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ORIGINAL RESEARCH PAPER

Determinants of a traditional agricultural landscape

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The study aim was to define the landscape determinants as certificates of natural and cultural heritage which identify the young glacial landscape under traditional agricultural management. These studies were conducted in the upper Parsęta basin (Pomerania, Poland) covered by the many annual environmental monitoring programs since 1994. The aim of this monitoring is to observe changes in geoecosystems of the temperate climate zone. The parameters of the abiotic landscape subsystem have been monitored in a wide range of terms, whereas biotic elements and cultural resources only in a very limited way. This was the reason for undertaking complementary studies. The paper presents the so-called “zero-state” for 2014, which will be a reference point from which to track the direction of landscape changes in the future. The abiotic, geobotanical, and cultural determinants of this state chosen have been characterized on the basis of field mapping data and the available literature. They were chosen based on the methodology of landscape audit to define the specificity of the traditional agricultural landscape. They were selected on the basis of assessment criteria for landscape structure: complexity (diversification of land use and cover), naturalness (syngensis of plant communities, hydrochemical properties of surface waters), coherence of composition with natural conditions, stewardship (intensity of use, crop weeds, ecological succession, fallows, anthropogenic denudation), aesthetic and visual perception, historicity (continuity of natural landscape elements, continuation of traditional agricultural use, architectural objects), and disharmonious elements.

Keywords

agricultural landscape; landscape audit; landscape determinants; landscape ecology; pond; vegetation

Introduction

The social and economic reality created in Poland within rural areas after 1989 under the free economic market has been reflected by changes in space [1,2]. One of the urgent current tasks is to identify landscapes which have not been degraded so far and take measures to preserve them. The Landscape Act (which requires a landscape audit) provides support for these actions [3]. It is aimed at an analysis of the landscape, the pressures within it and their effects, as well as landscape values which are relevant to the population. An audit covers elements which define a landscape form, including abiotic, geobotanical, and cultural components [4]. Special methods, methodology [5,6], and typology [7] have been developed for its needs. An audit and its results are to be included in future planning documents [8].

There are agricultural landscapes in the vicinity of the Geoecological Station of Adam Mickiewicz University located in Storkowo (West Pomerania) where programs are implemented under the Integrated Environmental Monitoring Program [9]. Due to their spatial and functional structure, historical features, and methods of treatment they can be considered of priority importance, constituting the cultural heritage. They are located within the upper Parsęta catchment, which has been monitored since 1994 [10]. A given landscape as well as its current and actual conditions may be explored and studied at any time. However, in order to determine the direction and dynamics of this landscape, it is necessary to run long-term measurements, together with documentation on its initial conditions. The Station provides a unique opportunity to run such studies by means of the methodology of landscape audit presented by Solon et al. [4], due its long-term observations of natural and anthropogenic processes and phenomena which determine the state of the environment. In 2013, there were floristic studies undertaken in one of the agricultural landscapes located within the area monitored by the Station [11]. The analysis of the flora showed that this is a traditionally-used agricultural landscape, which is characterized by a very high level of species richness and plant diversity. It stimulated further studies on the content and form of this landscape unit as well as its natural potential and cultural heritage. The present study aimed to: (i) define the landscape determinants of natural and culture heritage which identify the young glacial landscape under the traditional agricultural management, (ii) define the state of the monitored agricultural landscape for the assessment of landscape changes in future, and (iii) provide a case study for planners preparing a landscape audit.

Material and methods

Our studies largely focused on the landscape unit classification criteria given by Chmielewski et al. [7], as required for a landscape audit. The area has a surface-dominant complex of similar types of land cover related to agricultural land use in contrast to other types of land cover within its surroundings. It is located in the upper Parsęta catchment covered under the Integrated Environmental Monitoring Program. Based on the research studies and their results developed by Borysiak et al. [2] and Najwer et al. [12], it was considered to represent a young glacial area. It was located by a farm called Pustkowie, thus from hereon in the paper it will be referred to as “Pustkowie”.

A range of abiotic, geobotanical, and cultural features of the Pustkowie landscape unit were recognized together with its land use and land cover. Studies on its abiotic conditions were conducted on the basis of cartographic materials available and thematic literature. The following maps were used: Topographic Objects Database BDOT10k (CODGiK); MGŚP 1:50,000, with explanations (PIG-PIB); Detailed Geological Map of Poland 1:50,000, with explanations (PIG-PIB); Map of Hydrographical Division of Poland (IMGW, 2007), forest numeric SLMN (DGLP); agricultural – soil 1:5,000 and 1:25,000 (IUNG-PIB); topographic 1:10,000 (CODGiK); topographic 1:25,000 Bärwalde 875 and 2264 as well as Persanzig 876 and 2265, German agronomic 1:25,000 Bärwalde 2264 and Persanzig 2265 (see: http://mapy.amzp.pl/tk25_list.cgi?show=all;sort=g and <http://kpsc.umk.pl/dlibra>); orthophotomap 1:10,000 from 2015 (CODGiK), NMT and PRNG (CODGiK). The land use and land cover data were from the field mapping conducted in 2014. The topographical map 1:10,000, the orthophotomap 1:10,000, and GPS were used. Land cover units were delimited on the basis of the syngenetic classification of plant associations presented by Brzeg and Wojterska [13]. All the information relating to agricultural management is from interviews conducted with land users or is taken from the regulation of the Ministry of Agriculture and Rural Development of the Republic of Poland [14].

The analysis of abiotic conditions covered a set of physical and chemical properties of surface water in seven ponds and three watercourses (Fig. 1). The following parameters were measured in 2014: water temperature, conductivity, pH, and dissolved oxygen content using a Hanna Instruments meter with a multiparameter probe HI9898. Water samples were taken at the same measurement points and analyzed in the hydrochemical laboratory at the Geoecological Station of Adam Mickiewicz University in Storkowo. All the analyses were performed in line with the Polish Standards and according to the

