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DIVERSITY AND DISTRIBUTION OF RUSH COMMUNITIES FROM THE PHRAGMITO-MAGNO-CARICETEA CLASS IN PAMIR ALAI MOUNTAINS (MIDDLE ASIA: TAJIKISTAN)

ARKADIUSZ NOWAK[1], SYLWIA NOWAK[1] AND MARCIN NOBIS[2]

[1]*Department of Biosystematics, Laboratory of Geobotany & Plant Conservation, Opole University, Oleska St. 22, 45-052 Opole, Poland; anowak@uni.opole.pl*
[2]*Department of Plant Taxonomy, Phytogeography and Herbarium, Institute of Botany, Jagiellonian University, Kopernika St. 27, 31-501 Kraków, Poland*

Abstract

The study presents results of geobotanical investigations conducted in rush vegetation from the Phragmito-Magno-Caricetea class in the central Pamir-Alai Mts (Tajikistan, Middle Asia). Studies were carried out mainly within the Syr-Daria, Pyandzh, Zeravshan, Kafirnighan, Khanaka and Surkhandaria river valleys in the years 2008–2012. The research was focused on the classification of rush plant communities developing within this poorly-investigated area. Habitat conditions were checked for all vegetation plots, including pH reaction, water depth, inclination and altitude. Altogether 231 phytosociological relevés using the Braun-Blanquet method were sampled. The analyses classified the vegetation into 28 plant communities, including 26 associations. Eight new plant associations were proposed: *Scirpetum hippolytii, Mentho asiaticae-Nasturtietum microphyllae, Juncetum brachytepali, Sparganietum stoloniferi, Eleocharitetum argyrolepis, Eleocharitetum mitracarpae, Caricetum songoricae* and *Rorippo palustris-Alismatetum graminei*. The main discrimination factor for the data set is the floristic structure of the associations. Rush vegetation from the Phragmito-Magno-Caricetea class is spread throughout all river valleys of the research areas in montane and subalpine as well as in alpine zones. The vegetation patches occur mainly along the shores of water bodies and in ditches. Only sporadically have rush communities been noted within rice fields, where communities of the class Oryzetea sativae prevail. The study shows that riverside habitats with rush vegetation can harbour a relatively rich flora. Almost 200 species were found in vegetation plots, including some which are rare and have not been recorded until now in this part of Middle Asia.

Introduction

The Pamir-Alai is a part of the middle Asian mountain system recognised by Conservation International to be among 34 so-called hotspots of biodiversity (Mittermeier *et al*., 2006) and as one of the 11 most important focal points of future plant diversity studies and conservation (Giam *et al*., 2010). Furthermore, Tajikistan, with its near-lowest adaptive capacity to climate instability, is regarded as the country most sensitive in the world to climate change (Fay & Patel, 2008). According to Baettig *et al*., (2007), it is exposed to a high risk of climate change, which will be one of the most important degradation factors to the vegetation cover of the country.

The central part of the Pamir-Alai mountains is located in Tajikistan, a country is considered as one of the richest regions in plant species diversity in the former Soviet Union. According to the ten-volume flora of the former Soviet Socialist Republic of Tajikistan (Ovchinnikov, 1957, 1963, 1968, 1978; Ovchinnikov & Kochkareva, 1975; Ovchinnikov & Kinzikaeva, 1981; Chukavina, 1984; Kochkareva, 1986; Kinzikaeva, 1988; Rasulova, 1991) supplemented by the works of Zakirov (1961), Tzvelev (1976), Ikonnikov (1983), ca. 4,550 vascular plant species occur in Tajikistan. This number is not final, as recently some new records of Tajik flora have been published e.g., Lazkov, 2008; Nobis *et al*., 2010, 2011; Nobis, 2011a; Nobis & Nowak, 2011a, b). Moreover, some species new to science have been described based on plant specimens collected in the area of this country e.g., Fritsch *et al*., 2002; Khassanov *et al*., 2007; Fritsch & Friesen, 2009; Ranjbar *et al*., 2010; Nobis, 2011b; Nobis *et al*., 2013a,b). Approximately 30% of vascular plant species known from Tajikistan are generally accepted endemics of the country (Rasulova, 1991; Nowak & Nobis, 2010b; Nowak *et al*., 2011).

Across the globe, research on flora and vegetation of rush communities has been carried out within a range of contexts and with different levels of intensity e.g., Pott, 1995; Schubert *et al*., 1995; Sekioka *et al*., 2000; Ot'ahel'ová *et al*., 2001; Matuszkiewicz, 2007; Chytrý, 2011). A number of studies have appeared which record basic floristic and vegetation data on rush communities (e.g. Barrett & Seaman, 1980; Turki & Sheded, 2002; Spałek & Nowak, 2003; Nobis *et al*., 2006; Šilc *et al*., 2011).

To date, no syntaxonomical research on plant communities of rush vegetation has been carried out in Middle Asia. The only exception is a study on rush communities within rice fields (Nowak & Nobis, 2012; Nowak *et al*., 2013). Other phytosociological works in middle and southern Asia are focused generally on grassland, segetal and scree vegetation (Sher *et al*., 2011, 2013; Ozturk *et al*., 2012; Nowak & Nowak, 2013; Nowak *et al.,* 2013). Phytosociological research is essential for documenting the syntaxonomic diversity of those specific habitats. Even though Tajikistan's vegetation is rich and relatively well preserved, the research is all the more important because there has been a scarcity of synthetic syntaxonomic studies in this country so far (Nowak & Nobis, 2012, 2013; Nowak & Nowak, 2013; Nowak *et al.,* 2013).

Material and Methods

Study area: Tajikistan covers 143,500 km^2 and is situated in Middle Asia between E 36°40′ – 41°05′ and

N 67°31′ – 75°14′ (Figs. 1, 2). This is typically mountainous country, with more than 50% of its area located above 3000 m. The southern part of Tajikistan is influenced by a subtropical climate, while the northern part is situated in the temperate climate zone (Vladimirova, 1968). Generally, the area of the country is characterized by high insolation, low percentage of cloud cover, high amplitude of annual temperatures, low humidity and low precipitation. In the subtropical regions of Tajikistan, the average temperatures in June are around 30°C. In the temperate zone, comprising mainly the high mountains, the climate is much harsher, with average temperatures in July between 9.7°C and 13.5°C. Annual precipitation ranges in Tajikistan from ca. 70 mm (in the Pamirs) to ca. 600 mm (in the Hissar Range). The lower limit of perpetual snow is at an altitude of 3500–3600 m a.s.l. in the western part of the country, 5800 m in the eastern regions (Fig. 3; Latipova, 1968; Narzikulov & Stanjukovich, 1968).

The study was conducted in the Turkestan, Zeravshan, Hissar, Darvaz and Pamir mountains, mainly in the valleys of the Syr-Daria, Amu-Daria, Pyandzh, Vashan, Vaksh, Zeravshan, Kafirnighan, Khanaka and Surkhandaria Rivers, where vast areas of riverside and rush habitats are concentrated. The studied vegetation plots are located between 300 and 2900 m a.s.l.

Data and analyses: The field study was conducted in 2008–2012, during which 231 phytosociological relevés were taken. The plot size used to sample vegetation, established so as to represent full floristic composition, varied from 20 to 30 m^2 depending on plant density and homogeneity of vegetation cover. For each vegetation plot, all vascular plants were recorded. Cryptogams were not noted because of their inferior importance in rush communities in the Middle Asia. Plant species were recorded according to the Braun-Blanquet cover-abundance scale. The 7-degree scale was used (r, +, 1, 2, 3, 4, 5) (Braun-Blanquet, 1964). Geographical coordinates, elevation above sea level, aspect and slope inclination were noted for each relevé.

All relevés were stored in a database using the JUICE programme (Tichý, 2002). A TWINSPAN analysis (Hill, 1979) was used to perform the preliminary classification of communities. The relevés data showed a clear unimodal response, enabling us to use a Detrended Correspondence Analysis (DCA) with the floristic data set (presence-absence data, no downweighting of rare species) to check floristic-sociological classifications and to show relationships between the groups. For the ordination, Canoco for Windows 4.5 was used (ter Braak & Šmilauer, 2002).

Vegetation classification follows the sorted table approach of Braun-Blanquet (1964). In the analytic tables (Tables 1–4), species constancies are given in classes I–V (Dierschke, 1994). In cases where a particular species was noted in fewer than 8 relevés, the absolute number of species occurrences was specified. Newly-presented syntaxa, described as associations or subassociations, were proposed according to the International Code of Phytosociological Nomenclature (Weber *et al*., 2000). When distinguishing associations, the works of Pott (1995), Schubert *et al*., (1995), Ot'ahel'ová *et al*. (2001) and Chytrý (2011), were taken into account. The association concept follows Willner (2006). The presented communities are arranged in a syntaxonomic overview at the end of the results section.

Species nomenclature mainly followed Czerepanov (1995). Plant material collected during field studies was deposited in the Herbarium of Middle Asia Mountains, hosted in OPUN (Opole University, Poland) and KRA (Jagiellonian University, Poland).

Results

As a result of the study, within the Phragmito-Magno-Caricetea class, 28 plant communities have been distinguished.

Numerical correspondence analysis: DCA ordination run for the entire data set clearly segregates the associations described as new to science: *Scirpetum hippolytii*, *Mentho asiaticae-Nasturtietum microphyllae*, *Juncetum brachytepali* (central part of the diagram; Fig. 4), *Sparganietum stoloniferi*, *Rorippo palustris-Alismatetum graminei*, *Eleocharitetum argyrolepis* (right part of the diagram), *Eleocharitetum mitracarpae* (upper left part of the diagram) and *Caricetum songoricae* (upper part of the diagram). Other communities are also relatively well isolated. The reason for this is, of course, essential differences in the floristic composition and structure of individual phytocoenoses. Only phytocoenoses closely related in terms of habitat conditions, such as *Leersietum oryzoidis–Cyperetum longi*, *Typhetum latifoliae–Scirpetum triqueteri* or *Bolboschoenetum glauci–Calamagrostio- Typhetum minimae*, overlap slightly. The last-mentioned case seems the most interesting. Both of these associations are relatively rich in species as a result of the considerable 'openness' of the vegetation plots. As a result, and also due perhaps to the anthropogenic character of the habitat in the case of *Bolboschoenetum glauci*, a considerable share of ruderal and segetal species was noted in vegetation plots e.g., *Cynodon dactylon, Echinochloa crus-galli*, *Setaria pumila*, *Solanum nigrum* or *Sorghum halepense*. There are also significant similarities in habitat conditions. In both cases, the substrate contains a high percentage of gravel or other mineral material and is mostly deprived of humic substances. Even though these associations are often classified in different alliances (Dihoru, 1971; Chytrý, 2011; Nowak *et al*., 2013), they seem to be closely related, as is clearly visible on the DCA plot (Fig. 4). Hence, there is still a need for further research to unambiguously determine the syntaxonomic position of these communities.

Phytocoenoses occurring also in rice fields, such as *Cyperetum longi*, *Leersietum oryzoidis*, *Scirpetum triquetriformis* and *Scirpetum triqueteri* (bottom-left part of the diagram) are poorly distinguished; however, they are clearly set apart on the plot.

Fig. 1. The location of Tajikistan in the Middle Asia.

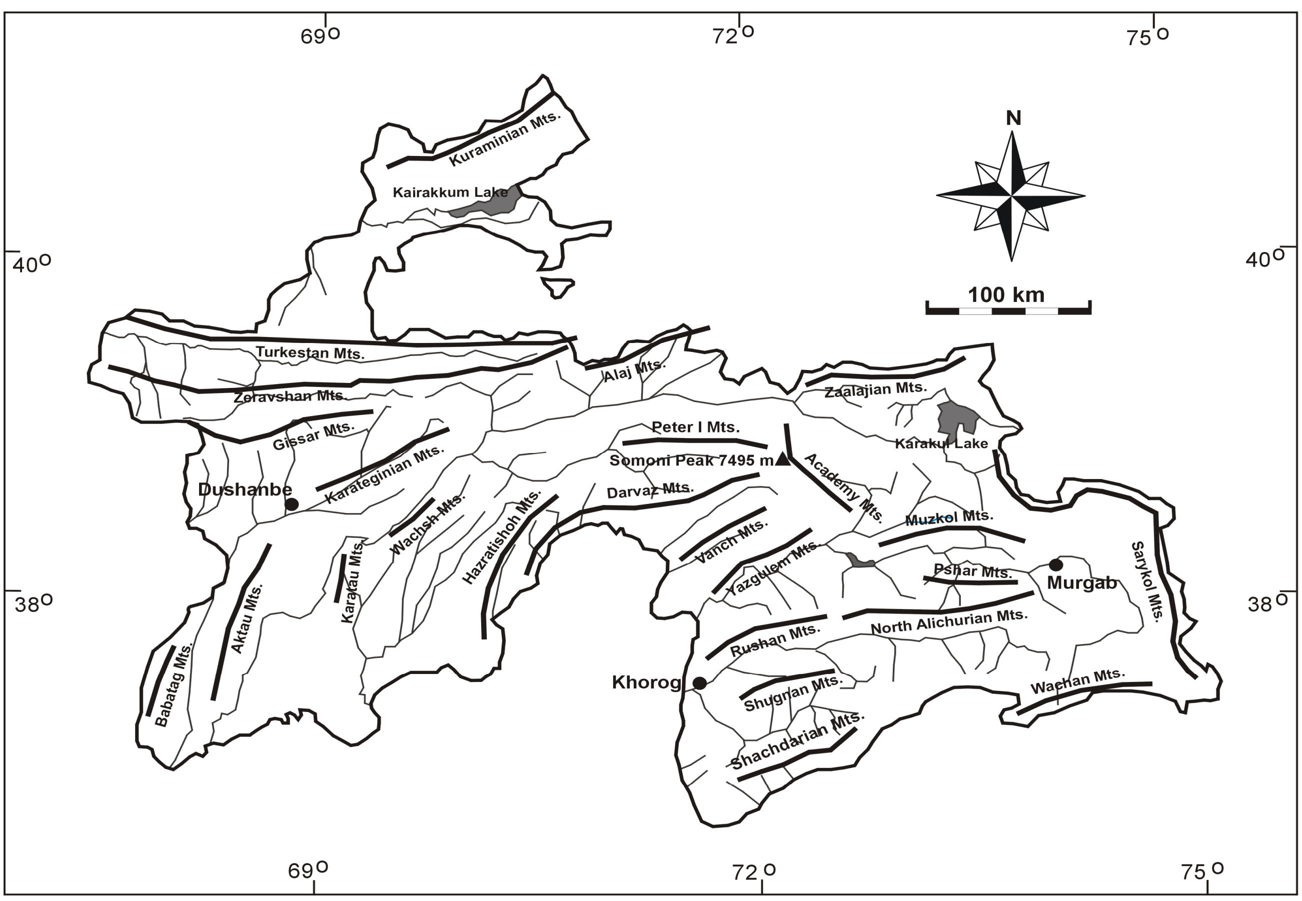

Fig. 2. The area of Tajikistan with main cities, mountain ridges, rivers and lakes.

Table 1. Associations of the *Phragmition austalis* alliance.

Successive number of relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
day	17	3	11	4	12	23	7	29	30	13	11	12	6	17	17	29	17	23
Date: month	6	7	6	5	6	6	9	6	6	6	6	6	6	6	6	6	6	6
year	9	9	9	11	11	9	11	9	9	10	9	9	11	9	9	9	11	9
Water depth (cm)	5	25	8	65	5	15	5	10	10	5	15	10	5	25	25	15	5	90
Aspect	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inclination (degrees)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Altitude (m)	950	1700	1418	687	1166	1750	318	1435	1650	920	1420	1150	1968	950	950	1475	1021	1750
Cover of herb layer (%)	95	85	75	80	90	35	50	95	80	70	50	75	75	40	40	60	85	75
Relevé area (m^2)	9	10	10	20	15	4	7	5	25	25	5	25	4	15	15	25	15	20
pH	8.15	7.93	7.8	8.6	8.5	8.14	7.1	7.4	8.27	8.53	8.11	8.4	8.4	7.72	7.72	8.4	8.4	8.7
Number of species	9	4	10	4	5	2	6	11	7	4	2	2	4	10	10	4	4	2
Association	Ta	Ta	Ta	Ta	Ta	Ta	Ta	Ta	Ta	Ta	Ta	Ta	Ta	Tl	Tl	Tl	Tl	Tl
ChAss. *Typhetum angustifoliae*																		
Typha angustifolia	5	5	4	4	5	3	3	4	4	4	3	4	4	.	.	.	.	.
ChAss. *Typhetum latifoliae*																		
Typha latifolia	.	.	.	.	.	.	.	.	.	.	.	.	.	3	3	4	5	4
ChAss. *Typhetum laxmannii*																		
Typha laxmannii	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	1	.
ChAss. *Phragmitetum australis*																		
Phragmites australis	.	+	+	1	1	1	+	+	.	.	.	.	.	+	+	+	.	1
ChAss. *Scirpetum triqueteri*																		
Scirpus triqueter	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
ChAss. *Scirpetum triquetriformis*																		
Scirpus triquetriformis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ChAss. *Cyperetum longi*																		
Cyperus longus	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.
Ch.Ass. *Cyperetum serotini*																		
Cyperus (Juncellus) serotinus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ChAss. *Scirpetum hippolytii*																		
Scirpetum hippolyti	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ChAll. *Phragmition australis*																		
Typha minima	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Scirpus lacustris	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ChO. et ChCl. *Phragmitetalia* et *Phragmito-Magno-Caricetea*																		
Polypogon demissus	2	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bolboschoenus glaucus	.	.	+	.	.	.	.	.	+	+	.	.	.	+	+	+	+	.
Glyceria notata	.	.	.	.	.	.	.	1	2	.	.	.	.	.	.	.	.	.
Mentha asiatica	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Juncus brachytepalus	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.
Lycopus europaeus	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Eleocharis uniglumis	.	.	.	.	.	.	.	.	.	.	.	.	+	1	1	.	.	.
Alisma plantago-aquatica	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.
Eleocharis argyrolepis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Veronica anagallis-aquatica	.	.	.	.	.	.	.	+	1	.	.	.	.	.	.	.	.	.
Carex songorica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Epilobium velutinum	.	.	.	.	+	.	.	2	.	.	.	.	.	.	.	.	.	.
Berula erecta	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Epilobium minutiflorum	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Alisma gramineum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.
Sium latifolium	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.
Galium palustre	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Nasturtium microphyllum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex melanostachya	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Scirpus tabernaemontani	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
Eleocharis mitracarpa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex riparia	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Table 1. (Cont'd.).

