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VEGETATION OF TRZEBINIA TOWN IN CONDITIONS OF STRONG HUMAN IMPACT. II. AQUATIC AND MIRE COMMUNITIES

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SZATA ROŚLINNA MIASTA TRZEBINI W WARUNKACH SILNEJ ANTROPOPRESJI. II. ZBIOROWISKA WODNE I TORFOWISKOWE

Przeprowadzone badania dotyczące zbiorowisk wodnych i torfowiskowych na terenie Trzebini w roku 2000 wykazały ich małą różnorodność wynikającą z niewielkiej ilości dużych zbiorników wodnych oraz z przeprowadzenia melioracji osuszających. Wyróżniono 12 syntaksonów reprezentujących 5 klas: *Lemnetea minoris* (1), *Potametea* (6), *Utricularietea intermedio-minoris* (1), *Littorelletea uniflorae* (1), *Scheuchzerio-Caricetea nigrae* (1). Wśród opisanych jednostek 3 zespoły są narażone na wymarcie w obrębie Górnego Śląska: *Myriophylletum verticillati*, *Hottonietum palustris*, *Valeriano-Caricetum flavae* (zespół o charakterze górskim).

Summary

The field investigations concerning water and peat bog communities on the territory of Trzebinia in 2000 revealed their little diversity caused by a small number of large water bodies and performed betterment drainages. 12 syntaxa were distinguished which represent 5 classes: *Lemnetea minoris* (1), *Potametea* (6), *Utricularietea intermedio-minoris* (1), *Littorelletea uniflorae* (1), *Scheuchzerio-Caricetea nigrae* (1). Among described units 3 plant associations are endangered within Upper Silesia: *Myriophylletum verticillati*, *Hottonietum palustris*, *Valeriano-Caricetum flavae* (montane plant association).

INTRODUCTION

The town of Trzebinia due to permanent and considerable industrialization and urbanization was considered an area of little interest for studies of natural plant communities [11]. However, the reality is quite different. Among built-up urban zone there are areas with conditions proper to development of natural phytocoenoses. Moreover, the locality at the border of two macroregions: Silesian Upland and Kraków-Częstochowa Upland, a variation of geological substratum and habitats, favours considerable differentiation of vegetation cover of the town. The geobotanical studies which were carried out there confirmed a wide spectrum of habitats – from extreme dry ones to marsh and water ones. Though flora of Trzebinia town has been an object of interest of many botanists, the plant communities of the town, particularly hygrophilous vegetation phytocoenoses have not been got to known. Until now, only plant communities accompanying the Chechło river and its tributaries have

been described, however they comprise only small fragments of southern part of Trzebinia. On the town territory there are many stagnant water reservoirs which are potential habitats of water phytocoenoses. The bigger ones, for instance lagoon Chechło or Balaton, are man-made objects and they are used as watering places. There are not many flowing rivers. The longest watercourse of Trzebinia – Kozi Bród is a regulated river and it flows in a concrete canal. However, the presence of plentiful ponds and pools with the biggest depth of 2 m and a bunch of local, little watercourses make it possible in their vicinity to develop marsh and mire vegetation. (Characterization of topography of the study area was introduced in part 1 [13]).

The aim of the paper is to characterize aquatic and mire plant communities and to qualify their state of development and condition.

METHODS

The field survey was carried out in 2000. The phytosociological relevés were performed according to Braun-Blanquet method [3]. The systematic and nomenclature of distinguished plant communities are given after "Przewodnik do oznaczania zbiorowisk roślinnych Polski" [7] and "Zarys hydrobotaniki" [10], whereas plant names after "Vascular Plant of Poland a checklist" [9], and the degree of threat of given plant community after "Czerwona lista zbiorowisk roślinnych Górnego Śląska" [4]. In the phytosociological tables, the following abbreviations were included:

BA – Balaton, CH – Chechło; Łd – Piaski, meadow close to Puszcza Dulowska; PB – Podbuczyna, S – Siersza; W – Wodna, meadow to the north from ZG "Trzebionka" ; W* – Wodna, meadow to the south from ZG „Trzebionka".

