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MONITORING REPORT
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DIVERSITY, DISTRIBUTION OF VEGETATION AND SUITABILITY FOR BREEDING OF THE AQUATIC WARBLER IN ŠYŠA POLDER

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The general overview of vegetation characteristic

In 2011, vegetation in Šyša polder was composed of 23 association communities and 2 rankless units – phytocenons. All communities belong to 7 vegetation classes.

The grasslands and wetlands. The communities of the *Phragmito-Magnocaricetea* class prevailed in Šyša polder, which distributed in the area of 567.62 ha. Among of them, the *Magnocaricion* alliance communities encompassed the largest area (543,48 ha). Dominant communities were distributed as follows: *Phalaridetum arundinaceae* (263.71 ha), *Caricetum gracilis* (211.88 ha) and *Caricetum distichae* (65.82 ha). These three communities occupied the area even of 541,41 ha. It tots up to 77.29 % of all investigated area of Šyša polder. The most widespread communities of the *Phalaridetum arundinaceae* grassland were formed on slightly more elevated areas than *Caricetum gracilis* in Šyša polder. Very often these communities, along with *Caricetum distichae* and *Caricetum gracilis*, comprised a complicated vegetation mosaic. The communities quickly react to intensive constant grazing, and as a result, they give a way to the *Rorripo-Agrostietum*, seldom – *Ranunculo-Alopecuretum geniculate* grassland. Under the influence of constant ecological conditions, reed canary grass tends to be overgrown in the area. *Caricetum distichae* comprises under the similar ecological conditions too. The succession process is observed in the occupied areas by these plant communities. Due to cessation of mowing or waterlogging of habitats, formation of the *Lysimachio-Filipenduletum vulgaris*, rarely – *Thelypterido-Phragmitetum* starts, therefore transitional variants such as *Caricetum distichae Filipendula vulgaris* facies (5.46 ha) and *Caricetum distichae Phragmites australis* facies (1.05 ha) are found there. The *Caricetum gracilis* grassland was distributed in the most waterlogged areas. It is the steadiest sedge phytocenosis in Šyša polder, therefore fluctuations are not so intense and frequent like with *Caricetum distichae*. The *Caricetum gracilis* phytocenosis, without having been mowed, remains stable for many years, if it is not overgrown by reeds. The *Caricetum gracilis Phragmites australis* facies were distinguished in the area of only 1.05 ha. Other communities belonging to the alliance of *Magnocaricion* (*Galio palustris-Caricetum ripariae*, *Thelypteridi-Phragmitetum* and *Iridetum pseudacori*) were distributed sporadically and none of them occupied a larger area than 1 ha.

The communities of *Phragmition australis* encompassed an area of 15.14 ha. These communities are formed in the wettest, and even in summer, inundated habitats by water. Amongst of them, *Glycerietum maximae* (13.01 ha) dominated and just a small plot was covered by *Phragmitetum australis* (2.13 ha).

The communities of the *Molinio-Arrhenatheretea* class covered the area of 98.86 ha. Among of them, *Rorippo-Agrostietum* grassland (31.87 ha) dominates and these communities are generally spread in north-eastern part of the territory. These communities have formed under the influence of assiduous grazing of the *Phalaridetum arundinaceae* grassland communities, therefore, these phytocenosis usually encompassed a large area creating a mosaic with the *Phalaridetum arundinaceae*. The *Lysamachio vulgaris-Filipenduletum* grassland covered the area of 20.23 ha, which was concentrated in south part of the territory. It is possible, that origin of communities is different. In the drier and less flooded plain of polder, these plant communities are formed of the *Caricetum distichae*, under the influence of cessation of mowing, because of *Carex disticha*, for the present, is an abundant component in phytocenosis of species composition. Moreover, *Caricetum distichae* often was found in a mosaic with the community of *Lysimachio vulgaris-Filipenduletum*. In damp habitats, these plant communities have formed from the *Caricetum gracilis* and *Phalaridetum arundinacea*, which became extinct under the influence of longer period floods than regular. A fairly large area was occupied by *Alpoecuretum pratensis* grassland (20.20 ha). It is a mowing mesophylous grassland meadow, which, due to excessive grazing, may give a way to *Deschampsietum cespitosae* grassland and in Šyša polder its occupied area was of 12.53 ha. Xeromesophylous grassland plant communities of the *Anthoxantho-Agrostietum* grassland (5.85 ha) are formed on the driest and highest level of non-flooded plains of polder, but for the mesophylous grassland plant communities of the *Festucetum pratensis* (3.59 ha) suitable area is where water regime sometimes fluctuates. In the *Festucetum*

pratensis phytocenosis abundantly grew *Scutellaria hastifolia*, which is listed in the Red Data Book of Lithuania. In wetter than *Alopecuretum pratensis* habitats, hygromesophylous grassland plant phytocenosis of the *Poo palustris-Alopecuretum pratensis* (4.27 ha) are formed. In the heavily-grazed areas, fragments of the *Ranunculo-Alopecuretum geniculati* (0.32 ha) along with *Rorippo-Agrostietum* are found.

