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THE SETTLEMENT AND ECONOMY OF THE PYRZYCE LOWLAND IN THE PRE-ROMAN AND ROMAN IRON AGES

The article presents the results of research on the settlement of the Pyrzyce Lowland, NW Poland, in the Pre-Roman and Roman Iron Ages. The central part of this area was covered in the past by a large water body, pre-Miedwie lake, which due to natural processes and subsequent human intervention was partially drained. In order to carry out the research, 85 Pre-Roman and 305 Roman Iron Age sites were catalogued. The main method of researching the spatial organization was triangulation and subsequent polygon networking. The results of the spatial analysis were confronted with data from lake Racze's palynological profile. Thanks to this procedure information was obtained on settlement structures, population, environment and economy, as well as their changes in time. The similarities and differences between the Pre-Roman and Roman Iron Ages were then discussed. During the research a strong suggestion of settlements having been relocated according to changes of the palaeo-shoreline of pre-Miedwie lake was concluded. Also, the change from inhabiting large and stable settlements in PRIA to single, often relocating farms in RIA was registered. There were no significant changes in terms of economy, which stayed diversified during the entire PRIA and RIA periods. The changes in anthropopression were most likely linked with changes in population size, reflecting 8 distinct phases of settlement in the area.

KEY WORDS: Settlement Archaeology, Pre-Roman Iron Age, Roman Iron Age, Palynology

INTRODUCTION

The Pyrzyce Lowland is one of the most interesting research areas of West Pomerania. Favourable natural conditions attracted intense prehistoric settlement beginning in the Stone Age. Later, in the Pre-Roman (hereafter: PRIA) and Roman Iron Ages (hereafter: RIA), this region was settled by a substantial population.

The most recent research on the Pre-Roman and Roman Iron Ages in the area was published by B. Rogalski (2010; 2014; 2017). These papers, however, were focused on cultural changes and discussed neither environmental nor settlement issues. The spatial analysis of the Roman Iron Age settlement was published by the author of this paper (Chmiel-Chrzanowska 2017). Nonetheless, the research did not include the local paleoenvironment's reconstruction due to the fact that there was no relevant study at that time. Furthermore, there still is no research on PRIA and RIA settlement changes and the context of local human-environment relation. Therefore the publication of the palynological research on the area of Miedwie and Płoń Lakes (Pędziszewska *et al*. 2020) triggered our attention to this subject.

The aim of this study is to offer an overall analysis of the settlement structures in the Pre-Roman and

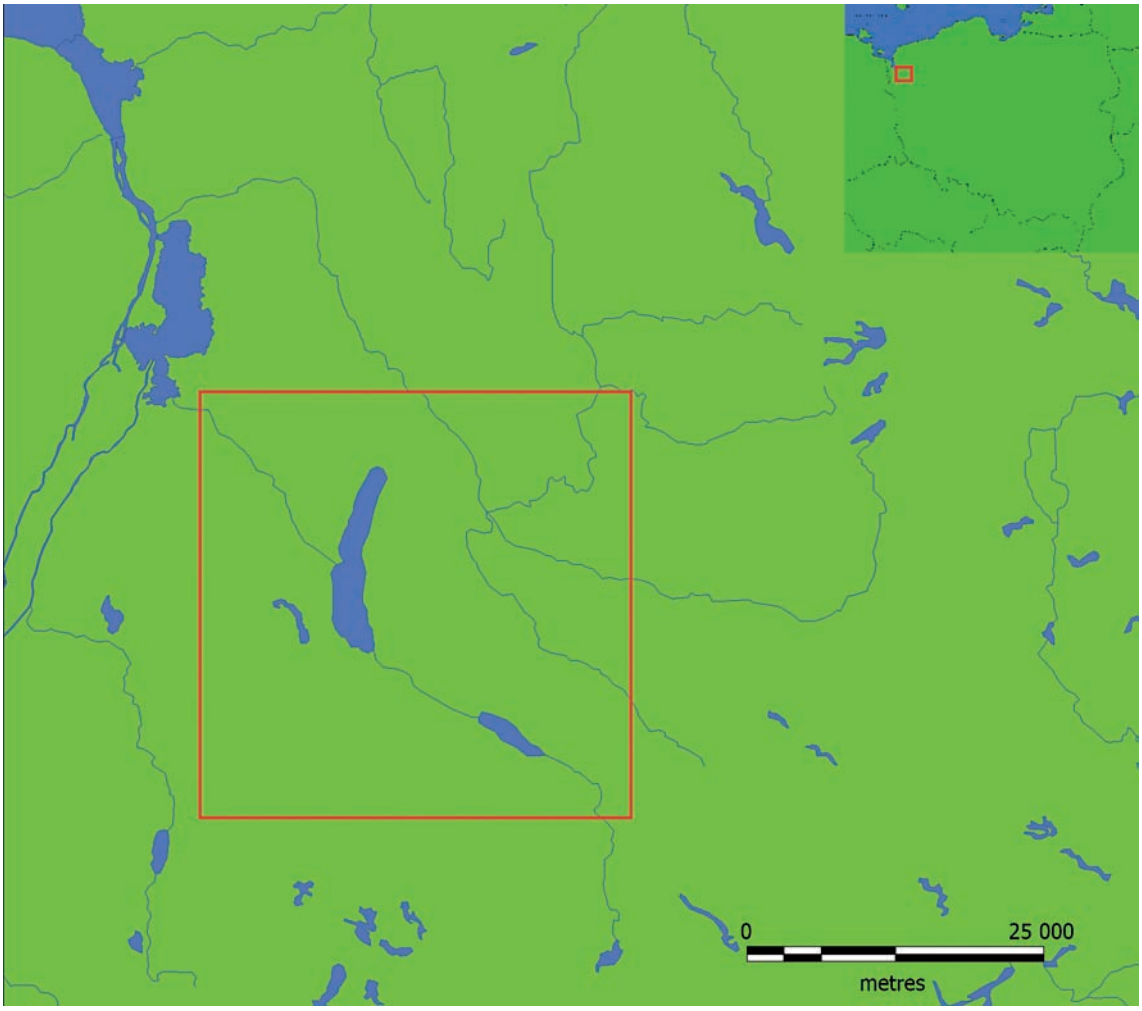

Fig. 1. Location of the research area (made by M. Chmiel-Chrzanowska)

Roman Iron Ages in the mesoregion of Miedwie and Płoń lakes, also called the Pyrzyce Lowland (fig. 1-2). The spatial structure and the relations between sites of different categories (burial site, settlement, settlement point, single find) were analyzed, which allowed us to model the settlement network. Subsequently, it was interpreted in the social and environmental contexts. The main methodology of this study is that of a comparative analysis of spatial models carried out by the authors and the palynological research published by Pędziszewska et al. (2020). Therefore both PRIA (fig. 3) and RIA (fig. 4) were analyzed in the perspective of space management, human activity, and environmental impact. The similarities and differences between the two periods were then compared and discussed.

In this context our understanding of a settlement is a system of social and territorial activities, which creates relations between humans and the surrounding world. A settlement as a process may be seen as the creation of space through specific activities typical for a given culture, related with the landscape both for the individual human being, as well as an entire society (Brück, Goldman 1999, 7-15).

ARCHAEOLOGICAL DATA

Although our paper is focused on settlement and economy, rather than on material culture, some explanation is needed. The Pyrzyce Lowland in the Pre-Roman Iron Age was settled by the Odra Group (Domański 1996, 151). Its beginning is marked by the so-called Marianowo Horizon around the 4th century BC (Rogalski 2010, 197; Dzięgielewski 2016, 39). Initially, the Jastorf Culture east of the Odra river was

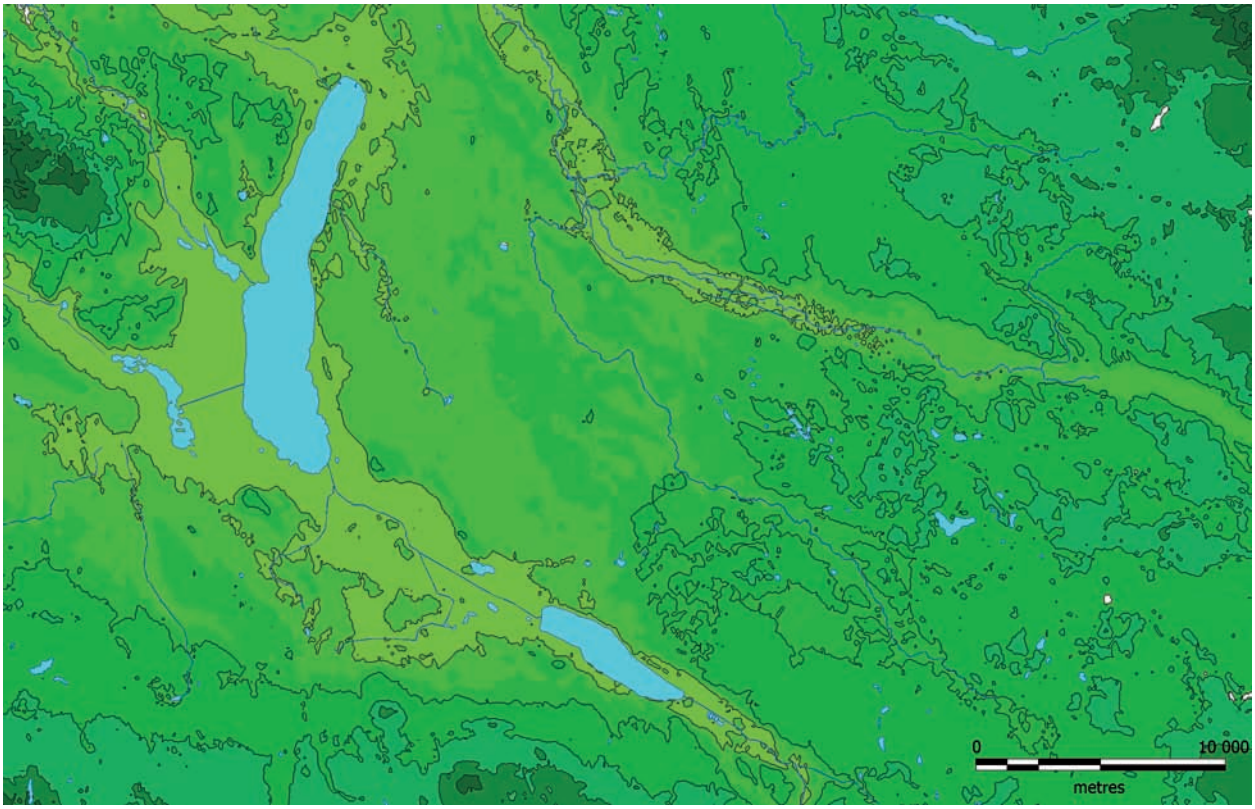

Fig. 2. Hypsometry of research area (made by M. Chmiel-Chrzanowska)

interpreted as Germanic migration from the West, however, since early 1970s it has been hypothesized that its basis was a local population adapting some stylistic patterns from western neighbours (Wołągiewicz 1970, 49-50).

