THE TEXTURAL AND STRUCTURAL FEATURES OF TOP RIVER TERRACE OF THE LUBSZA VALLEY

*CEZARY TOMCZYK**

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Research area includes the section of Lubsza river from springs in Żarskie Hills to Głogów-Baruth ice-marginal valley. That southern part of valley is located beyond the reach of Leszno phase of Würm glaciation. The major aim of this paper is to present structural and textural features of rivers terrace sediments and an attempt to reconstruct a characteristics of fluvial environment capable to from them. Lithofacial analysis proposed by ZIELIŃSKI (1998) was used for distinction of fluvial formations sets. Investigations were carried out on the top terrace level, which is at the same time the most visible element of area morphology. According to preliminary research, sediments that build river terrace were probably deposited in environment characteristic for braided river with sandy bed.

Key words: river terrace; lithofacial analysis

1 INTRODUCTION

River valleys are the inseparable element of Polish landscape. Present form of valleys is a result of complex geological and geomorphological processes, which took place in the past. One of the most significant impact on formation of river network had several transgressions of Scandinavian Ice Sheet, which occupied Polish Lowlands. River systems were constantly transformed during periods of glacial stagnation and recession as a result of variations in climatic conditions, what in the same time entailed hydrological changes.

The Lubsza Valley located on Wielkopolska Lowland is a good example of river valley formed and modified by presence of an ice sheet. The southern part of valley, in some parts deeply incised into moraine plateau is an important component of landscape morphology. (**Fig. 1**). On the other hand several, well-developed and highly deposited terrace levels, which were exposed to various fluvial processes, are also characteristic for that valley section.

2 THE AIM AND METHODS OF RESEARCH

The primary aim of this paper is a recognition of sediments forming river terrace and an attempt to indicate sedimentary processes responsible for formation of these deposits. Lithofacial analysis served as a key in distinction of fluvial formation sets, and lithofacial code proposed by ZIELIŃSKI (1998) were used in lithological description. Mentioned code is essential for detailed explanation of sedimentary subenvironments. The strongest pressure during deposits' characterization was paid by Author on structural features. Investigation included terrace level, with diverse width (200 – 300 meters), which is visible both on right and left riversides. Field work consisted in the determination of geomorphological situation of particular field sites; allocation basic sediment sets, and afterwards determination of their structural features. Directions of paleocurrents were measured (dip and strike of sandy laminaes). Next step was an investigation of the manner of sediment stratification and common spatial relations between particular lithofacies. Laboratory works were carried out to describe basic textural features. Granulation analysis was made by use of sieving method and quartz grain processing (diameter 1.0 – 0.8 mm) was determined by dint of graniformameter constructed by B. KRYGOWSKI (1964). All of mentioned actions were carried out to particularize distinction among particular sediment sets and were very helpful in their genetic classification.

3 THE FIELD SITE

Lubsza River, the right-bank tributary of Nysa Łużycka River, is 66.4 km long and posses a basin with total area of 914.1km^2. Course of the river starts NW from Olbrachtów vil-

*Institute of Palaeogeography and Geoecology, Adam Mickiewicz University, Poznań, Poland, e-mail: tomczyk@amu.edu.pl