Nitrophylous grassland plant communities of the *Galio-Urticetea* class covered the area of 22.16 ha. *Urtico-Calystegietum sepium* phytosenosis are concentrated in south part of the polder (12.44 ha). These plant communities have formed due to cessation of mowing of the *Lysimachio vulgaris-Filipenduletum* grassland or due to the overgrowing of the *Polygono-Bidentetum* phytocenosis by perennial plants. In the drier habitats near canal embankments or on them *Anthriscetum sylvestris* phytocenosis was distinguished (4.29 ha). Phytocenosis which are formed of alien species such as *Rumex confertus*, spread in west part of the territory (4.11 ha) as well as *Spirea alba* communities, which were formed by the alien species too − in south part (1.32 ha).

Nitrophylous grassland annual plant communities of the *Bidentetea tripartiti* were distinguished in the area of only 1,94 ha. Just one association of the *Polygono-Bidentetum* was described. These plant communities have formed in spring, under the influence of the saturation of the overgrowth of sedge. As a result, gross annual plants supplanted patches of bare soil.

The plant communities of the *Artemisietea vulgaris* are formed in two plots (total area 1.96 ha). One association of the *Convolvulo arvensis-Agropyretum repentis* was described in the neglected field.

The shrubs. The shrubs are distributed in the area of 7.94 ha and it tots up to 1.11 % of all investigated area of Šyša polder. The communities of *Salicetum triandro-viminalis* (7.61 ha) of the *Salicetea purupurea* class are generally distinguished near riverbanks. The communities belonging to the association of *Salicetum pentandro-cinereae* of the *Alnetea glutinosae* class were distinguished in waterlogged habitats (0.33 ha).

In 2013, vegetation in Šyša polder was composed of 24 association communities and 1 rankless unit – phytocenons. All communities belong to 6 vegetation classes. In 2013, the Cl. *Bidentetea tripartiti* plant communities from one vegetation class were not found. During the investigations, it was ascertained that plant communities belonging to Ass. *Poo palustris-Alopecuretum pratensis*, Ass. *Polygono-Bidentetum*, as well as one phytocenon – *Rumex confertus*, have vanished. New communities belonging to Ass. *Sparganio-Glycerietum fluitantis*, Ass. *Rorripo amphibiae-Sietum latifoliae* (due to a higher water level than normal) and Ass. *Artemisio-Tanacetetum* (due to absence of mowing) have been described in the territory of polder.

In 2013, *Phragmito-Magnocaricetea* class communities was dominant (covered 576.71 ha area). There plant communities of the alliance of *Magnocaricion* such as *Phalaridetum arundinaceae* (295.74 ha) and *Caricetum gracilis* (229.38 ha) predominated in polder. Areas covered by the *Caricetum distichae*, decreased in extent – from 65.82 ha to 9.40 ha. *Thelypteridi-Phragmitetum* coverage increased and encompassed the area of 1.70 ha. Other plant communities (*Galio palustris-Caricetum ripariae* and *Iridetum pseudacori*) from the *Magnocaricion* alliance are spread sporadically, and no one of them is distributed in the larger area than 1 ha.

The *Glycerietum maximae* community (covered area – 27.84 ha) belonging to All. *Phragmition australis* predominated in Šyša polder. Communities of Ass. *Sparganio-Glycerietum fluitantis* assosiation were newly described there (6.41 ha). Rather small plots were covered by the *Phragmitetum australis* (3.48 ha) and *Rorippo amphibiae-Sietum latifoliae* (0.46 ha) communties.

In polder, plant communities belonging the Cl. *Molinio-Arrhenatheretea* have been observed in area of 101.05 ha. Among of them, *Lysimachio vulgaris-Filipenduletum* (32.41 ha) and *Rorippo-Agrostietum* (26.87 ha) were as dominants. Rather large plots were covered by the *Alopecuretum pratensis* (20.07 ha). The *Deschampsietum cespitosae* plant community encampossed the area of 12.53 ha. Other coverages of meadow plant communities are:

Anthoxantho-Agrostietum (5.85 ha), *Festucetum pratensis* (3.00 ha), *Ranunculo-Alopecuretum geniculati* (0.32 ha). The phytocenosis of *Poo palustris-Alopecuretum pratensis* have vanished within polder.