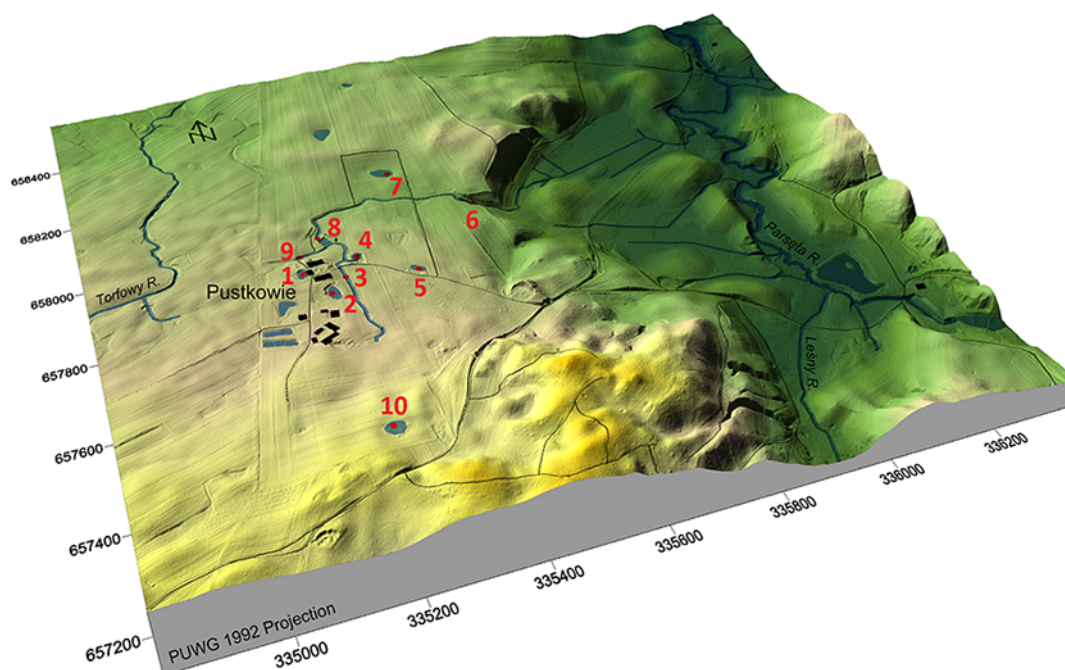


Fig. 1 Pustkowie as depicted by the numeric terrain model – the measurement points No. 1–10 used for testing the hydrochemical properties of surface water

procedures described in the publications of Krawczyk [15], Siepak [16], and Elbanowska et al. [17]. Bicarbonates and calcium were determined by titration; chlorides, sulfates, and nitrates by ion chromatography (DX120, Dionex). Phosphates, ammonium ions, and ionized silica were determined spectrophotometrically (Nanocolor VIS, Macherey-Nagel), respectively PO_4^{3-} – with stannous chloride, NH_4^+ – with Nessler's reagent, and SiO_2 – by blue reduction. Concentrations of sodium, potassium, magnesium, iron, and manganese were determined by atomic absorption / flame emission spectrometry (20 SpectrAA Plus, Varian). The average pH value was calculated using the method used in the Integrated Environmental Monitoring [18].

For the geobotanical survey of Pustkowie, the following features were studied: diversity of the actual vegetation and potential natural vegetation, Natura 2000 habitats, and ecological focus areas (EFAs). The results of the floristic and phytosociological inventories were used in this study. Inventories were made during the growing seasons in 2013–2014. The vascular flora has already been published [11]. The Braun-Blanquet method was applied for the phytosociological identification of plant communities which formed the actual vegetation. Phytosociological relevés were made and interpreted. Due to their large size, they will be published in a future paper. The syntaxa listed in this paper are consistent with those of Brzeg and Wojterska [13]. The monograph by these authors also provided data on a syngensis of the plant associations identified. Archaeophytes and kenophytes (syn. neophytes) were classified according to Tokarska-Guzik et al. [19]. The potential natural vegetation units were determined based on the methodology described by Faliński [20]. Using this methodology, the plant associations were grouped into dynamic circles of plant communities. The Natura 2000 habitats were classified based on the presence of diagnostic plant species mentioned in manuals edited by Herbich [21], whereas EFAs were listed in accordance with the guidelines set by the Ministry of Agriculture and Rural Development of the Republic of Poland [22].

Cultural determinants of the traditional agricultural landscape were identified according to Raszeja's methodology [23]. They were indicated on the basis of assessment criteria of landscape structure: (i) complexity (diversification of land use and land cover); (ii) naturalness (syngensis of plant associations, hydrochemical properties of surface waters); (iii) coherence of composition with natural conditions; (iv) stewardship (intensity of use, crop weeds, ecological succession, fallows, anthropogenic denudation); (v) aesthetic and visual perception (view connections, panoramas); (vi) historicity (continuity of natural landscape elements, continuation of traditional agricultural use, architectural objects); (vii) disharmonious elements.

Study area

The Pustkowie landscape unit of 75 ha is situated at an altitude of 107–156 m a.s.l. Its boundaries are specified as north – φ N 53°46'22.04" / λ E 16°29'45.32", south – φ N 53°45'15.46" / λ E 16°29'48.56", west – φ N 53°45'34.32" / λ E 16°30'17.94", and east – φ N 53°45'29.99" / λ E 16°29'42.64". It almost entirely falls in the ATPOL BB-56 square and its northern part is in the ATPOL BB-46. Based on the physical-geographical division of Poland [24], it was part of the mesoregion Drawskie Lake District (314.45), macro-region West Pomeranian Lake District (314.4), and subprovince Southern Baltic Lake District (314). It is a young glacial area of the Pomeranian phase under the Vistulian glaciation [25], with some late glacial and Holocene modification [26]. A significant impact on the Pustkowie landscape form has been made by the relief and lithological diversity of surface sediments, mainly formed in Pleistocene, such as kame sands, at some places gravels and boulder clays, and also glacial gravel dusty sands on boulder clays and sands with glacial gravels. Ceiling clay parts are characterized by Scandinavia erratic rocks [27]. The terrain relief and lithological structure, along with weather conditions of the moderate morphoclimatic zone, determined the direction and rate of geosuccession [28]. Based on the climatic division [29], Pustkowie is located within the Central Pomeranian region. According to meteorological observations conducted at the Geocological Station in Storkowo (approximately 3 km away from Pustkowie), since 1994 [10], the average annual air temperature is 7.9°C and the average annual precipitation 688 mm. Precipitation has not been much polluted due to the long distance of the measuring station from sources of emissions. Long-term monitoring has shown that, based on the classification by Szczukariew-Prikłowski (cited by [30]), precipitation has been a multicomponent hydrochemical type taking into account anions such as SO_4^{2-} , NO_3^- , and Cl^- and the cations NH_4^+ and Ca^{2+} . In the hydrological period 1994–2015, the average annual values of conductivity of the precipitation were 1.43–2.72 mS m^{-1} , which, according to the classification by Jansen et al. [31], place them in the “slightly raised” or “insignificant” conductivity class. Its conductivity showed a decline in time at an average rate of 0.04 $\text{mS m}^{-1} \text{ year}^{-1}$. The average annual pH of precipitation has ranged from pH 4.46–5.30 and has increased in the course of time. Since the mid-1990s to 2000, precipitation had acidity, which was characteristic of the “significantly reduced pH” class, and in the subsequent years to the “slightly reduced pH” class. In 2010 and 2015, precipitation had a “normal pH” value. The average decrease in the acidity of precipitation was 0.03 pH units year^{-1} . This increase in pH was correlated with a decrease in the emission of acid-generating greenhouse gases such as SO_2 and NO_x , which in Poland was also reflected in the chemistry of precipitation with decreasing concentration levels of SO_4^{2-} and NO_3^- . These declines in concentrations concerned all ionic components and led to a considerable reduction of wet atmospheric deposition. Its value in the mid-1990s was 8 $\text{t km}^{-2} \text{ year}^{-1}$, whereas in 2015 it was 2.5–3 $\text{t km}^{-2} \text{ year}^{-1}$. Then, there was a distinct reduction in the atmospheric supply of nutrients: nitrogen load (total N-NO_3 and N-NH_4^+) fell from 1 $\text{t km}^{-2} \text{ year}^{-1}$ in 1995 to 0.4 $\text{t km}^{-2} \text{ year}^{-1}$ in 2015. It is important in the context of placing surface water at risk of eutrophication.