Successive number of relevé	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
day	17	10	29	6	6	6	28	28	28	4	3	10	14	24	24	13	14	10	17	17	17	30	30	29	23
Date: month	6	6	6	9	9	9	6	6	6	7	7	6	6	6	6	6	6	6	6	6	6	6	6	6	6
year	9	11	9	11	11	11	9	9	9	9	9	11	10	9	9	10	10	11	11	11	11	9	9	9	9
Water depth (cm)	10	10	10	10	5	15	15	10	15	5	15	10	5	25	15	10	5	10	5	5	5	15	10	2	5
Aspect	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inclination (degrees)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Altitude (m)	950	1047	1660	1035	955	973	1720	1720	1550	634	2038	961	1040	1850	1780	880	1035	961	1021	1021	1021	1650	1650	1620	1750
Cover of herb layer (%)	80	95	80	35	40	40	70	70	60	80	95	60	95	65	70	85	85	80	90	90	90	85	95	75	40
Relevé area (m^2)	15	10	10	10	10	10	20	20	8	15	10	8	20	15	15	20	25	15	10	10	10	15	15	20	4
pH	8.1	7.6	7.4	7.4	7.7	7.6	7.5	7.5	7.65	8.2	7.93	7.9	7.83	7.8	7.8	8.02	7.52	8	8.2	8.2	8.3	8.21	8.31	8.1	8.23
Number of species	9	9	8	10	7	11	4	6	4	7	6	5	15	5	3	11	11	7	4	3	3	7	6	13	4
Association	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx
ChAss. *Typhetum angustifoliae*																									
Typha angustifolia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ChAss. *Typhetum latifoliae*																									
Typha latifolia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ChAss. *Typhetum laxmannii*																									
Typha laxmannii	4	4	4	3	3	3	4	4	4	4	5	4	4	4	4	4	4	4	5	5	5	5	4	4	3
ChAss. *Phragmitetum australis*																									
Phragmites australis	.	+	+	+	.	.	.	.	.	.	.	.	1	1	1	+	+	1	.	.	.	.	.	.	.
ChAss. *Scirpetum triqueteri*																									
Scirpus triqueter	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ChAss. *Scirpetum triquetriformis*																									
Scirpus triquetriformis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ChAss. *Cyperetum longi*																									
Cyperus longus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ch.Ass. *Cyperetum serotini*																									
Cyperus (Juncellus) serotinus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.
ChAss. *Scirpetum hippolytii*																									
Scirpetum hippolyti	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ChAll. *Phragmition australis*																									
Typha minima	.	.	.	.	.	+	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.
Scirpus lacustris	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ChO. et ChCl. *Phragmitetalia* et *Phragmito-Magno-Caricetea*																									
Polypogon demissus	+	+	.	.	.	.	.	.	+	1	+	+	+	.	.	+	+	+	.	.	.	.	.	.	.
Bolboschoenus glaucus	+	+	.	.	.	.	.	+	.	.	.	.	.	.	.	1	1	2	+	+	+	+	2	.	.
Glyceria notata	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Mentha asiatica	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Juncus brachytepalus	.	.	2	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	+	.
Lycopus europaeus	.	.	.	.	.	1	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Eleocharis uniglumis	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	1
Alisma plantago-aquatica	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.
Eleocharis argyrolepis	.	2	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.
Veronica anagallis-aquatica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex songorica	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.
Epilobium velutinum	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.
Berula erecta	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.
Epilobium minutiflorum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Alisma gramineum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.
Sium latifolium	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Galium palustre	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.
Nasturtium microphyllum	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex melanostachya	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Scirpus tabernaemontani	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.
Eleocharis mitracarpa	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex riparia																									

Table 1. (Cont'd.).

Successive number of relevé	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66
day	6	6	23	14	12	18	12	29	29	29	4	23	20	24	13	4	18	18	18	4	10	8	8
Date: month	9	9	6	6	6	6	6	6	6	6	7	6	6	6	6	7	6	6	6	5	6	6	6
year	11	11	10	10	9	9	11	9	9	9	9	9	10	9	11	9	10	10	10	11	9	9	9
Water depth (cm)	5	5	5	5	5	5	5	10	15	15	40	90	5	5	5	40	5	5	5	5	20	30	35
Aspect	-	-	-	-	-	-	-	-	-	-	-	-	-	NE	-	-	-	-	-	-	-	-	-
Inclination (degrees)	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-
Altitude (m)	1035	1035	2050	1035	1054	1650	1166	1816	1475	1475	713	1750	1680	1850	2018	634	2315	2320	2320	685	1419	2210	2210
Cover of herb layer (%)	30	40	95	95	50	95	90	80	95	80	100	95	90	90	90	85	75	70	70	70	35	20	40
Relevé area (m^2)	15	15	15	25	25	25	15	25	25	20	30	25	15	15	10	25	15	15	15	5	15	25	50
pH	7.2	7.2	8.1	7.4	8.12	8.2	8.3	7.7	8.2	8.2	7.1	8.7	8	8.6	8.4	8.1	7.25	8.02	8.02	7.9	8.32	7.9	7.7
Number of species	9	7	14	11	7	13	4	13	6	8	4	2	5	5	9	8	3	4	4	3	3	2	3
Association	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph
ChAss. *Typhetum angustifoliae*																							
Typha angustifolia	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ChAss. *Typhetum latifoliae*																							
Typha latifolia	.	.	.	.	.	.	.	.	.	2	.	+	.	.	.	.	.	.	.	.	.	.	.
ChAss. *Typhetum laxmannii*																							
Typha laxmannii	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ChAss. *Phragmitetum australis*																							
Phragmites australis	3	3	4	4	3	5	5	4	5	4	5	5	5	4	4	4	4	4	4	4	3	2	2
ChAss. *Scirpetum triqueteri*																							
Scirpus triqueter	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
ChAss. *Scirpetum triquetriformis*																							
Scirpus triquetriformis	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
ChAss. *Cyperetum longi*																							
Cyperus longus	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.
Ch.Ass. *Cyperetum serotini*																							
Cyperus (Juncellus) serotinus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ChAss. *Scirpetum hippolytii*																							
Scirpetum hippolyti	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ChAll. *Phragmition australis*																							
Typha minima	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Scirpus lacustris	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ChO. et ChCl. *Phragmitetalia* et *Phragmito-Magno-Caricetea*																							
Polypogon demissus	.	.	.	1	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bolboschoenus glaucus	.	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Glyceria notata	.	.	.	.	.	.	.	+	1	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Mentha asiatica	.	1	1	.	.	+	1	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Juncus brachytepalus	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lycopus europaeus	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.
Eleocharis uniglumis	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Alisma plantago-aquatica	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Eleocharis argyrolepis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Veronica anagallis-aquatica	.	.	.	.	.	.	.	+	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex songorica	.	.	.	+	.	.	.	1	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
Epilobium velutinum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.
Berula erecta	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Epilobium minutiflorum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Alisma gramineum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sium latifolium	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Galium palustre	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Nasturtium microphyllum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.
Carex melanostachya	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.
Scirpus tabernaemontani	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Eleocharis mitracarpaa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex riparia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Table 1. (Cont'd.)

Successive number of relevé	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	Constancy	Number of occurrence	Constancy	Constancy	Number of occurrence	Number of occurrence	Number of occurrence	Number of occurrence	Number of occurrence
Date: day	17	7	7	26	26	9	9	9	9	13	13	14	14	14	17	17	29	29	29	29									
Date: month	6	9	9	6	6	9	9	9	9	6	6	6	6	6	6	6	6	6	6	6									
Date: year	11	11	11	10	10	11	11	11	11	10	10	10	10	10	9	9	9	9	9	9									
Water depth (cm)	5	5	10	5	3	10	5	10	5	5	5	5	5	10	5	3	5	5	5	3									
Aspect	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
Inclination (degrees)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
Altitude (m)	1021	318	316	730	729	742	742	771	742	880	880	950	950	950	950	950	1620	1620	1620	1620									
Cover of herb layer (%)	55	95	85	75	75	80	50	85	65	95	100	70	75	55	85	85	85	85	85	85									
Relevé area (m^2)	4	7	7	15	10	8	8	6	8	5	5	5	4	5	10	10	10	10	8	10									
pH	7.7	7.6	7.6	7.3	7.3	7.3	7.3	7.7	7.3	8.7	8.7	7.98	8.05	7.8	7.59	7.7	7.8	7.8	7.8	7.8									
Number of species	7	6	10	4	6	11	8	6	6	8	6	6	5	5	12	12	16	14	10	15	rel.	rel.	rel.	rel.	rel.	rel.	rel.	rel.	rel.
Association	St	St	St	Sts	Sts	Cl	Cl	Cl	Cl	Cs	Cs	Cs	Cs	Cs	Sh	Sh	Sh	Sh	Sh	Sh	1−13	14-18	19-43	44-66	67-69	70-71	72-75	76-80	81-86
ChAss. *Typhetum angustifoliae*																													
Typha angustifolia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V	-	-	I	-	-	-	-	-
ChAss. *Typhetum latifoliae*																													
Typha latifolia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	5	-	I	-	-	-	-	-
ChAss. *Typhetum laxmannii*																													
Typha laxmannii	.	.	+	.	.	.	.	.	.	.	.	.	.	.	2	1	1	1	1	1	-	4	V	I	1	-	-	-	6
ChAss. *Phragmitetum australis*																													
Phragmites australis	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	III	4	II	V	1	-	1	-	-
ChAss. *Scirpetum triqueteri*																													
Scirpus triqueter	3	3	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	-	-	I	3	-	-	-	-
ChAss. *Scirpetum triquetriformis*																													
Scirpus triquetriformis	.	.	.	4	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	-	I	-	2	-	-	-
ChAss. *Cyperetum longi*																													
Cyperus longus	.	+	.	.	.	4	3	5	4	.	.	.	.	.	.	.	.	.	.	.	I	-	-	I	1	-	4	-	-
Ch.Ass. *Cyperetum serotini*																													
Cyperus (Juncellus) serotinus	.	.	.	.	.	.	.	.	.	4	4	4	4	3	.	.	.	.	.	.	-	-	I	-	-	-	-	5	-
ChAss. *Scirpetum hippolytii*																													
Scirpetum hippolyti	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	4	4	5	4	4	-	-	-	-	-	-	-	-	6
ChAll. *Phragmition australis*																													
Typha minima	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	I	I	-	-	-	-	5
Scirpus lacustris	.	.	.	1	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	I	-	-	2	-	-	4
ChO. et ChCl. *Phragmitetalia* et *Phragmito-Magno-Caricetea*																													
Polypogon demissus	.	.	.	.	.	.	.	.	1	2	+	.	+	+	1	1	1	+	.	.	II	-	II	I	-	-	1	4	4
Bolboschoenus glaucus	+	.	.	.	.	.	.	.	.	.	.	.	.	1	.	+	1	.	.	+	II	4	III	I	1	-	-	1	3
Glyceria notata	.	.	.	.	.	.	.	.	.	.	1	1	+	1	.	.	+	1	1	1	I	-	I	I	-	-	-	4	4
Mentha asiatica	+	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	1	1	1	1	I	-	I	II	1	-	-	2	4
Juncus brachytepalus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	1	1	.	-	-	I	I	-	-	-	-	3
Lycopus europaeus	.	.	.	.	+	+	.	.	+	.	.	1	.	.	.	.	.	.	.	.	I	-	I	I	-	1	2	1	-
Eleocharis uniglumis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	2	I	I	-	-	-	-	-
Alisma plantago-aquatica	.	.	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	-	I	I	-	2	1	-	-
Eleocharis argyrolepis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	-	-	I	I	-	-	-	-	2
Veronica anagallis-aquatica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	I	-	-	I	-	-	-	-	2
Carex songorica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	-	-	I	I	-	-	-	-	1
Epilobium velutinum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	-	I	I	-	-	-	-	-
Berula erecta	.	.	.	.	.	.	.	.	.	1	3	+	.	.	.	.	.	.	.	.	-	-	I	-	-	-	-	3	-
Epilobium minutiflorum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.	.	.	I	-	-	-	-	-	-	-	3
Alisma gramineum	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	-	1	I	-	1	-	-	-	1
Sium latifolium	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	I	-	-	I	-	-	-	1	-
Galium palustre	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	I	-	1	-	-	-	-
Nasturtium microphyllum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	I	I	-	-	-	-	-
Carex melanostachya	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	-	I	-	-	-	-	-
Scirpus tabernaemontani	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	I	-	-	-	-	-	-
Eleocharis mitracarpa	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	-	-	I	-	-	-	-	1	-
Carex riparia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	I	-	-	-	-	-	-	-	1

Table 1. (Cont'd.).

Successive number of relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
day	17	3	11	4	12	23	7	29	30	13	11	12	6	17	17	29	17	23
Date: month	6	7	6	5	6	6	9	6	6	6	6	6	6	6	6	6	6	6
year	9	9	9	11	11	9	11	9	9	10	9	9	11	9	9	9	11	9
Water depth (cm)	5	25	8	65	5	15	5	10	10	5	15	10	5	25	25	15	5	90
Aspect	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inclination (degrees)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Altitude (m)	950	1700	1418	687	1166	1750	318	1435	1650	920	1420	1150	1968	950	950	1475	1021	1750
Cover of herb layer (%)	95	85	75	80	90	35	50	95	80	70	50	75	75	40	40	60	85	75
Relevé area (m^2)	9	10	10	20	15	4	7	5	25	25	5	25	4	15	15	25	15	20
pH	8.15	7.93	7.8	8.6	8.5	8.14	7.1	7.4	8.27	8.53	8.11	8.4	8.4	7.72	7.72	8.4	8.4	8.7
Number of species	9	4	10	4	5	2	6	11	7	4	2	2	4	10	10	4	4	2
Association	Ta	Ta	Ta	Ta	Ta	Ta	Ta	Ta	Ta	Ta	Ta	Ta	Ta	Tl	Tl	Tl	Tl	Tl

Sporadic species: *Apium nodiflorum* 54; *Carex diluta* 51; *Eleocharis equisetiformis* 21; *Eleocharis uniglumis* f. *pallida* 35; *Polypogon viridis* 34.

Accompanying species																		
Juncus articulatus	1	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.
Rumex crispus	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.
Equisetum arvense	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Equisetum ramosissimum	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.
Cynodon dactylon	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.
Polygonum persicaria	.	.	+	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
Bolboschoenus planiculmis	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Trifolium repens	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Myosotis caespitosa	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Plantago lanceolata	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Calamagrostis pseudophragmites	.	.	1	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.
Plantago major	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Veronica oxycarpa																		
Scirpus mucronatus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cyperus difformis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Agrostis gigantea	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cirsium incanum	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Polygonum hydropiper	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ranunculus laetus	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Saccharum spontaneum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Chara sp.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Potamogeton perfoliatus	.	.	.	.	.	.	.	.	.	+	.	.	.	1	1	.	.	.
Trifolium pratense	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sagittaria trifolia	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.
Bromus japonicus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Salix linearifolia c	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lotus krylovii	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ranunculus sceleratus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Poa pratensis	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Batrachium divaricatum	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.
Utricularia vulgaris	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.
Potentilla reptans	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Poa trivialis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Taraxacum sp.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bidens frondosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Daucus carota	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Euphrasia pectinata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Xanthium italicum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carum carvi	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Dactylorhiza umbrosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex orbicularis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Tussilago farfara	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pycreus flavidus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Potentilla supina	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pulicaria uliginosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bidens tripartita	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Setaria pumila	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Heracleum lehmannianum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Melilotus officinalis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Blysmus compressus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Triglochin palustre	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Glycyrrhiza glabra	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sorghum halepense	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Myricaria bracteata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Table 1. (Cont'd.).

Successive number of relevé	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
day	17	10	29	6	6	6	28	28	28	4	3	10	14	24	24	13	14	10	17	17	17	30	30	29	23
Date: month	6	6	6	9	9	9	6	6	6	7	7	6	6	6	6	6	6	6	6	6	6	6	6	6	6
year	9	11	9	11	11	11	9	9	9	9	9	11	10	9	9	10	10	11	11	11	11	9	9	9	9
Water depth (cm)	10	10	10	10	5	15	15	10	15	5	15	10	5	25	15	10	5	10	5	5	5	15	10	2	5
Aspect	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inclination (degrees)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Altitude (m)	950	1047	1660	1035	955	973	1720	1720	1550	634	2038	961	1040	1850	1780	880	1035	961	1021	1021	1021	1650	1650	1620	1750
Cover of herb layer (%)	80	95	80	35	40	40	70	70	60	80	95	60	95	65	70	85	85	80	90	90	90	85	95	75	40
Relevé area (m^2)	15	10	10	10	10	10	20	20	8	15	10	8	20	15	15	20	25	15	10	10	10	15	15	20	4
pH	8.1	7.6	7.4	7.4	7.7	7.6	7.5	7.5	7.65	8.2	7.93	7.9	7.83	7.8	7.8	8.02	7.52	8	8.2	8.2	8.3	8.21	8.31	8.1	8.23
Number of species	9	9	8	10	7	11	4	6	4	7	6	5	15	5	3	11	11	7	4	3	3	7	6	13	4
Association	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx	Tlx

Sporadic species: *Apium nodiflorum* 54; *Carex diluta* 51; *Eleocharis equisetiformis* 21; *Eleocharis uniglumis* f. *pallida* 35; *Polypogon viridis* 34.

Accompanying species

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
Juncus articulatus	.	.	.	.	.	.	.	.	.	.	1	.	1	.	.	1	+	.	.	.	.	.	+	+	.
Rumex crispus	.	.	.	.	.	.	+	+	.	1	.	.	1	.	.	+	1	.	.	.	.	+	.	+	.
Equisetum arvense	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.
Equisetum ramosissimum	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	.	.	.	.	.	.	.	.	.	.
Cynodon dactylon	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Polygonum persicaria	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.
Bolboschoenus planiculmis	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Trifolium repens	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	+	.
Myosotis caespitosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.
Plantago lanceolata	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.
Calamagrostis pseudophragmites	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1	+	.	.
Plantago major	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.
Veronica oxycarpa									+																
Scirpus mucronatus	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cyperus difformis	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Agrostis gigantea	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	1	.	.	.	.	.	.	.	.
Cirsium incanum	.	.	.	+	+	+	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.
Polygonum hydropiper	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ranunculus laetus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Saccharum spontaneum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.
Chara sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	1	+
Potamogeton perfoliatus	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Trifolium pratense	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.
Sagittaria trifolia	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bromus japonicus	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	+	.	+	.	.	.	.	.	.	.
Salix linearifolia c	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.
Lotus krylovii	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ranunculus sceleratus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Poa pratensis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Batrachium divaricatum	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Utricularia vulgaris	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Potentilla reptans	.	.	.	1	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Poa trivialis	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Taraxacum sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bidens frondosa	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Daucus carota	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Euphrasia pectinata	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.
Xanthium italicum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carum carvi	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Dactylorhiza umbrosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex orbicularis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Tussilago farfara	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pycreus flavidus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Potentilla supina	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pulicaria uliginosa	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bidens tripartita	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Setaria pumila	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Heracleum lehmannianum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Melilotus officinalis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Blysmus compressus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Triglochin palustre	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Glycyrrhiza glabra	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sorghum halepense	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Myricaria bracteata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Table 1. (Cont'd.).