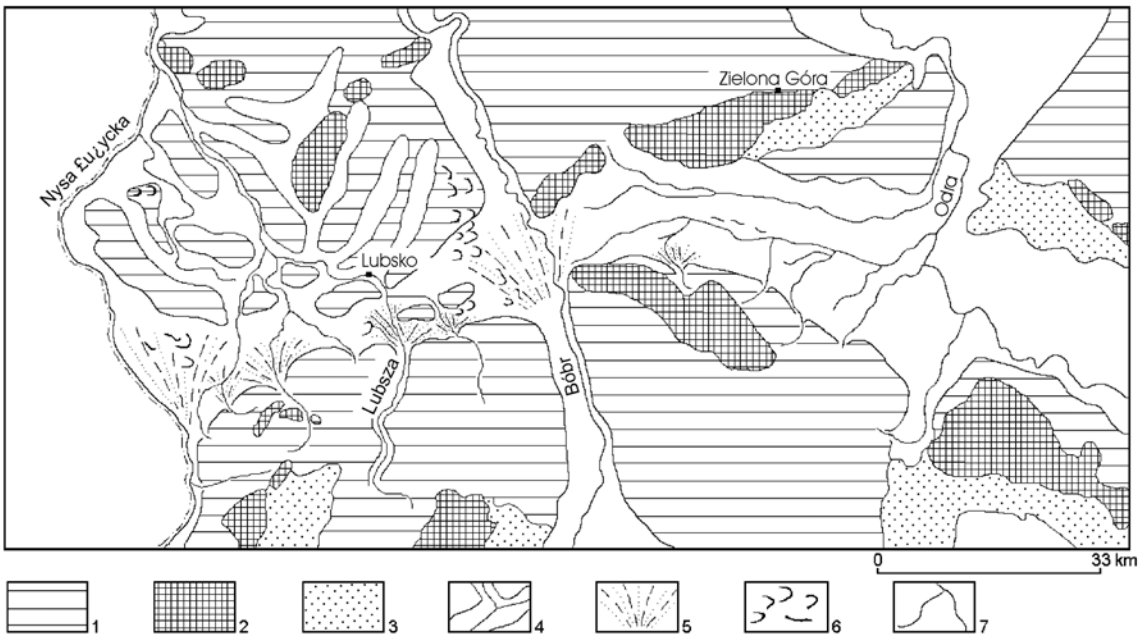

Fig. 1 Geomorphological map of Zielona Góra and Lubsko regions (NOWACZYK 1996)
1— morainic plateau, 2 — push moraine, 3 — outwash valley, 4 — valley bottom, 5 — alluvial fan, 6 — dunes, 7 — hydrography

lage, located on the brink of Żarskie Hills and ends in currents of Nysa Łuzycka River nearby the Gubiń Hills. The study area contained initial, southern part of Lubsza valley i.e. section from river springs (Zarskie Hills) to Głogów-Barycz ice-marginal valley. Investigated section is 26 km long and starts on a level of 180 m a.s.l and terminates in a form of alluvial fan in the outlet to ice-marginal valley approx. 90 m a.s.l. **Fig. 2** shows that a field site is located in the south from the maximal extent of Würm glaciation. According to KONDRACKI (2001)

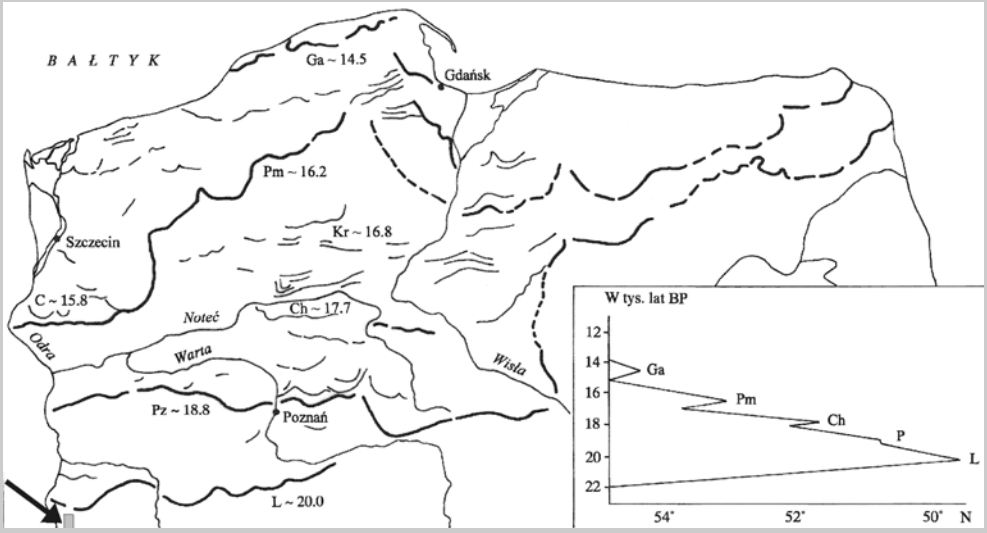

Fig.2 The major extention lines during deglaciation of northwestern Poland according to KOZARSKI (1995)
square means localization of research area