CHARACTERIZATION OF DISTINGUISHED PLANT COMMUNITIES

1. Aquatic plant communities from *Lemnetea minoris, Potametea, Littorelletea uniflorae* and *Utricularietea-intermedio minoris* classes.

The plant communities representing *Lemnetea minoris, Potametea, Littorelletea uniflorae* and *Utricularietea-intermedio minoris* classes do not occupy large areas because most of water reservoirs in the town area are rather small and shallow. However, these bigger ones are used as recreation centers what facilities to develop described phytocoenoses. Their biggest fragments were confirmed in ponds in Podbuczyna. Smaller fragments of these plant communities occur also in ponds and pools situated in meadows and peat bogs. In each case their characteristic species are in the same time dominant species which determine physiognomy of the phytocoenoses.

On the territory of Trzebinia eight plant associations have been identified. They are basically the most common lowland water plant communities and their localities are known almost in the whole country [10]. In Upper Silesia some of them are endangered. Among syntaxa from class *Potametea*, to a group of threatened belong: *Hottonietum palustris* and *Myriophylletum verticillati*, and with indeterminate threat – *Potametum lucentis*. In *Littorelletea uniflorae* class all communities are rare, but their status of threat is unknown [4].

1.1. *Lemno-Spirodeletum polyrrhizae* W. Koch 1954 em. Müll. et Görs 1960

A fragment of this plant association was found in a pond in the area of Podbuczyna. It occurs along the bank of the water body with depth of 0.5 m in a neighborhood of marsh with *Typha angustifolia*. The community is built-up by duckweed (*Lemna minor* L.), composing dense agglomerations in the area about 30 m^2. Full floristic composition of phytocoenosis is included in a phytosociological relevé no. 40. date 27.05.2000; locality: PB; forest district: S; forest section: 93; area of relevé: 20 m^2; cover of herb layer c: 100%; number of species in relevé: 3; Ch: *Lemno-Spirodeletum polyrrhizae*: *Lemna minor* 5.5; accompanying species: *Potamogeton natans* +; *Typha latifolia* r.

1.2. *Potametum lucentis* Hueck 1931 (Tab. 1)

Table 1. *Potamentum lucentis* Hueck 1931

Successive number of relevé	1	2	3	4	5
Date	28.08.2000	27.05.2000	10.06.2000	10.06.2000	28.08.2000
Locality	CH	PB	PB	PB	CH
Forest district	–	S	S	S	–
Forest section	–	91	91	97	–
Area of relevé (m^2)	15	10	25	20	15
Cover of herb layer c (%)	50	80	70	80	70
Number of species in relevé	1	4	4	4	4
Ch: *Potametum lucentis*° + *Potametea*					
°*Potamogeton lucens*	3.3	4.4	4.4.	4.4	4.4
Potamogeton natans	·	2.2	1.1	2.2	·
Myriophyllum verticillatum	·	·	·	·	1.1
Ch: *Phragmitetea*					
Equisetum fluviatile	·	r	+	·	·
Alisma plantago-aquatica	·	·	·	·	+
Schoenoplectus lacustris	·	·	·	·	r
Typha latifolia	·	·	·	·	·
Accompanying species:					
Juncus articulatus	·	·	+	+	·
Juncus bulbosus	·	+	·	·	·

In the area of research phytocoenoses of this association are rare and do not occupy a huge area. Their distribution is limited to two water bodies: pond – in district Podbuczyna and lagoon Chechło. They arise in eutrophic water reservoirs with organic substratum and depth of 0.5–1.5 m.

Potametum lucentis represents extremely poor, considering floristic composition, one-layer underwater plant communities. The loose conglomerations, basically built up by

Potamogeton lucens L., compose the association. The contribution of other species is insignificant. From water surface the community adjoins *Potametum natanis* phytocoenosis, and from the land it is in neighborhood of marsh communities.