The cultural image of the Pyrzyce Lowland in the Roman Iron Age is complicated due to problems with the state of research (Domański 1996, 156) and the multiculturalism of West Pomerania. In the late BCs and early ADs, West Pomerania was an arena of serious cultural and population changes. According to B. Rogalski (2014; 2017), the knowledge on cultural affinity of the Pyrzyce Lowland is scarce, but some conclusions are possible. The most important trait is somehow eclectic culture. Both R. Wołągiewicz (1970), H. Machajewski (2010), and J. Schuster (2010) claim that in terms of material culture the area was different than its neighbours, hence the name 'Pyrzyce Group' was coined. However, as B. Rogalski (2014, 13-15; 2017, 15-22) pointed out, there are clear influences of Elbe, Scandinavian, Przeworsk, and Wielbark Cultures, as seen in burial rites, ritual behaviours, buildings, and material culture style, e.g., pottery. The same traits are typical for the so-called Lubusz Group, neighbouring to the S with the research area (e.g., Machajewski 2010, 43). A strong influence of the Wielbark Culture in the Gustow Group to the N was also noted by J. Schuster (2007; 2018, 163-166), according to whom the latter unit is in fact the western province of the former. Similar mixing among neighbouring cultural groups took place in other regions of the North European Lowland. Though the causes of these events are not known, they resulted in an increased activity of the northern barbarian tribes. At the same time, the Roman conquest of Gaul and the creation of new imperial borders on the Rhine and Danube rivers caused great turmoil in Central Europe, resulting in migrations and subsequent imports of Roman-made objects to West Pomerania. The appearance of extremely rich graves in the early ADs, of the Lubieszewo Type, was another aspect of these events, one reflecting changes in social structures (Schuster 2010).

The problems with the cultural image of the research area are caused to some degree by the complicated research history (Chmiel 2013, 11-14). Although the first finds were collected in the 19th century, most of them, as well as the original documentation and archival record were lost at the end of the World War Two, when the Museum in Pyrzyce was destroyed,

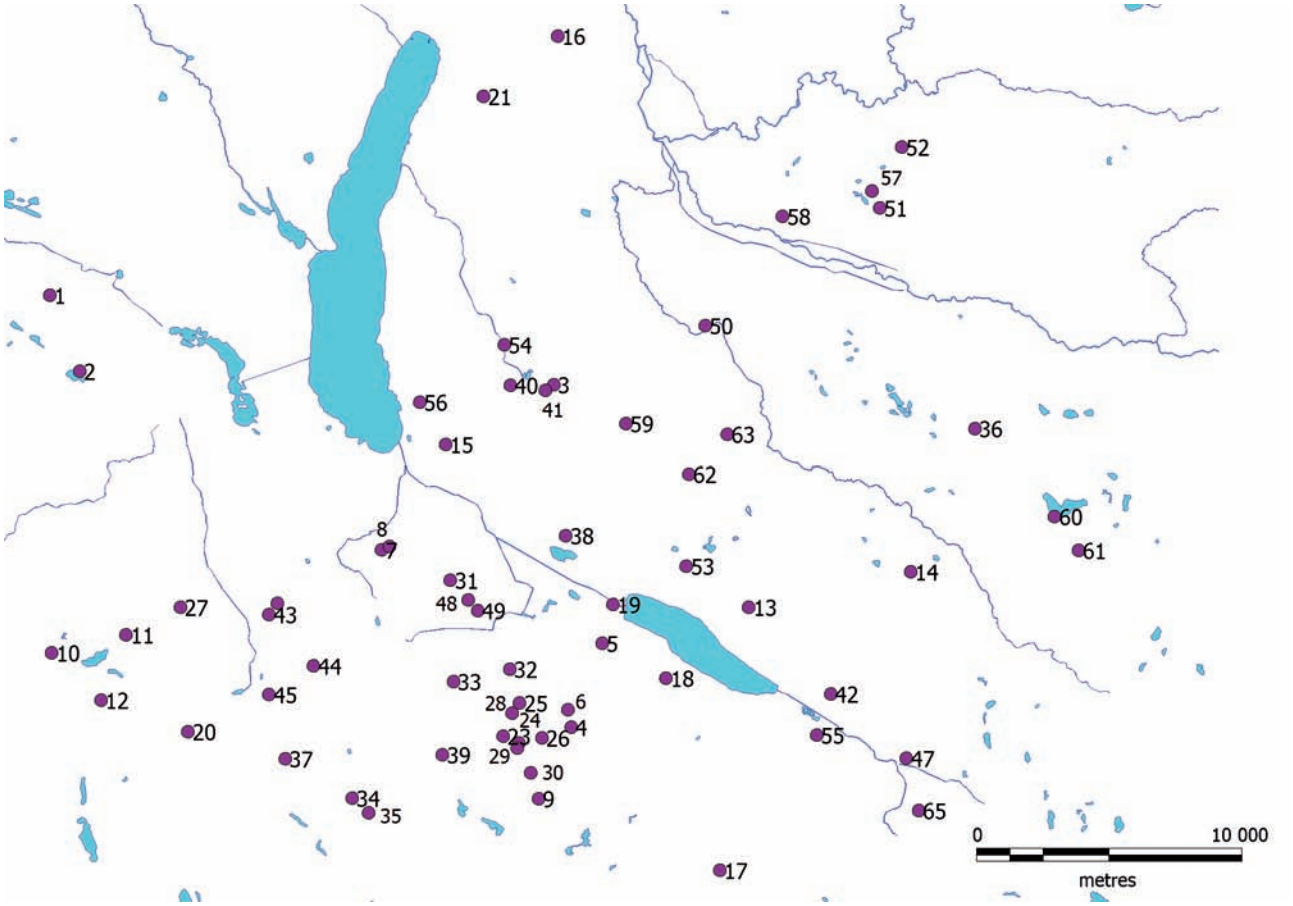

Fig. 3. Sites dated to the Pre–Roman Iron Age. Numbers contradict to Appendix 1 (made by M. Chmiel-Chrzanowska)

thus re-analysis of the old collections is impossible. There are, however, several published works containing information on PRIA and RIA on the Pyrzyce Lowland, the most important for the early stage of research being G. Dorka's 1939 monograph of the area's prehistory. Other notable works include publications by E. Walter (1889), H. Schummann (1898), E. Blume (1912), J. Kostrzewski (1919), H. J. Eggers (1959), R. Hachman (1961), R. Wołągiewicz (1959; 1963), M. D. Wołągiewicz and R. Wołągiewicz (1963), P. Krajewski (1992), H. Machajewski (2012a), J. Schuster (2010), B. Rogalski (2010; 2014; 2017), M. Chmiel (2013), and M. Chmiel-Chrzanowska (2017). Finally, supplementing data is available in the Archive of the Department of Archaeology of the National Museum in Szczecin (ADA MNS), however, it is probably incomplete due to the damage suffered during WWII. For this study we used all of the aforementioned sources.

THE TERRITORIAL AND CHRONOLOGICAL RANGE

The paper focuses on the mesoregion around two main lakes: Miedwie and Płoń. This mesoregion is defined by its geomorphology and its limits are: the Lipiany Plateau (pol. Wysoczyzna Lipiańska) on the south-west, the Choszczno Plateau (pol. Wysoczyzna Choszczeńska) on the south-east, the Stargard Plateau (pol. Wysoczyzna Stargardzka) and Ina river valley on the east, and the somewhat hard to define border with the Goleniów Plain (pol. Równina Goleniowska) on the north (Borówka 2007, 7). This area is more or less synonymous with J. Kondracki's Pyrzyce Lowland (pol. Nizina Pyrzycka), although its northern part is seen as part of the Goleniów Plain (Kondracki 2002, 52). In this paper we follow the definition of R. Borówka (2007), due to the central location of two lakes in the area based on his definition. As we see it, this definition is more fitting for settlement analysis,

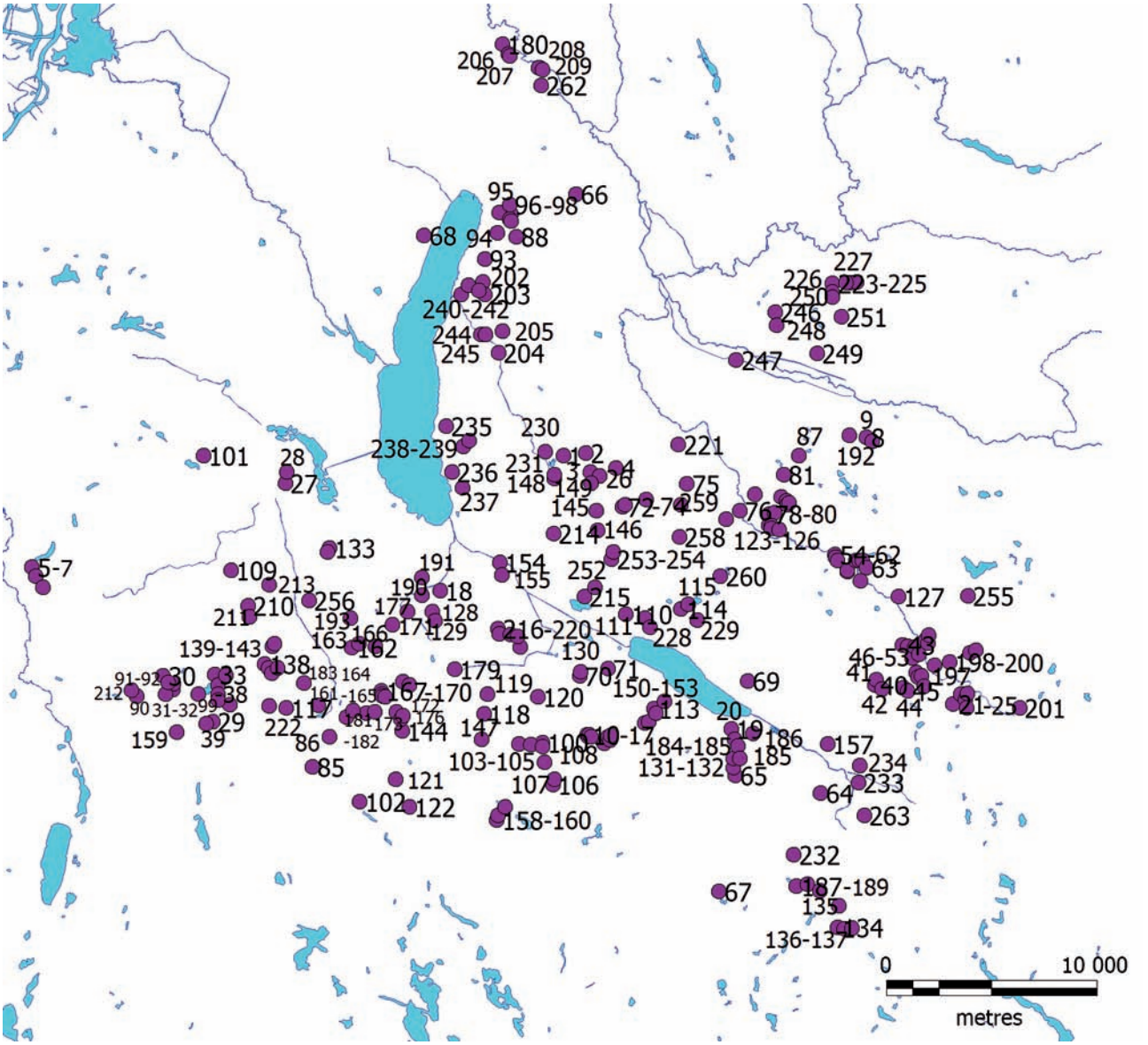

Fig. 4. Sites dated to the Roman Iron Age. Numbers contradict to Appendix 2 (made by M. Chmiel-Chrzanowska)

as the lakes were clearly focal points for prehistoric people.

