and affect processes and microorganisms.



Ryc. 1 Research area

In the MIRECLIM project, we will comprehensively explore the climatic functioning of the mid-forest *Sphagnum* peatlands, using the multispecialist, and multiscale (from microscale to satellite data) approaches. We plan to study 36 mid-forest peatlands located in three regions of Poland, characterized by a gradually changing climate, from more oceanic to more continental (Fig. 1). We will focus primarily on the mechanisms that affect microclimatic conditions (size of peatlands, vegetation, topography, succession phases, hydrometeorological conditions, seasonality, atmospheric circulation, regional climatic conditions). We will also assess how the overgrowth of peatlands changes the microclimatic conditions and how it affects the moss growth, and rate and the decomposition of organic matter. We will also examine how this is reflected in the species structure of testate amoebas, which are an indicator of hydrological changes successfully used in palaeoecological research. We will create a “Mireclim” database based on the collected data, which will be used to validate and parameterize the models used in determining the microclimatic conditions, as well as use the data from satellite images for multi-level measurement integration.

The project will provide new insight into the microclimatic functioning of Sphagnum peatlands, which is crucial in understanding their role as microrefugia. The combination of many research methods, both in time and space, will allow to look at the studied problem from different perspectives, indicating the directions of proper management of these ecosystems. The proposed research problem of the project is very well in line with the recently discussed issues of resistance and resistance of peatlands ecosystems to climatic changes and rapid hydrometeorological extremes.