1.3. *Potametum natantis* Soó 1927 (Tab. 2)

Table 2. *Potametum natantis* Soó 1927

Successive number of relevé	1	2	3	4	5	6	Constancy
Date	20.05.2000	23.08.2000	10.06.2000	27.05.2000	23.08.2000	10.06.2000	
Locality	PB	BA	PB	PB	PB	PB	
Forest district	S	–	S	S	S	S	
Forest section	91	–	97	93	94	91	
Area of relevé (m²)	30	20	30	20	25	20	
Cover of herb layer c (%)	100	60	100	100	70	70	
Number of species in relevé	2	2	3	3	4	6	
Ch: *Potametum natantis*° + *Potametea*							
°*Potamogeton natans*	5.5	4.4	5.5	5.5	4.4	4.4	V
Myriophyllum verticillatum	·	1.1	+	·	+	1.1	IV
Potamogeton lucens	1.1	·	·	·	·	·	I
Ch: *Phragmitetea*							
Equisetum fluviatile	·	·	·	1.1	1.1	+	III
Typha latifolia	·	·	r	+	r	·	III
Alisma plantago-aquatica	·	·	·	·	·	+	I
Eleocharis palustris	·	·	·	·	·	+	I
Schoenoplectus lacustris	·	·	·	·	·	r	I

Fragments of this plant association occur rarely, but occupy large areas. On the territory of the town they were observed in ponds in Podbuczyna and next to Balaton. They are in nutrient-rich stagnant waters, depth of 1.5–2 m. They form compact, one – or two layer phytocoenoses – in which *Potamogeton natans* L. preponderates. In most of the fragments *Myriophyllum verticillatum* L. is the most frequent species, and among marsh species the most frequently encountered are: *Equisetum fluviatile* L. and *Typha latifolia* L. In the investigated area phytocoenoses *Potametum natantis* form at the furthest from the land protruding belt of water vegetation. As a consequence it bears down fragments of *Potametum lucentis* into more shallow waters. *Potamogeton natans* L is a very expensive species. It is conspicuous by big biomass increases during vegetation season, inhabiting large space of water depth. Therefore, it plays crucial role in overgrowing and swallowing of water bodies [10].

1.4. *Myriophylletum verticillati* Soó 1927 (Tab. 3)

Table 3. *Myriophylletum verticillati* Soó 1927

Succesive number of relevé	1	2	3	4	5	6	7	Constancy
Date	20.08.2000	25.08.2000	14.08.2000	27.05.2000	20.08.2000	02.06.2000	06.06.2000	
Locality	PB	PB	W	PB	W	W	W	
Forest district	S	S	–	S	–	–	–	
Forest section	94	91	–	93	–	–	–	
Area of relevé (m^2)	5	5	6	4	2	15	6	
Cover of herb layer c (%)	80	80	80	90	90	90	60	
Number of species in relevé	3	4	5	5	3	2	3	
Ch: *Myriophylletum verticillati* + *Potametea*°								
Myriophyllum verticillatum	4.4	4.4	4.4	4.4	4.4	5.5	4.4	V
°*Potamogeton natans*	1.1	1.1	·	·	·	·	·	II
Ch: *Phragmitetea*								
Equisetum fluviatile	+	+	+	1.1	·	·	·	III
Carex rostrata	·	+	+	·	·	·	·	II
Eleocharis palustris	·	·	·	·	1.1	+	·	II
Typha angustifolia	·	·	r	·	·	·	+	II
Phragmites australis	·	·	·	·	·	1.1	·	I
Typha latifolia	·	·	·	+	·	·	·	I
Accompanying species:								
Carex canescens	·	·	·	+	·	·	·	I
Lemna minor	·	·	·	r	·	·	·	I
Mentha aquatica	·	·	·	·	·	·	+	I
Utricularia minor	·	·	·	·	1.1	·	·	I

The phytocoenoses of this plant association belong to the most common plant communities on the town territory. They occur both in small and not very deep water reservoirs like infield pools, holes after peat output, or ditches with stagnant water and in bigger water basins. Its largest fragments were found in pond in district Wodna. Another dominant and characteristic species is *Myriophyllum verticillatum* L. The other species do not play large role in the described community. They are mainly plants typical for rush community which adjoin on this plant community: *Equisetum fluviatile* L., *Carex rostrata* Stokes, *Eleocharis palustris* (L.) Roem & Schult. However, in larger water bodies, water species like *Potamogeton natans* enter into composition of community, too.

