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THE HUMAN IMPACT IN BORY Tucholskie, NORTH POLAND  
A POLISH-SWEDISH PALAEOECOLOGICAL RESEARCH PROJECT

INTRODUCTION

Within the framework of the Polish ecological project R-III-15 under the guidance of professor Ryszard Bohr at the Biological Institute of Toruń University the Swedish research student Mervi Hjelmroos-Ericsson made a palaeoecological study of Lake Wielkie Gacno, north of Chojnice. The aim was to describe the lake development as well as the terrestrial ecosystem changes in this area, which is characterized by sandy soils of the outwash plains connected with the Pommeranian icemarginal zone<sup>1</sup>.

That study is also part of a UNESCO programme, the International Geological Correlation Programme with the project 158 (IGCP 158) *Palaeohydrological changes in the temperate zone in the last 15,000 years*<sup>2</sup>. The aim of this project is to study the climatic and the human impact on the environment of the past. The research should be based on a correlation of palaeoecological reference sites (rivers, lakes, mires). The international leaders for this project are professor Leszek Starkel, Kraków (leader of Subproject A em-

<sup>1</sup> M. Hjelmroos-Ericsson, *Holocene Development of Lake Wielkie Gacno Area, Northwestern Poland*, Lund 1981.

<sup>2</sup> *Palaeohydrological Changes in the Temperate Zone in the Last 15,000 Years. Subproject B. Lake and Mire Environments. Project Guide*, ed. B. E. Berglund; Lund 1979.

phasizing river environments) and professor Björn E. Berglund, Lund (leader of Subproject B emphasizing lake-mire environments). The national leader of Subproject B in Poland is dozent Magdalena Ralska-Jasiewiczowa, Kraków. The working plan and the first results from different lake reference sites in Poland were presented in 1982 by a team of palaeoecologists<sup>3</sup>.

The Swedish-Polish cooperation between palaeoecologists at the universities of Lund, Toruń and Gdańsk will continue in the field area of Bory Tucholskie. The ambition is to deepen the knowledge of the past environment as we will take advantage of the experience gained at Lake Wielkie Gacno as well as the archaeological investigations performed by the team of archaeologists connected to Łódź University under the leadership of dozent Jerzy Kmiecinski. Since 1982 our field work will be facilitated by the negotiation concerning a joint Polish-Swedish field centre at Białe Błoto - Suszek for archaeology and palaeoecology - officially a cooperation between the universities in Łódź and Stockholm.

#### THE FIELD STUDY AREA

From a geological and geomorphological point of view the Bory Tucholskie area is a sandy region which separates the clay-silty plain between the rivers Gwda and Brda in the west from the wide river plain of Vistula in the east (Fig. 1). The working hypothesis is that these plains have been central areas for prehistoric settlement and that during settlement expansions the marginal areas of Bory Tucholskie have been exploited. Correlations of pollen diagrams from central and marginal areas may help in tracing changes of the human impact through time according to experiences in Sweden and other areas<sup>4</sup>.

<sup>3</sup> M. Ralska-Jasiewiczowa, *Polish National contributions to IGCP 158 B*, "Acta Palaeobotanica" 1982, vol. 22/1.

<sup>4</sup> B. E. Berglund, *Vegetation and Human Influence in South Scandinavia during Prehistoric Time*, "Oikos Supplement" 1969, vol. 12.