In the northwestern and southeastern areas of the research area, there are valleys of watercourses which discharge water into the Parsęta River (both directly and indirectly) in amount depending on the thermal and precipitation conditions [32].

Results

Land use and land cover

Pustkowie is a type of landscape with a structure which has been shaped by natural processes and also by agriculture. On the grounds of the topographical map dated 1877, it can be concluded that the area then mainly comprised arable lands and grasslands. Over the last 120 years, there have been significant changes in its land cover. Some grasslands were transformed into arable lands. Land management was completely abandoned on some grasslands and arable lands within habitats with a high groundwater level. The least fertile arable soils were afforested or turned into orchards or fallows. This applied to the

whole southern part, which, according to the German agronomic maps 1:25,000, was overlain with sandy soils. Based on the field mapping dated 2014 and scaled 1:10,000, this area was characterized by a high diversity of land cover. It included arable lands, orchards, meadows, pastures, fallow lands, tree stands, thickets, 11 midfield ponds, watercourses (1.9 km), balks, dirt roads (2 km), and farm buildings.

According to the typology of landscapes given by Chmielewski et al. [7], Pustkowie is categorized in the following units: group (B) a natural-cultural landscape formed as a result of the joint operation of natural processes and modifications of land cover and spatial structure by anthropogenic factors or type (6) rural (agricultural) subtype (6d) dominated by a mosaic arrangement of agricultural lands forming medium-sized fields. There are reasons to suppose that the landscape we analyzed increased its biotic diversity in its spontaneous vascular flora when compared to its state nearly 120 years ago. There was a rise in the typological diversity of landscape patches which now form the land cover. Former grasslands (now fallow) make the undoubted contribution to the improved biodiversity. Within them, various stages of secondary succession were found, ending with forest ecosystems in some places. A considerable contribution to the biodiversity is also made by a larger surface share of habitat ecotones and their typological variation related to the enrichment of the landscape with new land cover structures.

Traditional, extensive farming was found within the area of Pustkowie. The land was fertilized organically. Seeding materials produced by the farmer was used. No herbicides and pesticides were applied. Land rows in between were mowed only in the orchards. Cows were moved out to pastures. Marginal natural habitats are preserved within the landscape.

Properties of surface water

Water in the midfield ponds within Pustkowie was distinctly different in its physical and chemical properties, conditioned by the type of water supply, local biogeochemical conditions, and the level of anthropogenic pollution (Tab. 1). These reservoirs located close to farm buildings (apart from Pond 1) showed some hydrochemical similarities. Mostly they contained calcareous water (HCO_3^- - Ca^{2+}) and only in one case (Pond 4) the type also included sulfates (HCO_3^- - SO_4^{2-} - Ca^{2+}). The conductivity of the water ranged within 41.9–59.1 mS m^{-1} indicating a medium degree of mineralization. The pH ranged from 6.93 to 8.70. These ponds were not obviously contaminated anthropogenically. The concentration of phosphates ranged from 0.03 to 0.07 mg dm^{-3} , and ammonium ions – 0.14–0.89 mg dm^{-3} . Measurable nitrate concentrations occurred in Pond 2 (4.73 mg dm^{-3}) only. Any delivery of pollutants in the form of biogenic elements could be counteracted as a result of their absorption by algae and vascular plants, and in the case of nitrates, in the denitrification process involving microorganisms. Among the ponds located within Pustkowie, Pond 1 (situated next to the barn) stood out in terms of its physicochemical properties. The ionic composition of water indicated a hydrogeochemical type with dominant sulfates among the anions (SO_4^{2-} - HCO_3^- - Ca^{2+}). This water had high conductivity (103.3 mS m^{-1}) and a pH of 6.81. With a similar content of bicarbonates to other ponds, water in Pond 1 had up to 10 times higher concentrations of other ionic components. A very high concentration of sulfates, 288.3 mg dm^{-3} , was a distinctive feature. As for biogenic elements, Pond 1 had the highest concentration of ammonium ions (2.18 mg dm^{-3}) and potassium (37.1 mg dm^{-3}) and one of the highest concentrations of phosphates (0.74 mg dm^{-3}). A high phosphorus concentration suggested eutrophication of this reservoir. This pond could have been contaminated with manure effluent and probably also by other sources of contamination. The midfield ponds located furthest away from the farm buildings (Pond 7 in the northern part of Pustkowie and Pond 10 in the southern part) were characterized by their different chemistry. Their water belonged to the following hydrogeochemical type: HCO_3^- - SO_4^{2-} - Ca^{2+} . They had a small amount of dissolved oxygen and a low pH. A low concentration of dissolved components resulted in low values of their conductivity: 13.0 mS m^{-1} in Pond 7 and 9.4 mS m^{-1} in Pond 10. These waters had concentrations of bicarbonate and calcium ions at levels several times lower than those of the other ponds examined, which suggests the dominance of a precipitation-type supply of water

Tab. 1 Surface water quality in the Pustkowie landscape unit.