Phytocoenoses *Myriophylletum verticillati* do not play a big role in the processes of swallowing because they occupy small areas [10]. However, *Myriophyllum verticillatum* L. is frequently considerable admixture of other water and rush communities.

1.5. *Hottonietum palustris* R. Tx. 1937

A plant community with dominance of *Hottonia palustris* L. was found only in lagoon Chechło. It covers about 3 m^2. It is located in a belt between rush plant communities *Phragmition* and *Magnocaricion,* in the place where the depth of water is 0.5 m. The floristic composition of this fragment of the plant association in investigated area is shown in relevé 137; date: 13.06.2000; locality: CH; area of relevé: 2 m^2; cover of herb layer c: 60%; number of species in relevé: 4; Ch: *Hottonietum palustris*: *Hottonia palustris* 4.4; Ch: *Phragmitetea*: *Alisma plantago-aquatica* +; *Equisetum fluviatile* 1.1; accompanying species: *Lycopus europaeus* r.

1.6. Plant community with *Callitriche cophocarpa* Sendtn.

In the neighborhood of the railway line Kraków – Katowice, in district Wodna, there is a pond arisen in a subsidence basin. A plant community with *Callitriche cophocarpa* Sendtn. covers about 50 m^2. The dominated species – *Callitriche cophocarpa* Sendtn. forms a compact and one-layer fragment, which like most of water phytocoenoses has aggregative appearance. *Callitriche cophocarpa* Sendtn. is a characteristic species for plant association *Hottonietum palustris* and alliance *Hottonion* [7]. Since other characteristic taxa for this association do not occur in this fragment, therefore the described unit has been distinguished as a community. It may be a degenerative form of *Hottonietum palustris* phytocoenoses. The floristic composition is illustrated by phytosociological relevé no. 65; date: 02.06.2000; locality: W*; area of relevé: 20 m^2; cover of herb layer c: 100%; number of species in relevé: 5; D community: *Callitriche cophocarpa*: 5.5; accompanying species: *Berula erecta* r ; *Equisetum palustre* +; *Lycopus europaeus* +; *Mentha aquatica* +.

1.7. *Ranunculetum fluitantis* Allorge 1922

In the investigated area the fragments of this plant association were confirmed in a small pond, located close to the railway line Trzebinia – Bolęcin. It is a shallow water basin with maximum depth 1 m and the substratum is slimy and polluted. In spring during the period of *Batriachium trichophyllum* (Chaix) Bosch blooming the water level is the highest and next it systematically decreases, swallowing down to 0.5 m of depth. The fragments of *Ranunculetum fluitantis* in the study area develop in different habitat conditions in

comparison with analogous plant communities in other stands in Poland. The described phytocoenoses occurred in eutrophic, clear, fast flowing waters with sandy or light slimy bottom [10].

In Poland, phytocoenoses of this plant association are built up by: *Batriachium trichophyllum* (Chaix) Bosch, *Potamogeton fluitans* Roth and *Sparganium emersum* Rehmann *ssp. longissimum*, which are considered characteristic for this association [10]. In the study area the depicted community is composed mainly by *Batriachium trichophyllum* (Chaix) Bosch. Other taxa play no large role because their coverage is rather small. Its floristic composition is depicted in phytosociological relevé no. 215; date: 05.07.2000; locality: ŁD; area of relevé: 10 m^2; cover of herb layer c: 90%; number of species in relevé: 4; Ch*: Ranunculetum fluitantis*: *Batrachium trichophyllum* 5.5; Ch: *Phragmitetea*: *Alisma plantago-aquatica* +; *Glyceria fluitans* +; *Phragmites australis* r.