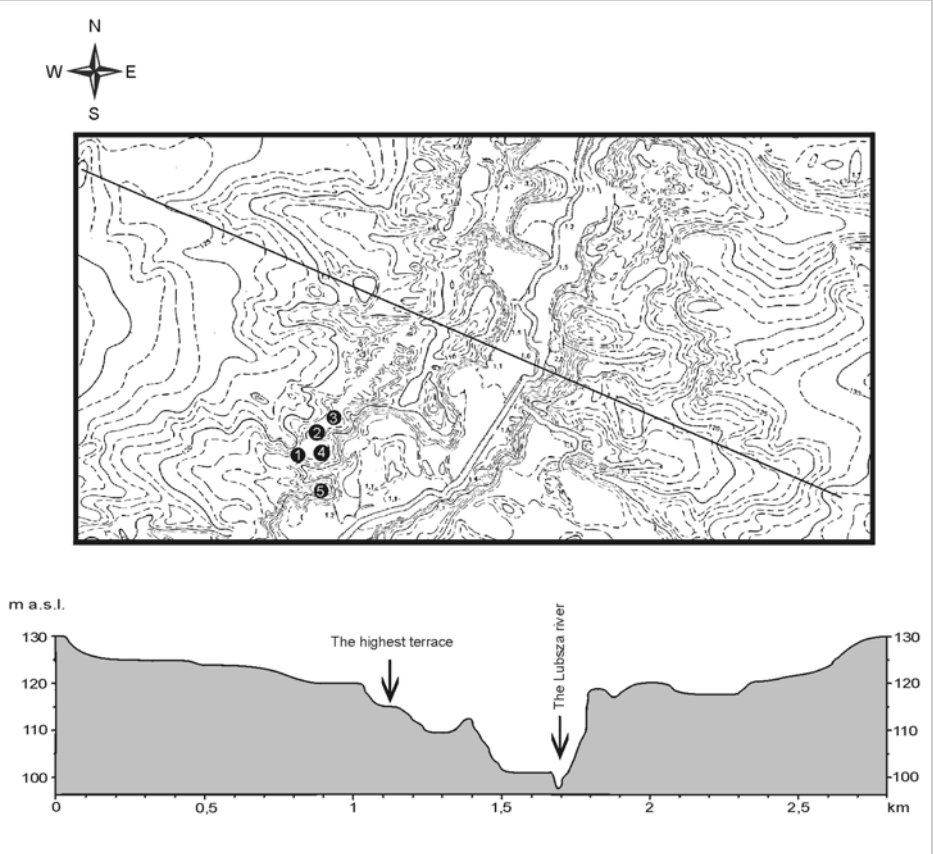

Fig. 3 Morphological section through the Lubsza river valley. 1,2,3,4,5 — outcrops

physiographic division a research area fits within two units: Żarskie Hills and Nowowsolskie Lowering. Field sites (**Fig. 3**) were localized on left-bank terrace level, below the level of ground moraine, consisted of morainic clay.

4 LITHOFACIAL ANALYSIS

Investigated level – which makes up the top river terrace lies approx. 20 meters above tidal frame. Five pits with average depth of 2.5-3.0 meters were digged out in terrace surface. **Figure 4** indicates that practically all vertical profiles of excavations look similarly. First 30 cm is composed of humus. Next 70 centimetres is made of fine and medium-grained unstructural sands. Below these sediments a layer of medium-grained sands with visible bedding is formed and according to chosen lithofacial code was qualified to lithofacial sets: Sh, St, Sl and Sp. **Figure 5** shows a situation in a bed part of an excavation where layers of coarse-grained sands and cross-bedded gravels (Sp, SGp and Gp) appear in a form of discontinued bars. Dominant structures in sediment are cross- and horizontal beddings. Characteristic turbulent bedding St was also observed.

