

## KRYSTYNA BAŁAGA

## TYPE REGION P-m: LUBLIN POLESIE

The easternmost region of the belt of central-Polish lowlands is at the same time the western area of Polesie (USSR), which is the land of lakes and mires, formed at the margin of continental platform of Eastern Europe, far beyond the limits of maximum extent of Vistulian ice-sheet.

Situation: 22°35'E longitude, 51°10'—52°10' N latitude.

Altitude: 140—200 m a.s.l.

Climate: a rather upland type of climate, with high continentality, e.g. yearly temperature amplitudes 22—23°C; mean January temperatures —2.0——2.4°C, mean July Temperatures 19.4—19.6°C, mean annual temperatures 8.0—8.4°C; westerly winds prevailing; mean annual rainfall 480—560 mm; growing season 211 days.

Geology: Pre-Quaternary surface built of Jurassic and Cretaceous limestones and marls, Tertiary sands and mudstones; in the lowering of Bug River carboniferous deposits are exploited as coal-mines. Quaternary cover originating mainly from the Middle-Polish glaciation, covered locally by thin layers of Vistulian sands and lacustrine muds. Holocene muds and fluvial sands flood plains in the river valleys; sands, lacustrine muds and peats fill extensive depressions.

Topography: denudation and accumulation plains, with sand and gravel hills; landscape formed by karst processes of different age, sink-holes filled by numerous lakes and peat-bogs. Morainic hills and outwash plains originating from Middle-Polish glaciation.

Soils: podsols formed on sandy subsoil prevail; small areas of brown soils and rendzinas; bog and marsh soils in river valleys and depressions.

Vegetation: ca. 50% of land surface occupied by lakes and mires of very differentiated types and trophy; eutrophic lakes and fens are dominant. Raised bogs and dystrophic lakes less frequent. Around 90% of forests are pine forests (*Peucedano-Pinetum*, *Cladonio-rangiferinae-Pinetum*, and *Vaccinio uliginosi-Pinetum*); on more fertile soils *Pino-Quercetum*, small areas of mixed deciduous forests (*Tilio-Carpinetum*, *Ficario-Ulmetum*) along the rivers and *Carici elongatae-Alnetum* around the lakes.

Population: 38.7 inhabitants/km<sup>2</sup>.

Land use: rye, oat, potatoes, buckwheat are main crops, forests ca. 21%, cultivated land 38%.

Reference site: Lake Łukcze (163 m a.s.l.) (Bałaga 1982), lake area 56.5 ha, max. depth 8.9 m, eutrophic lake without outlet (Fig. 1).

Age range: 12 800—0 B.P.; 10 <sup>14</sup>C dates.