1.8. Community with *Juncus bulbosus* L.

Phytocoenoses with a dominance of *Juncus bulbosus* L. occur in Trzebinia on two stands. In both cases they occupy small areas and develop on eutrophic habitats, but different in relation to humidity. In Podbuczyna they develop in littoral zone of the pond with depth 10 cm. Except *Juncus bulbosus* L. an important role is played by *Potamogeton natans* L. which covers about 15% of the phytocoenoses. The contribution of other waters and rush is not large. However, along lagoon Chechło the community is encountered over the belt of rushes, in muddy spot, where water does not appear on the surface. Its significant components are: peat bog species, especially *Comarum palustre* L., which together with *Juncus bulbosus* L. composes its phytocoenoses.

Phytocoenoses with *Juncus bulbosus* L. are reckoned with association *Ranunculo-Juncetum bulbosi* known from lobelias lakes [7, 10]. On account of heterogeneous floristic composition, eutrophy of the habitat, and lack of many characteristic taxa for class *Littorelletea uniflorae,* these phytocoenoses in Trzebinia are described as a community.

The floristic composition and coverage of this community are shown in the following phytosociological relevés:

Phytosociological relevé no. 46; date: 27.05.2000; locality: PB; forest district: S; forest section: 91; area of relevé: 10 m^2; cover of herb layer c: 100%; number of species in relevé: 5; D community: *Juncus bulbosus* 5.5; Ch: *Potametea: Myriophyllum verticillatum* +; *Potamogeton natans* 2.2; Ch: *Phragmitetea: Equisetum fluviatile* +; *Sparganium erectum* +. Phytosociological relevé no.196; date: 05.07.2000; locality: CH; area of relevé: 15 m^2; cover of herb layer c: 80%; number of species in relevé: 8; D community: *Juncus bulbosus* 3.3; Ch: *Phragmitetea: Iris pseudacorus* +; Ch: *Scheuchzerio-Caricetea nigrae: Comarum palustre* 3.3; *Juncus articulatus* 1.1; *Ranunculus flammula* +; accompanying species: *Agrostis canina* 1.1; *Juncus effusus* +; *Lysimachia vulgaris* +.

1.9. *Scorpidio-Utricularietum minoris* (Müll. et Görs 1960)

In the investigated area plant association *Scorpidio-Utriculiereteum* is the only community representing itself as a class. Its fragment was found on a meadow behind Zakłady Górnicze "Trzebionka" in a shallow little pond covering about 5 m^2. *Utricularia minor* L. is a dominant species on the territory of Trzebinia, treated also as a characteristic for this association [7, 10]. Among accompanying species, huge contribution concerns bog

moss *Sphagnum cuspidatum* Hoffm. em. Warnst., whereas other species do not have a great weight in composition of phytocoenoses of this association. The floristic composition of phytocoenosis is illustrated in phytosociological relevé no. 267; date: 14.08.2000; locality: W*; area of relevé: 5 m^2; cover of herb layer c: 90%; cover of bryophytes layer d: 5%; number of species in relevé: 6; Ch: *Scorpidio-Utricularietum minoris*: *Utricularia minor* 5.5; accompanying species: *Equisetum fluviatile* +; *Juncus articulatus* +; *Juncus effusus* r ; *Myriophyllum verticillatum* +; *Spagnum cuspidatum* d: 1.1.

2. Mire communities from class *Schechzerio-Caricetea nigrae*

Within Trzebinia mire communities occupy small areas. They are encountered almost only in district Wodna, on meadows around Zakłady Górnicze "Trzebionka". From the floristic point of view they are unusually interesting elements of vegetation cover of the study area in regard to the presence of many protected and threatened species like: *Carex davalliana* Sm., *Dactylorhiza majalis* (Rchb.) P. F. Hunt & Summerh, *Drosera rotundifolia* L., *Equisetum varigatum* Schleich., *Eriophorum latifolium* Hoppe, *Malaxis monophyllos* (L.) Sw., *Menyanthes trifoliata* L., *Tofieldia calyculata* (L.) Wahlenb.