Successive number of relevé	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66
day	6	6	23	14	12	18	12	29	29	29	4	23	20	24	13	4	18	18	18	4	10	8	8
Date: month	9	9	6	6	6	6	6	6	6	6	7	6	6	6	6	7	6	6	6	5	6	6	6
year	11	11	10	10	9	9	11	9	9	9	9	9	10	9	11	9	10	10	10	11	9	9	9
Water depth (cm)	5	5	5	5	5	5	5	10	15	15	40	90	5	5	5	40	5	5	5	5	20	30	35
Aspect	-	-	-	-	-	-	-	-	-	-	-	-	-	NE	-	-	-	-	-	-	-	-	-
Inclination (degrees)	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-
Altitude (m)	1035	1035	2050	1035	1054	1650	1166	1816	1475	1475	713	1750	1680	1850	2018	634	2315	2320	2320	685	1419	2210	2210
Cover of herb layer (%)	30	40	95	95	50	95	90	80	95	80	100	95	90	90	90	85	75	70	70	70	35	20	40
Relevé area (m^2)	15	15	15	25	25	25	15	25	25	20	30	25	15	15	10	25	15	15	15	5	15	25	50
pH	7.2	7.2	8.1	7.4	8.12	8.2	8.3	7.7	8.2	8.2	7.1	8.7	8	8.6	8.4	8.1	7.25	8.02	8.02	7.9	8.32	7.9	7.7
Number of species	9	7	14	11	7	13	4	13	6	8	4	2	5	5	9	8	3	4	4	3	3	2	3
Association	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph	Ph
Sporadic species: *Apium nodiflorum* 54; *Carex diluta* 51; *Eleocharis equisetiformis* 21; *Eleocharis uniglumis* f. *pallida* 35; *Polypogon viridis* 34.																							
Accompanying species																							
Juncus articulatus	.	.	.	1	+	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rumex crispus	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	1	.	.	.	.	.	.	.
Equisetum arvense	.	.	+	.	.	.	.	1	.	.	.	.	+	2	1	.	.	.	.	.	.	.	.
Equisetum ramosissimum	+	.	1	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cynodon dactylon	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Polygonum persicaria	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.
Bolboschoenus planiculmis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Trifolium repens	+	.	.	.	.	1	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
Myosotis caespitosa	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Plantago lanceolata	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
Calamagrostis pseudophragmites	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Plantago major	.	+	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Veronica oxycarpa																							
Scirpus mucronatus	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cyperus difformis	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Agrostis gigantea	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cirsium incanum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Polygonum hydropiper	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ranunculus laetus	.	.	1	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.
Saccharum spontaneum	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Chara sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Potamogeton perfoliatus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Trifolium pratense	.	.	.	1	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sagittaria trifolia	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bromus japonicus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Salix linearifolia c	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.
Lotus krylovii	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.
Ranunculus sceleratus	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Poa pratensis	.	.	1	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.
Batrachium divaricatum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Utricularia vulgaris	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Potentilla reptans	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.
Poa trivialis	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Taraxacum sp.	.	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bidens frondosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Daucus carota	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.
Euphrasia pectinata	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.
Xanthium italicum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carum carvi	.	.	+	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.
Dactylorhiza umbrosa	.	.	1	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.
Carex orbicularis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.
Tussilago farfara	.	.	.	.	.	.	.	.	.	.	.	.	1	+	.	.	.	.	.	.	.	.	.
Pycreus flavidus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Potentilla supina	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pulicaria uliginosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bidens tripartita	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Setaria pumila	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Heracleum lehmannianum	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.
Melilotus officinalis	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Blysmus compressus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+
Triglochin palustre	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.
Glycyrrhiza glabra	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.
Sorghum halepense	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Myricaria bracteata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Table 1. (Cont'd.)

Successive number of relevé	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	Constancy	Number of occurrence	Constancy	Constancy	Number of occurrence	Number of occurrence	Number of occurrence	Number of occurrence	Number of occurrence
Date: day	17	7	7	26	26	9	9	9	9	13	13	14	14	14	17	17	29	29	29	29									
Date: month	6	9	9	6	6	9	9	9	9	6	6	6	6	6	6	6	6	6	6	6									
Date: year	11	11	11	10	10	11	11	11	11	10	10	10	10	10	9	9	9	9	9	9									
Water depth (cm)	5	5	10	5	3	10	5	10	5	5	5	5	5	10	5	3	5	5	5	3									
Aspect	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
Inclination (degrees)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-									
Altitude (m)	1021	318	316	730	729	742	742	771	742	880	880	950	950	950	950	950	1620	1620	1620	1620									
Cover of herb layer (%)	55	95	85	75	75	80	50	85	65	95	100	70	75	55	85	85	85	85	85	85									
Relevé area (m^2)	4	7	7	15	10	8	8	6	8	5	5	5	4	5	10	10	10	10	8	10									
pH	7.7	7.6	7.6	7.3	7.3	7.3	7.3	7.7	7.3	8.7	8.7	7.98	8.05	7.8	7.59	7.7	7.8	7.8	7.8	7.8									
Number of species	7	6	10	4	6	11	8	6	6	8	6	6	5	5	12	12	16	14	10	15	rel.	rel.	rel.	rel.	rel.	rel.	rel.	rel.	rel.
Association	St	St	St	Sts	Sts	Cl	Cl	Cl	Cl	Cs	Cs	Cs	Cs	Cs	Sh	Sh	Sh	Sh	Sh	Sh	1−13	14-18	19-43	44-66	67-69	70-71	72-75	76-80	81-86
Sporadic species: *Apium nodiflorum* 54; *Carex diluta* 51; *Eleocharis equisetiformis* 21; *Eleocharis uniglumis* f. *pallida* 35; *Polypogon viridis* 34.																													
Accompanying species																													
Juncus articulatus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	+	+	+	+	I	2	II	I	-	-	-	-	6
Rumex crispus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	+	+	I	-	II	I	-	-	-	-	4
Equisetum arvense	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	2	2	I	-	I	II	-	-	-	-	4
Equisetum ramosissimum	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	-	2	I	I	-	-	-	1	-
Cynodon dactylon	.	4	+	.	.	.	+	1	+	+	.	.	.	.	.	.	.	.	.	.	I	-	I	I	2	-	3	1	-
Polygonum persicaria	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	I	-	I	I	-	-	-	-	2
Bolboschoenus planiculmis	.	.	.	1	1	1	+	.	.	.	.	.	.	.	+	.	.	.	.	.	I	-	I	-	-	2	2	-	1
Trifolium repens	.	.	.	.	.	.	.	+	.	1	.	.	.	.	.	.	.	.	.	.	I	-	I	I	-	-	1	1	-
Myosotis caespitosa	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	+	+	I	-	I	I	1	-	-	-	4
Plantago lanceolata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	+	I	-	I	I	-	-	-	-	2
Calamagrostis pseudophragmites	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	-	I	I	-	-	-	-	-
Plantago major	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	-	-	I	I	1	-	-	1	-
Veronica oxycarpa															1	+	+	+	+	+	-	-	I	-	-	-	-	-	6
Scirpus mucronatus	.	1	.	.	.	2	+	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	I	I	1	-	2	-	-
Cyperus difformis	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	I	I	1	-	1	-	-
Agrostis gigantea	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	I	-	I	I	-	-	-	-	2
Cirsium incanum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	-	I	-	-	-	-	-	-
Polygonum hydropiper	.	.	2	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	-	-	I	I	1	-	1	-	-
Ranunculus laetus	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	-	-	I	1	-	-	-	-
Saccharum spontaneum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.	.	.	-	-	I	I	-	-	-	-	3
Chara sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	-	I	-	-	-	-	-	-
Potamogeton perfoliatus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	2	I	-	-	-	-	-	-
Trifolium pratense	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	I	I	-	-	-	-	-
Sagittaria trifolia	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	-	I	I	1	-	-	-	-
Bromus japonicus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	I	-	-	-	-	-	-
Salix linearifolia c	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	I	I	-	-	-	-	-
Lotus krylovii	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	-	-	-	I	-	-	-	-	2
Ranunculus sceleratus	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	-	-	-	I	-	-	-	2	-
Poa pratensis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	-	-	I	-	-	-	-	-
Batrachium divaricatum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	2	-	-	-	-	-	-	-
Utricularia vulgaris	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	2	I	-	-	-	-	-	-
Potentilla reptans	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	I	I	-	-	-	-	-
Poa trivialis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	I	I	-	-	-	-	-
Taraxacum sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	-	I	-	-	-	-	-
Bidens frondosa	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	I	-	-	1	1	-	-
Daucus carota	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	I	I	-	-	-	-	-
Euphrasia pectinata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	I	I	-	-	-	-	-
Xanthium italicum	.	.	.	.	.	+	+	.	+	.	.	.	.	.	.	.	.	.	.	.	-	-	-	-	-	-	3	-	-
Carum carvi	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	-	I	-	-	-	-	-
Dactylorhiza umbrosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	-	I	-	-	-	-	-
Carex orbicularis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	-	I	-	-	-	-	-
Tussilago farfara	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	-	I	-	-	-	-	-
Pycreus flavidus	.	.	.	.	.	.	+	1	.	.	.	.	.	.	.	.	.	.	.	.	-	-	-	-	-	-	2	-	-
Potentilla supina	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	-	I	-	-	-	-	-	-
Pulicaria uliginosa	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	I	-	-	-	1	-	-
Bidens tripartita	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	-	-	I	-	-	-	-	1	-
Setaria pumila	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	-	-	-	I	-	-	1	-	-
Heracleum lehmannianum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	-	I	-	-	-	-	-
Melilotus officinalis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	-	I	-	-	-	-	-
Blysmus compressus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	-	I	-	-	-	-	-
Triglochin palustre	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	-	I	-	-	-	-	-
Glycyrrhiza glabra	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	-	-	-	I	-	-	-	-	1
Sorghum halepense	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	-	-	-	-	-	-	2	-	-
Myricaria bracteata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	-	-	-	-	-	-	-	-	2

Table 1. (Cont'd.).

Sporadic species: *Algae* indet. 20(2); *Artemisia vulgaris* 22; *Bromus popovii* 10; *Carex turkestanica* 49(1); *Chara vulgaris* 19; *Chenopodium glaucum* 69; *Chenopodium rubrum* 69(1); *Cichorium intybus* 28; *Echinochloa crus-galli* 45(1); *Elymus alaicus* 1; *Epipactis palustris* 42; *Erigeron* sp. 69; *Filago arvensis* 48; *Geranium collinum* 58(1); *Holoschoenus vulgaris* 72; *Juncus atrofuscus* 2; *Lathyrus pratensis* 46; *Lolium cuneatum* 25; *Lolium perenne* 79(1); *Medicago lupulina* 49(1); *Polygonum minus* 34; *Polygonum lapathifolium* 12(2); *Potamogeton pectinatus* 43(1); *Potentilla kulabensis* 29; *Schoenoplectus oryzetorum* 29(1); *Solanum nigrum* 72; *Sonchus oleraceus* 49; *Stuckenia amblyphylla* 65; *Symphyotrichum graminifolius* 69; *Thalictrum kuhistanicum* 58; *Trifolium fragiferum* 34; *Urtica dioica* 50.

Explanations: Ta- *Typhetum angustifoliae*; Tl- *Typhetum latifoliae*; Tlx - *Typhetum laxmannii*; Ph- *Phragmitetum australis*; St- *Scirpetum triqueteri*; Sts - *Scirpetum triquetriformis*; Cl- *Cyperetum longi*; Cs - *Cyperetum serotini*; Sh- *Scirpetum hippolytii*.

Locality of relevé: 1- (393020, 9; 673539, 6); 2- (383248; 714440, 9); 3- (392403; 683127); 4- (425618, 4; 743026, 5); 5- (392736, 3; 675638, 5); 6- (391053; 683451); 7- (401407, 9; 693038, 8); 8- (390514, 3; 703658, 1); 9- (384309; 703158); 10- (393050, 9; 672922, 2); 11- (392356; 683133); 12- (392800, 6; 680116, 5); 13- (375739, 3; 713178, 4); 14- (393024, 9; 673525, 5); 15- (393024, 9; 673525, 5); 16- (390530, 4; 703949, 2); 17- (383810; 690840); 18- (391053; 683451); 19- (393024, 9; 673525, 5); 20- (392928, 7; 674215, 6); 21- (391045, 7; 704821, 1); 22 - (393042, 7; 674650, 3); 23- (393030; 673542, 4); 24- (393121, 3; 673839); 25- (391141, 5; 711222, 2); 26- (391141, 5; 711222, 2); 27- (391005; 705249); 28- (382334; 691422); 29- (383248; 714440, 9); 30- (393021, 5; 673540); 31- (393054; 674626, 6); 32- (391002, 4; 683438, 3); 33- (391002, 4; 683438, 3); 34- (393109, 5; 672910, 6); 35- (393048, 5; 674632, 3); 36- (393021, 5; 673540); 37- (383810; 690840); 38- (383810; 690840); 39- (383810; 690840); 40- (384258; 703141, 7); 41- (384258; 703141, 7); 42- (391005; 705249); 43- (391053; 683451); 44- (393046, 6; 674655); 45- (393046, 6; 674655); 46- (393045, 8; 674655, 2); 47- (393048, 5; 674632, 3); 48- (392816, 9; 675006, 2); 49- (392328, 9; 684227, 2); 50- (392736, 3; 675638, 5); 51- (391019, 4; 704403, 9); 52- (390530, 4; 703949, 2); 53- (390530, 4; 703949, 2); 54- (380703, 3; 691806, 8); 55- (391053; 683451); 56- (391053, 2; 683450, 6); 57- (391002, 4; 683438, 3); 58- (391401, 9; 682546, 8); 59- (382334; 691422); 60- (390332; 682320); 61- (390332; 682320); 62- (390332; 682320); 63- (425690, 4; 743438, 8); 64- (392346; 683139); 65- (390511, 8; 682221, 3); 66- (390515, 6; 682211, 5); 67- (383810; 690840); 68- (401407, 9; 693038, 8); 69- (401330, 4; 693025, 3); 70- (382911; 683453, 1); 71- (382911, 3; 683454, 1); 72- (382847, 8; 683449, 4); 73- (382847, 8; 683449, 4); 74- (383125, 4; 683737); 75- (382847, 8; 683449, 4); 76- (393116; 672610); 77- (393116; 672610); 78- (393046; 673552, 6); 79- (393046; 673552, 6); 80- (393046; 673552, 6); 81- (393020, 9; 673539, 6); 82- (393020, 7; 673539, 4); 83- (391005, 1; 705248, 8); 84- (391005; 705249); 85- (391005; 705249); 86- (391005, 1; 705248, 8).

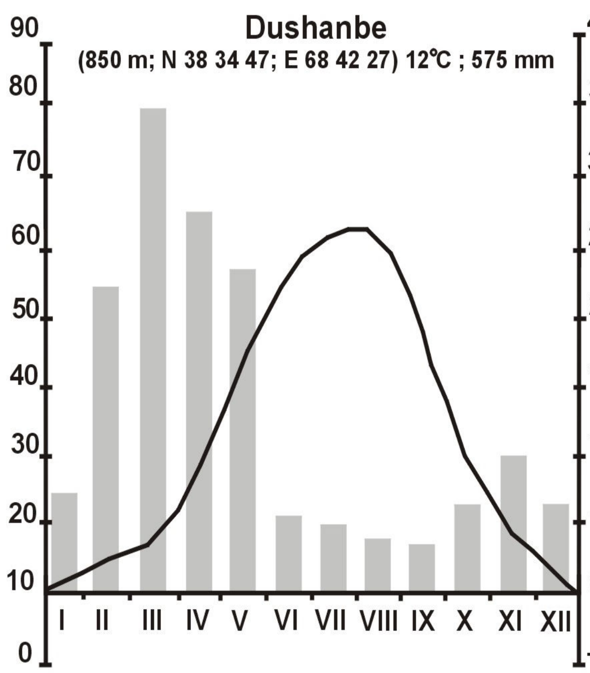

Fig. 3. Climatic characterisation of the study area according to the Dushanbe weather station.

General floristic features and habitat characteristics: The number of taxa recorded in all relevés totals 192, ranging from 2 to 17 species in particular plots. More than 100 taxa exceed 1% constancy, 69 taxa 2%. Those with the highest constancy are: *Bolboschoenus glaucus* (75 occurrences), *Phragmites australis* (71), *Typha laxmannii* (40), *Polypogon demissus* (57), *Mentha asiatica* (54), *Glyceria plicata* (42), *Juncus articulatus* (42), *Rumex crispus* (24), *Eleocharis uniglumis* (33), *Equisetum ramosissimum* (33), *Berula erecta* (30), *Equisetum arvense* (30), *Plantago lanceolata* (28) and *Veronica oxycarpa* (27). Excepting *Equisetum arvense* and *Plantago lanceolata*, both with wide ecological amplitude, all the above-mentioned species are typical and almost exclusively restricted to the studied vegetation type, i.e. rush vegetation. Those taxa with less than 2% constancy all belong to different water communities e.g., *Chara vulgaris*, *Myriophyllum spicatum*, *Potamogeton nodosus*, *P. pusillus*, *Batrachium divaricatum* etc., and occur only occasionally in the studied vegetation types. Some of the species, e.g. *Schoenoplectus oryzetorum*, *Scirpus mucronatus*, *Cyperus difformis*, and *Bolboschoenus planiculmis*, are related to the Oryzetea phytocoenoses. Others have come over from the neighboring root or crop fields e.g., *Pycreus flavidus*, *Sonchus oleraceus*, *Xanthium italicum*) or riverbed vegetation e.g., *Saccharum spontaneum*, *Myricaria bracteata*. Several species of peat bog vegetation were also found in the studied vegetation plots (*Triglochin palustre*, *Dactylorhiza umbrosa*, *Carex orbicularis* and *Blysmus compressus*). There are also species representing succeeding succession stages, such as the shrubs *Hippophoë rhamnoides* and *Trachomitum lancifolium*.