No. of sample	φN/AE	SEC		O ₂	O ₂	pH	T	mg dm ⁻³										Hydrogeochemical type
		mS m ⁻¹	dm ⁻³					HCO ₃ ⁻	SO ₄ ²⁻	Cl ⁻	NO ₃ ⁻	PO ₄ ³⁻	Ca ²⁺	Mg ²⁺	Na ⁺	K ⁺	NH ₄ ⁺	
Ponds																		
1	53°45'31.62"/ 16°29'56.59"	103.3	74.0	8.1	6.81	11.1	242.8	288.3	33.0	0.15	0.74	151.1	14.73	15.61	37.10	2.18	5.7	SO ₄ ²⁻ -HCO ₃ ⁻ -Ca ²⁺
2	53°45'30.11"/ 16°29'58.79"	41.9	72.6	7.5	7.42	13.8	211.1	21.8	6.9	4.73	0.03	71.7	4.23	5.50	1.14	0.15	1.3	HCO ₃ ⁻ -Ca ²⁺
4	53°45'32.35"/ 16°30'2.46"	59.1	29.5	3.3	6.93	11.0	277.0	65.1	6.7	0.00	0.04	109.0	4.73	6.39	1.37	0.57	1.2	HCO ₃ ⁻ -SO ₄ ²⁻ -Ca ²⁺
5	53°45'30.23"/ 16°30'7.29"	49.8	42.1	4.8	7.02	9.5	280.7	16.5	10.5	0.00	0.07	86.2	6.42	7.73	2.70	0.89	4.9	HCO ₃ ⁻ -Ca ²⁺
7	53°45'40.84"/ 16°30'8.75"	13.0	5.9	0.7	6.07	10.7	43.9	12.0	6.3	0.00	1.60	14.8	1.75	2.97	9.20	0.88	1.5	HCO ₃ ⁻ -SO ₄ ²⁻ -Ca ²⁺
8	53°45'35.52"/ 16°29'59.61"	42.1	130.1	14.2	8.70	11.5	227.0	21.3	7.0	0.00	0.07	72.1	4.53	6.13	1.54	0.14	1.2	HCO ₃ ⁻ -Ca ²⁺
10	53°45'17.37"/ 16°29'59.58"	9.4	65.1	7.3	6.40	11.7	26.8	14.4	4.5	0.00	0.31	11.6	1.83	3.56	1.07	1.33	0.3	HCO ₃ ⁻ -SO ₄ ²⁻ -Ca ²⁺
Watercourses																		
3	53°45'30.63"/ 16°30'0.48"	40.9	72.6	7.9	7.51	11.5	229.4	20.9	6.0	0.63	0.06	72.9	4.57	5.78	0.99	0.13	4.2	HCO ₃ ⁻ -Ca ²⁺
6	53°45'37.26"/ 16°30'15.76"	48.6	33.5	3.9	7.43	9.5	236.7	26.5	5.9	26.59	0.07	85.4	4.73	5.31	1.35	0.05	7.6	HCO ₃ ⁻ -Ca ²⁺
9	53°45'33.51"/ 16°29'57.28"	52.7	76.8	8.8	7.93	10.0	305.1	21.4	5.4	0.28	0.10	101.0	4.57	5.38	1.55	0.06	9.2	HCO ₃ ⁻ -Ca ²⁺

to these reservoirs. For both ponds, nitrate was undetectable, but there were relatively high phosphate (Pond 7 – 1.60 mg dm⁻³, Pond 10 – 0.31 mg dm⁻³) and ammonium ion concentrations (0.88 and 1.33 mg dm⁻³, respectively), the former suggested eutrophication, which may cause the overgrowing of these reservoirs in the future.

The quality of water draining the Pustkowie area was examined at three measurement points: 3, 6, and 9. Their water was all characterized by the following hydrogeochemical type: HCO₃⁻-Ca²⁺. They include medium-carbonated water with a conductivity in the range 40.9–52.7 mS m⁻¹. They showed similar physicochemical properties and at the same time concentrations of ionic components compared to those reported in Ponds 2, 4, 5, and 8 located in the vicinity of the farm buildings. Nitrates were the differentiating factor; they were undetectable in most ponds, whereas they had the following concentrations in the watercourses: 0.28 mg dm⁻³ at the Point 9, 0.63 mg dm⁻³ – Point 3, and 26.59 mg dm⁻³ – Point 6. At Point 6, the watercourse led surface water brought from the Points 3 and 9, but at the same time it probably drained the deeper aquifer. Underground water could be contaminated with impurities coming from the fertilization of agricultural lands but they could also be polluted by domestic sewage.

Landscape determinants of the traditional agricultural landscape

The diagnosis of abiotic, geobotanical, and cultural features of Pustkowie led to the identification of landscape determinants which define the young glacial landscape under an extensive management.

The vegetation at Pustkowie was characterized by a high diversity. It comprises 48 plant associations with 17 classes, 23 orders, and 31 alliances (Tab. 2).

The list of syntaxa recorded is dominated (26) by natural associations. Their phytocoenoses were usually found in patches of tree stands or thickets, midfield ponds, watercourses, and balks. SeminatURAL grasslands (eight associations) were mowed, grazed, or trampled. The weed vegetation of agrocoenoses was characterized by a large diversity. There were nine synanthropic segetal associations. Weed communities occupied the central and southern terrains of Pustkowie. In the northern part, it was an orchard established in the fallow, the largest of which was covered by a *Solidago virgaurea* Aiton (*Molinio-Arrhenatheretea/Artemisietea*). Biochores of four ruderal synanthropic associations were mainly limited to degraded habitats close to the farm buildings. The invasive kenophyte (syn. neophyte) *Acorus calamus* L. (*Acoretum calami* ass.) occurred in the pond near the barn. Some of the associations represented the Natura 2000 habitats: (i) 6430 (tall herb fringe communities *Epilobio-Convolutetum* and *Fallopio-Humuletum*), (ii) 6510 (hay meadow *Arrhenatheretum elatioris*), (iii) 9160 (Subatlantic oak-hornbeam forest *Stellario holosteeae-Carpinetum betuli*), and (iv) 9190 (acidophilous oak forest *Calamagrostio arundinaceae-Quercetum petraeae*). The first and third of the above were present at a favorable conservation status. This suggests that in the near future their territorial range will not shrink, and the structure and functions required to preserve their habitat exist and are likely to continue to do so. The hay meadow (6510) was not mowed. The acidophilous oak forest (9190) was a degenerate form with cultivation of *Pinus sylvestris* L.

Potential natural vegetation of the Pustkowie area is formed by four units being the determinants of the Pomeranian Division out of the Southern Baltic Subprovince: the West Pomeranian race of *Calamagrostio arundinaceae-Quercetum*, fertile beech wood *Melico-Fagetum*, and Subatlantic hornbeam forest *Stellario-Carpinetum*.

The landscape comprises distinct EFAs forming a kind of “greening” and, at the same time, defining a complex form of space. Eight types of EFAs were identified: (i) wood lines, (ii) free-standing trees, (iii) linear woodlots, (iv) group woodlots, (v) midfield balks, (vi) ponds, (vii) open watercourses, and (viii) strips of land along forest edges. These EFA patches are of key importance to preserve the biodiversity. They include a large part of the vascular flora of Pustkowie and plant communities of natural syngensis. Among the EFAs defined, there were 11 ponds; they represent different stages of evolution. In a few cases, it was possible to observe an advanced overgrowing process in the ponds, which was seen in the development of forest ecosystems around astatic water surfaces. As for the midfield ponds, a supply of components coming from land fertilization was conducive to such overgrowing. The quality of water in the reservoirs

Tab. 2 Plant associations recorded in the Pustkowie landscape unit.