Peat bog communities are very sensitive to changes of water conditions. Thus land improvement and agricultural drainage considerably diminish area of their occurrence. For this reason they are rare in the Kraków Upland and Silesian Upland. Besides, they are very often degenerated and not numerous, fragments of them are preserved well and properly developed [1]. Plant associations from class *Schechzerio-Caricetea nigrae* are included on a red list of plant associations of Upper Silesia [4]. Among them phytocoenoses *Valeriano-Caricetum flavae* are considered as threatened syntaxa in the study area.

2.1. *Valeriano-Caricetum flavae* Pawł. (1949 n.n) 1960 (Tab. 4)

Phytocoenoses of his plant associations occur as not large fragments among flood waters of the stream Pstróżnik and in subsidence of the area under the impact of water trickling. Likely to other regions of Poland they develop on peaty soils and peaty-gley soils comprising calcium carbonate [7]. The bog spring has appearance of a lowland meadow. Most of the fragments are featured by tuft structure in regard to the abundant contribution of *Carex davalliana* Sm. It is accompanied by other moor species such as: *Valeriana simplicifolia* (Rchb.) Kabath, *Carex nigra* Reichard, *Eriophorum latifolium* Hoppe. In fragments located closer to the stream *Menyantes trifoliata* L. has huge coverage. A significant role in depicted community is played by meadow species from order *Molinietalia caerulae*. Among them, the most frequent species are: *Equisetum palustre* L., *Caltha palustris* L., *Cirsium rivulare* (Jacq.) All., *Galium uliginosum* L., *Lythrum salicaria* L. However, these taxa are also frequent in other hygrophilous communities on the territory of the town and do not reveal any special affiliation to any of them.

Described bog spring in Trzebinia in comparison with phytocoenoses from other regions, is distinguished by the presence and dominance of *Carex davalliana* Sm. [2, 6, 12, 14]. Besides, it resembles phytocoenoses *Valeriano-Caricetum flavae* from Pogórze Wielickie [6]. The common feature is a large association and abundant occurrence of *Eriophorum latifolium* Hoppe, *Valeriana simplicifolia* (Rchb.) Kabath and *Carex nigra* Reichard. Similar proportions are revealed by species from alliance *Caricion davallianae* and class *Schechzerio-Caricetea nigrae* and also plentiful group of taxa from order *Molinietalia*

caerulae. However, except for domination of *Carex davalliana* Sm. it distinguished by occasional presence of *Crepis paludosa* (L.) Moench, which in the valley of Wierzbanówka distinctly single out the described community.