Nitrophylous grassland plant communities of the *Galio-Urticetea* class covered the area of 13.17 ha. Phytocenosis of the *Urtico-Calystegietum sepium* (8,05 ha) predominated there. Within the territory, the plant communities of *Anthriscetum sylvestris* (3.80 ha) and *Spiraea alba* (1.32 ha) were not widely distributed. *Rumex confertus* communities vanished.

In polder, plant communities of two assosiations from Cl. *Artemisietea vulgaris* were described. *Convolvulo-Agropyretum repentis* phytocenosis covered the area of 0.88 ha and *Artemisio-Tanacatetum vulgaris* – 0.73 ha.

Coverage of scrubs (7.94 ha) is the same like in 2011.

2. Compendium of plant communities

ALNETEA GLUTINOSAE Braun-Blanquet et Tüxen 1943
- *Alnetalia glutinosae* Tüxen 1937
  - *Alnion glutinosae* (Malc. 1929) Meijer Drees 1936
    - *Salicetum pentandro-cinereae* (Almquist 1929) Passarge 1961

SALICETEA PURPUREAE Moor 1958
- *Salicetalia purpureae* Tüxen 1955
  - *Salicion albae* Tüxen 1955
    - *Salicetum triandro-viminalis* Lohmeyer 1952

MOLINIO-ARRHENATHERETEA ELATIORIS Tüxen 1937
- *Molinietalia caeruleae* Koch 1926
  - *Alopecurion pratensis* Passarge 1964
    - *Alopecuretum pratensis* (Regel 1925) Steffen 1931
    - *Poo palustris-Alopecuretum pratensis* Shelyag-Sosonnko et al., 1985
- *Arrhenatheretea elatioris* Pawłowski 1928
  - *Arrhenatherion elatioris* Luquet 1926
    - *Festucetum pratensis* Soó 1938
  - *Cynosurion cristati* Tüxen 1947
    - *Anthoxantho-Agrostietum tenuis* Sillinger 1933
- *Trifolio fragiferae-Agrostietalia stoloniferae* Tüxen 1970
  - *Agropyro-Rumicion crispi* Nordhagen 1940 em. Tüxen 1950
    - *Ranunculo-Alopecuretum geniculati* Tüxen 1937
    - *Rorippo-Agrostietum* (Moor 1958) Oberdofer et Th. Müller 1961
  - *Calthion palustris* Tüxen 1937
    - *Deschampsietum cespitosae* Horvatić 1930
    - *Lysimachio vulgaris-Filipenduletum* Balátová-Tuláčková 1978

PHRAGMITO-MAGNOCARICETEA Klika in Klika et Novák 1941
- *Phragmitetalia* Koch 1926
  - *Phragmition* Koch 1926
    - *Glycerietum maximae* Nowiński 1930
    - *Phragmitetum australis* Savič 1926
    - *Rorippo amphibiae-Sietum latifolii* (Philippi 1973) Passarge 1999
    - *Sparganio-Glycerietum fluitantis*
  - *Magnocaricion* Koch 1926
    - *Caricetum distichae* Nowiński 1927
    - *Caricetum distichae* Nowiński 1927 *Phragmites australis* facija
    - *Caricetum distichae* Nowiński 1927 *Lysimachia vulgaris* facija
    - *Caricetum gracilis* Savič 1926
    - *Caricetum gracilis* Savič 1926 *Phragmites australis* facija

Galio palustris-Caricetum ripariae Balátová-Tuláčková in Balátová-Tuláčková et al. 1993
Iridetum pseudacori Eggler 1933
Phalaridetum arundinaceae Libbert 1931
Thelypteridi-Phragmitetum Kuiper ex van Donselaar et al. 1961
ARTEMISIETEA VULGARIS Lohmeyer et al. ex von Rochow 1951
Onopordetalia acanthii Braun-Blanquet et Tüxen 1943
Onopordion acanthii Braun-Blanquet et al. 1936
Artemisio-Tanacetetum vulgaris Sissingh 1950
Agropyretalia intermedio-repentis (Oberd. et al. 1967) Müller et Görs 1969
Convolvulo-Agropyrion repentis Görs 1966
Convolvulo arvensis-Agropyretum repentis Felföldy 1943