It is noteworthy that the area between Lake Miedwie and Lake Płoń was flooded in the Iron Age. The two lakes were definitely separated as an outcome of the melioration works ordered by Frederick the Great of Prussia in the 18th Century (Meller 2007, 95-108). This created a mosaic of peat bogs of different types (Wołłejko *et al*. 2007, 122). Thus, Miedwie and Płoń lakes and the swamps between them must be seen as one basin for the sake of this study. It need be stressed that the exact palaeoshoreline of the lakes is still unknown, as geological data is very unclear.

Chronologically, the paper focuses on the period between the beginnings of Jastorf Culture in the PRIA up to the end of RIA and the beginning of the Migration Period (hereafter: MP). In terms of absolute dating, the research period spans from ca. 400 BC to ca. 400 AD.

RESEARCH METHODOLOGY AND DATA

In this paper, triangulation was used as the main method of spatial analysis. The results of triangulation research for the RIA were published before (Chmiel-Chrzanowska 2017). For this project, the procedure was repeated for PRIA and integrated with RIA results.

The purpose of using the triangulation method in archaeology is research on the properties of the analyzed structure. Contrary to other range methods, triangulation does not include statistical hypothesis testing or factor calculating; rather, it is a method of data visualization and interpretation. Such research is based on counting ranges between events. A correct interpolation procedure results in the creation of a graph based on ranges up to n-neighbouring event. Subsequent measurement of both underrepresented and overrepresented ranges allows the building of a Christialler's Network (Valde-Nowak 2001, 172).

The network is then applied to the structure, and the relations between the events are interpreted. However, application of triangulation to archaeological sites causes certain problems. Most importantly, the analyzed points interact with a real space, full of natural obstacles. Therefore measurements between points divided by water bodies and outside research area should be excluded. In the case of Miedwie and Płoń lakes, any measurements between points separated by the lakes should be excluded, as well as points separated by the area between the lakes. The shore effect was limited by basing the research area on the natural region.

The applied network is a visualization of the principle of least effort determining basic traits of human territoriality present on every level of the social structure (Kobyliński 1986, 8). The use of a hexagon causes more uniform values of distance between a centre and a given point on a border (Hodder, Orton 1976, 56). Although it must be pointed out that it is merely a model and each time it must be tested against both cultural and environmental contexts.

It is also important to understand that for this type of study the spatial information is essential, as every single find is evidence of human activity in a given area. Thus, we focused on human presence in space, rather than cultural divisions. For our paper we assumed that people, despite possible cultural divisions, were aware of the presence of other groups, and that their interactions would be possible to analyze on the basis of spatial analysis. Therefore we decided to treat all groups living in the Pyrzyce Lowland as a single population in an ecological sense.

The palaeoenvironmental reconstruction was based on a published fragment of the pollen profile from lake Racze (fig. 5-6). The pollen profile was originally taken and analyzed by K. Bloom and later was used and published by Pędziszewska *et al*. (2020). Its analysis and interpretation supplemented the

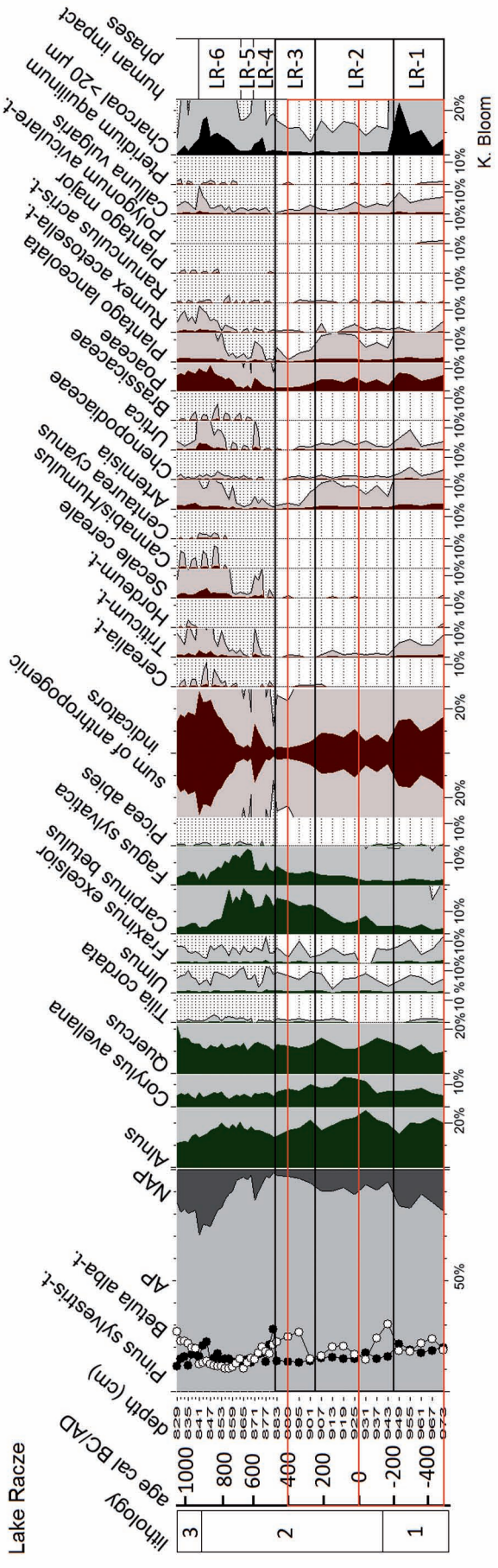

Fig. 5. Pollen profile from lake Racze (after Pędziszewska *et al*. 2020, diagram 4.2)

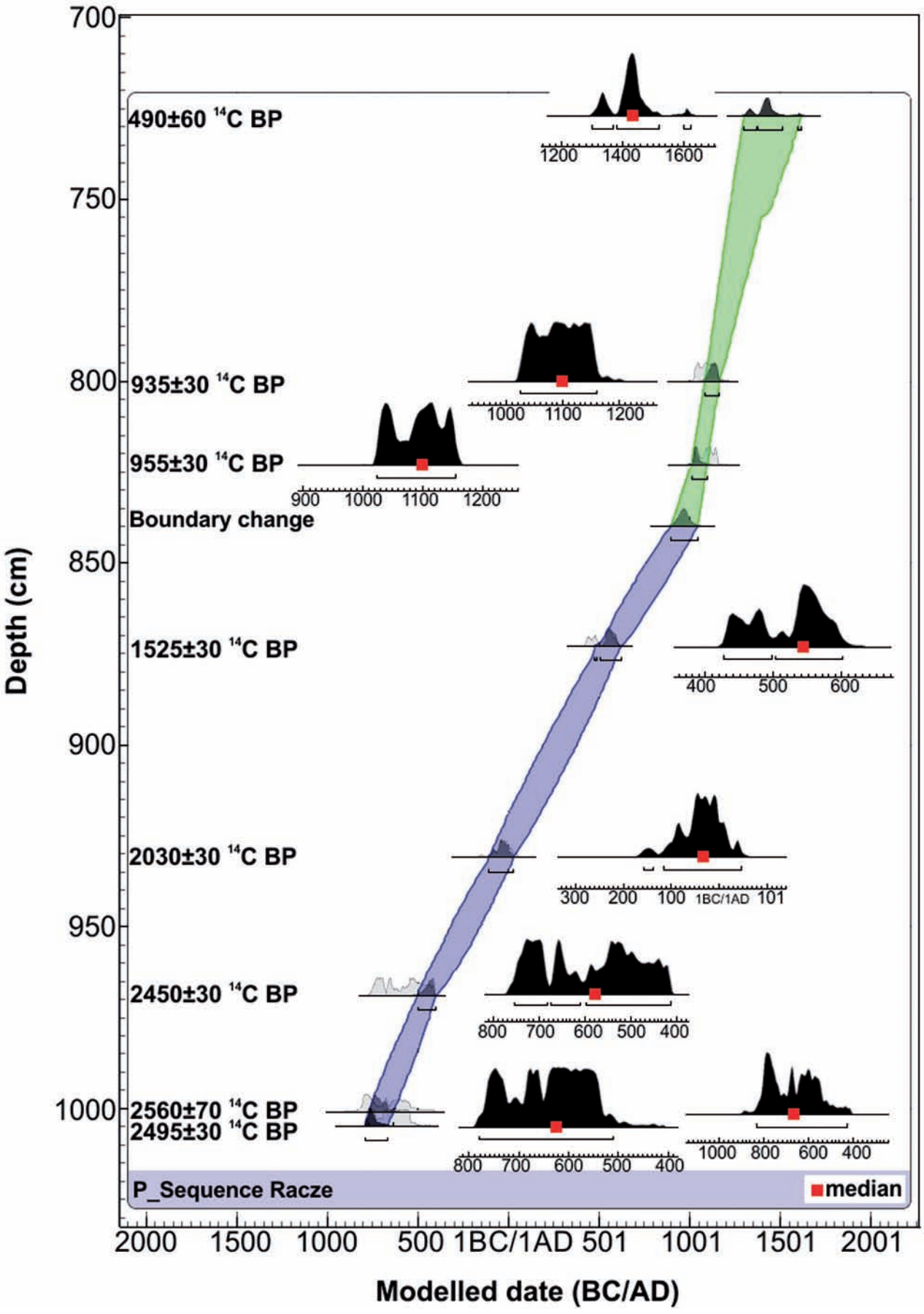

Fig. 6. Sediment graph for profile from lake Racze (after Pędziszewska *et al*. 2020, fig. 4.2)

archaeological data on PRIA and RIA in the Pyrzyce Lowland.

In modern times Racze is an independent water body, however, in the past it was part of the pre-Miedwie palaeolake. As mentioned above, the melioration of the Pyrzyce Lowland in the 18th Century resulted in the separation of the Miedwie and Płoń lakes, as well as several smaller lakes and ponds, with lake Racze among them. The sampling site is located in the NW part of the research area.

In this study both archaeological and palaeoenvironmental data were used to verify each other. Importantly, the interpretations presented by Pędziszewska *et al*. (2020) did not always fit the modern state of knowledge on archaeology around lakes Miedwie and Płoń. We critically reviewed these interpretations and then proposed our own, based on the archaeological perspective.

