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THE BŁĘDÓW DESERT (PUSTYNIA BŁĘDOWSKA) – A UNIQUE PHENOMENON OF THE POLISH LANDSCAPE

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Abstract. The Błędów Desert, located in the southern part of Poland, is an anthropogenic creature: it has originated in the early Middle Ages and later in the 16th century, owing to deforestation being the result of the develepment of contemporary lead and silver ores mining and metallurgy. A typical aeolian "desert" relief developed in the uncovered sandy area under the influence of NW and W winds.
It survived until the 1960-ties, when vegetation was introduced into this area to fix mobile sands. At present, the old "desert" landscape of the Błędów Desert is intensively disappearing.
References 8, Figs 6. In English, summary in Lithuanian.

Keywords: Błędów Desert, Silesian Upland, Southern Poland, aeolian landforms, psammophylous vegetation
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Introduction

The Błędów Desert is one of the most interesting – as far as landscape forms are concerned – areas in Poland. It is a geographical concept introduced into literature in the second half of the 19th century to describe vast sandy areas without vegetation. It is not, for obvious reasons, a real climatic desert, however for 800–900 years of its existence it has maintained a specific "desert" landscape. This paper is an attempt to present the current changes in that area.

1. Methodology

The research was carried out basing on analysis of historical sources, the author's perennial field research works and analysis of aerial pictures of different years at an approximate scale 1: 10 000. Pictures of 1958 and 1987 were applied to present relief changes and pictures of 1955 and 1995 were applied to present changes of vegetation distribution. Analysis of the relief changes was carried out long time ago (Szczypek, Wach, Wika, 1994), while analysis of vegetation changes were made much later. Therefore, aerial images have been applied for the purpose. The geomorphological map of the state in 1995 was not prepared as before the eighties of the last century the dunes had already been formed and vegetation distribution was based on the latest period when the last available images were taken.

2. Origin of the Błędów Desert

The Błędów Desert is located in the eastern part of the Silesian Upland in the vicinity of the Upper Jurassic cuesta of the Cracow-Wielun Upland (Fig.1). Accumulation of sand-gravel sediments, 60–70 m thick, is related to the Pleistocene, mainly – as it results from the latest investigations (Lewandowski, 1990) – the period of the Odranian (Riss) and the Vistulian (Würm) glaciations. The material is mostly of riverine–extraglacial or riverine–prolluvial origin. The area of the Cracow–Wielun Upland, where the material was

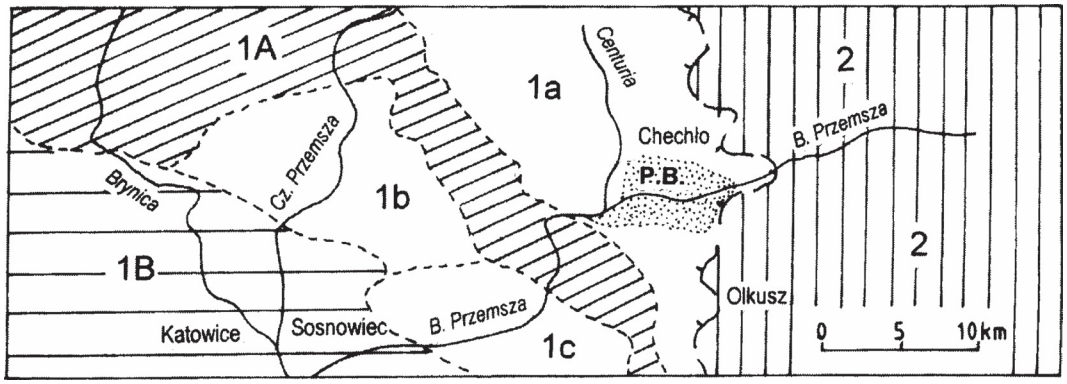


Fig. 1. Location of Błędów Desert in the southern part of Poland: 1 – Silesian Upland: 1A – Middle Triassic Cuesta, 1B – Southern Silesian Upland, 1a – Mitręga Basin, 1b – Dąbrowa Basin, 1c – Biskupi Bór Basin; 2 – Cracow-Wieluń Upland; P. B. – Błędów Desert