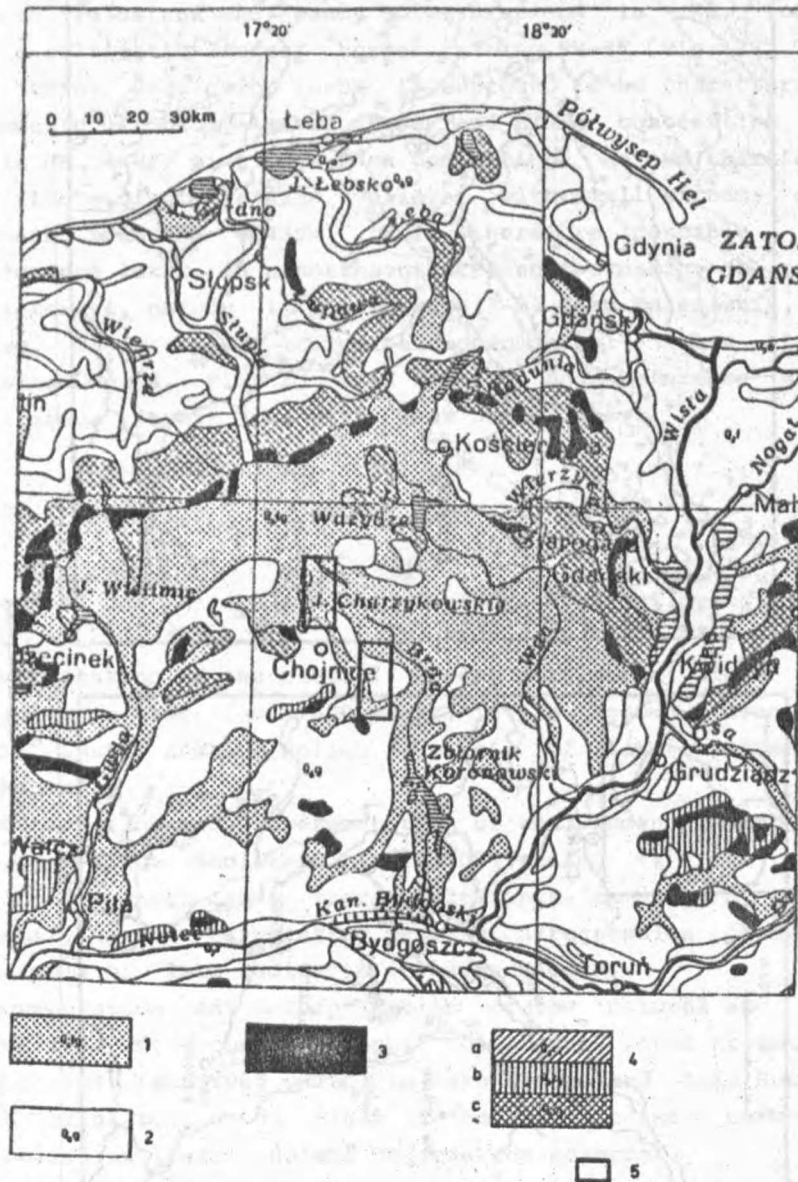


Fig. 1. Map of Quaternary deposits in central north Poland (acc. to *Geological Atlas of Poland*, ed. J. Znosko 1968)

1 - sands and gravels of fluvio-glacial accumulation; 2 - boulder clays, locally sands with boulders of glacial accumulation; 3 - boulders, gravels, sands and boulder clays of terminal-glacial accumulation of all phases; 4 - boulders, gravels, sands and boulder clays in the terminal-glacial zone of the Leszno phase (a), Poznań-Dobrzyń phase (b), and Pomeranian phase (c); 5 - investigation area