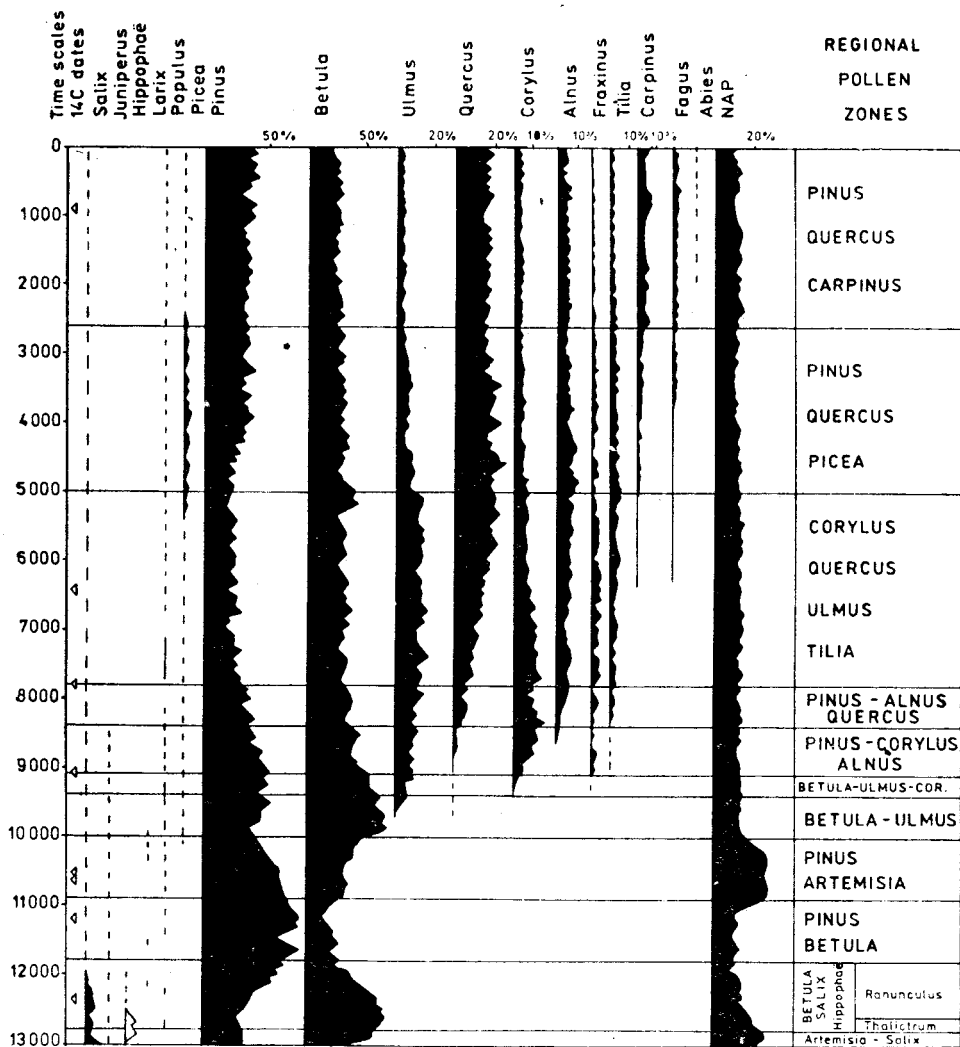
11 regional pollen assemblage zones and 2 regional subzones:

Ł-0 12800 B.P.

*Artemisia-Salix Hippophaë-Ranunculus*

Ł-1a 12800±12600 B.P.

## Lake Łukcze P-9



anal. K. Bataga

Fig. 1

Ł-1b	12600 ± 11800	B.P.
Ł-2	11800—10900	B.P.
Ł-3	10900—10000	B.P.
Ł-4	10000—9400	B.P.
Ł-5	9400—99100	B.P.
Ł-6	9100—8400	B.P.
Ł-7	8400—7800	B.P.
Ł-8	7800 ± 5000	B.P.
Ł-9	5000—2600	B.P.
Ł-10	2600 ± 0	B.P.

*Betula-Salix Hippophaë-Thalictrum*  
*Pinus-Betula*  
*Pinus-Artemisia*  
*Betula-Ulmus*  
*Betula-Ulmus-Corylus*  
*Pinus-Corylus-Alnus*  
*Pinus-Alnus-Quercus*  
*Corylus-Quercus-Ulmus-Tilia*  
*Pinus-Quercus-Picea*  
*Pinus-Quercus-Carpinus*

## DISCUSSION

1. Regional vegetation (Bałaga 1982, Bałaga et al. 1983): till 12800 B.P. an open landscape with willow shrubs. The steppe-like vegetation with *Artemisia*, *Chenopodiaceae*, *Ranunculus* and *Helianthemum* developed on dry and sandy soils.

12 800±11 800 B.P. northward shifting of the tree limit. Open birch forests developed, and reached maximum of their expansion around 12 330±160 years B.P. The areas of steppe-like communities on the sandy habitats, in which *Hippophaë* played a considerable role, were reduced.

11 800 to 10 900 B.P. — *Pinus* dominance in this area, with no significant division into the older part with *Betula* prevailing and the younger one with *Pinus*.

10 900—10 000 B.P. — park landscape with dominating heliophilous communities. Replacement of forests by expanding herb communities indicates deterioration of climatic conditions.