Plant association	Position in WGS 84
Natural forest and forest clearing associations	
<i>Agrostio-Populetum tremulae</i> Pass. in Pass. et Hofm. 1968	φN 53°45'55.2" / λE 16°30'2.75"
<i>Calamagrostio arundinaceae-Quercetum petraeae</i> (Hart. 1934) Scam. et Pass. 1959 em. Brz., Kasp. et Krot. 1989	φN 53°46'19.32" / λE 16°29'46.77"
<i>Rubetum idaei</i> Mal. et Dziub. 1914 em. Oberd. 1973	φN 53°45'57.46" / λE 16°30'6.99"
<i>Stellario holosteae-Carpinetum betuli</i> Oberd. 1957	Torfowy Stream valley from φN 53°46'15.26" / λE 16°29'42.42" to φN 53°46'7.6" / λE 16°29'47.14"
Natural shrubs	
<i>Aegopodio-Sambucetum nigrae</i> Doing 1962 em. M. Wojt. 1990	φN 53°45'32.9" / λE 16°29'58.5"
<i>Salicetum cinereae</i> Kob. 1930	φN 53°45'34.16" / λE 16°29'52.19", φN 53°45'40.97" / λE 16°30'7.83"
Natural aquatic associations	
<i>Callitricho-Lemnetum minoris</i> (Web.-Old. 1969) Pass. 1978	φN 53°45'30.33" / λE 16°29'43.57"
<i>Lemno-Spirodeletum polyrrhizae</i> W. Koch 1954 ex Th. Müll. et Görs 1960	φN 53°45'34.38" / λE 16°30'0.19"
<i>Potametum natantis</i> Soó 1927 ex Pod. et Tom. 1978	φN 53°45'29.71" / λE 16°29'58.86"
<i>Ricciatum fluitantis</i> Slav. 1956 em. R. Tx. 1974	φN 53°45'17.3" / λE 16°29'59.9", φN 53°45'40.76" / λE 16°30'8.76"
Natural spring associations	
<i>Cardamino-Chrysosplenietum alternifolii</i> Maas 1959	φN 53°46'8.91" / λE 16°29'47.81"
Natural liverworts associations	
<i>Pellio-Conocephaletum</i> Maas 1959	φN 53°45'37.81" / λE 16°30'0.88"
Natural rushes	
<i>Caricetum acutiformis</i> Egg. 1933	φN 53°45'30.43" / λE 16°29'43.54"
<i>Caricetum elatae</i> W. Koch 1926	φN 53°45'40.74" / λE 16°30'9.08"
<i>Caricetum rostratae</i> Rüb. 1912 ex Osv. 1923	φN 53°45'17.3" / λE 16°29'59.9"
Natural mud therophyte	
<i>Bidentetum cernui</i> Kob. 1948	φN 53°45'30.28" / λE 16°29'43.59"
Natural sand grassland	
<i>Corniculario-Corynephorum</i> (R. Tx. 1928) Steff. 1931 nom. inv. Brz. et M. Wojt. 2001	φN 53°45'57.78" / λE 16°30'6.32"
Natural hydrophilous tall herbs	
<i>Agropyro repentis-Aegopodietum podagrariae</i> R. Tx 1967 em. Neuh.-Nov. et al. 1969	φN 53°45'29.75" / λE 16°29'51.82", φN 53°45'37.94" / λE 16°30'13.78"
<i>Epilobio hirsuti-Convolutetum sepium</i> Hil., Hein. et Niem. 1972	φN 53°45'34.26" / λE 16°30'0.9", φN 53°45'37.75" / λE 16°30'11.18"
<i>Fallopia-Humuletum lupuli</i> Brz. 1989 ex Brz. et M. Wojt. 2001	φN 53°45'35.66" / λE 16°30'17.81"
<i>Lysimachio vulgaris-Filipenduletum</i> Bal.-Tulač. 1978	φN 53°45'31.91" / λE 16°29'52.44"
<i>Stachyo sylvaticae-Impatientetum noli-tangere</i> (Pass. 1967) Hil. 1972	φN 53°46'7.99" / λE 16°29'47.95"
<i>Urtico-Convolutetum sepium</i> Görs et Th. Müll. 1969	φN 53°45'32.95" / λE 16°29'58.91"

Tab. 2 Continued

Plant association	Position in WGS 84
Natural thermophilous herbs	
<i>Lathyro linifolii-Melampyretum pratensis</i> Pass. 1967 em. Brz. 1988	φN 53°46'16.47" / λE 16°29'47.56"
<i>Sedo maximi-Peucedanetum oreoselini</i> Brz. 1981 ex Mac.-Paw. et Wil. 1996	φN 53°46'19.68" / λE 16°29'48.95"
<i>Trifolio-Agrimonieta eupatoriae</i> Th. Müll. 1962	φN 53°46'0.51" / λE 16°30'1.24"
Seminatural grasslands	
<i>Angelico-Cirsietum oleracei</i> R. Tx. 1937 em. 1947	φN 53°45'43.41" / λE 16°29'55.89", φN 53°45'50.51" / λE 16°29'55.79"
<i>Arrhenatheretum elatioris</i> Br.-Bl. 1919 ex Scherr. 1925	φN 53°45'47.89" / λE 16°29'55.29", φN 53°45'44.67" / λE 16°29'55.37"
<i>Caricetum cespitosae</i> Steff. 1931	φN 53°45'32.52" / λE 16°29'53.3"
<i>Herniarietum glabrae</i> (Hoh. 1960) Hej. et Jeh. 1975	φN 53°46'17.76" / λE 16°29'52.69"
<i>Lolio-Plantaginetum</i> Beg. 1932 em. Siss. 1969	Dirt road from φN 53°45'29.16" / λE 16°30'9.16" to φN 53°45'42.73" / λE 16°30'10.74"
<i>Ranunculo repentis-Alopecuretum geniculati</i> R. Tx. 1937 em. 1950	φN 53°45'33.17" / λE 16°29'4.49"
<i>Scirpetum silvatici</i> Ralski 1931	φN 53°45'29.86" / λE 16°29'43.08", φN 53°45'43.06" / λE 16°29'56.48", φN 53°45'48.28" / λE 16°29'57.13"
<i>Stellario palustris-Deschampsietum cespitosae</i> Freitag 1957	φN 53°45'32.7" / λE 16°29'54.79"
Synanthropic segetal associations	
<i>Digitarietum ischaemi</i> R. Tx. et Preis. in R. Tx. 1950 ex R. Tx. 1954	φN 53°45'35.44" / λE 16°30'15.77", φN 53°45'38.16" / λE 16°30'0.4", φN 53°45'53.22" / λE 16°29'59.41", φN 53°46'1.13" / λE 16°30'5.77"
<i>Echinochloo-Setarietum pumilae</i> Felf. 1942 corr. Muc. 1993	φN 53°45'56.1" / λE 16°30'4.36", φN 53°45'47.88" / λE 16°30'50.62"
<i>Papaveretum argemones</i> Krus. et Vlieg. 1939	φN 53°45'34.2" / λE 16°30'10.95"
<i>Ranunculo-Myosuretum</i> Diem., Siss. et West. 1940	φN 53°45'31.39" / λE 16°30'3.62"
<i>Sclerantho-Arnoseridetum minima</i> R. Tx. 1937	φN 53°45'34.51" / λE 16°30'15.82", φN 53°45'50.8" / λE 16°29'58.4"
<i>Setario-Lycopsietum arvensis</i> Pass. 1959	φN 53°45'31.25" / λE 16°30'12.37", φN 53°45'33.8" / λE 16°30'2.95"
<i>Spergulo arvensis-Scleranthetum annui</i> Kuhn 1937	φN 53°45'36.59" / λE 16°29'58.16"
<i>Spergulo-Echinochloetum cruris-galli</i> (Krus. et Vlieg. 1939) R. Tx. 1950 nom. inv. Brz. et M. Wojt. 2001	φN 53°45'45.32" / λE 16°30'4.15"
<i>Veronico agrestis-Fumarietum officinalis</i> R. Tx. in Lohm. 1949 ex J. Tx. 1955	φN 53°45'18.22" / λE 16°29'56.22"
Synanthropic ruderal associations	
<i>Artemisio vulgaris-Tanacetetum</i> Br.-Bl. 1949 ex Siss. 1950 nom. inv. Brz. et M. Wojt. 2001	φN 53°45'58.87" / λE 16°30'1.64"
<i>Chenopodietum stricti</i> (Oberd. 1957) Pass. 1964	φN 53°45'32.1" / λE 16°29'58.79"
<i>Convolvulo arvensis-Agropyretum repentis</i> Felf. (1942) 1943	φN 53°45'35.95" / λE 16°30'10.21"
<i>Matricario matricarioidis-Polygonetum arenastri</i> Th. Müll. in Oberd. 1971	φN 53°45'32.77" / λE 16°29'56.89"
Xenospontaneous rush associations (composed of a kenophyte, syn. neophyte)	
<i>Acoretum calami</i> Egg. 1933 ex Kob. 1948	φN 53°45'29.65" / λE 16°29'58.85"