GALIO-URTICETEA Passarge ex Kopecký 1969
Convolvuletalia sepium Tüxen 1950
Convolvulion sepium Tüxen 1947
Urtico-Calystegietum sepium Görs et Müller 1969
Spiraea alba bendrija
Glechometalia hederaceae Tüxen in Tüxen et Brun-Hool 1975
Aegopodion podagrariae Tüxen 1967
Anthriscetum sylvetris Hadač 1978
Rumex confertus bendrija

BIDENTETEA TRIPARTITI Tüxen et al. ex von Rochow 1951
Bidentetalia tripartiti Braun-Blanquet et Tüxen 1943
Bidention tripartiti Nordhagen ex Klika et Hadač 1944
Polygono-Bidentetum (Koch 1926) Lohmeyer 1950

3. The coverage of plant communities

Table 1

The covered area by plant communities in Šyša polder

	Plant community	**2011**		**2013**	
		Area, ha	**%**	**Area, ha**	**%**
1	*Ranunculo-Alopecuretum geniculati*	0.32	0.05	0.32	0.05
2	*Salicetum pentandro-cinereae*	0.33	0.05	0.33	0.05
3	*Galio palustris-Caricetum ripariae*	0.60	0.09	0.82	0.12
4	*Thelypteridi-Phragmitetum*	0.65	0.09	1.70	0.24
5	*Iridetum pseudacori*	0.82	0.12	0.82	0.12
	Caricetum distichae Phragmites australis facies	1.05	0.15	0.00	0.00
6	*Spiraea alba* community	1.32	0.19	1.32	0.19
7	*Convolvulo arvensis-Agropyretum repentis*	1.96	0.28	0.88	0.13
8	*Phragmitetum australis*	2.13	0.30	3.48	0.50
	Caricetum gracilis Phragmites australis facies	2.49	0.36	2.45	0.35
9	*Polygono-Bidentetum*	1.94	0.28	0.00	0.00
10	*Festucetum pratensis*	3.59	0.51	3.00	0.43
11	*Rumex confertus* community	4.11	0.59	0.00	0.00

12	*Poo palustris-Alopecuretum pratensis*	4.27	0.61	0.00	0.00
13	*Anthriscetum sylvestris*	4.29	0.61	3.80	0.54
	Caricetum distichae Lysimachia vulgaris facies	5.46	0.78	0.00	0.00
14	*Anthoxantho-Agrosietum tenuis*	5.85	0.84	5.85	0.84
15	*Salicetum triandro-viminalis*	7.61	1.09	7.61	1.09
16	*Deschampsietum caespitosae*	12.53	1.79	12.53	1.79
17	*Glycerietum maximae*	13.01	1.86	27.84	3.97
18	*Urtico-Calystegietum sepium*	12.44	1.78	8.05	1.15
19	*Alopecuretum pratensis*	20.20	2.88	20.07	2.87
20	*Lysimachio vulgaris-Filipenduletum*	20.23	2.89	32.41	4.63
21	*Rorippo-Agrostietum stoloniferae*	31.87	4.55	26.87	3.84
22	*Caricetum distichae*	65.82	9.40	7.61	1.09
23	*Caricetum gracilis*	211.88	30.25	229.38	32.75
24	*Phalaridetum arundinaceae*	263.71	37.65	295.74	42.22
25	*Rorippo amphibiae-Sietum latifoliae*	0.00	0.00	0.46	0.07
26	*Sparganio-Glycerietum fluitantis*	0.00	0.00	6.41	0.92
27	*Artemisio-Tanacetetum vulgaris*	0.00	0.00	0.73	0.10
	Total:	700.48	100.00	700.48	100.00

4. The coverage of vegetation classes

Table 2

The coverage of plant communities belonging to different vegetation classes in Šyša polder

Vegetation class	**2011**		**2013**	
	Area, ha	**%**	**Area, ha**	**%**
Alnetea glutinosae	0.33	0.05	0.33	0.05
Artemisietea vulgaris	1.96	0.28	1.61	0.23
Bidentetea tripartiti	1.94	0,28	0.00	0.00
Salicetea purpurea	7.61	1.09	7.61	1.09
Galio-Urticetea	22.16	3.16	13.17	1.88
Molinio-Arrhenatheretea	98.86	14.11	101.05	14.43
Phragmito-Magnocaricetea	567.62	81.03	576.71	82.33
Total:	700.48	100.00	700.48	100.00

5. Short characterizations of plant communities

Salicetum pentandro-cinereae

1. Physiognomy. Willow scrubs in marshy habitats are dominated by *Salix cinerea.* The canopy of scrubs is dense, therefore, the herbal layer is scarce.
2. Coverage of shrubs. Shrubs densely cover the plants community and its projection coverage is up to 100%.
3. Tussocks. No tussocks are observed.
4. Stability. The plants community is stable and has a characteristic species composition.