10 000—9400 B.P. — *Betula* forests prevails on more wet areas while *Pinus* covered the sandy places. The characteristic feature for this area is an early appearance of *Ulmus* connected with the migration of this tree from S and SE.

9400—9100 B.P. — *Pinus-Betula* forests with *Ulmus* were dominant. *Corylus* appeared on more sunny spots as well as at the margin of the forests. *Quercus* and *Fraxinus* played an insignificant role.

9100—8400 B.P. — *Pinus-Betula* forests were still prevailing with increasing part of hazel. The values of the latter are relatively low, typical for the poor soils occupied by pine forests. The contribution of other thermophilous species increased.

The characteristic feature of the interval from 8400 to 7800 B.P. is restriction of the hazel communities owing to encroachment of deciduous trees, particularly of *Quercus*.

The maximum development of mixed deciduous forests has occurred between 7800 and 5000 B.P. An early appearance of *Carpinus* and *Fagus* dated ca. 6400 B.P. is the phenomenon characteristic for the SE part of Poland, however the contribution of those trees in the forests was insignificant. The regular appearance of *Viscum* and sporadic of *Hedera* since ca. 7800 B.P. points out more continental climate. *Plantago lanceolata* and *Cerealia* pollen grains indicate the beginning of changes in the natural vegetation caused by human activity.

Since ca. 5000 years B.P. a gradual decline of *Corylus* and *Ulmus* role in the forest communities is recorded. Coincidentally, *Carpinus* was gaining larger and larger part in deciduous forests. Mixed and pine forests on heavier soils comprised also *Picea*. At present, spruce on the Polesie area occurs only in small patches of *Querco-Piceetum* and as admixture in typical swamp alderwood.

The period 2600—0 B.P. was characterized by the optimum development of hornbeam on this area, however, its values are lower than in other lowland regions what is most likely connected with edaphic conditions. Pine and mixed forests were dominating communities. Hornbeam and oak with addition of beech occurring locally replaced elm and linden in deciduous forests. The occurrence of fir was most likely limited to the northern area of Polesie where rare localities of fir and beech occur recently.

First, uncertain traces of human activities found at ca. 6400 years B.P., might be connected with the penetrations of the Neolithic tribes moving northward, along the Vistula valley. The next culture indicators appeared at ca. 5000 B.P., simultaneously with *Ulmus* decline. The indicators of animal husbandry prevail here.

2. Hydrology and climate (Fig. 2): at the beginning of the Late Glacial, on the area of Polesie there were small water pools in which silt sediments with admixture