in the vicinity of the buildings was good. Water from only one of them had an ionic composition indicating a level of anthropogenic contamination.

From three directions (the north, east, and south), Pustkowie is closed by wide forest complexes and from the west, by the Torfowy Stream valley, the right tributary of the Młyński Stream (reaching the Parsęta River from the left) which separates it from the village of Nowy Chwalim (and its agricultural lands). Forests in the north and east part of the landscape are located within the PLH 320007 Dorzecze Parsęty, one of the Natura 2000 areas. The landscape unit is therefore spatially isolated from the settlement areas by tree stands. Two plant communities of kenophytes (syn. neophyte), *Acoretum calami* in Pond 2 and *Bromus carinatus* Hook & Arn. at the barn, were the only identified.

The landscape of Pustkowie was characterized by numerous territorial internal functional systems which ensure the ecological continuity of the flora and fauna migration corridors. This dense and habitat-diverse network of corridors includes: ecotones at the margins of all types of land cover patches, valleys of natural watercourses, ponds (as stepping-stone corridors), and drainage ditches. Individual elements of this network have distinguishable plant associations. Ecotones at the fringes of tree stands in the potential natural habitats of *Fraxino-Alnetum* and *Stellario-Carpinetum* can be distinguished by: *Epilobio-Convolutum*, *Fallopio-Humuletum*, *Stachyo-Impatientum*, and *Urtico-Convolutum*. The valleys of natural watercourses are the habitats of: *Aegopodio-Sambucetum*, *Angelico-Cirsietum*, *Cardamino-Chrysosplenietum*, *Caricetum cespitosae*, *Lysimachio-Filipenduletum*, *Scirpetum silvatici*, and *Stellario-Carpinetum*. The midfield ponds are the domain of *Salicetum cinereae* and phytocoenoses from *Lemnetea minoris*, *Potametea*, *Bidentetea*, and *Phragmitetea*, and the drainage ditches – for *Pellio-Conocephaletum*.

The natural hydrographic network remains preserved, whereas the layout of fields is generally dependent on soil conditions. The landscape composition clearly shows the historical division of agricultural units derived from the late nineteenth century, 120 years ago, into arable lands and valley grasslands. It represents records of the culture of land use by few consecutive generations of people managing Pustkowie. The abundant weed seed bank in the soil (including 36 recorded archaeophytes) may provide evidence of the continuity of arable lands. It is manifested in the form of highly extensive field weeding and richly diverse segetal vegetation (nine associations of field weeds). It can be regarded as a hallmark of traditional, extensive agricultural usage, characterized by the lack of application of herbicides. Over the past 120 years, the arrangement of fields has been preserved at its relatively constant level, but the spatial differentiation of vegetation related to this layout has probably changed. The distribution of plant associations is determined to a very large extent by anthropogenic denudation. This process can be regarded as the distinguishing feature of young glacial agricultural landscapes. Fields have been ploughed and planted along hill slopes which, due to their high gradients, have shaped surface runoff lines. The main dirt road has more or less the same orientation. This along hill slope method of land management has been permanent, as evidenced by the presence of well-formed alluvial fans in their lower parts.

Field stones are present within the area. The smaller ones have been removed from fields and put aside; the larger ones were moved out of fields.

Microphytocoenoses, with a share of epiphytic lichens and bryophytes, evolved on rocks at the oldest landfills, which has undoubtedly increased a level of biodiversity of the area recorded. The following nearly 100-year-old farm buildings in Pustkowie survived: a pigsty, cowshed and stable, and a wooden barn. Residential buildings did not survive, apart from their foundations.

The Pustkowie landscape had various aesthetic and scenic cultural values as a result of the diversity of its relief, land use, and cover. Its historic farm buildings were exposed very well on a horizontal plane, with numerous view links with scenic surroundings. The landscape covers large areas of the undulated ground moraine, sloping (towards the north) from 158 m down to 100 m a.s.l. (towards the landscape interior boundary), along the axis for about 2 km. It stands out with numerous vertical planes related to culminated moraine waves. From each of these planes, which are natural viewpoints, a panorama spreads with the open landscape of agricultural lands being the frontline for this view. Two panoramas have an extraordinary range of visibility and provide outstanding aesthetic values. One of them stretches out from a hunters' platform at an altitude of 135 m a.s.l. by the eastern border of Pustkowie (from the following

point: φ N 53°45'42.58" / λ E 16°30'14.96"). If it was not former arable land located at the cadastral plot No. 141/5 (see <http://www.geoportal.gov.pl>) covered with trees as a result of secondary succession, almost all the interior landscape analyzed would be seen from there. The second panorama extends from an altitude of 135 m a.s.l. from the local hill on the west side of the farm. A very interesting (wide and far for about 800 m to the north) view due to the hydrographic network can be taken from a dirt road on the east side of the farming complex of Pustkowie (from the following point φ N 53°45'29.11" / λ E 16°30'9.84").