1 pav. *Blenduvo dykuma Pietų Lenkijoje: 1– Silezijos aukštuma: 1A – viduriniojo triaso kvesta, 1B – Pietų Silezijos aukštuma, 1a – Mitrengos baseinas, 1b – Dombrovos baseinas, 1c – Biskupi Bór baseinas; 2 – Krokuvos–Veliūnės aukštuma; P. B. – Blenduvo dykuma*

accumulated as fluvioglacial one during the Sanian glaciation (Mindel), was its source. It was transported from that place by rivers and filled the system of pre-Quaternary deep valleys (currently fossil ones) (Szczypek, Wach, 1989 et al.).

Since the beginning of the Holocene, the area of the Błędów Desert has been covered by a dense mixed forest, which, probably already in the subboreal period (5100 BP), was predominated by pine-trees (Szczypek, Wach, Wika, 1994). Such form of the Błędów Desert existed till the beginning of the Middle Ages, when due to development of lead and silver ores mining and metallurgical industry and due to usage of the forests as a source of fuel for primitive iron works they were completely destroyed uncovering sandy bed layer. Under such conditions, the main morphogenetic role – not for the first time in the history – was played by W and NW winds, which were mostly a driving force of deflation. Hence, vast deflation surfaces occurred in the area of the contemporary Błędów Desert. The second activation of aeolian sands in that area caused by the same reasons, took place there in the 16th century. Therefore, it can be stated that "arid" landscape of the Błędów Desert is of an anthropogenic character.

3. Current Changes of the Relief and Vegetation in the Błędów Desert

The first geomorphological investigations, carried out at the end of the 1950-ties (Alexandrowiczowa, 1962), proved that the Błędów Desert – as today – was composed of two significantly varying parts: northern and southern ones, divided by an "oasis-like" area – a humid, green valley of the Biała Przemsza River. The northern part of „the desert" was characterised, as now, by a dominating, typical deflation relief. While a system of dunes, transverse in the western part and longitudinal in the eastern part, at various stages of development existed within the limit of the southern part of the area. Among the dunes more or less vast deflation surfaces and basins occurred (Fig. 2A).

The area of the Błędów Desert is surrounded in the north and south by forest complexes. The neighbourhood of forests is also characteristic of a part of the edge of the Biała Przemsza valley vicinity. Hence, characteristic dune border ridges have been formed on the verge between the flat sandy surface and the forest.

Since the 1960-ties, the area of the Błędów Desert has started to change rapidly, due to secondary human interference, into a "desert" environment. However, that interference was completely different than it had been before. The vegetation was not destroyed but intensively planted to stabilise quick sands. There were mainly shrubs of willows *Salix acutifolia* and *S. arenaria*, as well as pines (*Pinus sylvestris*) and alders (*Alnus*).