Most of the distinguished associations develop in the middle mountain belt, at altitudes ca. 1000 to 2000 m. The lowest locations, ca. 400–900 m, are occupied mainly by communities associated with rice fields (*Leersietum oryzoides*, *Scirpetum triqueter*, *Scirpetum triquetriformis*, *Cyperetum longi* and *Cyperetum serotini*), whereas the highest elevations (over 2000 m) are occupied by low and medium-sized rushes, *Eleocharitetum argyrolepis*, *Scirpetum tabernaemontani* and *Caricetum songoricae*. The studied associations prefer calcareous soils with pH (7.0–)7.5–8.4(–8.7), with the exception of *Eleocharitetum argyrolepis* and *Eleocharitetum uniglumis*, which prefer stronger alkaline soils with pH about 9.0. The vegetation plots are rather species-poor. The Shannon-Wiener index (H′) and species richness are highest in the case of *Scirpetum hippolytii* and *Juncetum brachytepali*. Also relatively rich are *Scirpetum triquetriformis*, *Bulboschoenetum glauci* and *Typhetum minimae* (Fig. 5).

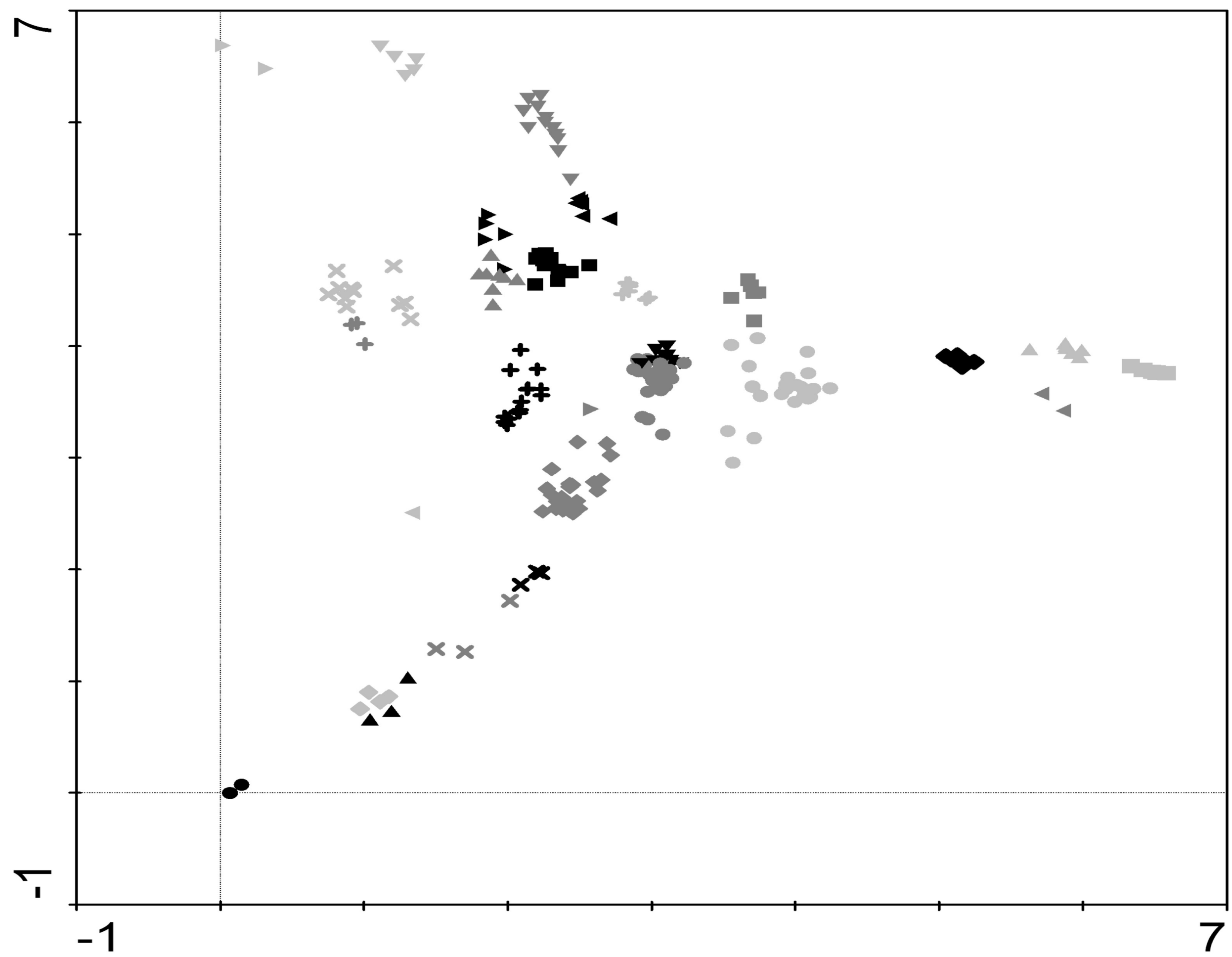

Fig. 4. DCA ordination for all samples (N=231).

Syntaxa of the Phragmito-Magno-Caricetea class in the central Pamir Alai Mountains

Syntaxonomical synopsis
Class: *Phragmito-Magno-Caricetea* Klika in Klika et Novák, 1941
Phragmitetalia australis Koch, 1926
Phragmition austalis Koch 1926
1. *Typhetum angustifoliae* Pignatti, 1953
2. *Typhetum latifoliae* Nowiński, 1930
3. *Typhetum laxmannii* (Ubrizsy, 1961) Nedelcu, 1968
4. *Phragmitetum australis* Savič, 1926
5. *Scirpetum triqueteri* Zonneveld,1955
6. *Scirpetum triquetriformis* A. Nowak, S. Nowak et M. Nobis, 2013
7. *Scirpetum hippolytii* A. Nowak, S. Nowak et M. Nobis ass. nova
8. *Cyperetum longi* Micevski, 1957
9. *Cyperetum serotini* Krausch, 1965

Eleocharito palustris-Sagittarion sagittifoliae Pass. 1964.
10. *Eleocharitetum uniglumis* W. Braun 1968
11. *Eleocharitetum mitracarpae* A. Nowak, S. Nowak et M. Nobis ass. nova
12. *Bolboschoenetum glauci* Grechushkina, Sorokin et Golub 2011
13. *Eleocharitetum argyrolepis* A. Nowak, S. Nowak et M. Nobis ass. nova
14. *Juncetum brachytepali* A. Nowak, S. Nowak et M. Nobis ass. nova
15. *Scirpetum tabernaemontani* De Soó 1947
16. *Rorippo palustris-Alismatetum graminei* A. Nowak, S. Nowak et M. Nobis ass. nova

Glycerio-Sparganion Br.-Bl. et Sissingh in Boer 1942
17. *Leersietum oryzoidis* Eggler 1933
18. *Helosciadietum nodiflori* Maire 1924
19. *Beruletum erectae* Roll 1938
20. *Mentho asiaticae-Nasturtietum microphyllae* A. Nowak, S. Nowak et M. Nobis ass. nova
21. *Sparganietum stoloniferi* A. Nowak, S. Nowak et M. Nobis ass. nova
22. *Sparganietum erecti* Roll 1938

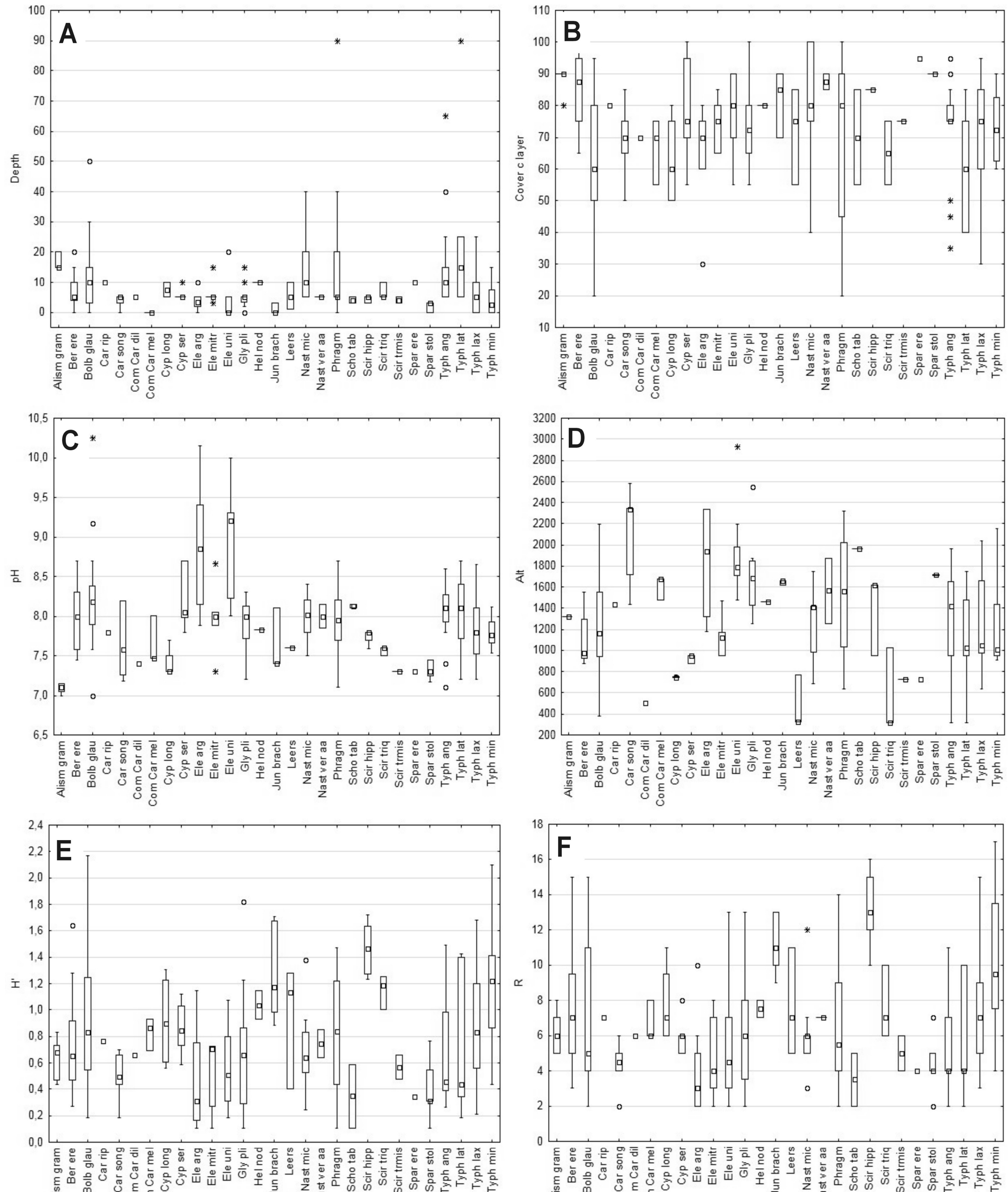

Fig. 5. The habitat characterisation of the communities. A- depth of water, B- mean cover of the herb layer, C- pH reaction, D- altitudinal distribution, E- Shannon-Wiener diversity index (H'), F- richnes (R). Alism gram - *Rorippo palustris-Alismatetum graminei*, Ber ere- *Beruletum erectae*, Bolb glau- *Bolboschoenetum glauci*, Car rip- *Caricetum ripariae*, Car song- *Caricetum songoricae*, Com Car dil- community with *Carex diluta*, Com Car mel- community with *Carex melanostachya*, Cyp long- *Cyperetum longi*, Cyp ser- *Cyperetum serotini*, Ele arg- *Eleocharitetum argyrolepis*, Ele mitr- *Eleocharitetum mitracarpae*, Ele uni- *Eleocharitetum uniglumis*, Gly pli- *Glycerietum notatae*, Hel nod- *Helosciadietum nodiflori*, Jun brach- *Juncetum brachytepali*, Leers- *Leersietum oryzoidis*, Nast micr- *Mentho asiaticae-Nasturtietum microphyllae*, Nast var aa- *Mentho asiaticae-Nasturtietum microphyllae* var. with *Veronica anagallis-aquatica*, Phragm- *Phragmitetum australis*, Scho tab- *Scirpetum tabernaemontani*, Scir hipp- *Scirpetum hippolytii*, Scir triq - *Scirpetum triqueteri*, Scir trmis - *Scirpetum triquetriformis*, Spar ere - *Sparganietum erecti*, Spar stol- *Sparganietum stoloniferi*, Typh ang- *Typhetum angustifoliae*, Typh lat- *Typhetum latifoliae*, Typh lax- *Typhetum laxmannii*, Typh min- *Calamagrostio pseudophragmitis–Typhetum minimae*.

Table 2. Associations of the *Eleocharito-Sagittarion sagittifoliae* alliance.

Successive number of relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
day	3	18	3	23	6	6	29	8	8	13	27	12	14	14	30
Date: month	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
year	11	9	11	9	10	11	9	9	9	11	9	9	10	10	9
Water depth (cm)	5	5	5	5	5	5	10	20	4	4	5	15	5	5	3
Aspect	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inclination (degrees)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Altitude (m)	1750	1984	2925	1750	1540	1968	1475	1840	1710	2195	1170	1120	950	950	1470
Cover of herb layer (%)	75	90	90	70	75	80	65	60	70	85	80	85	70	80	65
Cover of moss layer (%)	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-
Relevé area (m^2)	3	6	3	2	4	4	8	13	5	5	8	3	3	3	4
pH	8.1	8.16	8.2	8.23	9.25	8.8	8.01	9.17	10	9.8	7.3	8.66	7.89	8.05	8
Number of species	3	13	5	5	8	4	7	2	4	4	2	8	7	4	3
Association	Eu	Eu	Eu	Eu	Eu	Eu	Eu	Eu	Eu	Eu	Em	Em	Em	Em	Em
ChAss. *Eleocharitetum uniglumis*															
Eleocharis uniglumis	.	.	5	4	4	4	4	4	4	5	.	.	.	.	.
Eleocharis uniglumis f. *pallida*	4	5	.	.	.	.	.	.	.	.	.	.	.	.	.
ChAss. *Eleocharitetum mitracarpae*															
Eleocharis mitracarpa	.	.	.	.	.	.	.	.	.	.	5	5	4	4	4
Ch.Ass. *Bolboschoenetum glauci*															
Bolboschoenus glaucus	.	.	.	.	.	.	1	1	1	+	+	+	.	+	+
ChAss. *Eleocharitetum argyrolepis*															
Eleocharis argyrolepis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ch.Ass. *Juncetum brachytepali*															
Juncus brachytepalus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ch.Ass. *Scirpetum tabernaemontani*															
Scirpus tabernaemontani	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.
Ch.Ass. *Rorippo palustris-Alismatetum graminei*															
Alisma gramineum	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.
Rorippa palustris	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ChAll. *Eleocharito-Sagittarion sagittifoliae*															
Alisma plantago-aquatica	1	.	.	.	.	.	+	.	.	.	.	.	.	.	.
ChO. et ChCl. *Phragmitetalia* et *Phragmito-Magno-Caricetea*															
Polypogon demissus	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.
Phragmites australis	.	+	.	.	.	.	+	.	1	.	.	.	.	.	.
Typha laxmannii	.	.	.	+	1	.	.	.	.	.	.	.	.	.	.
Mentha asiatica	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.
Lycopus europaeus	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.
Veronica beccabunga	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex songorica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex diluta	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.
Epilobium velutinum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Glyceria notata	.	.	.	.	.	.	.	.	.	.	.	1	+	2	.
Berula erecta	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.
Cyperus (Juncellus) serotinus	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.
Eleocharis equisetiformis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Epilobium minutiflorum	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Sparganium stoloniferum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Typha minima	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Veronica anagallis-aquatica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Sporadic species: *Galium palustre* 42; *Nasturtium microphyllum* 25; *Scirpus triqueter* 37; *Sium latifolium* 7(1); *Sparganium erectum* 69; *Typha latifolia* 7.

Table 2. (Cont'd.).

Successive number of relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
day	3	18	3	23	6	6	29	8	8	13	27	12	14	14	30
Date: month	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
year	11	9	11	9	10	11	9	9	9	11	9	9	10	10	9
Water depth (cm)	5	5	5	5	5	5	10	20	4	4	5	15	5	5	3
Aspect	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inclination (degrees)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Altitude (m)	1750	1984	2925	1750	1540	1968	1475	1840	1710	2195	1170	1120	950	950	1470
Cover of herb layer (%)	75	90	90	70	75	80	65	60	70	85	80	85	70	80	65
Cover of moss layer (%)	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-
Relevé area (m^2)	3	6	3	2	4	4	8	13	5	5	8	3	3	3	4
pH	8.1	8.16	8.2	8.23	9.25	8.8	8.01	9.17	10	9.8	7.3	8.66	7.89	8.05	8
Number of species	3	13	5	5	8	4	7	2	4	4	2	8	7	4	3
Association	Eu	Eu	Eu	Eu	Eu	Eu	Eu	Eu	Eu	Eu	Em	Em	Em	Em	Em
Accompanying species															
Equisetum ramosissimum	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.
Polygonum persicaria	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.
Rumex crispus	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+
Myosotis caespitosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Equisetum arvense	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Veronica oxycarpa	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Algae indet.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.
Juncus articulatus	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.
Chara sp.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.
Trifolium pratense	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Plantago lanceolata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cirsium incanum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ranunculus laetus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Calamagrostis pseudophragmites	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Potamogeton perfoliatus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Potentilla reptans	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Halerpestres sarmentosa	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Echinochloa crus-galli	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cyperus difformis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Potamogeton nodosus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Trifolium repens	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Cynodon dactylon	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Agrostis gigantea	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Medicago lupulina	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Poa annua	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Scirpus mucronatus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sagittaria trifolia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rhinanthus songaricus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Musci indet.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Saccharum spontaneum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Chara vulgaris	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
Trifolium fragiferum	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.
Pycreus flavidus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Polygonum aviculare	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Poa pratensis	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Blysmus compressus	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.
Bromus japonicus	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.
Potamogeton pusillus	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.
Setaria pumila	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Xanthium italicum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Plantago major	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hordeum geniculatum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Epipactis palustris	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Poa trivialis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Table 2. (Cont'd.).

16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
9	9	9	6	10	8	8	10	10	16	12	17	17	17	17	17	28	17	28	30	13	6	13	30	12	12	17	27	28	27	13
9	9	9	9	9	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
11	11	11	11	11	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	10	11	10	9	11	11	11	9	9	9	11
15	15	10	15	3	20	3	15	0	15	10	10	50	20	10	10	15	3	10	10	10	5	30	15	5	15	5	5	10	5	10
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
730	730	768	954	385	1840	1710	1426	1419	1458	1180	948	948	946	945	948	1550	1100	1550	1650	880	1968	920	1470	1166	1166	1021	1170	1550	1350	2196
85	55	45	20	60	60	70	45	45	80	65	65	50	45	60	65	45	95	50	65	90	50	75	90	100	85	85	65	90	100	85
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	5	5	5	5	15	5	5	10	15	10	5	6	6	6	5	15	8	10	10	8	10	15	15	12	12	10	15	8	10	15
7.9	7.9	7.9	7.7	7.9	9.17	10.3	8.38	7.6	7.58	8.4	7.77	7.64	8.1	8.2	8.2	8.59	8.1	8.15	8.15	8.7	8.6	8.53	8.2	8.4	8.8	8.7	6.99	8.5	8.6	8.45
11	11	12	12	10	2	3	3	5	12	3	5	7	11	12	5	4	15	7	5	8	6	4	7	6	5	5	2	4	5	3
Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg
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4	3	3	2	4	4	4	3	3	4	4	4	3	2	3	3	3	3	3	4	4	3	4	4	5	4	4	4	4	5	5
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Table 2. (Cont'd.).