The orchard constitutes a disharmonious element of the landscape. As late as 1903 and the 1980s, there were arable lands at the location of this orchard. The low agricultural productivity of its sandy soils, characterized by a low level of groundwater, led to the abandonment of cropping, their conversion into fallow lands, and then into this orchard. However, the orchard did not follow the principles of good orchard management and so it did not provide adequate yields. A large number of the fruit trees planted failed during the first year after planting. Other disharmonious structures are as follows: a degenerated phytocoenoses of acidophilous oak forest *Calamagrostio arundinaceae-Quercetum* (Czaplinek forest inspectorate, 42m), midfield ponds with anthropogenically eutrophic water, unmown meadows with *Angelico-Cirsietum oleracei* and *Arrhenatheretum elatioris*, as well as ploughed fields along the slope with some visible effects of surface water erosion of soils and agrotechnical denudation. The process of water erosion was also visible on dirt roads running along the slope, especially within an access road to the eastern part of arable lands.

Discussion

The landscape law [3] introduces and defines the concept of a priority landscape. It protects a landscape which is particularly valuable to society because of its natural, cultural, historical, architectural, urban, rural, or aesthetic and scenic values and, as such, calls for its preservation. To a large extent, Pustkowie meets the criteria of this concept for a priority landscape. In spite of disturbances in the cultural continuity in material terms as well in the range of intangible assets (traditions) caused by the World War II within the area of West Pomerania, some natural and cultural values related to agriculture have still been preserved. Several structures of the landscape unit analyzed were indeed disharmonious, but the restoration of their harmony in order to raise its value is still possible. Restoration of the floristic composition of the acidophilous oak forest habitat (Czaplinek forest inspectorate, 42m), degenerated by cultivation of *Pinus sylvestris*, is practical. As part of sustainable forest management such stands can be rebuilt. The direction of restoration should be consistent with the characteristic species of the *Calamagrostio arundinaceae-Quercetum*. The species composition of this association has been defined by Kasprowicz [33].

In general, the quality of midfield pond water was good, taking into consideration similar reservoirs (among the farm buildings) assessed by Durkowski and Woroniecki [34] in the Western Pomerania region and by Skwierawski [35] in the northeastern part of Poland. The main components in terms of their concentration were at the "average level" compared to surface water found at the upper Parsęta catchment [10]. Hydrochemical types of water were characteristic to underground and surface waters, which are present at young glacial lake district areas [36]. It should be noted that within Pustkowie, the quality of underground water was good. Eutrophication occurs within the water Ponds 7 and 10; it is probably due to the fertilization of agricultural lands (in the case of the water Pond 1) due to cattle sewage. The state of water can be improved by affecting the source of this eutrophication by implementing the code of good agricultural practice detailed under the EU Rural Development Program 2014–2020 adopted by the European Commission on May 26, 2015, and/or benefiting from compensation for agricultural activities in areas with unfavorable conditions of management. According to these principles (in force under the penalty of law), an application of manure may not exceed 170 kg N ha⁻¹ year⁻¹ [37]. This code of good agricultural practice, if followed, will provide the ponds with favorable conservation conditions. Surface water erosion of soils and agrotechnical denudation pose a threat to the midfield ponds. As a result,

reservoirs are surrounded by agricultural terraces and gradually become levelled [38]. This was seen clearly in several of the ponds within the area of Pustkowie, to a large extent filled with mud and retreating water and marsh plants.

Unmown *Angelico-Cirsietum oleracei* and *Arrhenatheretum elatioris* meadows may be included under the agri-environmental and climatic measures and reused. The former meets the conditions of inclusion under Package 5.4 of the Program, and the latter under Package 5.5 [14].

On January 1, 2015, new regulations came into force on payments to be made due to agricultural practices which are beneficial to the climate and the environment in the scope of greening. This is done through the diversification of crops and maintenance of permanent pastures and EFAs within the landscape. Payments made for the greening are mandatory components of the direct support schemes for farmers under the common agricultural policy (in 2017 – about 74 EUR ha⁻¹ year⁻¹), and thus this is an effective tool aimed at the protection of landscape components based on vegetation which is primarily composed of native plant species. Such maintenance of EFAs only applies to farms with an area of ≥15 ha of agricultural lands and must occupy ≥5% of arable lands within [39]. As long as the country implements the practice of greening, patches of vegetation related to EFAs may become part of the landscape form.

From the economic point of view, the orchard, set up in the fallow of low-productivity former arable lands, is a negative landscape determinant and should be eliminated. It provides evidence of the poor combination of agricultural production with the natural environmental conditions. The orchard and its history is typical of the Western Pomerania region. Maciejczak [40] reported that this type of fruit orchard has been established on the least fertile soils under agri-environmental and climatic constraints (Package 3, “Preservation of orchards with traditional varieties of fruit trees”). They are much reduced (in 2017, 1,964 PLN ha⁻¹ year⁻¹ = about 468 EUR), hence their extraordinary popularity among owners of lands which previously laid fallow. Most of these orchards have been set up only to obtain financial support from the EU [40]. To restore the harmony, the lost orchards should be forested. Agricultural producers may receive financial support for afforestation under the EU Rural Development Program 2014–2020, the “Afforestation and creation of forested areas” measure [14]. In accordance with the requirements of this measure, it is necessary to analyze a given forested area and take into consideration its local natural environmental context. The transformation of arable lands into an orchard is a positive action undertaken for the landscape. The same applies to the transformation of arable lands into pastures on the west side of Pustkowie.