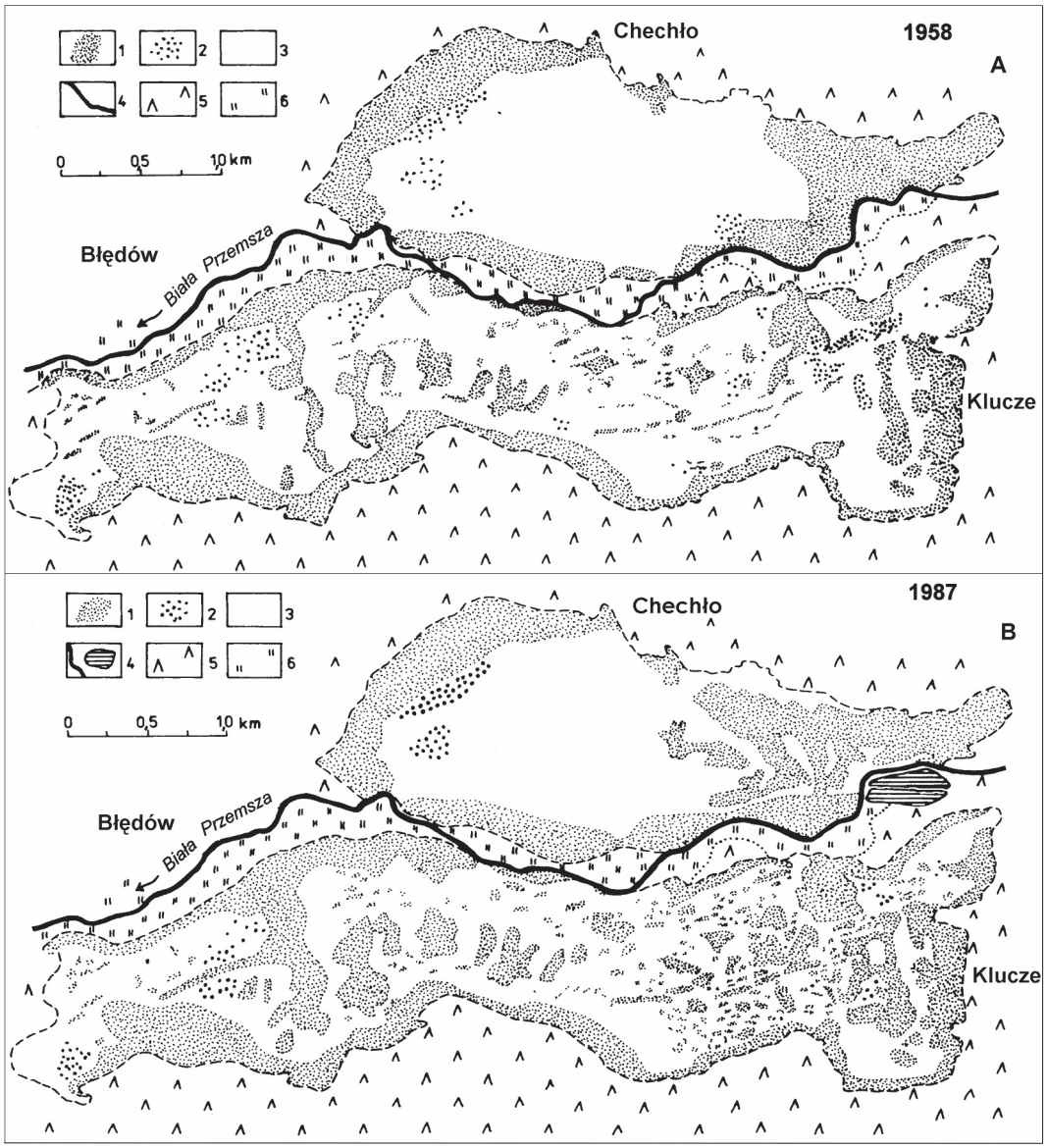


Fig. 2. Distribution of dunes in the Błędów Desert in 1958 (A) and 1987 (B) – photo-interpretation sketch maps: 1 – large dunes, 2 – small dunes, 3 – deflation field, 4 – hydrographic net, 5 – forest, 6 – meadows
2 pav. *Kopų išsidėstymas Blenduvo dykumoje 1958 m. (A) ir 1987 m. (B) – scheminių žemėlapių fotointerpretacija: 1 – didžiosios kopos, 2 – mažosios kopos, 3 – defliacinė lyguma, 4 – hidrografinis tinklas, 5 – miškas, 6 – pievos*

Since the 1970-ties, hydrological and hydrogeological conditions in the discussed area have also changed significantly. Until the mentioned year, the ground water level had been 3–8 m below the level of the ground. Later, it lowered abruptly by 20–30 m due to currentdeep exploitation of zinc and lead ores occurring in the neighbourhood. However, the change of those conditions has not caused any changes in vegetation as the above-mentioned species have adapted to the new water regime and continued to grow under arid conditions.