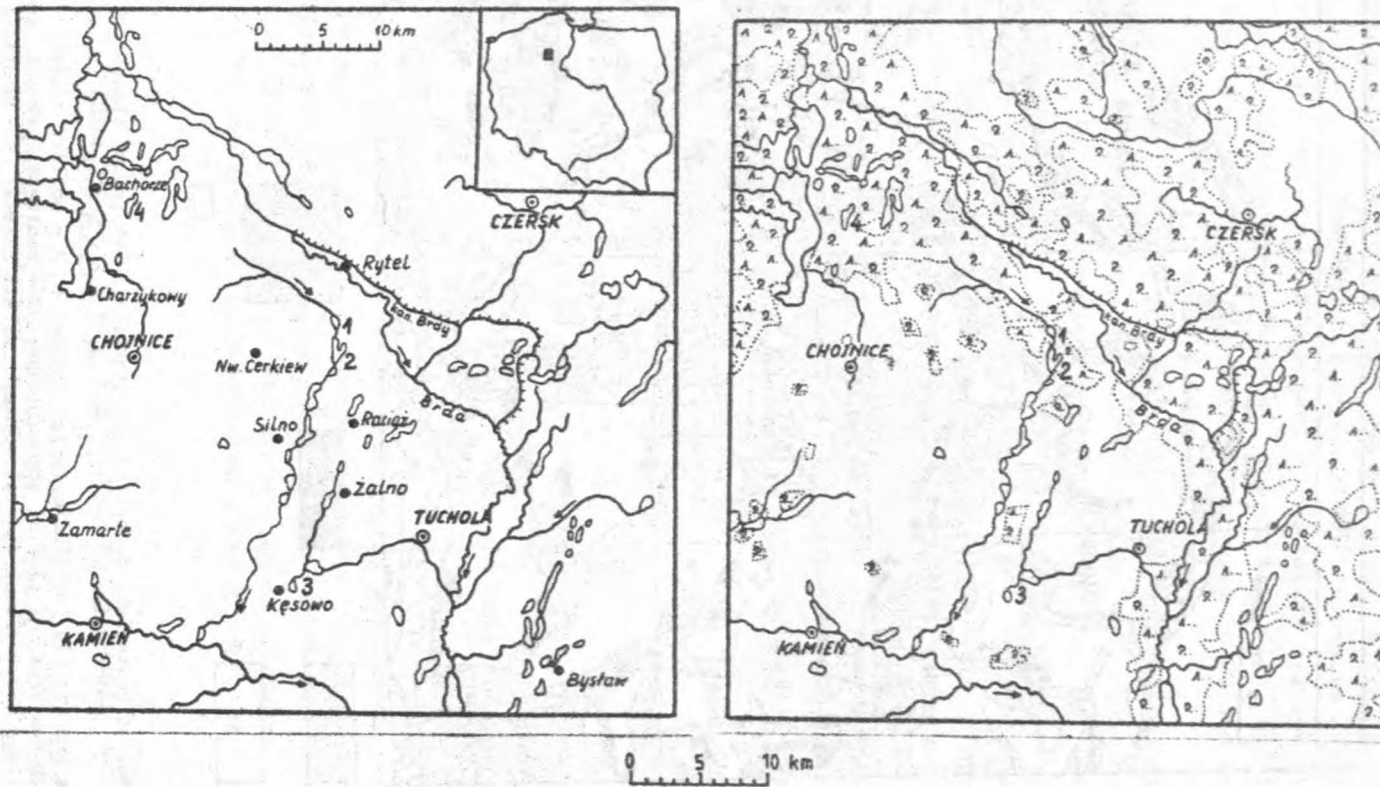


Fig. 2. Maps of the Bory Tucholskie region. The site map (left) with reference lakes indicates, the forest map (right) with forests and open land indicated

The Chojnice-Tucholskie area is a transition area between the clayey plain in SW and the sandy outwash upland in NE, today marked by a cultivation/forest border running NW-SE (Fig. 2). The potential forest vegetation in SW is supposed to be characterized by a mosaic of broad-leaved trees and pine, contrasting to the area in NE where pine has been dominating. We are therefore lucky to find ancient drainage valleys, with small streams and lakes, running from NNE to SSW. It is therefore possible to choose reference lakes in a north-south transect crossing the ecotone of interest, namely 1) Lake Suszek, 2) Lake Śpierzewnik, 3) Lake Kęsowo. Besides these three palaeoecological sites Lake Wielkie Gacno (No. 4, Fig. 2) will be used as a reference site for a coniferous forest area with weak human impact.

#### THE PROJECT AIM

The project has as its aim to elucidate the following problems:

1. Documentation of the natural forest development since Atlantic/Mesolithic time (ab. 7000 years) in the Kęsowo area as well as the Suszek area - Pollen analysis of lake sediments (Grażyna Miotk).

2. Documentation and interpretation of the human impact on the vegetation since Neolithic time (7000 years) in the same areas as above, which means tracing clearings, agriculture, grazing. Identifying and correlating expansion/regression phases - Pollen analysis of lake sediments (Grażyna Miotk).