Granulation analysis indicates that mean grain diameter (Mz) for the whole investigated material equals 0.4 mm, with extreme values of 0.20 – 0.82 mm. Standard divergence (δ) in all analyzed samples reaches balanced level and oscillates within the bounds of 0.7, what enables to include collected material to moderate sediment sortation group. Noticeable is also a clear predominance of β-type grains, whose mean participation in river terrace material amounts to 47 %. Only in bed parts of excavations decrease of β-type grains was observed, in favour to proportional growth of γ-type grains. Indicator of W_0 is contained in a range of 1120-1515, with average for a whole material 1300. Those values represent a mature type of sedimentary environment i.e. fluvial environment. Dip and strike measurements shows

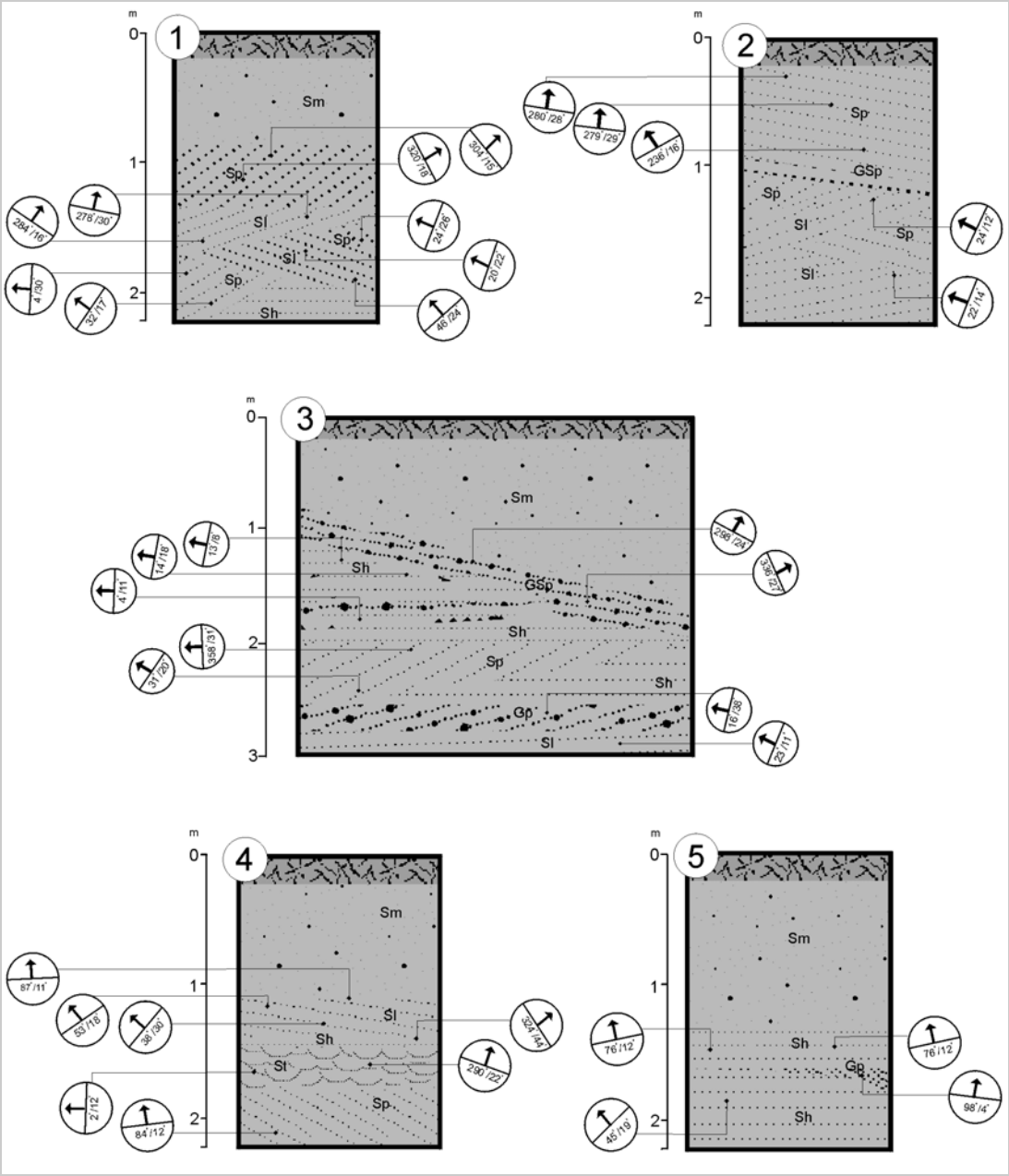

Fig. 4 Lithological section

that material was deposited by waters coming from southern and south-eastern sector

5 CONCLUSIONS

Constantly moving waters are the most effective sculptor of Earth surface. Water was also the "mean of transport" for debris, which as a result of fluvial processes, formed the Lubsza valley. Preliminary investigation indicated that valley is deeply incised into older sediments i.e. boulder clay. Similarly as showed investigations of WIECZORKOWSKA (1989) in terrace level (to 3 meters depth) presence of clay was not stated. Clay was probably eroded by water, whereas sand and gravel where deposited. The 75 % of material that builds terrace consists of fine and medium-grained sands. Moderate sortation indicates rather stable energy of depositional environments. The reconstruction of dips and strikes of particular sediment layers suggests high dispersion of outflow directions. Such a river behaviour is typical for highly-energetic fluvioglacial envi-