Table 4. *Valeriano-Caricetum flavae* (1949 n.n) 1960

Successive number of relevé	1	2	3	4	5
Date	02.06.2000	25.05.2000	22.97.2000	02.06.2000	02.06.2000
Locality	W	W	W*	W*	W
Area of relevé (m²)	25	30	25	20	15
Cover of herb layer c (%)	100	100	100	100	80
Number of species in relevé	31	26	30	20	12
Ch: *Valeriano-Caricetum flavae*					
Valeriana simplicifolia	3.3	2.2	2.2	2.2	2.2
Carex davalliana	1.2	3.3	2.2	3.3	·
Ch: *Caricetalia davallianae* + *Scheuchzerio-Caricetea nigrae*°					
°*Carex nigra*	1.1	1.1	1.1	2.2	+
Eriophorum latifolium	·	2.2	1.1	2.2	3.3
Epipactis palustris	·	+	2.2	·	·
°*Menyanthes trifoliata*	4.4	2.2	·	·	·
Dactylorhiza majalis	+	+	·	·	·
°*Epilobium palustre*	+	·	1.1	·	·
Ch: *Molinio-Arrhenatheretea*					
Equisetum palustre	1.1	2.2	2.2	2.2	1.1
Caltha palustris	2.2	1.1	·	+	2.2
Cirsium rivulare	1.1	+	1.1	1.1	·
Galium uliginosum	+	+	1.1	+	·
Lythrum salicaria	+	1.1	+	+	·
Ranunculus acris	r	+	+	+	·
Festuca rubra	+	·	1.1	1.1	·
Sanguisorba officinalis	·	+	2.2	2.2	·
Achillea millefolium	·	·	1.1	+	·
Angelica sylvestris	+	·	·	·	+
Juncus conglomeratus	·	·	1.1	+	·
Lychnis flos-cuculi	+	·	·	+	·
Lysimachia vulgaris	+	2.2	·	·	·
Myosotis palustris	+	·	·	·	1.1
Accompanying species:					
Mentha aquatica	1.1	2.2	2.2	·	2.2
Carex panicea	1.1	2.2	1.1	·	·
Eupatorium cannabinum	+	+	·	+	·
Juncus inflexus	+	·	+	·	+
Lycopus europaeus	·	1.1	+	·	+
Potentilla erecta	·	+	2.2	1.2	·
Briza media	·	r	·	r	·
Carex rostrata	r	·	·	·	+

Sporadic species: Ch: *Caricetalia davallianae* + *Scheuchzerio-Caricetea nigraeş: Carex flava* 4(1.2); *Parnassia palustris* 3(1.1); *Veronica scutellata* 3; *Ch: Molinio-Arrhenatheretea: Cardamine pratensis* 1;

Centaurea jacea 3(1.1); *Cirsium palustre* 3(1.1); *Crepis paludosa* 1(1.1); *Deschampsia caespitosa* 3(1.2); *Festuca pratensis* 2; *Gentiana pneumonanthe* 3; *Hypericum tetrapterum* 1; *Knautia arvensis* 3; *Lotus uliginosus* 2(1.1); *Molinia caerulea* 3(1.2); *Poa trivialis* 1(1.1); *Rumex acetosa* 1; Accompanying species: *Ajuga reptans* 2; *Carex flacca* 1; *Eleocharis palustris* 5; *Galium palustre* 1; *Gymnadenia conopsea* 2; *Lysimachia nummularia* 4; *Mentha longifolia* 1(2.2); *Salix rosmarinifolia* c 3; *Scutellaria galericulata* 1; *Senecio rivularis* 2; *Veronica persica* 3;

Phytocoenoses *Valeriano-Caricetum flavae* have been already described on the territory of Trzebinia from surroundings of settlement tank belonging to Zakłady Górnicze "Trzebionka" and to the west from Las Skowron [14]. They have not been taken into consideration in the present paper because they are situated beyond borders of the study area. They occupy considerably smaller areas (10 m^2), and their floristic composition and their ratios singled out from the described fragments, developed in district Wodna. Probably the cause of this phenomenon is an impropriate land improvement which let to excessive drainage of that area [14].

2.2. Community with *Menyanthes trifoliata* L.

Community with a dominance of *Menyanthes trifoliata* L. occurs only in the area of Wodna. During the entire year its fragments are supplied by waters from the stream Pstróżnik. In the study area it occupies a medium place between rush with *Carex acutiformis* Ehrh. and fragments *Valeleriano-Caricetum flavae* to which it refers by similar floristic composition (compare tab. 4, relevé 1). But in relation to the lack of characteristic species for this plant association, described syntaxon was classified as a community. Nevertheless, its affiliation to class *Schechzerio-Caricetea nigrae* is well documented. The floristic composition and ratios in this community are depicted in phytosociological relevé no. 3; date: 31.07.1999; locality: W; area of relevé: 20 m^2; cover of herb layer c: 100%; number of species in relevé: 23; D community: *Menyanthes trifoliata* 4.4; Ch: *Caricetalia davallianae* + *Scheuchzerio-Caricetea nigrae*°: °*Carex nigra* +; *Epipactis palustris* 1.1; *Eriophorum latifolium* +; Ch: *Molinio-Arrhenatheretea: Angelica sylvestris* +; *Caltha palustris* 1.1; *Cardamine pratensis* +; *Cirsium rivulare* +; *Deschampsia caespitosa* r; *Galium uliginosum* 1.1; *Hypericum tetrapterum* r; *Lotus uliginosus* +; *Lysimachia vulgaris* r; *Lythrum salicaria* +; *Myosotis palustris* r; accompanying species: *Carex panicea* 1.1; *Eupatorium cannabinum* +; *Gymnadenia conopsea* r; *Juncus inflexus* +; *Lycopus europaeus* +; *Mentha aquatica* 2.2; *Mentha longifolia* 1.1; *Scutellaria galericulata* r.
An analogous community was described in the Cracovian Upland.