3. Documentation and interpretation of the natural and the man-induced lake development (trophic conditions) since Atlantic/Mesolithic time (ab. 7000 years) in Lake Kęsowo and Lake Suszek - analysis of diatoms other algae in the same sediment cores as used for pollen analysis (Bożena Bogaczewicz-Adamczak).

4. Local study of the human impact in the Śpierzewnik village area by pollen analysis of the small mire pool east of Lake Suszek (Grażyna Miotk).

5. Local studies of eolic activity, i.e. natural and man-induced wind erosion in the sandy region surrounding Lake Charzy-

kowskie, N Chojnice, and relating these to the study of the general vegetation development documented in the Lake Wielkie Gacno sediments (Mervi Hjelmroos-Ericsson in collaboration with Bolesław Nowaczyk, Poznań).

6. Absolute dating of the sediment cores from the lakes mentioned above by transferring ages from the Lake Wielkie Gacno sediments (with 23 radiocarbon dates) and possibly by datings of a sediment core from the Śpierzewnik pool. This lake is non-calcareous and dystrophic, the other lakes have calcareous sediments, which are unsuitable for radiocarbon dating.

7. Correlation of man-induced palaeoecological changes - expansion phases etc. - with archaeological evidence in the Bory Tucholskie. Possibly local studies related to archaeological excavations.

8. Regional correlations of the human impact in Pommerania within the map area of Fig. 1 - correlation of palaeoecological and archaeological evidence.

Figure 3 illustrates, a synthesis of the human impact changes in the longterm perspective based on the pollen-analytical study of Lake Wielkie Gacno<sup>5</sup>. Six expansion phases have been documented since Early Neolithic time (ab. 4500 B.C. in calibrated calendar time scale) - the impact in Neolithic time was temporary and very weak (mainly grazing), but from the transition Neolithic/Bronze Age there was a more or less continuous impact of grazing and agriculture which distinctly increased in the last expansion stage beginning about 800 A.D. Such a diagram will raise many questions especially about the representativity of the expansions for a larger area. The future research will answer some of these questions.

#### FIELD STUDIES 1982

During a field week in September 1982 the three lakes at Suszek, Śpierzewnik and Kęsowo were selected for sediment sampling. The field work was performed by the authors together with Mr