Overall, 85 sites included in our analysis were dated to PRIA (Appendix 1). Only 11 of them were culturally defined. Also, the number of specific categories is relevant. From the total number of 85 sites, 37 were interpreted as settlements. Notably, most of them are known only as surface collections, with only 3 sites having been excavated in the past. 19 sites were interpreted as cemeteries, though (like the settlements) they are mostly surface collections. Among other sites, 18 were catalogued as settlement points (i.e., sites of unknown function, possibly settlements or specialized production sites), 1 is a deposit, and the remaining 10 sites are stray finds or archival sites of unknown function. The main problem in this case is the low number of excavated sites, causing problems with their functional and chronological interpretation. Additionally, the bulk of sites was discovered and researched before WWII. Suffice to say, this leads to some doubts about the precision of dating and the location of the finds (Rogalski 2010, 40-113).

A total number of 305 sites used in this study were dated to RIA (Appendix 2). Among them 14 were culturally identified. In terms of function, 145 sites were identified as settlements, 30 as cemeteries, 119 as settlement points, 4 as stray finds, and 7 were archival sites of unknown function (Chmiel-Chrzanowska 2018).

Although catalogued sites are never the full number of sites functioning in prehistory, the high number of overall known points allows us to draw conclusions on the general properties of PRIA and RIA settlement structures, as well as some basic human-environment relations.

The data shows that only a fraction of sites (10%) can be dated precisely (i.e., to a phase or sub-phase of PRIA or RIA). Therefore, eliminating all non-precisely dated sites (i.e., sites dated generally to PRIA or RIA) would be a methodically questionable decision, leading to the exclusion of 90% of the catalogue. This does not however mean that analysis is impossible. Our research is about human behaviour in space. The traces are material culture remains, though their taxonomy is irrelevant. Human groups are for most of the time well aware of the presence of each other, therefore relations between them (either hostile, friendly, or neutral) should be visible in space. Additionally, in situations of the maximum exploitation of a local environment by a settlement (e.g., soil erosion), it was necessary to relocate this settlement. It is possible then, that those exploited areas were not habitable and were avoided before the full recovery of a local environment. This process could last for decades, meaning some areas were economically excluded for a long time. Because the chronological range of our study is relatively short, it is worth pointing out that the number of known settlements is not equal to the number of settlements functioning at the same time. This fact will be important for our later interpretations.

SETTLEMENT STRUCTURES AND HUMAN-ENVIRONMENT RELATIONS IN PRIA

The results of triangulation application indicate that the settlement of PRIA represents a concentrated model. Comparison with maps shows that mostly the SW part was settled, with minor shifts to the E and NE. Two types of polygons were drawn based on distance measurements, with radiuses of r = 0.75 km and r = 2.25 km respectively. The visualization of polygons drawn for settlement sites revealed 5 major settlement concentrations in the W and at least 1 in the E part of the Pyrzyce Lowland (fig. 7-8).

The polygons of the first degree (inner) are most probably related with the economical exploitation of areas around settlements. In most cases polygons of different settlements do not overlap, with only 3 exceptions. Due to the model type, data quality, and possible environmental and cultural factors, this overlapping may have various reasons, often more than one.

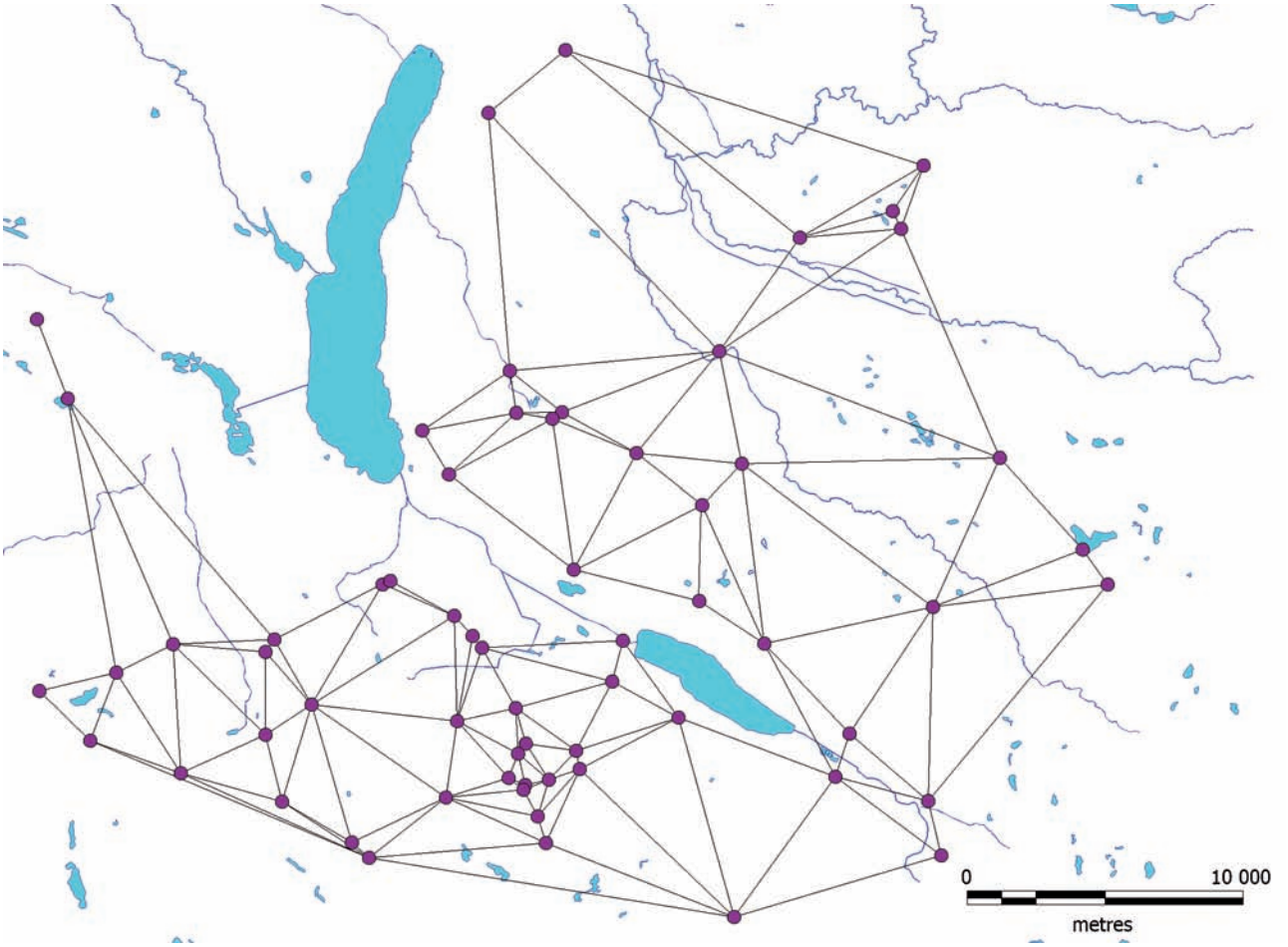

Fig. 7. Visualization of triangulation for Pre-Roman Iron Age sites (made by M. Chmiel-Chrzanowska)

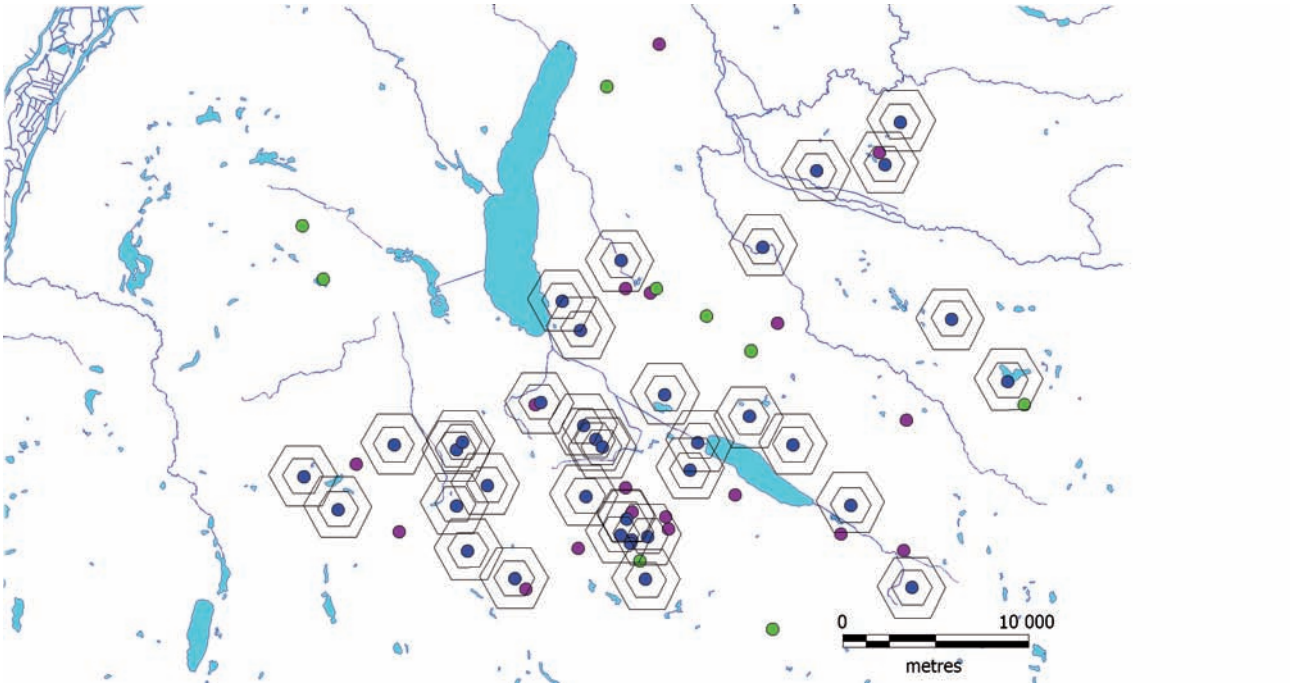

Fig. 8. Visualization of polygons for Pre-Roman Iron Age sites: blue – settlement sites, green – cemeteries, violet – settlements points and stray finds (made by M. Chmiel-Chrzanowska)

It is worth remembering this when interpreting the overlapping of polygons of sites in Letnin (sites 22, 23, 52, 54, 55), Stróżewo (sites 2, 14), and Mechowo (site 1), as well as polygons of sites Pyrzyce 52 and Rzepniewo 4. Presumably, these sites are in fact a single large settlement or a cluster of single neighbouring farms. Noteworthy, the sites are surface collections, which may have resulted in errors in location and thus incorrect registration in the AZP database. Also, a lack of knowledge on a real site range automatically generates an error equal to at least the size of a site (Bender 1981, 287). On the other hand it is possible that in this particular case it was a single settlement site with multiple settlement phases, each one resulting in the relocation of the site. From the methodological perspective, the polygons are a model depending on calculation outcome. Therefore this overlapping may be a result of a model construction method.

The polygons of the second degree (outer) are most probably the limit of a settlement's exploitation zone. They are also useful for describing possible relations with neighbouring settlements. In most cases they slightly overlap, which suggests that their limits are more or less identical with borders between settlement territories. This also suggests that fields, pastures and other zones of economic activity were adjacent to settlements.

According to the data it seems that PRIA settlements were clustered in small concentrations. Just as in the case of the first degree polygons, this is merely a model and it is influenced by incomplete data. Some general, highly probable tendencies are visible, though.