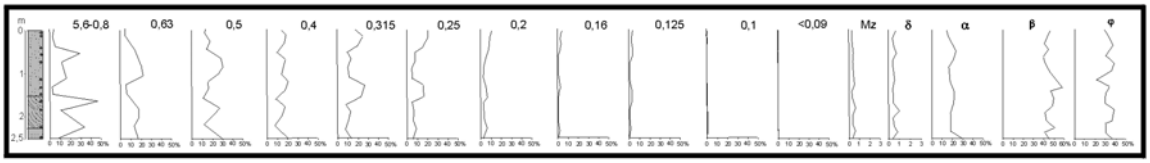

Fig. 5 Diagram of granulation

ronment, characterized by changeable dynamics and magnitude of discharge. Finally, the outflow direction is similar to north-western. Observed granulometric as well as structural features give a basis to consider the past character of Lubsza river as braided-type with sandy bed. Despite some differences in a position of extent of Würm glaciation on that area, analyzed part of Lubsza Valley was located in periglacial zone (KRYGOWSKI 1961, BARTKOWSKI 1961, 1963). According to TURKOWSKA (1988) rivers flowing in the vicinity of an ice sheet were modelled by series of periglacial processes. Absence of structures in a bed layer of terrace sands suggests a periglacial character of climate which influenced formation of valley. Geological structure of valley and internal structure of terrace suggest that investigated terrace should be classified to erosional-accumulative type. The main cause of river incision into clay deposits was a change of base of erosion, what took place after a recession of frontal part of an ice sheet from the maximal extent of Würm glaciation. Investigation shows that analyzed terrace in Lubsza valley was formed in periglacial conditions, in the proglacial zone of last glaciation (Leszno phase) and Lubsza river was a typical periglacial, braided river with sandy bed. Previous observations and analysis allowed to realize only some percentage of planned research. Investigations tend to present a detailed recognition of structural and textural features of sediments, what will lead to precise description of dynamics of depositional environment as well as evolution of fluvial processes.

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