<sup>5</sup> Hjelmroos-Ericsson, *Holocene Development...*

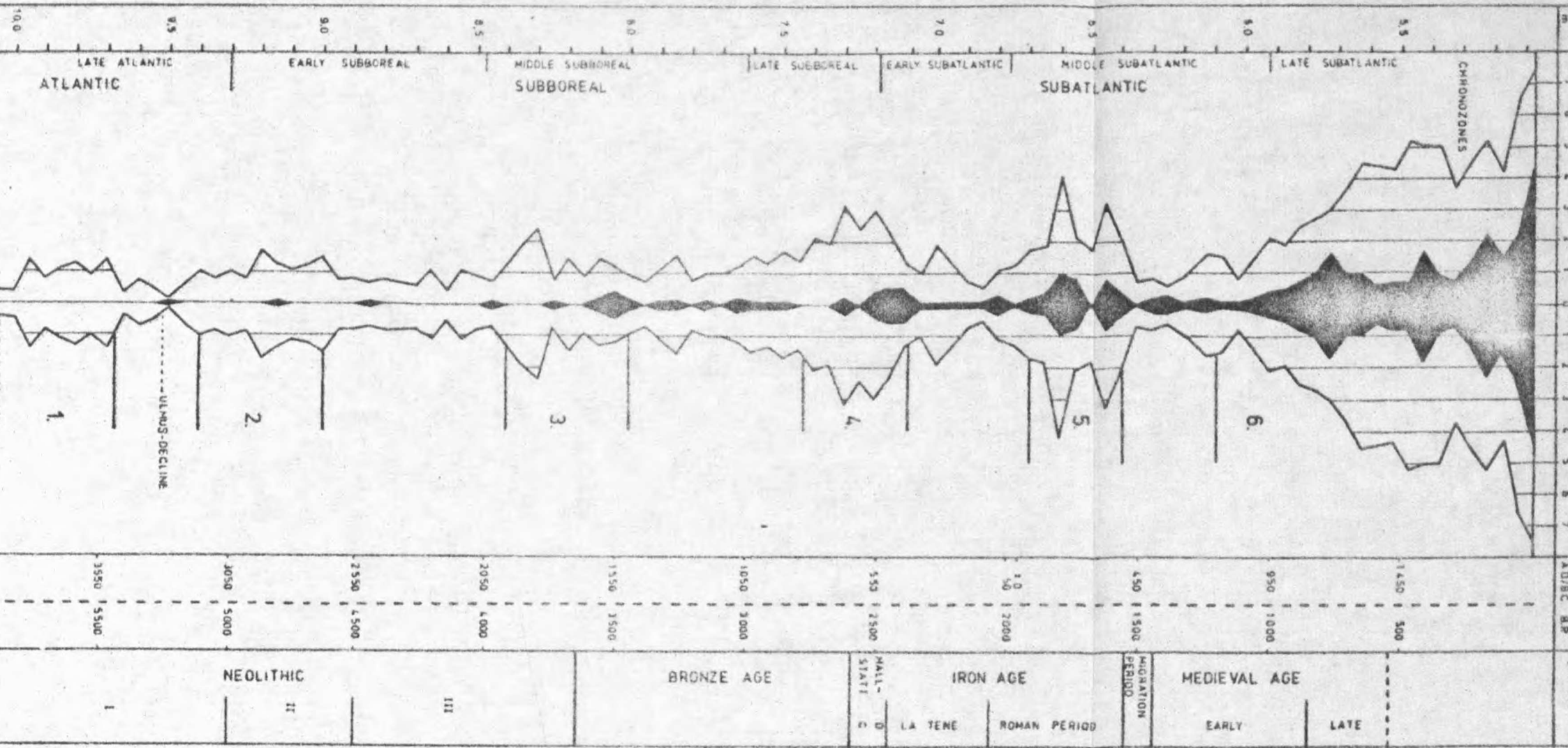


Fig. 3. Human impact diagram with local expansion phases for grazing and agriculture as they are documented by pollen analysis of Lake Wielkie Gacno sediments (Hjelmroos-Ericsson 1981)

Thomas Persson and Mr Joachim Regnell, Lund, who acted as skilful technicians. The Swedish team brought coring platform, boat and sediment samplers (piston core 50 mm diam. and Russian peat sampler 50 mm diam.) from Lund to the field area. The sediment cores were later stored at Gdańsk University. Following the program mentioned above, the laboratory analyses are concentrated to the cores from Lake Suszek and Lake Kęsowo. In the following a few notes are presented for each site.

Lake Suszek (map Fig. 4a). - Surrounded by pine woodland but in NW, S and SE also meadows and fallow fields (the waste village of Śpierzewnik situated SE of the lake). The Swedish field station is an old farm house 500 m N of the lake. Lake Suszek has not yet been mapped in detail. The lake area is ab. 10 ha and the water depth in the centre is 4 to 6 m. Coring was performed in the centre at 4,25 water depth and cores were sampled to the depth of ab. 13 m. The sediment is a fine detritus gyttja grading towards an algae gyttja downwards. Preliminary pollen analysis indicates that this sediment column covers only ab. 4000 years. Further sampling is needed.

Lake Śpierzewnik (map Fig. 4a). - Surrounded by pine woodland but in the S and SW open arable land and meadows. Ancient, Mediaeval fortress situated on the peninsula in the southern bay. The lake area is ab. 140 ha, and the maximum depth 14 m. Coring was performed in the SW bay, W of the fortress peninsula. The water depth was 3,85 m and we sampled down to 8,65 m.

The sediment is a calcareous gyttja. The sampled sediment column covers approximately 2000 years. Palaeoecological analysis may be of interest for the local landscape history. Further sampling is not planned in the near future.