Interesting results were obtained by the comparison of settlement structure with other categories of sites. The events catalogued as settlement points are located within polygons or next to their borders. This may confirm the hypothesis of polygons being settlement exploitation zones. Interestingly, within the category of cemeteries almost all points are located outside polygons. The notable exceptions are sites Letnin 13 and Ziemomyśl 3 located within polygons and two sites in the NW part of the research area – Babin and Babin 71 – that are separated from other PRIA sites. As a general rule of PRIA in the Pyrzyce Lowland, cemeteries were located at least 2 km from settlements. Therefore the two separated burial sites in Babin are an evidence of a poor state of research in this part of the area, confirmed by a total absence of any other sites or even stray finds. It seems highly improbable that these sites for some reason are located more than 9 km from the nearest settlement.

PRIA settlements are located on heights of 20-80 AMSL, on the borders of plateaus around lakes Miedwie and Płoń. In most cases their distance to the main water bodies is less than 15 km, except for the sites Święte 7, 8, and 22 and Witkowo 10.

Most of the PRIA settlements are located on black earth soils. This was not a strict rule though, as some settlements are on the edges of the fine soil areas. The presence of fertile soils in the area may have triggered the end of the one-field system, which according to Tacitus (Germania, 26) was a predominant farming system among the Germanic people.

The sediments dated to the PRIA in lake Racze's palynological profile are represented by levels LR-1 (973-946 cm) dated to ca. 490-200 cal BC and the lower part of LR-2 (946-904 cm) dated to ca. 200 cal BC-240 cal AD (Pędziszewska *et al*. 2020, 155-157).

In level LR-1, reflecting the Pre-Roman Iron Age, the mean value of NAP is ca. 15%, of which ca. 7% are pollen grains of anthropogenic indicators. These are mostly plants typical for pastoral habitats (*Plantago lanceolata*, Poaceae) and wheat (*Triticum*-t.) among cereals (Pędziszewska *et al*. 2020, 155-157). Other common taxa include mugwort (*Artemisia*), nettle (*Urtica*), sorrel (*Rumex acetosella*-type), and Chenopodiaceae. Microcharcoals, which are also seen as an anthropogenic indicator, reached their peak in the upper part of this level (Pędziszewska *et al*. 2020, 155-157).

Among the AP taxa the authors point out the decrease of alder (*Alnus*) (Pędziszewska *et al*. 2020, 155-157). The palynological data suggest that the main type of landscape in the early PRIA was a mixed forest with an approximately equal share of pine (*Pinus*), birch (*Betula*), and alder (*Alnus*), though the curve of the latter decreased at the end of the LR-1 level. Other notable species were common hazel (*Corylus avellana*), oak (*Quercus*), elm (*Ulmus*), European ash (*Fraxinus excelsior*), European hornbeam (*Carpinus betulus*), European beech (*Fagus sylvatica*), and small-leaved lime (*Tilia cordata*), with their curves indicating minor periodic rises and falls.

In the lower part of the LR-2 level, the most significant event is the rapid fall of human impact indicators, most notably microcharcoals and cerealia. In case of pasture plants (*Plantago lanceolata*, Poaceae) the fall is less severe. Other indicator taxa (*Artemisia*, *Urtica* and *Rumex acetosella*-type) are present, their

content however is low (Pędziszewska *et al*. 2020, 157).

In the late PRIA some small changes in the forest composition occurred. As far as pine (*Pinus*) value has not changed compared to the previous period, the rise of the alder (*Alnus*) curve was noteworthy. At the beginning of this period the curve of birch (*Betula*) showed a rapid rise, followed by a fall to the previous level. Similar, though more spread out in time, was the change of the oak (*Quercus*) curve. Elm (*Ulmus*) and beech (*Fagus sylvatica*) curves are almost indifferent. Shortly before the BC/AD turn curves of hazel (*Corylus avellana*) and hornbeam (*Carpinus betulus*) rise rapidly, while ash (*Fraxinus excelsior*) curve vanishes. Norway spruce (*Picea abies*) appears episodically in the profile and lime (*Tilia cordata*) is absent in the late PRIA.

The palynological data indicate a clear division of the PRIA to early and late phases with a border around 200 cal BC. It seems possible that the changes registered in the profile included the environment as well as the settlement and its economy.

In the early PRIA palynological data suggest the presence of a developed settlement network, most probably representing Jastorf Culture. The economy of the Jastorfian population was based most probably on wheat farming and herding (Pędziszewska *et al*. 2020, 158), resulting in high values of meadow and pasture plants (e.g., *Plantago lanceolata*). The rise of the common heather (*Calluna vulgaris*) curve suggests possible silvopastoralism, i.e., grazing animals in a forest (e.g., Mitchell *et al*. 2008). The dominating landscape type was a forest with numerous small deforested areas used as economic activity zones. A mixed forest composition indicates many ecological niches were present, allowing the supplementation of farming and grazing with hunting, gathering, and fishing.

Around 200 BC some serious changes occurred, resulting in drop of human impact correlated with a significant rise of AP values. This event was preceded by a drastic rise of microcharcoal content in the sediment and resulted in rapid forest growth on part of the old fields and pastures. It seems possible that this event was not a natural one, because the observable changes in the forest composition and size are later and therefore are an effect of forest growth in the old economic activity zones. There was possibly some kind of ongoing conflict in the Pyrzyce Lowland, resulting in partial settlement destruction and subsequent depopulation. This is suggested by the peak of the microcharcoal curve, which is not accompanied by any plants growing on fire-affected land, such as common bracken (*Pteridium aquilinum*), meaning an episode of intense fire use, although limited in time and space, and is followed by a decrease of human impact indicators. This brings to mind burning villages and intense burial practices rather than forest management or creation of new fields in a slash-and-burn system.

Interestingly, after this episode came to an end the population started to rebuild, resulting in the steady increase of human impact. This phase lasted to ca. 100 cal BC and was ended by another rapid population decrease correlated with forest growth.

The population that inhabited the Pyrzyce Lowland after the episode of 200 BC most probably continued the economic patterns present in the early PRIA. Although the overall content of economy-related pollen was smaller, the composition and proportions remained similar to the earlier period. Again, the economic basis was formed by wheat farming as well as both meadow and forest herding, probably supplemented by gathering, hunting, and fishing.

To sum up, it seems that the settlement preferences in the PRIA were significantly related to environmental factors. The observed preferences might be seen as an effect of lifestyle adaptation according to preferred economic and natural conditions. Notably, similar to other regions of Pomerania (e.g., Godłowski 1983, 295), the settlement may be related to lower areas, possibly ancient shorelines of the pre-Miedwie lake.

SETTLEMENT STRUCTURES AND HUMAN-ENVIRONMENT RELATIONS IN RIA

According to the results of triangulation, the model of RIA settlement in the Pyrzyce Lowland was concentrated. The distance measurements allowed us to draw two classes of polygons with radiuses of r = 0.85 km and r = 1.6 km (fig. 9-10). In correlation with environmental data, the analysis of spatial organization added some interesting data on RIA settlement in the area.

The mapping of points shows a few dozen small settlement concentrations. The settlement in the E part seems to concentrate in lines along the rivers

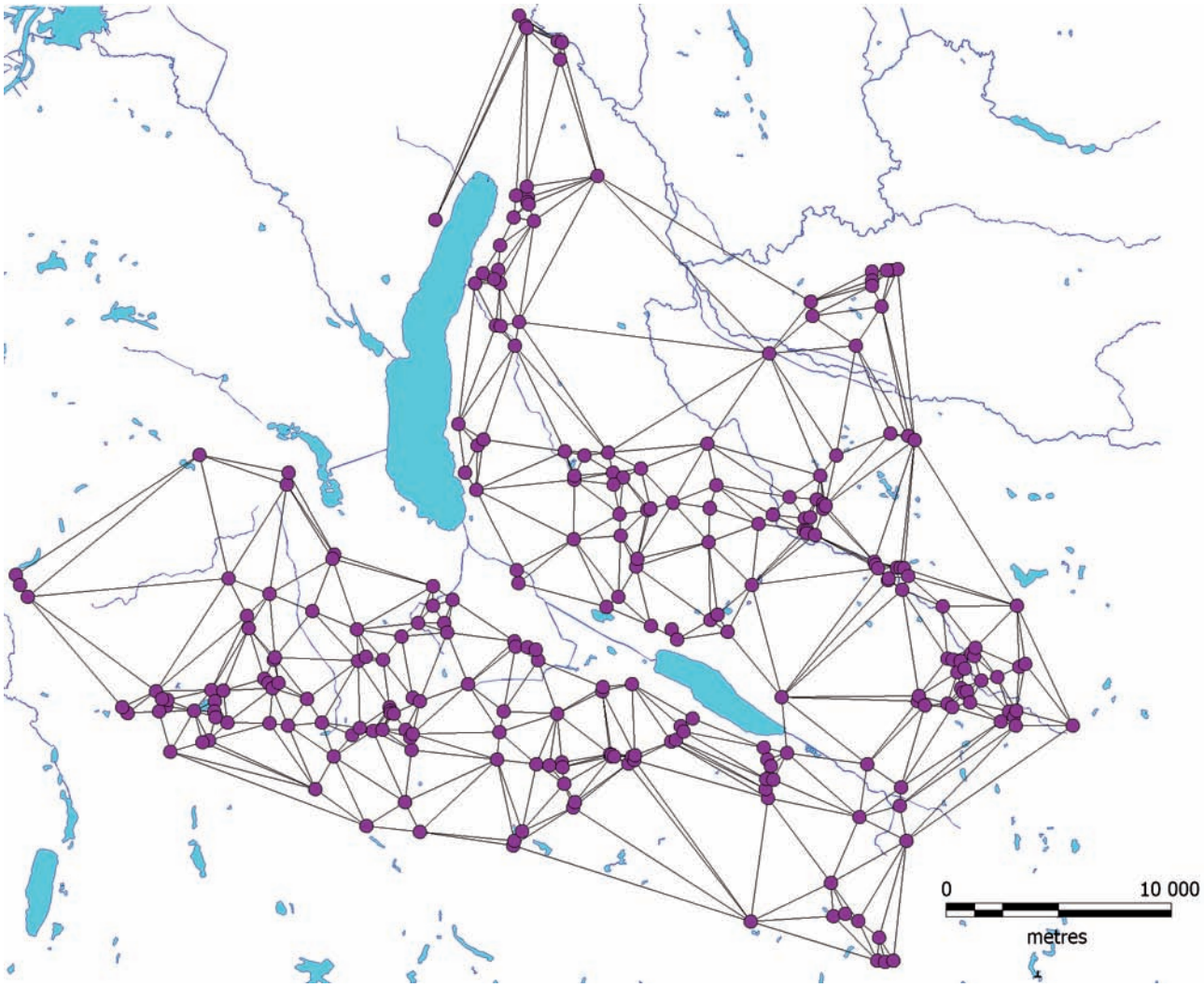

Fig. 9. Visualization of triangulation for Roman Iron Age sites (made by M. Chmiel-Chrzanowska)

and shores of lakes. In the W part it is more organized in concentrated clusters (Chmiel-Chrzanowska 2017, 16).