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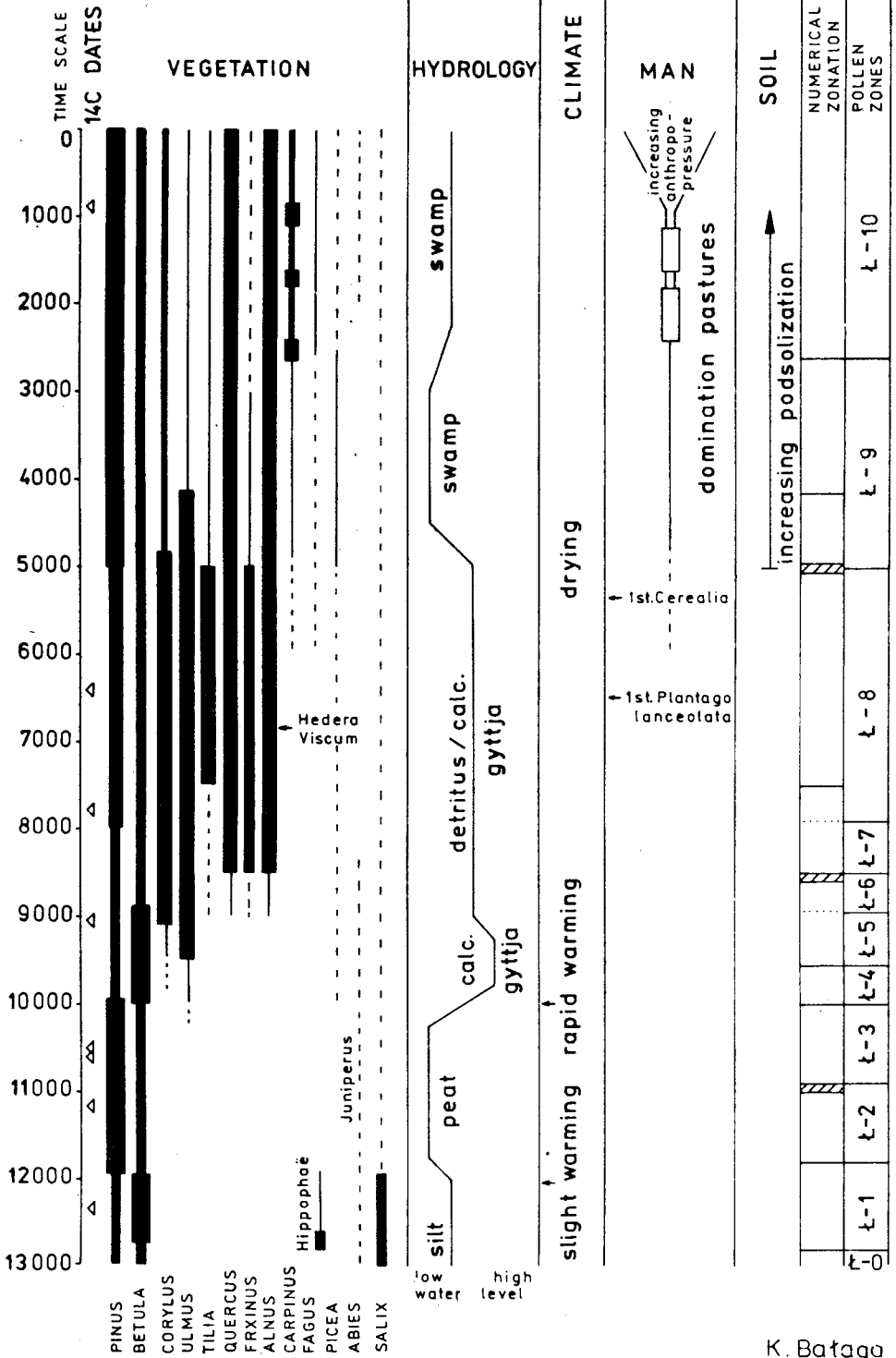


Fig. 2

K. Bataga

of organic matter were deposited. The occurrence of the depressions without outlet in the relief at the base of the organogenic sediments is connected on this area either with the degradation of permafrost or with karst phenomena. In case of studied sites it can be supposed that the basins originated from permafrost degradation, for they were very shallow and as early as the beginning of Allerød they started to become overgrown and during the Allerød and Younger Dryas periods they existed as mires (Łukcze L., Krowie Bagno).

The climatic oscillation corresponding to the Older Dryas has not been recorded in the pollen diagrams. The vegetational succession from Bølling to Allerød indicates progressive warming. The relatively rare *Juniperus* with coincidentally abundant *Artemisia* during the time span 10 900—10 000 B.P. of this part of the country was dry and continental.

Since ca. 10 000 B.P. the deepening of basins and development of lakes have progressed — the sedge-moss peats are overlaid by detritus and detritus-calcareous gyttjas (Łukcze L., Krowie Bagno). Evident overgrowing of the Łukcze lake in the younger part of the Preboreal period, connected with the lowering of water table, can indicate drier climate with lower precipitation. The lack of deposits representing the time span between 5000 and 3000 B.P. in the peat profiles from Łukcze Lake margins is probably caused by the lowering of the water table as well as by reduction of accumulation process. At the same time the Krowie Bagno Lake was shallowing and overgrown: calcareous-detritus gyttja is overlaid by *Carex-Phragmites* peat.

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