Lake Kęsowo (map Fig. 4b). - Situated in an agricultural district and therefore surrounded by arable fields, meadows and small woods of deciduous trees. The lake area is ab. 24 ha and the maximum depth 7,5 m. For the coring we avoided the deepest spot and we chose the northern bay, E of the Kęsowo parish church. The water depth was 3,7 m and we sampled down to



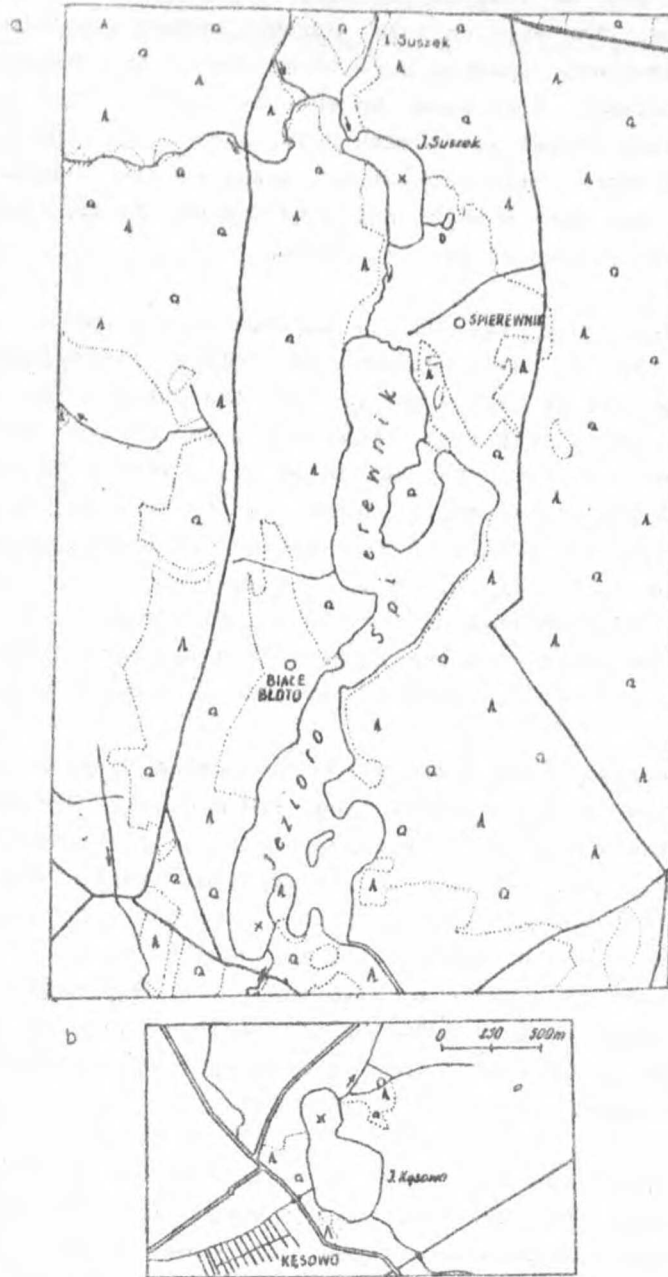


Fig. 4. The local setting of the three lakes, Lake Suszek and Lake Śpierzewnik (above), Lake Kęsowo (below). Forests and open land are indicated as well as coring points for the sediment sampling 1982

9,0 m. The sediment is a clayey, calcareous gyttja, and it is evident that agriculture erosion of the lake catchment is reflected in these sediments. Preliminary pollen analysis indicates that this sediment column covers only ab. 3000 years. Further sampling is needed.

## ACKNOWLEDGEMENTS

We would like to express our gratitude, towards the colleagues at the Biological Institute of Toruń University and its head professor Ryszard Bohr for all kinds of support during our work in Bory Tucholskie. We are also grateful to dozent Jerzy Kmiecinski and his colleagues at Białe Błoto field station for the generosity they showed us during the field season 1982.

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WPEŁYWY CZŁOWIEKA W BORACH TUCHOLSKICH  
POLSKO-SZWEDZKI PROJEKT BADAŃ PALEOBOTANICZNYCH

Autorzy zrelacjonowali problemy i wyniki wspólnych prac badawczych. Były to analizy palinologiczne, pochodzące z den wybranych jezior na obszarze Borów Tucholskich (Suszek, Kęsowo, Śpierzewnik).