Interestingly, in 17 cases the inner polygons overlap. On the one hand this might be a result of surveying errors, due to the fact that the majority of sites is known as surface collections. On the other hand, several sites may in fact be a single settlement (similarly to PRIA), especially in the numerous cases when the distance between sites is less than 300 m. The errors may result from locating and mapping surface collections, as well as from incorrect description of site range. Just as in the case of PRIA, it must be pointed out that the presented model is an idealized representation. Therefore possible barriers that are non-existing in the present times might have a substantial impact on it (Chmiel-Chrzanowska 2017, 17).

An interesting phenomenon is the clustering of settlement sites, especially around the modern-day village of Święte. The distance between these sites is around 250-600 m. In terms of culture Święte 6 and 7 represent Wielbarkian, while Święte 10 is related to the Lubusz Group (Rogalski 2014). Wielbarkian sites Święte 6 and 7 are small settlements, with only 4 partially destroyed structures at site 6 (Słota, Snakowski 2009) and a single dugout house and 2 pits at site 7 (Kornas, Ostrowski 2009). Contrary, Święte 10 is a settlement site with a distinct production part, including kilns and fireplaces. These sites might be parts of a village, or more probably a set of independent neighbouring farms and hamlets inhabited at the same time (Chmiel-Chrzanowska 2017, 16-17). This model of settlement organization is common in the Pyrzyce Lowland RIA. Another notable example is that of the

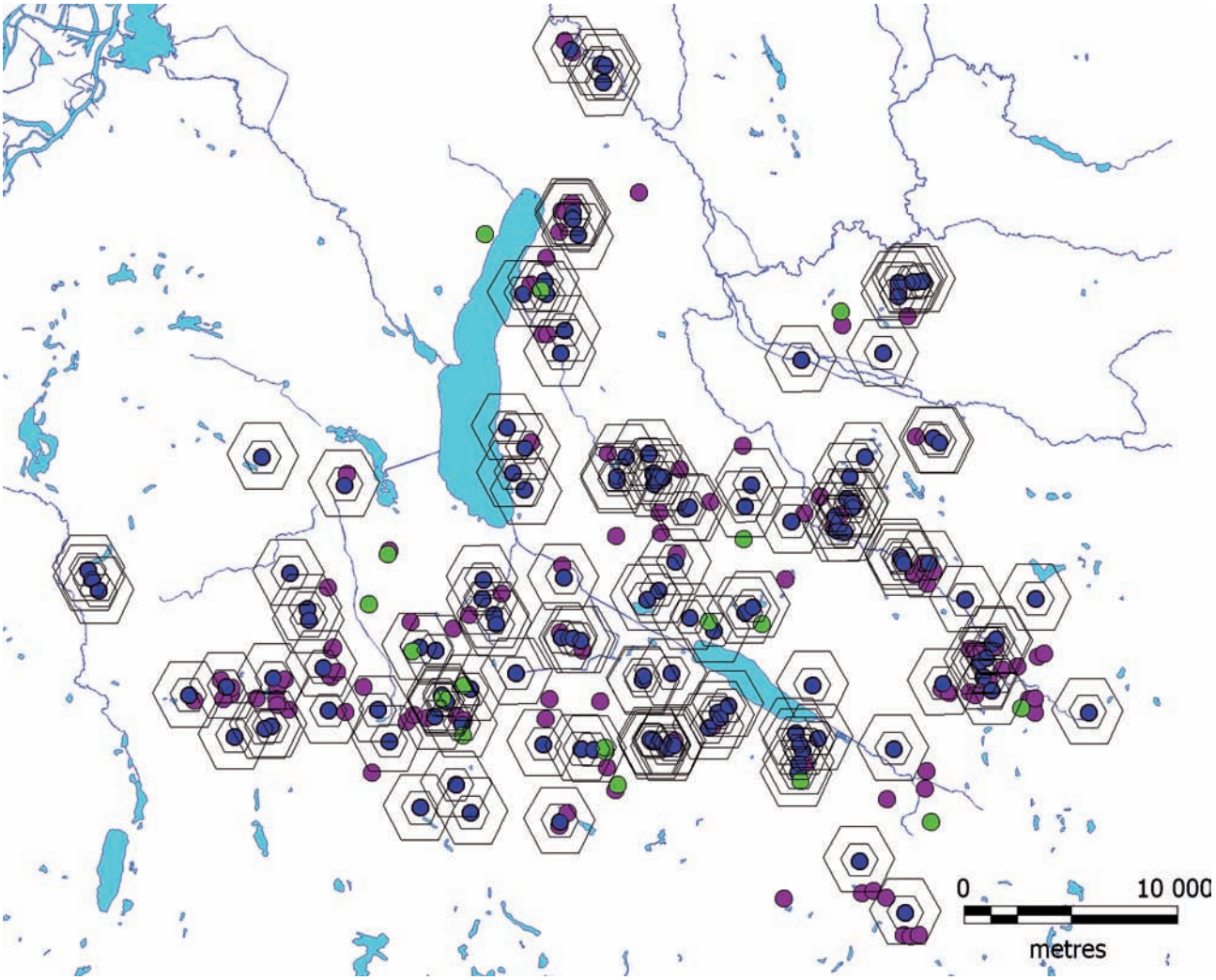

Fig. 10. Visualization of polygons for Roman Iron Age sites: blue – settlement sites, green – cemeteries, violet – settlements points and stray finds (made by M. Chmiel-Chrzanowska)

cluster containing sites Czarnowo 59, Czarnowo 63 and Parnica 6 (Pachulski, Żychliński 2009; Chmiel-Chrzanowska 2017), although in this case it may be an effect of the development of a hamlet resulting in establishing new farms nearby, and therefore a distinction between the central and filial sites (Domański 2010, 80). A similar situation was registered in Marwice on the Gorzów Plain (Pol. Równina Gorzowska), some 50 km to the south from the research area. Two sites, Marwice 5 and 13, both dated to the RIA, were separated by ca. 50 m of unused area (Machajewski 2010).

The second degree polygons (outer) should be interpreted as the limits of economic activity zones. Thus they are more or less identical with borders of settlement clusters (Chmiel-Chrzanowska 2018, 19).

During analysis, the map of settlement sites and polygons was supplemented with settlement points and stray finds (Chmiel-Chrzanowska 2017). The majority of these points was located within the polygons. This supports the hypothesis of outer polygons marking the limits of economic activity zones (Chmiel-Chrzanowska 2017, 19).

The last element of spatial analysis was adding cemeteries to the mapped systems. The results suggest that every single cemetery correspond to a few nearby settlement sites.

Similarly to PRIA, there are some cases suggesting errors in surveying. In the case of sites no. 25, 68, 69, and 101 in Pyrzyce, the settlement sites (or pottery-based surface collections, to be more specific) are clustered around a cemetery, which may be a result of a misinterpretation of materials. On the other hand, H. Machajewski pointed out that settlement of the late RIA and MP Dębczyno Group are often organized around a central space serving as a cemetery

(Machajewski 1996, 58). Unfortunately, in the case of sites in Pyrzyce the discovery circumstances are unclear. Similar doubts are present in the case of two other site clusters in Wierzchląd (sites 3 and 94) and Skalin (sites 1 and 12) (Chmiel-Chrzanowska 2017, 20).

The locations of known RIA sites do not seem to be related to the height AMSL, nor to soil quality. Both black and brown earths were settled and exploited, though the reasons for using less fertile soils were complicated. One of them may have been the importance of a herding and pastoral economy, as suggested by isotope analysis of human remains from the RIA cemetery in Rogowo (Reitsema, Kozłowski 2013). Another reason is that of the presumed supplementation of the diet with hunting, gathering, and fishing. A substantial consumption of freshwater fish was proven in the case of the Wielbarkian grave of the Bagicz Woman (Chmiel-Chrzanowska, Fetner 2020). In the case of the Pyrzyce Lowland, fish consumption may explain the tendency to settle areas close to rivers and lakes. The general model of RIA settlement is similar to that of the Dębczyno Group, and differences may be an effect of local adaptations (cf. Machajewski 1992).

Some interesting data on human impact and population size in the RIA may be concluded on the basis of palynology. The Roman Iron Age in Racze lake covers the upper part of LR-2 level (946-904 cm) dated to ca. 200 cal BC-240 cal AD and the lower part of LR-3 level (904-881 cm) dated to ca. 240-480 cal AD (Pędziszewska et al. 2020, 157).

The upper part of LR-2 resembles the early RIA. This level contains low quantities of human impact indicators, continuing the general pattern started in the late PRIA. The indicators present here are low values of *Artemisia*, *Urtica* and *Rumex acetosella*-type (Pędziszewska *et al*. 2020, 157). Values of cereals are also low, the main being wheat (*Triticum*-t.), but pollen grains of rye (*Secale*-t.) also show some periodic occurrence. Plants related to pastoral activity are also present, indicating both meadow (*Plantago lanceolata*, Poaceae), as well as forest grazing (*Calluna vulgaris*). Interestingly, their curve changes are identical.

A relative AP curve decrease that is correlated with increasing human impact is visible in comparison with the late PRIA. Some minor changes in forest composition are present. The constantly dominating AP species were pine (*Pinus*) and birch (*Betula*), however the decrease of alder (*Alnus*), oak (*Quercus*), elm (*Ulmus*) and hornbeam (*Carpinus betulus*) curves are notable. They are replaced by hazel (*Corylus avellana*), which shows a constant curve rise from ca. 100 cal BC, reaching its peak in early RIA, although it decreases severely in the same period. The curves of ash (*Fraxinus excelsior*) and beech (*Fagus sylvatica*) are also rising, and small amounts of lime (*Tilia cordata*) pollen grains are noted.

The late RIA is represented by the lower part of the LR-3 level. Its main trait is the constant decrease of human impact indicators correlated with increasing forest cover and AP values. In this period the curves of all indicators are decreasing: wheat (*Triticum*-t.), mugwort (*Artemisia*), nettle (*Urtica*), sorrel (*Rumex acetosella*-type), plantain (*Plantago lanceolata*), as well as accompanying grasses (Poaceae). The one exception is the increase of the heather (*Calluna vulgaris*) curve. Initially, the microcharcoal curve also decreases, however this trend is reversed after the first few decades and the curve rises again. Those waving values of human impact indicators may be related to the general turmoil in central and northern Europe being the result of the Marcomannic Wars.

There were some changes in the forest composition in this period. At first, a significant increase followed by a decrease of the birch (*Betula*) curve is visible, although birch and pine (*Pinus*) were still the dominating species. The curves of oak (*Quercus*), hazel (*Corylus avellana*), and alder (*Alnus*) are also decreasing. At the same time the curves of hornbeam (*Carpinus betulus*) and beech (*Fagus sylvatica*) are rising. The curves of ash (*Fraxinus excelsior*) and elm (*Ulmus*) show high values, however they are not constant over time. The presence of small amounts of lime (*Tilia cordata*) is noted.