16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
9	9	9	6	10	8	8	10	10	16	12	17	17	17	17	17	28	17	28	30	13	6	13	30	12	12	17	27	28	27	13
9	9	9	9	9	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
11	11	11	11	11	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	10	11	10	9	11	11	11	9	9	9	11
15	15	10	15	3	20	3	15	0	15	10	10	50	20	10	10	15	3	10	10	10	5	30	15	5	15	5	5	10	5	10
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730	730	768	954	385	1840	1710	1426	1419	1458	1180	948	948	946	945	948	1550	1100	1550	1650	880	1968	920	1470	1166	1166	1021	1170	1550	1350	2196
85	55	45	20	60	60	70	45	45	80	65	65	50	45	60	65	45	95	50	65	90	50	75	90	100	85	85	65	90	100	85
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5	5	5	5	5	15	5	5	10	15	10	5	6	6	6	5	15	8	10	10	8	10	15	15	12	12	10	15	8	10	15
7.9	7.9	7.9	7.7	7.9	9.17	10.3	8.38	7.6	7.58	8.4	7.77	7.64	8.1	8.2	8.2	8.59	8.1	8.15	8.15	8.7	8.6	8.53	8.2	8.4	8.8	8.7	6.99	8.5	8.6	8.45
11	11	12	12	10	2	3	3	5	12	3	5	7	11	12	5	4	15	7	5	8	6	4	7	6	5	5	2	4	5	3
Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg	Bg
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Table 2. (Cont'd.).

47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	Constancy	Number of occurrence	Constancy	Constancy	Constancy	Number of occurrence	Number of occurrence
10	12	19	19	19	20	12	28	29	29	29	29	29	29	29	6	6	16	16	16	16	16	16							
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6							
9	11	9	9	9	9	9	9	9	9	9	9	9	9	9	11	11	11	11	11	11	11	11							
0	2	5	2	2	5	10	5	3	3	2	4	3	3	3	3	5	15	15	15	15	20	20							
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-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
1420	1216	2335	2335	2335	2325	1180	1550	1620	1620	1660	1660	1660	1660	1660	1968	1968	1323	1323	1323	1323	1325	1325							
70	70	80	70	60	75	30	60	85	85	90	90	85	95	100	70	85	80	85	90	90	90	75							
-	-	-	-	-	-	-	-	15	15	-	-	-	-	-	-	-	-	-	-	-	-	-							
3	5	4	4	4	5	1	2	10	10	10	10	10	10	10	10	5	10	10	10	10	10	10							
7.89	8.16	10.2	9.35	9.45	7.9	8.4	8.45	8.1	8.1	7.4	7.4	7.4	7.4	7.4	8.2	8.25	7.15	7.2	7.2	7	7.15	7.15							
10	2	2	4	3	3	1	6	12	13	11	10	9	11	13	5	2	6	7	5	8	5	6	rel.	rel.	rel.	rel.	rel.	rel.	rel.
Ea	Ea	Ea	Ea	Ea	Ea	Ea	Ea	Jb	Jb	Jb	Jb	Jb	Jb	Jb	Stb	Stb	RA	RA	RA	RA	RA	RA	1–10	11–15	16-46	47-54	55-61	62-63	64-69
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4	4	5	4	4	4	3	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	-	-	I	V	-	-	1
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Table 2. (Cont'd.).

47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	Constancy	Number of occurrence	Constancy	Constancy	Constancy	Number of occurrence	Number of occurrence
10	12	19	19	19	20	12	28	29	29	29	29	29	29	29	6	6	16	16	16	16	16	16							
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6							
9	11	9	9	9	9	9	9	9	9	9	9	9	9	9	11	11	11	11	11	11	11	11							
0	2	5	2	2	5	10	5	3	3	2	4	3	3	3	3	5	15	15	15	15	20	20							
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
1420	1216	2335	2335	2335	2325	1180	1550	1620	1620	1660	1660	1660	1660	1660	1968	1968	1323	1323	1323	1323	1325	1325							
70	70	80	70	60	75	30	60	85	85	90	90	85	95	100	70	85	80	85	90	90	90	75							
-	-	-	-	-	-	-	-	15	15	-	-	-	-	-	-	-	-	-	-	-	-	-							
3	5	4	4	4	5	1	2	10	10	10	10	10	10	10	10	5	10	10	10	10	10	10							
7.89	8.16	10.2	9.35	9.45	7.9	8.4	8.45	8.1	8.1	7.4	7.4	7.4	7.4	7.4	8.2	8.25	7.15	7.2	7.2	7	7.15	7.15							
10	2	2	4	3	3	1	6	12	13	11	10	9	11	13	5	2	6	7	5	8	5	6	rel.	rel.	rel.	rel.	rel.	rel.	rel.
Ea	Ea	Ea	Ea	Ea	Ea	Ea	Ea	Jb	Jb	Jb	Jb	Jb	Jb	Jb	Stb	Stb	RA	RA	RA	RA	RA	RA	1–10	11–15	16-46	47-54	55-61	62-63	64-69
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Table 2. (Cont'd.).

Sporadic species: *Barbarea arguata* 29; *Batrachium pachycaulon* 28; *Bidens frondosa* 16; *Bidens tripartita* 34; *Bromus squarrosus* 28; *Bromus tectorum* 47; *Bryum pseudotriquetrum* d 3(1); *Calliergonella cuspidata* d 3; *Carex orbicularis* 61(1); *Cyperus fuscus* 20; *Descurainia sophia* 47(1); *Eleocharis meridionalis* 61; *Epilobium thermophilum* 2; *Equisetum variegatum* 29; *Filonotis fontana* d 3; *Juncus nevskii* 2; *Lactuca tatarica* 33; *Lolium persicum* 33(3); *Lotus krylovii* 54; *Medicago* x *varia* 19; *Myosotis refracta* 5; *Myriophyllum spicatum* 5; *Polygonum fimbrilliferum* 47(1); *Polygonum minus* 36(2); *Potamogeton berchtoldii* 26(1); *Potentilla supina* 30; *Prunella vulgaris* 64; *Pulicaria uliginosa* 17(1); *Salix linearifolia* c 2; *Solanum nigrum* 20; *Sorghum halepense* 16; *Stuckenia amblyphylla* 2; Stuckenia pectinata 22(1); *Taraxacum* sp. 50; *Trachomitum lancifolium* 19; *Triglochin palustre* 4; *Tripleurospermum disciforme* 33(1); *Veronica anagalloides* 36(1).

Explanations: Eu- *Eleocharitetum uniglumis*; Em- *Eleocharitetum mitracarpae*; Bg- *Bolboschoenetum glauci*; Ea- *Eleocharitetum argyrolepis*; Jb- *Juncetum brachytepali*; Stb- *Scirpetum tabernaemontani*; RA- *Rorippo palustris -Alismatetum graminei*.

Locality of relevé: 1- (374411, 8; 720448, 6); 2- (392550, 7; 692839); 3- (374411, 8; 720448, 6); 4- (391053; 683451); 5- (403923, 6; 695522, 2); 6- (375739, 3; 713178, 4); 7- (390530, 4; 703949, 2); 8- (390757, 8; 682643, 3); 9- (391050, 6; 683126, 3); 10- (392207, 6; 683827, 9); 11- (385120, 4; 695845, 4); 12- (392801,4; 680120, 6); 13- (393046; 673552, 6); 14- (393046; 673552, 6); 15- (384713, 7; 701806, 8); 16- (382911, 8; 683453, 4); 17- (382911, 8; 683453, 4); 18- (383110, 8; 683556, 5); 19 - (393028, 9; 673541, 5); 20- (375136, 8; 683650, 7); 21- (390757, 8; 682643); 22- (391050, 6; 683126, 3); 23- (391050, 8; 683128, 3); 24- (392346; 683139); 25- (391648; 674147,1); 26- (392809, 3; 680133, 4); 27- (393022, 9; 673540, 9); 28- (39303, 7; 673541, 9); 29- (393020, 8; 673507, 9); 30- (393017, 6; 673507, 9); 31- (393020, 5; 673524); 32- (391005; 705249); 33- (392720, 9; 675217, 5); 34- (391005; 705249); 35- (384309; 703158); 36- (393116; 672610); 37- (375739, 3; 713178, 4); 38- (393050, 9; 672922, 2); 39- (384713, 7; 701806, 8); 40- (392736, 3; 675638, 5); 41- (392736, 3; 675638, 5); 42- (383810; 690840); 43- (385120, 4; 695845, 4); 44- (391005; 705249); 45- (390304; 702508); 46- (390507, 2; 682214, 8); 47- (392401; 683129); 48- (392706, 1; 680548, 3); 49- (392750; 694625); 50- (392750; 694625); 51- (392750; 694625); 52- (392752, 4; 694612); 53- (392809, 3; 680133, 4); 54- (391005; 705249); 55- (391005; 705249); 56- (391005; 705249); 57- (391045, 7; 704821, 1); 58- (391045, 7; 704821, 1); 59- (391045, 7; 704821, 1); 60- (391045, 7; 704821, 1); 61- (391045, 7; 704821, 1); 62- (375739, 3; 713178, 4); 63- (375739, 3; 713178, 4); 64- (385151, 9; 685011, 2); 65- (385151, 9; 685011, 2); 66- (385151, 9; 685011, 2); 67- (385151, 9; 685011, 2); 68- (385151, 9; 685011, 2); 69- (385151, 9; 685011, 2).

23. *Glycerietum notatae* Kulczyński 1928

Phalaridion arundinaceae Kopecký 1961
24. *Calamagrostio pseudophragmitis–Typhetum minimae* Dihoru 1971

Magno-Caricion gracilis Géhu 1961
25. *Caricetum songoricae* A. Nowak, S. Nowak et M. Nobis ass. nova
26. *Caricetum ripariae* Máthé et Kovács 1959
27. Comm with *Carex melanostachya*
28. Comm. with *Carex diluta*

Description of syntaxa

1. *Typhetum angustifoliae* Pignatti 1953 (Table 1, rel. 1–13)
Synonym: *Typhetum angustifoliae* (Allorge 1922) Soó 1927

Diagnostic species: *Typha angustifolia*

The community *Typhetum angustifoliae* is not particularly common. Stands dominated by *Typha angustifolia* developed mostly in the Syr-Daria, Zeravshan, Kafirnighan and Vaksh Rivers, mostly at altitudes of 1000–1700 m. *Typhetum angustifoliae* spreads along riverbanks and ditches and, sporadically, in rice fields (Nowak *et al*., 2013). The association develops in muddy and alkaline habitats (mean value of pH about 8.2), with medium water depth (Fig. 5). *Typha angustifolia* is an apparent dominant; however, in few plots, the cover of this diagnostic species fails to exceed 40%. In this phytocoenosis, which is characterized by low species diversity, ca. 4 taxa have been noted on average. The co-occurring species represent mainly the Phragmito-Magno-Caricetea class (formerly Phragmitetea), e.g., *Bolboschoenus glaucus*, *Phragmites australis*, *Carex riparia*, *Lycopus europaeus*, *Schoenoplectus tabernaemontani*, *Polypogon demissus*, *Sium latifolium*, *Glyceria notata*, and *Alisma plantago-aquatica*. The phytocoenosis is also supported by species typical for water or meadow communities like *Potamogeton perfoliatus* or *Ranunculus laetus* (Table 1).

2. *Typhetum latifoliae* Nowiński 1930 (Table 1, rel. 14–18)
Synonym: *Typhetum latifoliae* Soó 1927

Diagnostic species: *Typha latifolia*

As in the case of *Typhetum angustifoliae*, the association of *Typhetum latifoliae* is not widely distributed in Tajikistan. It was found only in the Syr-Daria and Zeravshan river valleys. Generally the association occupies riverbanks and ditches. Only a single plot was noted at the edge of a rice field near Khudzhand. *Typhetum latifoliae* prefers medium altitudes, between 1000 and 1500 m a.s.l. The community develops in muddy soils with a high clay content, on an alkaline substrate (mean value of pH about 8.2). In the plots approximately 4 species have been noted (Fig. 5). The clear dominant is *Typha latifolia*, which has a medium cover of ca. 70%. In the phytocoenosis, several species were found with significant constancy, representing mainly the Phragmito-Magno-Caricetea class e.g., *Phragmites australis*, *Bolboschoenus glaucus* and *Typha laxmannii*. With a lower abundance rate, *Potamogeton perfoliatus* and *Eleocharis uniglumis* support the structure of those phytocoenoses. Shares of other species were insignificant.

Table 3. Associations of the *Glycerio-Sparganion* alliance.

Successive number of relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
day	7	7	26	16	16	11	11	12	16	13	14	14	14	17	13	17	13	13	17	14	12
Date: month	9	9	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
year	11	11	10	9	9	9	9	9	9	10	10	10	10	9	10	9	10	10	9	10	9
Water depth (cm)	5	1	10	10	10	5	5	15	10	5	5	5	8	3	10	10	10	5	20	5	15
Aspect	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inclination (degrees)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Altitude (m)	321	320	765	1459	1459	1300	1300	985	1459	900	1040	966	965	1532	880	1553	880	880	944	950	1150
Cover of shrub layer (%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cover of herb layer (%)	55	75	85	90	85	85	65	90	90	90	100	95	95	95	95	80	70	100	85	90	70
Cover of moss layer (%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Relevé area (m^2)	8	10	5	2	2	2	2	5	5	4	10	2	2	5	3	3	3	4	2	3	3
pH	7.6	7.6	7.6	7.83	7.83	8.1	8	8.2	7.44	7.47	7.8	8	8	7.55	8.7	8.4	7.53	8.7	7.6	7.89	8.66
Number of species	7	11	5	8	7	10	9	11	7	15	15	5	5	8	6	7	3	5	8	5	4
Association	Lo	Lo	Lo	Hn	Hn	Be	Be	Be	Be	Be	Be	Be	Be	Be	Be	Be	Be	Be	Be	Be	Be
ChAss. *Leersietum oryzoidis*																					
Leersia oryzoides	3	4	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ChAss. *Helosciadietum nodiflori*																					
Apium nodiflorum	.	.	.	4	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ChAss. *Beruletum erectae*																					
Berula erecta	.	.	.	+	.	5	4	4	5	4	5	5	5	5	5	4	4	5	5	5	4
ChAss. *Mentho asiaticae-Nasturtietum microphyllae*																					
Mentha asiatica	.	+	.	.	.	1	+	+	+	+	1	1	1	1	+	.	.	.	.	+	.
Nasturtium microphyllum	.	+	.	.	.	.	.	+	1	.	.	.	.	+	+	+	+	2	.	.	.
ChAss. *Sparganietum stoloniferi*																					
Sparganium stoloniferum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ChAss. *Sparganietum erecti*																					
Sparganium erectum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ChAss. *Calamagrostio pseudophragmitis-Typhetum minimae*																					
Typha minima	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.
ChAss. *Glycerietum notatae*																					
Glyceria notata	.	.	.	+	.	.	.	+	.	.	.	.	.	+	+	+	.	.	.	+	+
ChAll. *Glycerio-Sparganion*																					
Veronica beccabunga	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Scrophularia umbrosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ChO. et ChCl. *Phragmitetalia* et *Phragmito-Magno-Caricetea*																					
Polypogon demissus	.	+	.	.	.	.	.	+	+	+	.	+	1	+	.	.	.	.	.	.	+
Veronica anagallis-aquatica	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.	.	.
Phragmites australis	.	.	.	.	.	.	+	.	.	+	1	.	.	.	.	.	.	.	+	+	.
Eleocharis uniglumis	.	.	.	.	.	.	.	.	.	.	+	+	+	+	+	+	.	.	.	.	.
Typha laxmannii	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Epilobium minutiflorum	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.
Bolboschoenus glaucus	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.
Eleocharis argyrolepis	.	.	.	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Juncus brachytepalus	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Carex diluta	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex songorica	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Lycopus europaeus	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.
Acorellus laevigatus	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.
Sium latifolium	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Alisma gramineum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Sporadic species: *Alisma plantago-aquatica* 2; *Carex riparia* 57; *Epilobium velutinum* 63; *Polypogon viridis* 50; *Scirpus triqueter* 52.

Table 3. (Cont'd.).

Successive number of relevé	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
day	7	7	26	16	16	11	11	12	16	13	14	14	14	17	13	17	13	13	17	14	12
Date: month	9	9	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
year	11	11	10	9	9	9	9	9	9	10	10	10	10	9	10	9	10	10	9	10	9
Water depth (cm)	5	1	10	10	10	5	5	15	10	5	5	5	8	3	10	10	10	5	20	5	15
Aspect	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inclination (degrees)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Altitude (m)	321	320	765	1459	1459	1300	1300	985	1459	900	1040	966	965	1532	880	1553	880	880	944	950	1150
Cover of shrub layer (%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cover of herb layer (%)	55	75	85	90	85	85	65	90	90	90	100	95	95	95	95	80	70	100	85	90	70
Cover of moss layer (%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Relevé area (m^2)	8	10	5	2	2	2	2	5	5	4	10	2	2	5	3	3	3	4	2	3	3
pH	7.6	7.6	7.6	7.83	7.83	8.1	8	8.2	7.44	7.47	7.8	8	8	7.55	8.7	8.4	7.53	8.7	7.6	7.89	8.66
Number of species	7	11	5	8	7	10	9	11	7	15	15	5	5	8	6	7	3	5	8	5	4
Association	Lo	Lo	Lo	Hn	Hn	Be	Be	Be	Be	Be	Be	Be	Be	Be	Be	Be	Be	Be	Be	Be	Be
Accompanying species																					
Juncus articulatus	.	.	.	.	.	.	.	+	.	1	+	1	+	.	.	.	.	.	+	.	.
Plantago lanceolata	.	.	.	.	.	+	+	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Equisetum ramosissimum	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	+	.
Veronica oxycarpa	.	.	.	.	.	.	.	2	.	.	.	.	.	.	+	.	.	.	.	.	.
Rumex crispus	.	.	.	.	.	+	.	+	.	.	+	.	.	.	.	.	.	.	.	.	.
Equisetum arvense	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.	+	.	.
Plantago major	.	+	.	.	.	+	+	+	.	.	.	.	.	.	.	.	.	+	.	.	.
Taraxacum sp.	.	.	.	.	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Calamagrostis pseudophragmites	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.
Trifolium repens	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	+	.	.
Polygonum persicaria	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Trifolium pratense	.	.	.	.	.	+	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Poa trivialis	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cirsium incanum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.
Veronica anagalloides	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	+	.	.	.
Poa pratensis	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.
Saccharum spontaneum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.
Agrostis gigantea	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Chara sp.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Algae indet.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
Myosotis caespitosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.
Juncus bufonius	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Halerpestres sarmentosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Trifolium fragiferum	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.
Lotus krylovii	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Chamomila suaveolens	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Epilobium thermophilum	.	.	.	1	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Polygonum apmhibium	.	.	.	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Tussilago farfara	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Blysmus compressus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cyperus difformis	1	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hordeum geniculatum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Descurainia sophia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Juncus gerardii	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hipophäe rhamnoides b	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Chenopodium rubrum	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Urtica dioica	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Paramicrorhynchus procumbens	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.
Bidens tripartita	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+
Poa annua	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ranunculus laetus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex pseudofoetida	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Salix linearifolia c	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sonchus arvensis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Juncus heptopotamicus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lolium perenne	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Table 3. (Cont'd.).