2.3. Community with *Equisetum variegatum* Schleich.

A community with *Equisetum varigatum* Schleich was found in the area of a worked-out quarry Balaton. It occurs on moisterous supplied by trickling waters rich in calcium carbonate. The main role in the community is played by *Equisetum variegatum* Schleich. Attention should be paid to large contribution of other rare species such as *Malaxis monophyllos* (L.) Sw. and *Epipactis palustris* (L.) Crantz. Full species composition and ratios in this community are illustrated by phytosociological relevé no. 169; date: 23.06.2000; locality: BA; area of relevé: 20 m^2; cover of herb layer c: 70%; number of species in relevé: 11; D community: *Equisetum variegatum* 4.4; Ch: *Scheuchzerio-Caricetea nigrae*: *Epipactis palustris* 2.2; *Juncus articulatus* 1.1; Ch: *Molinio-Arrhenatheretea*:

Deschampsia coespitosa +; *Holcus lanatus* +; *Leontodon hispidus* +; accompanying species: *Eupatorium cannabinum* +; *Gymnadenia conopsea* r; *Malaxis monophyllos* 1.1; *Typha latifolia* r.

The affiliation of this community to *Caricetalia davallianae* order and *Schechzerio-Caricetea nigrae* class on the basis of the above relevé may be questionable. *Equisetum variegatum* Schleich. is considered as characteristic species for order *Epilobietalia fleischeri*, which comprises a group of associations initiating vegetation succession on gravel-banks of huge streams and mountain rivers [7]. But in lowland sites this species accompanies peat bog vegetation from *Caricetalia nigrae* and *Caricetalia davallianae* orders [8]. Moreover, the detailed studies carried out on old sand and loam excavation indicate the role of *Equisetum varigatum* Schleich. as pioneer species in forming of eutrophic spring bog vegetation [8].

SUMMARY AND CONCLUSIONS

1. As a result of the field studies carried out on the territory of the town of Trzebinia small differentiation of hygrophilous and peat bog communities, caused both by natural and anthropogenic factors, was confirmed. The limiting factor of development of hygrophilous communities is a small number of water bodies and their management for social needs. Whereas sporadic occurrence of mire communities resulted from river regulations and land improvements which caused drainage of the area.
2. Water phytocoenoses do not play a large role in the vegetation cover of Trzebinia because they occupy only small areas. Despite this they are its considerable constituents in Podbuczyny and lagoon "Chechło". Instead, peat bog communities are restricted to districts: Wodna and Balaton.
3. 12 syntaxa were distinguished, among them 8 as associations and 4 as communities. The described units belong to 5 classes: *Lemnetea minoris* (1), *Potametea* (6), *Utrcularietea intermedio-minoris* (1), *Littorelletea uniflorae* (1), *Scheuchzerio-Caricetea nigrae* (3).
4. To the most interesting in regard to geobotanical values from distinguished syntaxa belongs plant association with mountain nature: *Valeriano-Caricetum flavae*.
5. Among associations distinguished on the territory of the town, 3 are vulnerable and they are included on "Czerwona lista zbiorowisk Górnego Śląska". These are: *Myriophylletum verticillati, Hottonietum palustris, Valeriano-Caricetum flavae*.

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