The most important observation related with the beginning of the RIA in the Pyrzyce Lowland is the increase of the population size in the last decades of the 1st Century BC, reflected by the increase of human impact on the local environment. According to the authors of lake Racze's pollen profile, this is the effect of the immigration of settlers representing the Gustow Group (Pędziszewska *et al*. 2020, 158). However, it must be pointed out that the said population growth started in the late PRIA. Moreover, there were no serious changes in the economic model used in the Pyrzyce Lowland. The basis was wheat farming combined with both meadow and forest grazing, while the growth of the *Plantago lanceolata* curve may be interpreted as an increase of the area of meadow pastures. Therefore, if there was any immigration, the data sug-

gest a rather small group which quickly melted into the local population. This is confirmed to some degree by archaeological data (Rogalski 2014, 20).

The early RIA marks an intense growth of hazel bush, correlated with a decrease of alder and oak. This process was most probably a natural one, yet local people probably benefited from it, getting access to a substantial source of food that could be easily stored.

In the late RIA the steady decrease of the human presence is noted. This most probably means a reduction of the local population. What is important in this context is the fact that the process was long and spread out in time, lasting up to 300 years (ca. 200-500 cal AD), thus a massive, onetime emigration should be excluded. The more probable model is a gradual leaving of single families. It is worth emphasizing that the Pyrzyce Lowland was never truly abandoned, as was assumed by the Authors of the palynological research (Pędziszewska *et al*. 2020, 159). In the late RIA and MP there was still some settlement confirmed both in terms of palynology as well as archaeology (e.g., Machajewski 1996), however, the number of inhabitants was clearly lower than in previous periods.

INTERPRETATION: THE PRIA AND RIA IN THE PYRZYCE LOWLAND

The results presented on the spatial and pollen analysis by Pędziszewska *et al*. (2020) allow us to draw conclusions on the settlement, population, economy, and environment of the Pyrzyce Lowland in the PRIA and RIA.

The first issue worth discussing is the change of the settlement pattern, from big, long-lasting villages in the PRIA to relatively short-term single farms and hamlets in the RIA. The resulting outcome was the change in observed spatial distribution between the periods. This phenomenon could result from population decrease, as well as from more general cultural changes at the turn of BCs and ADs. The argument is supported by the results of palynological analysis, indicating generally lower human impact in the RIA in comparison with the PRIA. At first glance the population decrease may seem counterintuitive, as RIA sites are more numerous than PRIA sites. However, the results of spatial analysis suggest that while the RIA sites are in fact more numerous, their economic exploitation zones are significantly smaller compared to the PRIA. The calculated polygons have radiuses of 2.25 km in the PRIA and 1.6 km in the RIA. At the same time it seems probable that RIA settlements were being relocated more often than PRIA settlements. This, in combination with the generic chronology of known sites based on period distinction, generated a larger number of sites dated to the RIA despite the obviously smaller human impact registered in the pollen diagram.

As indicated by the spatial analysis, the settlement in both periods was clustered around rivers and most probably the old pre-Miedwie lake's palaeoshoreline, pointing out its changes in prehistory. An archival record undoubtedly shows lake Miedwie to have an area of ca. 7,400 ha before 1771 (the modern area is ca. 3,600 ha). The enormous size of Miedwie in the past is confirmed by the oldest medieval village locations at the height of 16.5-16.6 m AMSL, while the villages around Płoń Lake were located around 22 m AMSL (Siedlik 2007, 67-68). The location of early medieval hillforts, as well as data on watermills belonging to the monastery in Kołbacz, suggests a change of water level in Miedwie by ca. 40-50 cm between the early medieval and post-medieval period (Siedlik 2007, 70).

Unfortunately, this type of study is not available for PRIA and RIA, but we can assume that the changes during the Iron Age were substantial. The gradual lowering of the water level of the pre-Miedwie lake and subsequent drying of marshland would explain the obvious changes in the spatial distribution of settlement sites. In general terms, RIA settlement is located much closer to the modern day shores of Miedwie and Płoń lakes, as well as the Płonia River, than PRIA settlement. Therefore, some sites, especially in the RIA, may result from relocating farms and hamlets closer to the lake as the water level in the region was dropping.

The pollen profile from lake Racze (Pędziszewska *et al*. 2020) provided interesting information about the population of the Pyrzyce Lowland. The changes of human impact are clearly visible, most probably reflecting changes in the population size. Importantly, the episodes of growths and decreases form cycles, especially in the PRIA and the early RIA. They are not, however, dependent on environmental changes, preceding them slightly. Thus, it can be hypothesized that in most cases the changes in population size result from political and social events and processes, rather than environmental ones.

On the basis of the pollen profile it seems probable that there were 8 distinct phases of settlement in the Pyrzyce Lowland during the PRIA and RIA:

1. ca. 480-325 BC – decrease of human impact in relation to the previous period;
2. ca. 325-200 BC – gradual increase of human impact ended with rapid collapse;
3. ca. 200-100 BC – slow increase of human impact ended with another collapse;
4. ca. 100-50 BC – decrease of human impact;
5. ca. 50 BC-50 AD – significant increase of human impact;
6. ca. 50-100 AD – decrease of human impact;
7. ca. 100-200 AD – a period of relative stabilization, minor increase of human impact;
8. ca. 200-500 AD – slow and steady decrease of human impact.

According to this timetable there were three major episodes of rapid and intense events resulting in significant human impact decrease and reforestation, such as wars, outbreak of disease, or other political and social processes. These events took place ca. 200 BC, 100 BC, and 50 AD. The episode of ca. 200 BC could be the result of a local conflict or be related with wide migrations and cultural changes in the Vistula and Odra drainage basins, connected with supposed migration of Bastarnae and Scirii through the area of modern day Poland (Porucznik 2014; Grygiel 2015; Maciałowicz *et al*. 2017).

The causes of the episode of ca. 100 BC are also unknown, although the palynological sources suggest it was not a result of a natural environment changes. However, at the end of the 2nd century BC the tribes known as Cimbri and Teutones started the migration from their homeland located probably in Jutland. Their migration was supposedly caused by climate changes, which forced them to look for a new territory. According to archaeological sources, the first stage of this journey could take place in modern day Poland (Maciałowicz *et al*. 2017, 147-148). Of course, we are unable to say anything about mutual relations between the migrating tribes and the local population of the Pyrzyce Lowland, or even if there were any relations. The fact is that the migration of Cimbri and Teutones and a clear drop of human impact are dated similarly, and it is hypothesized that the main migration route was that of the nearby Odra river valley (Maciałowicz *et al*. 2017, 147-148).

What seems to be important in the context of the discussion on the cultural changes in the Iron Age of Pomerania, there is no visible change in economics between PRIA and RIA in the Pyrzyce Lowland. According to the human impact changes registered in the lake Racze profile (Pędziszewska *et al*. 2020) in the period of approximately 100 years between ca. 50 BC and ca. 50 AD the population was growing. The natural increase could possibly be induced by some immigration. However, if this hypothesis is correct, the immigrants most probably represented a similar culture, due to the fact that the economy shows continuous use of a similar basis.

The steady decrease of population in the late RIA and MP, suggested by a gradual drop of the human impact around ca. 200-500, is an interesting phenomenon. On the other hand, in the 2nd half of the 2nd century AD there are evidences for the presence of Scandinavian and Elbe Germanic peoples in the area, pointing to some immigration (e.g., Rogalski 2014; 2017). An example is the settlement in Czarnowo, where buildings similar to the style typical for Jutland have been found. At the same time a Scandinavian settlement appears on Wolin Island. Both the human impact drop and the presence of new cultural elements are part of serious cultural and population changes that took place in northern Europe roughly at the same time. It is hypothesized that the changes might have resulted from the Marcomannic Wars in 166-180 AD and the Third Century Crisis of the Roman Empire (Machajewski 2012a; 2012b; 2015).

As stated above, in the palynological profile from lake Racze (Pędziszewska *et al*. 2020), both environmental and cultural changes are visible. Interestingly, in most cases the cultural and social changes precede the environmental ones. This means that there were no major local climate changes (possibly due to the weakening effect of a large water body) and the observed events were related to the increase and decrease of human impact and the creation and devastation of habitats, such as forest clearing around farms or reforestation of abandoned settlements, fields, and pastures.

According to the data, some conclusions on the economy are also possible. It seems that the PRIA and RIA people were economically flexible, with basic farming and grazing, probably supplemented with hunting, gathering, and fishing.

The main crop was wheat, according to the abundance of *Triticum*-t. pollen. Probably there were several stages of field cultivation, differed by the period of fallowing, which may have resulted in the use of slash-and-burn and a two-field system, which was in use at least from the RIA (Wielowiejski 1981, 316).

It is possible that the process of adapting the two-field system started earlier in the research area due to its fertile black earth soils. The data, however, shows the contrary. In the analysis, the polygons are interpreted as areas of economic use, with the inner polygons being ploughed fields. The radiuses of these polygons are a bit smaller in the PRIA (0.75 km) than in RIA (0.85 km). The bigger fields in case of smaller RIA settlements may be explained by the two-field system, where only a half of the area is explored in a given year. On the other hand, the PRIA settlements were located in areas with generally more fertile soils, allowing for longer field exploitation before fallowing. However, some part of areas around settlements might have stayed unused for various reasons.

In case of animal breeding, it is worth mentioning that probably two different models of grazing were used. The first one was meadow grazing, resulting in increased values of some taxa, such as *Plantago lanceolata* and Poaceae. This model is widely known and often discussed (e.g., Latałowa 2007). The possible second model was forest grazing (silvopastoralism), with its distinct heather (*Calluna vulgaris*) curve increase (e.g., Mitchell *et al*. 2008). The use of this model in the past is not well known in Polish archaeology, where heather is mostly seen as a wild plant species without a clear relation with the economy. In the case of lake Racze's profile it is worth mentioning that the increases of heather curve are correlated with increases of human impact indicators, including curves of *Triticum*-t., *Plantago lanceolata,* and *Artemisia*, and not their decreases as expected in the case of the reforestation of old fields, pastures, or settlements. This means that both meadow and forest grazing were parts of the same economical system. The only serious exception is an episode of a few years around 200 AD. At this time, despite a general increase of human impact, the curve of heath decreased, which may have been related to negligible deforestation as well as the creation of new settlements, fields, and meadow pastures.

As mentioned before, most settlements are located in the vicinity of a river or a lake. It is strongly indicated that they were being relocated in step with changes of the water level in the pre-Miedwie lake. The trend to settle river banks and lake shores suggests the high importance of water resources, such as fish, shellfish, and freshwater molluscs, as well as water birds and mammals. Similarly, gathering could have been an important part of the economy. This is especially true for the previously mentioned increase of the hazel curve in the period between ca. 100 BC and ca. 100 AD. This increase was probably related to the growth of hazel bushes, though the cause and course of the process are unclear. It could be a natural one; however, it could also be human-caused or induced. This type of economy was dubbed a "tree breeding" one by L. Krzywicki (2003, 48-55) and it was based on a conscious selection and care of species seen as economically desirable, with simultaneous removal of species seen as redundant. On a large scale, a variety of similar systems were used by pre-Colombian woodland tribes of North America (e.g., Mann 2008).