22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
22	12	15	15	4	17	16	17	15	15	10	10	16	11	28	28	28	28	28	26
6	6	6	6	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
10	9	9	9	11	9	9	9	9	9	11	11	10	11	9	9	9	9	9	10
5	40	10	10	5	20	30	15	10	15	5	5	5	5	3	3	0	3	0	10
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1750	985	1420	1420	685	944	1447	1532	1420	1410	1047	1047	1255	1876	1720	1720	1710	1720	1710	730
-	-	-	-	-	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
75	100	85	55	40	100	100	80	80	70	80	80	90	85	90	90	90	75	75	95
5	-	-	-	-	-	-	-	-	-	-	-	-	15	-	-	-	-	-	-
5	5	4	4	4	5	5	4	3	2	5	5	4	5	10	10	10	10	10	5
7.72	8.2	8.4	8.4	7.8	7.6	7.8	7.95	8.32	8.02	8.2	8.2	7.85	8.15	7.45	7.45	7.17	7.25	7.3	7.3
7	6	6	3	3	7	6	6	12	6	5	6	7	7	2	4	4	7	5	4
MN	MN	MN	MN	MN	MN	MN	MN	MN	MN	MN	MN	MN	MN	Ss	Ss	Ss	Ss	Ss	Se
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Table 3. (Cont'd.).

22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
22	12	15	15	4	17	16	17	15	15	10	10	16	11	28	28	28	28	28	26
6	6	6	6	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
10	9	9	9	11	9	9	9	9	9	11	11	10	11	9	9	9	9	9	10
5	40	10	10	5	20	30	15	10	15	5	5	5	5	3	3	0	3	0	10
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1750	985	1420	1420	685	944	1447	1532	1420	1410	1047	1047	1255	1876	1720	1720	1710	1720	1710	730
-	-	-	-	-	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
75	100	85	55	40	100	100	80	80	70	80	80	90	85	90	90	90	75	75	95
5	-	-	-	-	-	-	-	-	-	-	-	-	15	-	-	-	-	-	-
5	5	4	4	4	5	5	4	3	2	5	5	4	5	10	10	10	10	10	5
7.72	8.2	8.4	8.4	7.8	7.6	7.8	7.95	8.32	8.02	8.2	8.2	7.85	8.15	7.45	7.45	7.17	7.25	7.3	7.3
7	6	6	3	3	7	6	6	12	6	5	6	7	7	2	4	4	7	5	4
MN	MN	MN	MN	MN	MN	MN	MN	MN	MN	MN	MN	MN	MN	Ss	Ss	Ss	Ss	Ss	Se
.	+	.	.	.	.	.	.	+	+	.	.	.	.	.	+	.	+	+	.
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Table 3. (Cont'd.).

																								Number of occurrence	Number of occurrence	Constancy	Constancy	Number of occurrence	Number of occurrence	Constancy	Constancy
42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65								
11	11	12	16	17	17	17	17	13	10	5	5	12	11	18	29	12	29	29	22	30	11	16	4								
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6								
9	9	9	9	9	9	9	9	10	11	11	11	10	9	9	9	9	9	9	10	9	11	10	11								
15	15	0	5	3	3	5	2	10	5	2	3	5	5	3	5	15	2	2	5	5	5	10	5								
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
1420	1419	1054	1456	950	950	950	950	905	961	2011	2150	1615	1418	1803	1435	1290	1850	1845	1680	1690	1876	1255	2547								
-	-	-	-	-	2	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-								
70	65	90	100	75	80	70	85	85	65	80	60	65	65	80	100	80	90	70	70	90	65	80	75								
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-								
10	10	25	20	5	10	10	6	20	10	12	10	4	8	9	2	8	3	3	3	3	5	4	3								
7.68	7.74	8.12	7.58	7.79	7.84	7.53	7.72	8	8.1	8	8.15	7.2	7.8	8	7.4	8.02	8.15	8	7.65	8.3	8.15	7.85	7.85								
9	8	7	14	12	17	14	10	13	6	8	4	13	8	8	3	2	4	6	6	9	7	5	3	rel.	rel.	rel.	rel.	rel.	rel.	rel.	rel.
Tm	Tm	Tm	Tm	Tm	Tm	Tm	Tm	Tm	Tm	Tm	Tm	Gn	Gn	Gn	Gn	Gn	Gn	Gn	Gn	Gn	Gn	Gn	Gn	1–3	4–5	6–21	22-33	34-35	36-40	42-53	54-65
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Table 3. (Cont'd.).

42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	Number of occurrence	Number of occurrence	Constancy	Constancy	Number of occurrence	Number of occurrence	Constancy	Constancy
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6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6								
9	9	9	9	9	9	9	9	10	11	11	11	10	9	9	9	9	9	9	10	9	11	10	11								
15	15	0	5	3	3	5	2	10	5	2	3	5	5	3	5	15	2	2	5	5	5	10	5								
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1420	1419	1054	1456	950	950	950	950	905	961	2011	2150	1615	1418	1803	1435	1290	1850	1845	1680	1690	1876	1255	2547								
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70	65	90	100	75	80	70	85	85	65	80	60	65	65	80	100	80	90	70	70	90	65	80	75								
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7.68	7.74	8.12	7.58	7.79	7.84	7.53	7.72	8	8.1	8	8.15	7.2	7.8	8	7.4	8.02	8.15	8	7.65	8.3	8.15	7.85	7.85								
9	8	7	14	12	17	14	10	13	6	8	4	13	8	8	3	2	4	6	6	9	7	5	3	rel. 1–3	rel. 4–5	rel. 6–21	rel. 22-33	rel. 34-35	rel. 36-40	rel. 42-53	rel. 54-65
Tm	Tm	Tm	Tm	Tm	Tm	Tm	Tm	Tm	Tm	Tm	Tm	Gn	Gn	Gn	Gn	Gn	Gn	Gn	Gn	Gn	Gn	Gn	Gn								
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Table 3. (Cont'd.).

Sporadic species: *Barbarea arguata* 34; *Bassia hyssopifolia* 1; *Bidens frondosa* 3; *Bromus japonicus* 11; *Bromus popovii* 50; *Bromus tectorum* 43; *Centaurium pulchellum* 45; *Centaurium umbellatum* 47; *Chara vulgaris* 28; *Chenopodium glaucum* 56; *Clementsia semenovii* 52; *Cynodon dactylon* 1(1); *Dactylorhiza umbrosa* 52; *Eleocharis meridionalis* 45(2); *Epilobium parviflorum* 62; *Euphrasia regelii* 45; *Festuca* sp. 63; *Filonotis fontana* d 35(2); *Impatiens parviflora* 5(1); *Lactuca tatarica* 49; *Lolium persicum* 3; *Medicago lupulina* 47; *Musci* indet. 22(1); *Myosotis laxa* 54(1); *Plantago griffithii* 45; *Polygonum hydropiper* 1(2); *Polygonum lapathifolium* 27(1); *Potentilla reptans* 41; *Puccinellia* sp. 61: *Pycreus flavidus* 1(1); *Ranunculus repens* 11; *Salix capusii* b 28; *Salix linearifolia* b 48(1); *Solanum nigrum* 2; *Symphyotrichum graminifolius* 1; *Triglochin palustre* 54.

Explanations: Lo- *Leersietum oryzoidis*; Hn- *Helosciadietum nodiflori*; Be- *Beruletum erectae*; MN- *Mentho asiaticae-Nasturtietum microphyllae*; Ss- *Sparganietum stoloniferi*; Se- *Sparganietum erecti*; Tm- *Calamagrostio pseudophragmitis-Typhetum minimae*; Gn- *Glycerietum notatae*.

Locality of relevé: 1- (401343, 6; 693058, 9); 2- (401248, 3; 692951, 1); 3- (383001; 683954, 4); 4- (391652, 7; 674142, 9); 5- (391652, 7; 674142, 9); 6- (392632; 681633); 7- (392632; 681633); 8- (392928; 674212); 9- (391652, 7; 674142, 9); 10- (393109, 5; 672910, 6); 11- (393054; 674626, 6); 12- (393051, 6; 673554, 5); 13- (393051, 6; 673554, 5); 14- (392014, 2; 680502, 6); 15- (393116; 672610); 16- (392014, 2; 680502, 6); 17- (393110, 8; 672614, 6); 18- (393116; 672610); 19- (393021, 8; 673530, 8); 20- (393046; 673552, 6); 21- (392800, 6; 680116, 5); 22- (392228; 681146); 23- (392928; 674212); 24- (391542, 4; 674750, 4); 25- (391542, 4; 674750, 4); 26- (425690, 4; 743438, 8); 27- (393021, 8; 673530, 8); 28- (391652, 9; 674150, 7); 29- (392014, 2; 680502, 6); 30- (391541, 2; 674750, 2); 31- (391548, 6; 674754, 8); 32- (392928, 7; 674215, 6); 33- (392928, 7; 674215, 6); 34- (392714; 680500, 2); 35- (391545, 1; 672941, 8); 36- (391141, 5; 711222, 2); 37- (391141, 5; 711222, 2); 38- (391141, 5; 711222, 2); 39- (391141, 5; 711222, 2); 40- (391141, 5; 711222, 2); 41- (383001; 683954, 4); 42- (392401; 683129); 43- (392403; 683128); 44- (392813, 7; 674953, 3); 45- (391646, 4; 674143, 9); 46- (393016, 5; 673531, 1); 47- (393015, 6; 673529, 5); 48- (393015, 6; 673529, 5); 49- (393019, 5; 673513, 3); 50- (393104, 6; 672913, 8); 51- (393021, 5; 673540); 52- (371209, 8; 713218, 5); 53- (380341, 6; 715219, 9); 54- (391415, 5; 673830, 3); 55- (392403; 683127); 56- (392414, 3; 690401, 9); 57- (390514, 3; 703658, 1); 58- (392650, 7; 680923, 2); 59- (391051; 704737); 60- (391043; 705103); 61- (392240; 681136); 62- (384614, 7; 703840, 1); 63- (391545, 1; 672941, 8); 64- (392714; 680500, 2); 65- (371209, 8; 713218, 5).

3. *Typhetum laxmannii* (Ubrizsy 1961) Nedelcu 1968 (Table 1, rel. 19–43)

Diagnostic species: *Typha laxmannii*

Typhetum laxmannii is widely distributed in Tajikistan in different types of habitats close to water, mainly in roadside ditches, irrigation and drainage ditches, stagnant waters and streams (Nowak *et al*., 2013). The association develops in places with temporarily significant fluctuations of water depth during the vegetation period, in muddy, clayey substrates. During the study, several plots of *Typhetum laxmannii* were found in the valleys of the Zeravshan, Syr-Daria, Vaksh, Kafinighan and Pyandzh rivers at altitudes of ca. 950–1650 m. It occurs in shallow (up to 10 cm depth) alkaline waters. *Typha laxmannii* clearly dominates the phytocoenosis, with an average coverage of about 70% (Fig. 5). The mean number of species in the plots was 7. Significant constancy was achieved by *Polypogon demissus*, *Bolboschoenus glaucus*, *Phragmites australis* and *Juncus articulatus*. *Calamagrostis pseudophragmites*, *Eleocharis argyrolepis*, *E. uniglumis* and several other species were observed sporadically (Table 1).

4. *Phragmitetum australis* Savič 1926 (Table 1, rel. 44–66)
Synonym: *Phragmitetum australis* (Gams 1927) Schmale 1939

Diagnostic species: *Phragmites australis*

Phragmitetum australis belongs to the most common rush communities in Tajikistan. It is widely distributed across different altitudinal zones and was observed in all researched river valleys at altitudes of ca. 600 to 2300 m. The association occurs in natural (riverbanks, oxbow lakes) as well as in anthropogenic (mining areas, rice fields) habitats. The phytocoenoses develop in muddy soils, occasionally with a significant admixture of gravel, in an alkaline substrate (pH ca. 8.0). In discovered plots, generally from 4 to 9 species were noted, representing mainly the Phragmito-Magno-Caricetea class (*Mentha asiatica*, *Carex songorica*, *Glyceria notata*) as well as meadow phytocoenoses (*Trifolium pratense*, *T. repens*, *Ranunculus laetus* and *Equisetum arvense*) (Fig. 5, Table 1).

5. *Scirpetum triqueteri* Zonneveld 1955 (Table 1, rel. 67–69)

Diagnostic species: *Scirpus triqueter* [Synonym *Schoenoplectus triqueter*]

This community is very rare along the watercourses and in the rice fields of Tajikistan. It was found in lower sections of the Syr-Daria, Zeravshan and Pyandzh river valleys at altitudes of ca. 320 to 900 m a.s.l. *Scirpetum triqueteri* develops in shallow alkaline waters (5–10 cm, pH 7.6), in muddy substrates. It attains an average height of around 0.6–1.2 m. The stands of the association are dominated by the main diagnostic species, which constitutes approx. 75% of the mean cover (Fig. 5). Among other species, *Cynodon dactylon*, *Polygonum hydropiper*, *Cyperus difformis*, *Chenopodium rubrum*, *Galium palustre* and *Scirpus mucronatus* have a significant share (Table 1).

Table 4. Associations and communities of the *Magno-Caricion gracilis alliance*.

Successive number of relevé	1	2	3	4	5	6	7	8	9	10	11	Number of occurrence	Number of occurrence
day	29	28	17	17	17	18	29	21	21	29	10		
Date: month	6	6	6	6	6	6	6	6	6	6	5		
year	9	9	10	10	10	10	9	9	9	9	11		
Water depth (cm)	3	3	5	5	5	5	10	3	5	3	5		
Aspect	-	-	-	-	-	-	-	-	-	-	-		
Inclination (degrees)	-	-	-	-	-	-	-	-	-	-	-		
Altitude (m)	1435	1720	2585	2345	2345	2320	1435	1672	1672	1475	502		
Cover of herb layer (%)	85	65	75	70	50	70	75	55	70	75	70		
Relevé area (m^2)	20	4	3	6	5	4	4	6	5	6	4		
pH	7.7	7.45	8.19	7.26	7.18	8.19	7.8	7.47	7.47	8.01	7.4		
Number of species	5	6	5	4	4	2	7	6	6	8	6	rel.	rel.
Association/Community	Cs	Cs	Cs	Cs	Cs	Cs	Cr	Cm	Cm	Cm	Cd	1–6	8–10
ChAss. *Caricetum songoricae*													
Carex songorica	5	4	4	4	3	4	.	.	.	.	.	6	-
ChAss. *Caricetum ripariae*													
Carex riparia	.	.	.	.	.	.	4	.	.	.	.	-	-
D. Comm. *Carex malanostachya*													
Carex melanostachya	.	.	.	.	.	.	.	3	4	4	.	-	3
D. Comm. *Carex diluta*	.	.	.	.	.	.	.	.	.	.	.		
Carex diluta	.	.	.	.	.	.	.	.	.	.	4	-	-
ChO. et ChCl. *Phragmitetalia* et *Phragmito-Magno-Caricetea*													
Eleocharis uniglumis	.	.	+	+	.	.	.	+	1	.	.	2	2
Phragmites australis	1	.	.	.	.	.	+	.	.	.	+	1	-
Glyceria notata	.	.	1	.	.	.	1	.	.	.	.	1	-
Lycopus europaeus	.	.	.	.	.	.	+	.	.	.	1	-	-
Sium latifolium	.	.	.	.	.	.	+	.	.	+	.	-	1
Typha latifolia	.	.	.	.	.	.	+	.	.	+	.	-	1
Sporadic species: *Alisma plantago-aquatica* 10; *Bolboschoenus glaucus* 10(1); *Epilobium minutiflorum* 9; *Epilobium velutinum* 11; *Juncus brachytepalus* 1; *Mentha asiatica* 1; *Typha laxmannii* 2(1)													
Accompanying species													
Calamagrostis pseudophragmites	.	+	.	.	.	.	.	+	1	.	.	1	2
Algae indet.	.	.	.	1	1	.	.	.	.	.	.	2	-
Blysmus compressus	.	.	.	.	1	1	.	.	.	.	.	2	-
Triglochin palustre	.	.	.	+	1	.	.	.	.	.	.	2	-
Carex karelinii	.	.	.	.	.	.	.	+	+	.	.		

Sporadic species: *Bidens tripartita* 8(1); *Bromus japonicus* 2; *Bromus tectorum* 3; *Chamomila suaveolens* 2; *Cirsium incanum* 11; *Juncus articulatus* 11; *Juncus atrofuscus* 8(1); *Plantago major* 9; *Poa pratensis* 10; *Poa trivialis* 3; *Polygonum persicaria* 10; *Potentilla reptans* 1; *Ranunculus laetus* 7; *Rumex crispus* 2; *Lepidium latifolium* 10.

Explanations: Cs- *Caricetum songoricae*; Cr- *Caricetum ripariae*; Cm- Community with *Carex malanostachya*; Cd- Community with *Carex diluta*.

Locality of relevé: 1- (390514, 3; 390514, 3); 2- (391141, 5; 711222, 2); 3- (390259, 4; 681918, 5); 4- (390332; 682320); 5- (390332; 682320); 6- (390332; 682320); 7- (390514, 3; 703658, 1); 8- (391241, 2; 683200); 9- (391241, 2; 683200); 10- (390530, 4; 703949, 2); 11- (410400; 721223, 9).