Considering the results obtained by Z. Alexandrowiczowa (1962), as well as analysis of aerial images of 1958 and 1987 (relief) and of 1955 and 1995 (vegetation), the trends of the landscape changes can be determined in terms of the aeolian relief and vegetation (Fig. 3).

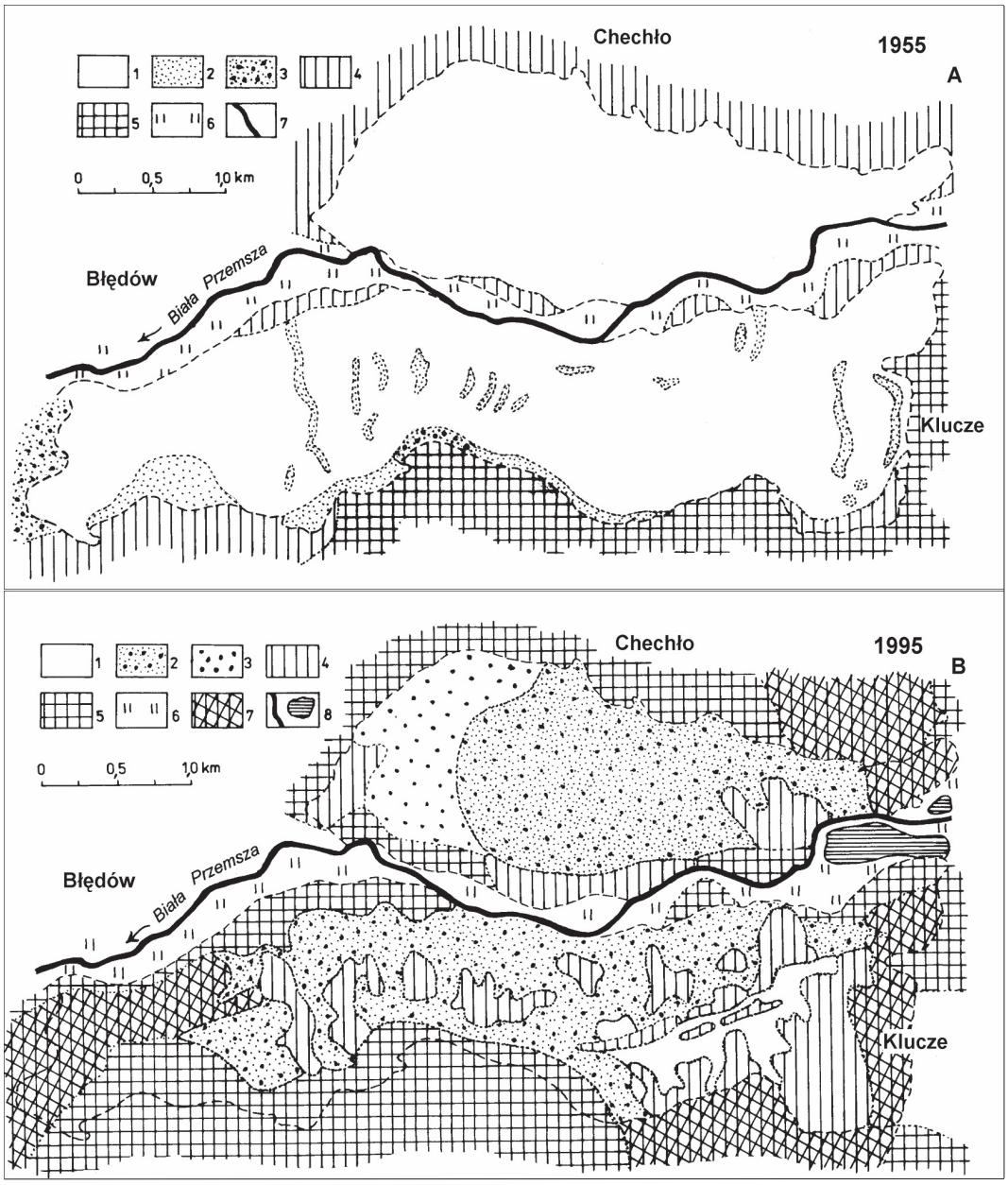


Fig. 3. Distribution of vegetation in the Błędów Desert and adjacent areas in 1955 (A) and 1995 (B) – photo-interpretation sketch maps: A – 1 – sandy areas without vegetation, 2 – initial psammophylous communities Corynephoretum canescentis and Koelerietum glaucae, 3 – psammophylous communities with shrubs, 4 – young pine forest, 5 – pine forest, 6 – riverside communities, 7 – hydrographic net; B – 1 – sandy areas without vegetation, 2 – psammophylous vegetation with shrubs, 3 – shrubs (Salix – Betula – Populus – Pinus), 4 – young pine forest, 5 – pine forest, 6 – riverside communities, 7 – artificial plantations, 8 – hydrographic net

3 pav. *Augalijos pasiskirstymas Blenduvo dykumoje ir gretimose teritorijose 1955 m. (A) ir 1995 m. (B) – scheminių žemėlapių fotointerpretacija: A – 1 – smėlio plotai be augalijos, 2 – pirmykštės psamofitų bendrijos Corynephoretum canescentis ir Koelerietum glaucae, 3 – psamofitų bendrijos su krūmynais, 4 – jaunas pušynas, 5 – pušynas, 6 – paupio bendrijos, 7 – hidrografinis tinklas; B – 1 – smėlio plotai be augalijos, 2 – psamofitų danga su krūmynais, 3 – krūmai (Salix – Betula – Populus – Pinus), 4 – jaunas pušynas, 5 – pušynas, 6 – paupio bendrijos, 7 – užsodinta augalija, 8 – hidrografinis tinklas*

During the 30-year period (1958–1987), significant changes of the aeolian relief took place in the analysed area. They occurred both in the northern and southern parts of the "desert". In the northern part, the dune forms were separated and their number slightly increased, also edge dunes grew in size, but deflation relief