What is important in the context of economy, the proportions of species seen as human indicators are more or less constant during the period discussed in this paper. This means that there were no significant economic changes between the PRIA and RIA, which in turn suggests a constant settlement of people representing similar cultures, despite obvious influxes of Wielbarkian, Scandinavian, and Elbe Germanic people seen in the material culture (Rogalski 2014; 2017). According to the data, the economy was based on diverse resources. The main reason for this diversification was most probably the reduction of the impact of possible disasters. On the other hand this image is purely hypothetical and needs to be verified with isotope research and bone analysis of animal remains from excavated settlements.

CLOSING REMARKS

The use of spatial analysis supplemented with palynological studies yielded satisfactory results. Comparison of the human impact level and population dynamics with different phenomena was especially interesting. For example, the bigger number of settlements in RIA in comparison to PRIA would suggest an increase of population, while pollen record suggests otherwise.

It is noteworthy that the known sites are just part of a real number (and in most cases these sites are surface collections and stray finds), and obviously we do not know how big that part is. This conclusion is true in particular for the NW part of the Pyrzyce Lowland, where the known sites are almost absent. This absence of sites is noted for both the PRIA and RIA, as well as the other ages. This is perhaps an effect

of the poor state of research, but also the destruction of a local museum in Pyrzyce at the end of WWII, leading to loss of materials and knowledge about the Pyrzyce Lowland's archaeology. On the other hand, as far as we know copies of a large part of the documentation and at least some artefacts from Pyrzyce Museum were stored at the National Museum in Szczecin, though the number is not great and we still do not know how complete the documentation is.

As a result of our analysis we have obtained a complex image of settlement and economy in PRIA and RIA. This image, however, can still be developed on the basis of future research, resulting from the use of both traditional (e.g., excavation), as well as modern (e.g., isotope analysis) research methods.

APPENDIX 1. SITES LOCATED IN THE PYRZYCE LOWLAND DATED TO THE PRE-ROMAN IRON AGE WITH KNOWN LOCATION

1. Babin 71; 2. Babin -; 3. Barnim 1; 4. Brzesko 17; 5. Brzesko 12; 6. Brzesko 8; 7. Brzezin 20; 8. Brzezin 17; 9. Bylice 2; 10. Czarnowo 11; 11. Czarnowo 14; 12. Czarnowo 59; 13. Dolice 106; 14. Dolice 107; 15. Grędziec 12; 16. Grzędzice 3; 17. Jesionowo 1; 18. Kluki 24; 19. Kluki 20; 20. Kozielice 7; 21. Kunowo 157; 22. Kunowo 5; 23. Letnin 22; 24. Letnin 55; 25. Letnin 20; 26. Letnin 54; 27. Letnin 40; 28. Letnin 23; 29. Letnin 52; 30. Letnin 13; 31. Mechowo 1; 32. Mechowo -; 33. Mechowo 5; 34. Mielęcin 15; 35. Mielęcin 21; 36. Moskorzyn 18; 37. Nowielin 2; 38. Nowy Przylep 4; 39. Obromino 20; 40. Obryta 3; 41. Obryta 5; 42. Przywodzie 5; 43. Pyrzyce 52; 44. Pyrzyce 67; 45. Rokity 8; 46. Rzepniewo 4; 47. Skrzany 1; 48. Stróżewo 14; 49. Stróżewo 2; 50. Strzebielewo 8; 51. Święte 22; 52. Święte 7; 53. Ukiernica -; 54. Warnica 10; 55. Warszyn 3; 56. Wierzbno 45; 57. Witkowo -; 58. Witkowo 10; 59. Wójcin 1; 60. Ziemomyśl 18; 61. Ziemomyśl 2; 62. Żalęcino 4a; 63. Żalęcino 5; 64. Żalęcino 4a; 65. Żuków 2.

APPENDIX 2. SITES LOCATED IN THE PYRZYCE LOWLAND DATED TO THE ROMAN IRON AGE WITH KNOWN LOCATION.

1. Barnim 6; 2. Barnim 3; 3. Barnim 15; 4. Barnim 4; 5. Borzym 22; 6. Borzym 23; 7. Borzym 25; 8. Bralęcin 6; 9. Bralęcin 5; 10. Brzesko 18; 11. Brzesko 5; 12. Brzesko 3; 13. Brzesko 54; 14. Brzesko 23; 15. Brzesko 20; 16. Brzesko 22; 17. Brzesko 21; 18. Brzezin 14; 19. Brzezina 11; 20. Brzezina 13; 21. Brzezina 10; 22. Brzezina 7; 23. Brzezina 6; 24. Brzezina 5; 25. Brzezina 9; 26. Burzykowo 4; 27. Chabówko 7; 28. Chabówko 6; 29. Czarnowo 59; 30. Czarnowo 32; 31. Czarnowo 35; 32. Czarnowo 11; 33. Czarnowo 29; 34. Czarnowo 19; 35. Czarnowo 28; 36. Czarnowo 43; 37. Czarnowo 5; 38. Czarnowo -; 39. Czarnowo 63; 40. Dobropole 25; 41. Dobropole 26; 42. Dobropole 24; 43. Dobropole 17; 44. Dobropole 21; 45. Dobropole 20; 46. Dobropole 16; 47. Dobropole 13; 48. Dobropole 15; 49. Dobropole 12; 50. Dobropole 10; 51. Dobropole 14; 52. Dobropole 11; 53. Dobropole 8; 54. Dolice 12; 55. Dolice 75; 56. Dolice 76; 57. Dolice 79; 58. Dolice 78; 59. Dolice 67; 60. Dolice 68; 61. Dolice 59; 62. Dolice 65; 63. Dolice 61; 64. Gardziec 18; 65. Glinna 4; 66. Grzędzice 3; 67. Jesionowo 22; 68. Jęczydół 1; 69. Karsko 5; 70. Kluki 22; 71. Kluki 21; 72. Kłęby 3; 73. Kłęby 4; 74. Kłęby 7; 75. Kolin 42; 76. Kolin 5; 77. Kolin 29; 78. Kolin 15; 79. Kolin 14; 80. Kolin 24; 81. Kolin 52; 82. Kolin 23; 83. Kolin 20; 84. Kolin 21; 85. Kozielice 16; 86. Kozielice 59; 87. Krępcewo 10; 88. Kunowo 4; 89. Kunowo 31; 90. Kunowo 19; 91. Kunowo 23; 92. Kunowo 4; 93. Kunowo 27; 94. Kunowo 12; 95. Kunowo 13; 96. Kunowo 33; 97. Kunowo 30; 98. Kunowo 29; 99. Laskówko Słowiańskie 2; 100. Letnin 12; 101. Letnin 31; 102. Letnin 28; 103. Letnin 5; 104. Letnin 59; 105. Letnin 15; 106. Letnin 2; 107. Letnin 13; 108. Letnin 11; 109. Linie 5; 110. Lubiatowo 3; 111. Lubiatowo -; 112. Lubiatowo -; 113. Lubiatowo 5; 114. Lubiatowo 28; 115. Lubiatowo 9; 116. Lubiatowo -; 117. Łozice 13; 119. Mechowo 12; 120. Mechowo 14; 121. Mechowo -; 122. Mielęcin 12; 123. Mielęcin 18; 124. Morzyca 18; 125. Morzyca 17; 126. Morzyca 16; 127. Morzyca 15; 128. Moskorzyn 12; 129. Nadarzyn 1; 130. Nadarzyn 4;

131. Nadarzyn 8; 132. Nadarzyn 7; 133. Nadarzyn 5; 134. Nieborowo 29; 135. Niepłocko 3; 136. Niepłocko 1; 137. Niepłocko 5; 138. Niepłocko 6; 139. Nowe Chrapowo 26; 140. Nowe Chrapowo 4; 141. Nowe Chrapowo 23; 142. Nowe Chrapowo 9; 143. Nowe Chrapowo 8; 144. Nowe Chrapowo 22; 145. Nowielin 4; 146. Nowy Przylep 10; 147. Nowy Przylep 8; 148. Obromino 11; 149. Obryta 23; 150. Obryta 8; 151. Oćwieka 6; 152. Oćwieka 18; 153. Oćwieka 7; 154. Oćwieka 8; 155. Okunica 3; 156. Okunica 9; 157. Parnica 6; 158. Przywodzie 20; 159. Pstrowice 13; 160. Pstrowice 12; 161. Pstrowice 34; 162. Pyrzyce 16; 163. Pyrzyce 17; 164. Pyrzyce 55; 165. Pyrzyce 41; 166. Pyrzyce 42; 167. Pyrzyce 60; 168. Pyrzyce 25; 169. Pyrzyce -; 170. Pyrzyce 68; 171. Pyrzyce 69; 172. Pyrzyce 101; 173. Pyrzyce 78; 174. Pyrzyce 79; 175. Pyrzyce -; 176. Pyrzyce -; 177. Pyrzyce 80; 178. Pyrzyce 10; 179. Pyrzyce 16a; 180. Pyrzyce 124; 181. Rogowo 1; 182. Rokity 8; 183. Rokity 7; 184. Rosiny 7; 185. Rosiny 5; 186. Rosiny 4; 187. Rosiny 12; 188. Równo 1; 189. Równo 3; 190. Równo 5; 191. Ryszewko 18; 192. Ryszewko 8; 193. Rzeplino 20; 194. Rzepniewo 19; 195. Sądów 41; 196. Sądów 40; 197. Sądów 42; 198. Sądów 35; 199. Sądów 36; 200. Sądów 33; 201. Sądów 21; 202. Sądów 13; 203. Skalin 13; 204. Skalin 1; 205. Słotnica 9; 206. Słotnica 3; 207. Smogolice 5; 208. Smogolice 6; 209. Smogolice 18; 210. Smogolice 19; 211. Stare Chrapowo 43; 212. Stare Chrapowo 45; 213. Stare Czarnowo 35; 214. Stare Czarnowo -; 215. Stary Przylep 4; 216. Stary Przylep 10; 217. Stróżewo 21; 218. Stróżewo 19; 219. Stróżewo 16; 220. Stróżewo 6; 221. Stróżewo 9; 222. Strzebielewo 16; 222. Swochowo 1; 224. Święte 10; 225. Święte 7; 226. Święte 6; 227. Święte 15; 228. Święte 8; 229. Ukiernica 16; 230. Ukiernica 3; 231. Warnica 19; 232. Warnica 15; 233. Warszyn 8; 234. Warszyn 7; 235. Warszyn 4; 236. Wierzbno 16; 237. Wierzbno 13; 238. Wierzbno 54; 239. Wierzbno 34; 240. Wierzbno 33; 241. Wierzchląd 3; 242. Wierzchląd 1; 243. Wierzchląd -; 244. Wierzchląd -; 245. Wierzchląd 14; 246. Wierzchląd 15; 247. Witkowo 22; 248. Witkowo 34; 249. Witkowo 2; 250. Witkowo 15; 251. Witkowo 11; 252. Witkowo -; 253. Zaborsko 14; 254. Zaborsko 20; 255. Zaborsko 4; 256. Ziemomyśl 11; 257. Żabów 6; 258. Żabów 7; 259. Żalęcino 4; 260. Żalęcino 35; 261. Żalęcino 8; 262. Żalęcino 30; 263. Żarowo 5; 264. Żuków -.

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