Pustkowie is characterized by a considerable share of arable lands on longer slopes with larger inclinations and therefore with significant potential of topographic relief. The difference in between the highest and lowest elevation impact on the erosion and anthropogenic denudation [38]. As a result, in the lower part of slopes, flushed soil creates an accumulation of surface cover, whilst the upper part is lowered by flushing soil material. Therefore, within areas where anthropogenic denudation occurs, habitat catenas have developed (at the “hilltop slope – slope foot” line) with their corresponding specific sequence of segetal plant associations. Catenal vegetation systems related to the process of erosion and denudation were described by Herbrich [41], who demonstrated the Kaszub Lake District case. Anthropogenic denudation of cultivation soils is perceived to be negative, which makes soils lose their natural properties or even leads to their degradation. It can be tempered by antierosion agricultural techniques [42]. The application of such recommended treatments aimed to limit erosion and mechanical denudation as across-slope ploughing could lead to the lower habitat-based diversity of catenas and thus the reduced species richness and plant diversity of the flora and segetal associations. The extensive cover with field weeds developed during the growing season was a probable factor which has decreased water erosion within arable lands of Pustkowie; it prevented material loss. A steep and long dirt road used to “serve” the entire eastern part of agricultural lands of the spatial unit examined was an anthropogenic disharmonious structure due to the water erosion with their location being difficult to alter. Its presence was also related to the occurrence of positive landscape elements such as phytocoenoses of natural and seminatural associations developed on both sides of this road, which enables it to operate a roadside ecological corridor. Under antierosion drainage, it is recommended to locate agricultural roads across land declines [42]. By

virtue of the protection of soils, an alternative organization of the road system would be beneficial, but due to the biodiversity present, it would probably be less advantageous because of the elimination of the catenal vegetation system.

The architectural form of Pustkowie reflects the local building tradition expressed in the application of local field stones to make foundations. Raszeja et al. [43] considered it to be a typical feature of rural buildings because locally available materials in villages were usually used for construction. Scandinavian erratics coming from Vistulian glacial deposits [44] are such materials within the area of Pustkowie. On these large-sized erratics taken from arable lands and, due to their heavy weight and stored at the nearest unused landfills, microphytocoenoses with some epiphytic lichens and bryophytes have developed. Such landfills should be regarded to be a landscape determinant (in line with the definition of a landscape determinant set by Myga-Piątek et al. [6]) of the last glacial advance onto the northwestern part of Poland.

The exposed complex of farm buildings within Pustkowie, as seen from numerous places in this landscape unit, may attract attention and positively affect the perception of the whole spatial form. Observers looking at the farm from the north side as well as all the panorama around it may be given a sense of scenic beauty and harmony. This is confirmed by Raszeja et al. [43], who state that a good landscape exposure positively affects the landscape, its perception, and aesthetic experienced by observers. The composition of this place derived from the prewar period and preserved in the landscape (consisting of various natural and anthropogenic patches as a result of ploughing, mowing and grazing) is an undoubted aesthetic value of the landscape and, according to the criteria set by Myga-Piątek et al. [6], a determinant of the identity and familiarity of this area. In the case of users in Pustkowie, this emotional bond with the landscape is probably strong and built from the moment of their arrival at the western lands during the great postwar migration. Strykiewicz [45] reported that the upper Parsęta and its areas were mostly inhabited by the rural population from southeastern Poland and from the regions which after World War II were absorbed by the former Soviet Union. It may explain the strong emotional bonds with the agricultural landscape from the former Polish territories with the Recovered Land. Biernat and Kałamucka [46] believe that a sense of familiarity and belonging may effectively contribute to the preservation of some historically accumulated landscape components and their values.

Conclusion

Landscape of Pustkowie is of outstanding value due to unique form, historical human settlements combined with natural structures influenced by their natural environment. A landscape audit should treat them as a priority due to numerous characteristic distinguishing landscape determinants which were reported in this paper. The preserved-in-space and clearly intelligible landscape form related to the culture of traditional agriculture within this young glacial area constitute the natural and cultural heritage which deserves special protection. It is threatened, by amongst other factors, replacement with contemporary forms which are disharmonious and inconsistent with the natural environment and its character. In the case of agricultural landscapes, conventionally managed areas (advanced in the intensification of productivity) are the extremes of such forms. Hence, some cosmopolitan components of the landscape form and its functions emerge. This threat is diminished by the EU Rural Development Program 2014–2020, implementing the Common Agricultural Policy of the EU, together with the national agricultural policy. It provides favorable conditions for the maintenance of proenvironment, traditional agriculture in 2014, the year during which the field mapping and study were conducted by the authors, which should be treated as a temporal benchmark and a base for recording future changes in the natural and cultural environment of Pustkowie. Our studies and their results, presented on a large spatial scale, have covered specific environmental circumstances, which in the future will be a point of reference to assess the dynamics and trend of changes to occur within the area of Pustkowie. The material needed to interpret these changes will also include long-term measurements and analyses conducted at the Geoecological Station in Storkowo under the program of Integrated Monitoring of the Environment.

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Wyróżniki tradycyjnego krajobrazu rolniczego

Streszczenie

Scharakteryzowano stan krajobrazu ekstensywnie, rolniczo użytkowanego przez indywidualnego producenta rolnego. Do badań wybrano jednostkę przestrzenną przy osadzie Pustkowie, w zlewni górnej Parsęty, w środkowej części Pojezierza Zachodniopomorskiego (Polska). Od 1994 r. zlewnia ta jest objęta badawczo-pomiarowymi programami państwowego Zintegrowanego Monitoringu Środowiska Przyrodniczego, których celem jest śledzenie zmian w strukturze i funkcjonowaniu geosystemów reprezentatywnych dla obszarów młodoglacjalnych umiarkowanej strefy klimatycznej. Głównie jest monitorowany stan abiotycznego podsystemu krajobrazowego, natomiast podsystemu biotycznego i zasobów kulturowych tylko w bardzo wąskim wymiarze, co dało impuls do poszerzenia zakresu śledzenia przemian. Artykuł przedstawia tzw. stan zerowy, referencyjny do śledzenia kierunku i zakresu zmian w krajobrazie ekstensywnego (tradycyjnego) rolnictwa. Omówiono abiotyczne, geobotaniczne i kulturowe atrybuty tego stanu, wybrane na podstawie metodyki audytu krajobrazowego, wykonywanego na podstawie tzw. ustawy krajobrazowej z 2015 roku. W oparciu o dane pochodzące z własnego kartowania terenowego wskazano wyróżniki stanu krajobrazu tradycyjnie rolniczo użytkowanego, które pokazują jego swoistość wyrażoną wartościami przyrodniczymi i kulturowymi, zapisanymi między innymi w procesach sukcesji, formie użytkowania ziemi i pokrycia terenu, ogólnej kompozycji przestrzeni historycznie ukształtowanej przez rolnictwo, zróżnicowaniu roślinności rzeczywistej i potencjalnej roślinności naturalnej, a także w wizualno-estetycznej percepcji przez człowieka. Ze względu na duże wartości analizowaną jednostkę uznano za krajobraz priorytetowy. Podkreślono rolę programu rolno-środowiskowo-klimatycznego PROW 2014–2020 w kształtowaniu i utrzymywaniu tych wartości. Dla wykonawców audytu krajobrazowego wyniki mogą być pomocne przy delimitacji priorytetowych krajobrazów tradycyjnego rolnictwa, a także formułowaniu rekomendacji dotyczących ochrony ich przyrodniczych i kulturowych zasobów, między innymi dla dokumentów planistycznych związanych z zagospodarowaniem przestrzennym.