was still dominating there (Fig. 4). Changes of the relief were much more varied in the southern part: they became less significant in the western fragment and more significant in the eastern one, where intensive complexity of the relief occurred. It included all dune forms. Typical, small, longitudinal dunes were formed there, the outlines of transverse dune forms changed and numerous small dunes, which had not existed there before, appeared. Deflation surfaces decreased significantly (Szczypek, Wach, Wika, 1994; Szczypek et al. 2001; Fig. 2B, 5).

All changes of the relief of the Błędów Desert were related to distribution of vegetation. According to analysis of the aerial pictures, almost all the area under consideration was still free of vegetation in 1955. Only grass vegetation partly covered most of the small dunes, while dune border ridges were covered with forest vegetation. Shrubs played only a minor role then (Fig. 3A).

In 40 years (in 1995), due to the mentioned human interference and also due to natural succession and expansion of willow shrubs and grass vegetation, the areas covered by plants have significantly increased. Young pine forests and psammophilous vegetation (mainly *Corynephorus canescens, Koeleria glauca, Festuca ovina*, rarely *Elymus arenarius*) with *Salix acutifolia* shrubs and *S. arenaria* covered almost the whole investigated area and the previous young forests had changed into mature ones (Rahmonov, 1999; Szczypek et al., 2001; Fig. 3B). Therefore, the unique "desert" character of Błędów Desert has almost completely disappeared. Currently (the years 2004–2005), the areas without vegetation – old active deflation basins (in SE part of the "desert") are minute, they do not play their morphogenetic role and they are covered by clumps of *Salix arenaria*, forming characteristic phytogenic hills (Рахмонов, Снытко, Щипек, 2005; Fig. 6).