6. *Scirpetum triquetriformis* A. Nowak, S. Nowak et M. Nobis 2013 (Table 1, rel. 70–71)

Diagnostic species: *Scirpus triquetriformis* [Synonym *Schoenoplectus triquetriformis*]

The association occurs very seldom, in the rice fields of Tajikistan. It was found at an altitude of ca. 730 m a.s.l. in the valley of the Khanaka River south of Hissar. Patches of the community were noted also in the neighbourhood of rice fields in the Hissar area and in southwestern Tajikistan, in the valley of the Kafirnighan River. *Scirpetum triquetriformis* develops in close to neutral (pH ca. 7.3), shallow waters (sometimes dried-up areas) in muddy substrates. The community has a typical medium rush height of about 0.6–1.1 m. The community is clearly isolated in a DCA analysis (Fig. 4), mainly due to habitat requirements, including shallow water, relatively low pH and medium elevation above sea level.

In the structure of this plant community, *Scirpus triquetriformis* apparently dominates, with approximately 60–70% coverage. This taxon is known only from Central Asia, from lower elevations in the Fergana Valley, the western Pamir-Alai and Turkmenistan. In Tajikistan it occurs mainly in stagnant waters and ditches. This species has not been recorded previously in rice fields (Ovchinnikov, 1963), but recently it has been noted by Nowak *et al.,* (2013).

Among other rush species, *Bolboschoenus planiculmis* and *Scirpus lacustris* have a considerable share in this community. Of other species belonging to the Phragmito-Magno-Caricetea, *Alisma plantago-aquatica* and *Lycopus europaeus* have been noted.

7. *Scirpetum hippolytii* ass. nova (Table 1, rel. 81-86)
Typus relevé: Table 1, rel. 84

Diagnostic species: *Scirpus hippolyti* [Syn. *Schoenoplectus validus*]

The community was found only in two places, in the Surhob and Pyandzh River valleys in the Eastern Tajikistan and Western Pamirian geobotanical regions, at the relatively high altitude of 1500–1600 m a.s.l. The association develops in muddy, alkaline river alluvia with considerable admixtures of gravel (pH 7.6–7.8). Most of the patches were found in very shallow waters up to 5 cm in depth. The domination of *Scirpus hippolytii* is quite clear. The species covers, on average, approx. 75% of the herb layer in the noted vegetation plots (Fig. 5). *Scirpetum hippolytii* is one of the most species-rich syntaxa amongst the associations known from Middle Asia. The noted phytocoenoses were built of 12 to 15 species on average. In addition to the main diagnostic species in the plots of the community, the highest constancy and cover are achieved by species typical for the Phragmito-Magno-Caricetea class. Here the following were noted: *Glyceria notata*, *Bolboschoenus glaucus*, *Juncus articulatus*, *Mentha asiatica*, *Myosotis caespitosa*, *Polypogon demissus*, *Typha laxmannii* and *Veronica oxycarpa*. Several species typical for meadow or other alluvial habitats were also sporadically noted such as *Equisetum arvense*, *Rumex crispus*, *Myricaria bracteata*, *Plantago lanceolata*, *Saccharum spontaneum* and others.

8. *Cyperetum longi* Micevski 1957 (Table 1, rel. 72–75)

Diagnostic species: *Cyperus longus*

This association occurs very rarely in Tajikistan. It was found only on margins of rice fields and in adjacent irrigation ditches in the middle section of the Kafirnighan river valley at an altitude of approx. 740–770 m. *Cyperetum longi* plots develop in shallow alkaline waters (pH 7.3–7.7; depth ca. 10 cm), in muddy, clayey substrates. The diagnostic species has an average cover of approximately 70% and dominates the community plots (Fig. 5). Among researched rush communities, *Cyperetum longi* is an association with a moderate number of species; on average, around 7 taxa were found (extremes 6 and 11). In the plots of the association, the following species belonging to the Phragmito-Magno-Caricetea class have been noted: *Lycopus europaeus*, *Phragmites australis* and *Alisma plantago-aquatica*, as well as those typical for rice cultivations (Oryzetea sativae class), e.g. *Bolboschoenus planiculmis*, *Cyperus difformis* and *Scirpus mucronatus*. Because of the fluctuating water level in the fields during the vegetation period, in these phytocenoses one can also find also species of root crops such as *Sorghum halepense*, *Solanum nigrum* or *Xanthium italicum*, as well as species alien to the flora of Tajikistan like *Bidens frondosa* (Table 1).

Cyperetum longi occupies those places where *Oryza sativa* reaches a relatively low density. The total coverage of weeds here is considerably high, averaging about 70%.

9. *Cyperetum serotini* Krausch 1965 (Table 1, rel. 76–80)
Synonym: *Juncelletum serotini* Krausch 1965

Diagnostic species: *Cyperus serotinus*

This association occurs relatively rarely in the irrigation ditches and rice fields of Tajikistan. It was found in the lowest section of the Zeravshan river valley at an altitude of ca. 950 m a.s.l. *Cyperetum serotini* develops in alkaline (pH 7.7–8.7), shallow waters (5–10 cm) in muddy substrates with a relatively high clay content.

The plots, dominated by *Cyperus serotinus*, include a moderate number of species; on average, around 8 taxa were noted. The diagnostic species dominates the community, occurring with an abundance of about 50–60% (Fig. 5). The accompanying species of *Cyperetum serotini* with higher constancy values include *Berula erecta*, *Glyceria notata* and *Polypogon demissus*. The structural density of the community is relatively high in comparison to other associations and can reach up to 100%. It is worth noting the occurrence of meadow species e.g., *Plantago major*, *Trifolium repens* in some plots of this community.

10. *Eleocharitetum uniglumis* W. Braun 1968 (Table 2, rel. 1–10)

Diagnostic species: *Eleocharis uniglumis*

The *Eleocharitetum uniglumis* association was noted quite often, especially in the montane elevations of the Zeravshan, Jagnob, Iskander-Daria and Pastrud-Daria river valleys. It prefers small water bodies and develops in the shallow margins of puddles and pools as well as within the edges of rice fields. The community was also noted along the outskirts of periodic water bodies (e.g. on ground-level roads) and slow-flowing drainage and irrigation ditches. Substrates are clayey sediments with a strong alkaline reaction (pH 9.3 on average; Fig. 5).

In the registered plots of vegetation, on average, 4 species, and very occasionally more than 10, were found. A total of 40 taxa were stated in all plots, and, apart from the predominant species, only *Bolboschoenus glaucus*, *Phragmites australis* and *Sium latifolium* have a significant cover. Among other taxa are mainly those related to the Phragmito-Magno-Caricetea class (eg. *Polypogon demissus*, *Juncus articulatus*, *Typha laxmannii*) as well as to other types of vegetation, e.g. *Blysmus compressuss*, *Stuckenia amblyphylla*, *Equisetum ramosissimum*, *Helerpestres sarmentosa* and others. A lack of taxa diagnostic for Oryzetea class is apparent (Table 2).

11. *Eleocharitetum mitracarpae* ass. nova (Table 2, rel. 11–15)
Typus relevé: Table 2, rel. 13

Diagnostic species: *Eleocharis mitracarpa* [Syn. *Eleocharis turcomanica*]

The *Eleocharitetum mitracarpae* association occurs sporadically in Tajikistan. Plots of this association were found within a narrow range of altitudes, from approx. 950 to 1500 m a.s.l. (Fig. 5). It has been noted mainly in the montane elevations of alpine river valleys: Zeravshan, Jagnob and Iskander-Daria. Patches of this association develop mostly in loess or muddy soils with evident alkaline reaction (mean value of pH = 8). The association prefers small, shallow water bodies as well as marginal zones of rice puddles. Between 2 and 8 species were recorded in the relevés, with the average being approx. 4 species (Fig. 5). The diagnostic taxon achieves considerable constancy (V) and an average cover of approx. 70–80%. The total cover of species in the phytocoenoses reaches up to 85%, and in most cases it varies between 70–75%. The most frequent accompanying species within the plots of *Eleocharitetum mitracarpae* are *Bolboschoenus glaucus*, *Glyceria notata* and *Berula erecta* (Table 2). Far more rarely, other species from rush vegetation have been observed (e.g. *Polypogon demissus*, *Mentha asiatica*, *Lycopus europaeus*, *Cyperus serotinus*).

12. *Bolboschoenetum glauci* Grechushkina, Sorokin et Golub 2011 (Table 2, rel. 16–46)

Diagnostic species: *Bolboschoenus glaucus*

The *Bolboschoenetum glauci* association commonly occurs in Tajikistan in different types of habitats. Mostly it overgrows shallow, temporary pools, irrigation and drainage ditches, developing sporadically within riverside vegetation. It is also noticed rarely in rice cultivations (Nowak *et al*., 2013). The association has been found in almost all explored river valleys. It occurs within a wide range of altitudes, from approx. 400 to 1500 m a.s.l. (Fig. 5). *Bolboschoenetum glauci* occurs in alkaline shallow waters (mean depth, approx. 10 cm) with pH from 7.0 to 8.7. In several places the association was observed in completely dried-up areas. The association develops in muddy clay substrates, growing to heights typical for medium-sized rushes, i.e. around 0.7–1.1 m. In the surveyed plots of this community the diagnostic taxon predominates, reaching on average nearly 60% of cover. In discovered patches of the association, apart from *Bolboschoenus glaucus*, other rush species were also observed, e.g. *Alisma plantago-aquatica*, *Epilobium velutinum*, *Lycopus europaeus Phragmites australis*, *Polypogon demissus*, *Sparganium stoloniferum* and *Veronica oxycarpa*. Relatively low constancies are attained by taxa from the Oryzetea class (e.g. *Cyperus difformis*, *Scirpus mucronatus*), which support the view that the community occurs optimally outside rice puddles. Quite stable are taxa representing water habitats, like *Potamogeton nodosus*, *P. perfoliatus*, *P. berchtoldii*, or *Batrachium pachycaulon*. The average number of species per plot was 5; however, a wide range of species richness within a given plot was observed (Fig. 5). The total number of species contributing to the *Bolboschoenetum glauci* community was 80.

13. *Eleocharitetum argyrolepis* ass. nova (Table 2, rel. 47–54)
Typus relevé: Table 2, rel. 50

Diagnostic species: *Eleocharis argyrolepis*

The community of *Eleocharitetum argyrolepis* has been recently mentioned by Nowak *et al*., (2013) in reference to the rice fields in Tajikistan. Compilation of all available relevés from different habitat types from the area of Tajikistan enable the definition of the *Eleocharitetum argyrolepis* association, which was noted in the Zeravshan, Pastrud-Daria, Jagnob, Vaksh and Iskander-Daria river valleys at the relatively high elevations of approx. 1200 to 2300 m a.s.l. (mean 2150). *Eleocharis argyrolepis* commonly occurs in Tajikistan, mainly in the alpine zone, in loamy, alkaline substrates (pH 7.8–10.2, mean 8.8; Fig. 5). The low rushes of *Eleocharis argyrolepis* were noted along the shallow margins of small puddles and in irrigation ditches, as well as, rarely, in rice fields. Quite often the community develops on the shores of periodic water bodies. The diagnostic species predominates in all patches, with an average cover of approx. 50%. The total cover of herb species reaches relatively low values of ca. 60%.

The plots of noted phytocoenoses were built by ca. 40 taxa, mainly typical for rush habitats (e.g. *Polypogon demissus*, *Bolboschoenus glaucus*). Several species typical for wet meadows or trampled grasslands have been also sporadically noted in plots of researched vegetation. Most abundant were *Halepestres sarmentosa*, *Poa annua* or *Lotus krylovii.* Because *Eleocharitetum argyrolepis* can thrive in ephemeral pools, there is a considerable share of ruderal species within the phytocoenosis, such as *Descurainia sophia* or *Bromus tectorum*.

14. *Juncetum brachytepali* ass. nova (Table 2, rel. 55–61)
Typus relevé: Table 2, rel. 57

Diagnostic species: *Juncus brachytepalus*

The *Juncetum brachytepali* association occurs sporadically in Tajikistan. Patches of this association were found within a narrow range of altitudes, within the subalpine zone at approximately 1700 m a.s.l. (Fig. 5). The association was noted in the Zeravshan, Pastrud-Daria and Iskander-Daria river valleys. *Juncetum brachytepali* occurs in sandy and loamy, neutral or alkaline substrates (pH 7.4–8.1, mean 7.4). This type of rush vegetation develops on margins of alpine rivers close to peat bogs or peaty meadows. This also causes the relatively frequent and abundant occurrence of mosses and wet meadow species such as *Rhinantus songaricus*, *Ranunculus laetus*, *Myosotis caespitosa*, *Epipactis palustris*, *Eleocharis meridionalis* or *Carex orbicularis*. However, in all plots the rush taxa dominated. The most abundant were *Bolboschoenus glaucus*, *Mentha asiatica*, *Phragmites australis*, *Carex songorica* and *Typha laxmannii*. The registered phytocoenoses were built by ca. 20 taxa. The diagnostic species predominates in all patches, with an average cover of approx. 60%. The total cover of herb species reaches relatively high values, ca. 80%.

15. *Scirpetum tabernaemontani* De Soó 1947 nom. mut. propos. (Table 2, rel. 62–63)

Diagnostic species: *Scirpus tabernaemontani*

The *Scirpetum tabernaemontani* association occurs sporadically in Tajikistan. It was found in the Pastrud-Daria river valley at the altitude of approx. 2000 m a.s.l. The association occupies typical rush habitats on the shores of alpine rivers or small water bodies. The phytocoenosis prefers alkaline substrates (pH ca. 8.2) with a considerable admixture of gravel in the soil. In the surveyed plots of this community, the diagnostic taxon predominates, reaching, on average, nearly 70% of cover (Fig. 5). In discovered patches of the association, besides *Scirpus tabernaemontani*, other rush species were also observed, e.g. *Phragmites australis* and *Eleocharis uniglumis*. The discovered patches were very poor in species, having no more than 3 vascular plant taxa in a plot. Besides the above-mentioned species, no other vascular plants were found. Only *Chara* sp. and *Algae* indet. contribute to the sampled vegetation plots.

16. *Rorippo palustris-Alismatetum graminei* ass. nova (Table 2, rel. 64–69)
Typus relevé: Table 2, rel. 64

Diagnostic species: *Alisma gramineum*, *Rorippa palustris*

This community, dominated by *Alisma gramineum*, was found only in two places, in the middle section of the Varzob and Zeravshan river valleys at the altitude of approx. 1300 m a.s.l. The association in all sites was found within small artificial ponds dammed by road escarpments. *Rorippo palustris-Alismatetum graminei* develops in relatively deep (10–20 cm), close to neutral waters with pH from 7.0 to 7.2. The association develops in muddy, clay substrates, growing to heights typical of smaller rushes, around 0.3–0.5 m. In the surveyed plots of this community, the diagnostic taxon predominates, reaching, on average, nearly 70% of cover. In comparison to Central European plots of Batrachio circinati-Alismatetum graminei Hejný in Dykyjová et Květ 1978, there is an apparent lack of water species, especially *Batrachium circinatum*, which is regarded as diagnostic (Chytrý, 2011). In discovered phytocoenoses of the association, besides *Alisma gramineum*, other rush species have been also observed, e.g. *Veronica oxycarpa*, *Typha laxmannii*, *Sparganium erectum* or *Mentha asiatica*. In all plots the diagnostic for the association, *Rorippa palustris*, has been found to have a relatively significant share. Probably due to the vicinity of grassy road verges, along with unstable water levels within the patches of the phytocoenoses, several meadow or nitrophilous species contribute to the community, such as *Equisetum arvense*, *Potentilla reptans* and *Prunella vulgaris*. The association is rather species-poor, with approx. 6 species as a mean (Fig. 5). The total number of species contributing to *Rorippo palustris-Alismatetum graminei* was also very small (13).

17. *Leersietum oryzoidis* Eggler 1933 (Table 3, rel. 1–3)

Diagnostic species: *Leersia oryzoides*

The *Leersietum oryzoidis* appears to be very rare in Tajikistan and was found exclusively in rice fields in the valley of the Syr-Daria River north of Proletarska at an elevation of around 320 m. The *Leersietum oryzoidis* association develops in places with shallow water (up to 5–10 cm) with alkaline reaction (pH 7.6), in a muddy substrate. The association has the typical physiognomy of a medium-sized rush with an average height of about 0.6–0.9 m. The noted plots had a significant cover of herb species and occupied not only the field margins, but also a significant area of the inner parts of puddles. In the structure of the community *Leersia oryzoides* predominates, reaching around 30–70% (mean approx. 70). Similar to other rush communities, the association of *Leersietum oryzoidis* is not species- rich (Fig. 5). On average, 9 taxa were noted, belonging to different phytosociological units. The largest share was taken by typical Oryzetea sativae species, such as *Cyperus difformis* and *Pycreus flavidus*. *Cynodon dactylon*, *Polygonum hydropiper* and *Veronica anagalloides* were also sporadically noted. In contrast to southern European patches, other numerous species of the class Phragmito-Magno-Caricetea were not found, apart from the diagnostic ones.

18. *Helosciadietum nodiflori* Maire 1924 (Table 3, rel. 4–5)

Diagnostic species: *Apium nodiflorum*

The association *Helosciadietum nodiflori* was found in only one location in the lower section of the Zeravshan river valley, north of Pendzhikent. A single plot of the phytocoenosis was noticed in small depression within a river gravel bed at the altitude of ca. 1500 m a.s.l. The association had developed on a small surface along the margins of a poorly-managed rice field, in a spot with a large amount of gravel. The water was very shallow here and, along with muddy soil, had an alkaline reaction (pH 7.8). The considerable share of diagnostic species makes up the community physiognomy. *Apium nodiflorum* had a mean value of approx. 70% in noted plots. In the phytocoenosis, *Oryza sativa* grows sparsely in the company of several Phragmito-Magno-Caricetea species, such as *Eleocharis argyrolepis*, *Berula erecta* and *Glyceria notata*.

19. *Beruletum erectae* Roll 1938 (Table 3, rel. 6–21)

Diagnostic species: *Berula erecta*

The *Beruletum erectae* association was noted very often all over the study area. The association was especially frequent in the submontane elevations of the Zeravshan, Jagnob, Iskander-Daria, Pastrud-Daria, Vaksh, Surhob and Vanch river valleys at altitudes of 900–1300 m a.s.l. It prefers small and shallow water bodies and develops in the margins of puddles and pools as well as the edges of rice fields. The community was also noted along the outskirts of periodic water bodies and slow-flowing drainage and irrigation ditches. *Beruletum erectae* develops on clayey sediments with an alkaline reaction (pH 7.5 to 8.7; Fig. 5).