Fig. 4. Northern part of Błędów Desert – general view – in 2005 (photo by T. Szczypek)
4 pav. *Bendras Blenduvo dykumos šiaurinės dalies vaizdas 2005 metais (nuotraukos autorius T. Szczypek)*



Fig. 5. Southern part of the Błędów Desert – small deflation areas – in 2005 (photo by O. Rahmonov)
5 pav. *Maži defliaciniai plotai pietinėje Blenduvo dykumos dalyje 2005 metais (nuotraukos autorius O. Rahmonov*



Fig. 6. Southern part of the Błędów Desert – phytogenic hillocks – in 2005 (photo by O. Rahmonov)
6 pav. *Fitogeniniai kupstai pietinėje Blenduvo dykumos dalyje 2005 metais (nuotraukos autorius O. Rahmonov)*

Final Remarks

On the one hand, the existence of Błędów Desert is connected with a natural factor, a large mass of sand. On the other hand, it is related with the anthropogenic factor as well – destruction of forest cover in the Middle Ages and later in the 16th century. Currently, due to secondary human interference the "desert" has been disappearing intensively. 25–30 years ago, when the "desert" landscape was still dominating there and covered approximately 32 km^2, its uniqueness and unusual character was disregarded. Now, when the "desert" has almost disappeared ("desert" areas, without vegetation cover altogether from several dozen hectares to slightly over 1 km^2), the loss has been realized (Вах и др., 2005). There are attempts to cut and remove willow shrubs from certain areas, motocross routes and hiking and horse-riding trails have been marked out. All these efforts are made to attract current and potential tourists by the existing remnants of, not only Polish, landscape phenomenon. The future of the Błędów Desert depends strongly on inventiveness of local authorities and available financial means. If they are not sufficient – it must be said with great sorrow – the "desert" will finally disappear in 10–15 years. It will remain only as a name on a map…

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Blenduvo dykuma – unikalus Lenkijos kraštovaizdžio objektas

Santrauka

Blenduvo dykuma – vienas įdomiausių Lenkijos kraštovaizdžių. Šia geografine sąvoka apibūdinami platūs smėlio tyrai be augalų dangos. Žinoma, tai nėra tikroji klimatinė dykuma, tačiau per 800–900 metų ji visada išsiskyrė dykumai būdingu kraštovaizdžiu.

Nuo holoceno pradžios iki ankstyvųjų viduramžių smėlėtosios Blenduvo dykumos vietoje augo tankus mišrusis miškas. Vėliau, vystantis tuometinei švino ir sidabro metalurgijai, miškai buvo iškirsti, paviršiuje atsidengė smėlio substratas. Tokiomis sąlygomis vyraujantys šiaurės vakarų ir vakarų krypties vėjai ėmė pustyti smėlį ir formuoti defliacinį reljefą. Tuometinės Blenduvo dykumos vietoje plytėjo defliacinė lyguma. Dėl tų pačių priežasčių eoliniai procesai vėl sustiprėjo XVI amžiuje. Taigi „dykuminis“ Blenduvo dykumos kraštovaizdis yra antropogeninės kilmės. Dykumos pirmykštis vaizdas praktiškai nekito kelis šimtus metų, beveik iki XX amžiaus vidurio.

Nuo septintojo XX amžiaus dešimtmečio Blenduvo dykumos vaizdas ėmė smarkiai keistis žmogui vėl įsikišus į „dykuminės“ aplinkos gyvenimą. Šį kartą įsikišimo pobūdis buvo visiškai kitoks: augalai nebebuvo naikinami: atvirkščiai, norint sutvirtinti judantį smėlį, buvo formuojama augalų danga. Pirmiausia buvo sodinami karklynai *Salix acutifolia* ir *S. arenaria*, taip pat pušys (*Pinus sylvestris*) ir alksniai (*Alnus* sp.). Pastaraisiais metais dėl šios kartotinės intensyvios žmogaus veiklos „dykuma“ baigia išnykti.