On average, in the noted plots of vegetation 7 species were found, and occasionally more than 12. A total of 20 taxa were stated in all plots. The dominant and most constant is *Berula erecta*, with approx. 70% of the average cover. Apart from the diagnostic species, several other species attain significant cover: *Trifolium fragiferum*, *T. repens*, *T. pratense*, *Veronica oxycarpa*, *Nasturtium microphyllum*, *Mentha asiatica*, *Phragmites australis*, *Equisetum ramosissimum* and *Polypogon demissus*. Among other taxa are mainly those related to the Phragmito-Magno-Caricetea vegetation (eg. *Glyceria notata*, *Juncus articulatus*, *Eleocharis uniglumis*) as well as to other types of vegetation, e.g. *Bromus japonicus*, *Ranunculus repens*, *Urtica dioica*, *Rumex crispus* and several others (Table 3).

20. *Mentho asiaticae-Nasturtietum microphyllae* ass. nova (Table 3, rel. 22–35)
Typus relevé: Table 3, rel. 24

Diagnostic species: *Nasturtium microphyllum*, *Mentha asiatica*

This community, dominated by *Nasturtium microphyllum*, is widely distributed all over the study area. It was found frequently in montane zones of the Varzob, Pastrud-Daria, Iskander-Daria, Jagnob, Pyandzh and Zeravshan river valleys at altitudes of approx. 1000 to 1400 m a.s.l. The association was generally found on banks of alpine rivers as well as within the marginal zones of rice fields and in irrigation ditches. *Mentho asiaticae-Nasturtietum microphyllae* develops in moderately deep (5–15, mean 10 cm), alkaline waters with pH from 7.7 to 8.2 (Fig. 5). The association develops in muddy, clay substrates, growing to heights typical of smaller rushes, around 0.2–0.4 m. Within the surveyed plots, the diagnostic taxon predominates, creating very dense stands with a relatively high cover rate and a mean value close to 90%. In discovered phytocoenoses of the association, besides *Nasturtium microphyllum*, other rush species were also observed, e.g. *Veronica oxycarpa*, *Phragmites australis*, *Epilobium minutiflorum* or *Mentha asiatica*. The last-mentioned species has significant constancy, comparable to the main diagnostic species; thus it is proposed as important for the association diagnosis. There is an apparent lack of *Nasturtium officinale*, which is regarded as diagnostic for *Nasturtietum officinalis* (Seib. 1962) Oberd. *et al.* 1967 in all plots. The study area is outside the range of the N. officinalis known only from the northern outskirts of Central Asia. Generally, the plots of *Mentho asiaticae-Nasturtietum microphyllae* are species-poor. In all phytocoenoses 26 taxa were noted, with the average value per plot close to 6.

In the correspondence analysis of the association, plots dominated by *Veronica anagallis-aquatica* were classified in between *Mentho-Nasturtietum*. It is supposed that these phytocoenoses could have a subassociation rank; however, this has to be proved through compilation of a larger phytosociological database (Figs. 4, 5).

21. *Sparganietum stoloniferi* ass. nova (Table 1, rel. 36–40)
Typus relevé: Table 1, rel. 37

Diagnostic species: *Sparganium stoloniferum*

Sparganietum stoloniferi occurs in Tajikistan very sporadically. Plots of this association were found in only one site in the upper section of Surhob River gravel alluvials, within a narrow altitudinal range at approx. 1700 m a.s.l. (Fig. 5). The association was noted in few places, in almost completely dry depressions within wide riverbed gravels. *Sparganietum stoloniferi* develops on sandy and loamy, near-neutral substrates with a considerable degree of gravel fraction and a low content of humic substances (pH 7.2–7.4). Within the researched plots, the diagnostic taxon apparently predominates, with a high cover rate close to 80%. Besides *Sparganium stoloniferum*, other rush species have been also observed in discovered phytocoenoses (e.g. *Eleocharis argyrolepis*, *Typha laxmannii*, *Juncus articulatus* or *Veronica oxycarpa*). Species from other types of vegetation have been also sporadically noted, such as *Plantago lanceolata* or *Equisetum arvense*. On average, plots of *Sparganietum stoloniferi* are poor in species. Altogether, in registered vegetation plots only 9 taxa were noted, with the mean value per plot close to 4.

22. *Sparganietum erecti* Roll 1938 (Table 3 rel. 41)

Diagnostic species: *Sparganium erectum*

The community appears in Tajikistan rarely, commensurate with the frequency of the diagnostic species within the country (Ovchinnikov, 1957). Only one plot built by *Sparganium erectum* was found in the valley of the Khanaka River south of Hissar at an altitude of ca. 740 m. Plots of *Sparganietum erecti* have been noted in margins of rice puddles and in irrigation ditches. The association develops in alkaline (pH 7.3), shallow waters (approx. 10 cm), in muddy soils.

In western Tajikistan, *Sparganietum erecti* is a community of poor species richness, having ca. 4 species, with a clear predominance of the diagnostic plant. In the studied plot *Sparganium erectum* was accompanied by *Polypogon demissus*, *Polygonum persicaria* and *Potentilla reptans*.

23. *Glycerietum notatae* Kulczyński 1928 (Table 3, rel. 54–65)
Synonym: *Glycerietum plicatae*

Diagnostic species: *Glyceria notata*

Glycerietum notatae is one of the most widespread rush communities in Tajikistan. It is distributed across the montane and subalpine altitudinal zones and was observed in all researched river valleys from 1400 to 1800 m a.s.l. The association occurs in natural (oxbow lakes) as well as in anthropogenic (rice fields, road verges, irrigation ditches) habitats. The phytocoenoses develop in muddy and loamy soils, in alkaline substrates (pH *ca*. 8.0). *Glycerietum notatae* creates relatively loose stands with the mean cover of the herb layer equalling approx. 70%. In registered plots, from 2 to 13 species were generally noted (mean 6), representing mainly the Phragmito-Magno-Caricetea class (*Mentha asiatica*, *Bolboschoenus glaucus*, *Polypogon demissus*, *Veronica anagallis-aquatica* and *V. oxycarpa*). Meadow species (*Trifolium pratense*, *T. repens*, *Ranunculus laetus*, *Poa pratensis*, *P. trivialis* and *Plantago lanceolata*) also contribute significantly to the association. Altogether, the plots of association in Tajikistan consist of 4 taxa (Fig. 5, Table 3).

24. *Calamagrostio pseudophragmitis–Typhetum minimae* Dihoru 1971 (Table 3, rel. 42–53)

Diagnostic species: *Typha minima*

Phytocoenoses dominated by *Typha minima* were noted relatively often all over the study area. The association was frequent in the submontane zones of the Zeravshan, Jagnob, Iskander-Daria, Pastrud-Daria, and Vaksh river valleys at altitudes of 1000–1450 m a.s.l. It prefers small and very shallow water bodies or develops on dry margins of alpine river beds. *Calamagrostio pseudophragmitis–Typhetum minimae* develops mainly on gravel sediments with low levels of humic substances, on alkaline substrates (pH 7.5 to 8.2; Fig. 5).

The association belongs to the richest in species among rush communities occurring in Tajikistan. On average, approximately 10 species, but occasionally more than 15, were found in the noted plots. A total of 58 taxa were registered in all relevés. The dominant and most constant was *Typha minima*; however, it did not reach a high mean cover (approx. 55%). Apart from the diagnostic species, several other Phragmito-Magno-Caricetea species attain a significant share: *Bolboschoenus glaucus*, *Carex diluta*, *Phragmites australis*, *Polypogon demissus*, *Typha laxmannii* and *Epilobium minutiflorum*. Among other taxa the highest constancies and abundancy characterized species related to riverbed vegetation, mainly from the Nerio-Tamaricetea class (e.g. *Calamagrostis pseudophragmites*, *Equisetum ramosissimum, Hippophäe rhamnoides*, *Saccharum spontaneum*). Additionally, meadow species contributed considerable cover, e.g. *Plantago major*, *P. lanceolata*, *Trifolium repens*, *T. pratense* and several others (Table 3).

25. *Caricetum songoricae* ass. nova (Table 4, rel. 1–6)
Typus relevé: Table 4, rel. 1

Diagnostic species: *Carex songorica*

Caricetum songoricae appears in Tajikistan sporadically, mainly in the subalpine zone at altitudes of approx. 1700–2400 m a.s.l. The association was found in the Funn Mts. in the upper sections of the Iskander-Daria and Pastrud-Daria river valleys. The phytocoenoses, dominated by *Carex songorica*, develop on alpine river banks or in oxbow lakes in close contact with peaty meadows or bogs. The researched plots were found in shallow (ca. 5 cm), alkaline (pH 7.3–8.3) waters, in peaty substrates with a significant content of organic substances (Fig. 5).

In comparison to other rush communities found in the study area, *Caricetum songoricae* is an association with a low number of species in a plot; on average, around 5 taxa were noted. The diagnostic species clearly predominates in the community, with a cover of around 35 to 60%. The group of species with a high constancy includes mainly rush species (e.g. *Phragmites australis*, *Mentha asiatica*, *Juncus brachytepalus* and *Glyceria notata*) and bog species (e.g. *Triglochin palustre* and *Blysmus compressus*). However, they had an inconsiderable share in the phytocoenoses.

26. *Caricetum ripariae* Máthé et Kovács 1959 (Table 4, rel. 7)

Diagnostic species: *Carex riparia*

The vegetation plot belonging to *Caricetum ripariae* was found only in one site in the upper part of the Surhob river valley at the altitude of ca. 1400 m a.s.l. This plot, dominated by *Carex riparia*, developed on the banks of an artificial pond used as a watering place for cattle. The association was found in alkaline (pH 7.8), shallow water (approx. 10 cm), in muddy soils.

Carex riparia dominates the phytocoenosis, but with a relatively low abundance (ca. 60%). It is accompanied by other species typical for rush communities, such as *Glyceria notata*, *Lycopus europaeus*, *Phragmites australis*, *Sium latifolium* and *Typha latifolia*.

Besides the above-mentioned associations, two additional communities of *Carex* species were noted within the surveyed area; however, the collected phytosociological evidence is not enough to classify them in a syntaxonomical system. Thus the communities of *Carex diluta* and *C. melanostachya* are given outside the rank system as communities.

Discussion

As one of the regions richest in flora in the world, Middle Asia would also be expected to have a significant number of rush species and relevant communities. However, the alpine landscape of Tajikistan does not promote the development of extensive rush vegetation. Still, the presence of numerous rivers, both in the mountains (Zeravshan, Jagnob, Vanch, Vaksh, Varzob and others) and in the lowlands (Pyandzh, Syr-Daria, Amu-Daria), creates favourable conditions for the development of typical communities of the class Phragmito-Magno-Caricetea in river valleys within small riverside zones.

Most of the syntaxa are clearly separated in correspondence analysis. The absence of powerful discrimination between some associations in the DCA (e.g. *Eleocharitetum uniglumis*, *Beruletum erectae*, *Cyperetum serotini*) is probably due to the relatively low number of species per relevé, closely related habitats, and, perhaps, to a low degree of fidelity of some rush or aquatic species. This is a widely accepted fact; although species of hygrophilous habitats display a certain degree of fidelity, different associations thriving in the same ponds are possible (Haslam, 1978; Wiegleb & Herr, 1985; Riis *et al*., 2000; Hatton-Ellis & Grieve, 2003; Gacia *et al*., 2009). Some communities represented by few relevés occupy clearly separated positions, e.g. *Caricetum ripariae*, *Scirpetum tabernaemontani*, or *Scirpetum triquetriformis*.

Due to the abundance and uniqueness of the flora in the study area, the research enabled 8 syntaxa new to science to be distinguished at the association rank. All these associations are well distinguished both in the area and on the DCA correspondence graph. The majority of newly-described associations belong to the so-called low rushes (*Eleocharitetum mitracarpae, Eleocharitetum argyrolepis, Juncetum brachytepali, Mentho asiaticae-Nasturtietum microphyllae*) or medium-sized rushes (*Scirpetum hippolytii, Sparganietum stoloniferi, Caricetum songoricae, Rorippo palustris-Alismatetum graminei*). All of them are composed of a characteristic set of species, usually dominated by the diagnostic taxa. Only in the case of *Mentho asiaticae-Nasturtietum microphyllae* was it decided that the association would be defined using 2 taxa to make a clear distinction between it and *Nasturtietum officinalis* (Seib. 1962, Oberd *et al*., 1967) as described for Central Europe (e.g. Matuszkiewicz, 2007; Pott, 1995; Schubert *et al*., 1995), which is also characterized by the presence of *Nasturtium microphyllum*. Nevertheless, Middle Asian patches of the Mentho asiaticae-Nasturtietum microphyllae association are distinctly separate. *Nasturtium microphyllum* is an absolute dominant here, with the absence of *N. officinale*. Middle Asian plots are also well distinguished thanks to taxa such as *Mentha asiatica*, *Epilobium minutiflorum* and *Veronica oxycarpa*, which occur in Europe either not at all or only sporadically.

Also, patches dominated by *Alisma gramineum* have been found at several locations in the area. The diagnosis of this association has been performed on the basis of Chytrý's study (2011), and it shows significant differences when compared with central European patches. Aquatic taxa are absent from Middle Asian plots, especially *Batrachium circinatum*, which is considered to be diagnostic. Considering the high stability and relatively high coverage of *Rorippa palustris*, a new association has been proposed.

Rush vegetation from the Phragmito-Magno-Caricetea class is scattered all over river valleys within the research areas. It occurs only sporadically within rice fields, where communities of the class Oryzetea sativae dominated. The main difference between these two vegetation types is related to the life form of the most abundant species. In rice fields, cultivation techniques cause the effective eradication of perennials, e.g. *Typha* species, regarded by farmers as nuisance weeds which could significantly limit crop yields. However, there are some exceptions. For instance, *Typhetum laxmannii* seems to be partially adapted to the rice field habitats. This association develops in places with temporarily significant fluctuations of water depth during the vegetation period, similar to the situation in Central Europe (e.g. Nedelcu, 1969; Popescu *et al*., 1969; Ot'ahel'ová *et al*., 2001; Šumberová *et al*., 2001; Chytrý & Rafajová, 2003 Hrivnák, 2004; Nobis *et al*., 2006). Thus *Typhetum laxmannii* can thrive both on rice field margins and in natural riverbank habitats.

Another association which has been observed within rice fields as well as in natural rush habitats is *Cyperetum serotini*. This community was sporadically found on marginal zones in paddy fields (Nowak *et al*., 2013). However, in all plots, the number and abundance of Phragmito-Magno-Caricetea species were relatively high (e.g. *Sparganium erectum*, *Scirpus tabernaemontani*, *S. triqueter*, *S. triquetriformis*, *Typha laxmannii*, *Glyceria notata*, *Bolboschoenus glaucus*, *Mentha asiatica* or *Lycopus europaeus*). There is also an apparent lack of Oryzetea sativae species within the researched plots of vegetation (eg. *Cyperus difformis*, *Scirpus planiculmis* or *Echinochloa oryzoides*). Following ordination analyses (Fig. 4) of species structure, the association was classified in the Phragmito-Magno-Caricetea class, rather than Oryzetea, despite the attitude presented by Sanda *et al.* (2008) and Koch (1954), who assumed *Cyperus* (*Juncellus*) *serotinus* to be a typical species of the class Oryzetea. A similar situation is observed in the case of *Leersietum oryzoidis*, in which the structure of patches is almost the same as in European patches of the association (e.g. Schubert *et al*., 1995; Pott, 1995; Pla, 2006; Matuszkiewicz, 2007; Stančić, 2007; Sanda *et al*., 2008; Chytrý, 2011).

The majority of the rush communities noted in Tajikistan have wider ranges. This regards not only associations whose main distribution area falls within the Circumboreal or Euro-Siberian provinces (e.g. *Phragmitetum australis*, *Typhetum latifoliae*, *Typhetum angustifoliae* and others), but also those which occur frequently in the Mediterranean and Irano-Turanian geobotanical provinces. A typical example is *Cyperetum longi*, which is known mainly from the eastern part of the Mediterranean area, from Italy (Brusa *et al*., 2006; Cianfaglione, 2009), Montenegro (Imeri *et al.,* 2010) and Croatia (Stančić, 2007). Everywhere the community is characterized by the predominance of *Cyperus longus*. In Middle Asia it reaches the eastern outskirts of the range, however, the floristic composition of the plots in comparison to European plots is very similar (Horvatić, 1934, 1939). Another example is the community of *Helosciadietum nodiflori*, which is not a typical rush community and which originates from the gravel riverbeds of the large alpine rivers of Middle Asia. The association was recorded in similar habitats from the Mediterranean region (Gradstein & Smittenberg, 1977; Ninot *et al*., 2000; Pla, 2006). However, in some cases the unique climatic conditions and extraordinary richness of flora cause significant differences between phytocoenoses known from Middle Asia and those from other regions of the world. This applies, for instance, to *Bolboschoenetum glauci*. In comparison to patches described from the Azov Sea region (Grechushkina *et al*., 2011), the Tajik communities comprise a higher number of species. This is perhaps due to the anthropogenic character of the habitat and the considerable share of ruderal and segetal species, e.g. *Cynodon dactylon, Echinochloa crus-galli*, *Setaria pumila*, *Cirsium incanum*, *Medicago ×varia*, *Solanum nigrum* or *Sorghum halepense*. Also, the floristic structure of *Scirpetum triqueteri* is considerably different. In contrast to patches in southern Europe, other taxa from the Phragmito-Magno-Caricetea class were not abundant here in comparison to the diagnostic species. This applies both to plots described as *Scirpetum triqueteri* Zonneveld 1955 (Bail & Lacroix, 2005; Djachenko, 2011) and to subassociation *Bolboschoenetum maritimi* Eggler 1933 or *Schoenoplectetosum triqueteri* Ştefan et Coldea 1997 (Sanda *et al*., 2008).

There is still a need to continue research on rush communities in the Middle Asia. Some of the above-mentioned syntaxa (e.g. *Calamagrostio pseudophragmitis–Typhetum minimae*, *Mentho asiaticae-Nasturtietum microphyllae* or *Rorippo palustris-Alismatetum graminei*) are significantly diversified in terms of floristical structure; hence, it seems that after collection of more data or enlargement of the survey area, it will be possible to describe new syntaxa of at least subassociation rank or to revise their syntaxonomical position. It is also supposed that several taxa known from Tajik's rush habitats could create associations; however, such associations were not found during the present research. It seems indispensable for the full recognition of the rush diversity of this region to carefully look for communities including e.g. *Typha australis*, *T. elephantina*, *Carex diluta*, *C. melanostachya* or *C. acutiformis*. Also, chorological analyses will be of great importance. Special research should be also conducted to determine the relationship between rush communities from the Phragmito-Magno-Caricetea and Oryzetea sativae classes. Within this topic the co-ocurrence of species from both classes, evolutionary perspective, succession sequences and geographical distribution patterns would seem to be most interesting.

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