5. Variations of species composition. The plants community is found in just one area in Šyša polder, therefore the variations of species composition are not established.
6. Successions, reasons and tendency. The plants community has formed under the influence of cessation of mowing of sedges. Without mowing of sedges around a community it has a tendency to spread in the area. The *Salicetum pentandro cinereae* – stadial plants community and it is a stage in the succession to scrubs (usually invaded by *Betula pendula*) and then woodland community belonging to the *Carici elongatae-Alnetum* association.
7. Farming and intensity. No farming.
8. The key factors in the development of community. No land-use activities.
9. Vegetation changes. Plant communities' coverage and their species composition have not changed.

Salicetum triandro-viminalis

1. Physiognomy. The overgrowth of willow scrubs of flooded but not marshy riparian habitats where *Salix triandra* and *S. viminalis* dominate. Single trees grow in the community. The scrub canopy is dense, therefore herbal layer is scarce.
2. Coverage of shrubs. Shrubs densely cover the community and its projection coverage is up to 100 %.
3. Tussocks. No tussocks are observed.
4. Stability. The community is stable and has a characteristic species composition.
5. Variations of species composition. The community is rare in Šyša polder, therefore variations of species composition are not established.
6. Successions, reasons and tendency. The community usually has formed due to cessation of mowing of sedges and Reed canary grasses where, during tides, riverbanks are more inundated by water. Without mowing of sedges around a community it has a tendency to spread in the area. The *Salicetum triandro-viminalis* – stadial riverside community and it is a stage in the succession to scrubs (usually invaded by *Salix alba, S. fragilis*) and then a riparian woodland community belonging to the *Salicetum albo-fragilis* association.
7. Farming and intensity. No farming.
8. The key factors in the development of community. No land-use activities.
9. Vegetation changes. Plant communities have not altered.

Alopecuretum pratensis

1. Physiognomy. Meadow plant communities on the upper levels of the flood-plain of polder where *Alopecurus pratensis, Gallium mollugo, Veronica longifolia, Bromopsis inermis, Vicia cracca, Lathyrus pratensis* and *Rhinanthus minor* dominate. Hygrophytes are not observed, or occur just spontaneously.
2. Coverage of shrubs. No shrub layer.
3. Tussocks. No tussocks are observed.
4. Stability. The community is quite stable and has a characteristic species composition, but due to the insufficient mowing, nitrophites of the *Galio-Urticetea* class such as *Urtica dioica*, *Calystegia sepium*, *Galium rivale* begin to dominate or other species of *Magnocaricion* such as *Phalaroides arundinacea* and *Carex disticha* begin to grow there.
5. Variations of species composition. Sometimes plant communities with dominant species such as *Bromopsis inermis* and *Veronica longifolia* are found.
6. Successions, reasons and tendency. The plant communities on alluvial soils on the upper levels of the flood-plain of polders have formed under the influence of constant mowing. Because of absence of mowing, formation of *Urtico-Calystegietum* or *Lysimachio vulgaris-Filipenduletum* starts and *Phalaroides arundinacea* begins to dominate in the communities. Due to excessive grazing, *Deschampsietum cespitosae* or *Rorippo-Agrostietum* can be formed.
7. Farming and intensity. Some plots have been mowed in the area.
8. The key factors in the development of community. Mowing and poor flooding.

9. Vegetation changes. Plant communities slightly altered. In some plots abundant *Carex praecox* has vanished and abundance of *Galium boreale* has apparently diminished. Instead, plenty of new abundantly growing hygrophytes species such as *Glechoma hederacea, Ranunculus repens, Potentilla anserina. Rhinanthus minor* found their niche in these plant communities.

Poo palustris-Alopecuretum pratensis

1. Physiognomy. The community is very similar to the *Alopecuretum pratensis* community of the upper levels of the floodplain of polder where *Alopecurus pratensis, Veronica longifolia, Bromopsis inermis, Vicia cracca, Lathyrus pratensis, Achillea cartilaginea* and *Deschampsia cespitosa* dominate. The community can be distinguished from the *Alopecuretum pratensis* by the fact, that its habitats are damper and hygrophytes such as *Iris pseudacorus, Poa palustris, Galium uliginosusm,* and *Stellaria palustris* flourish there.
2. Coverage of shrubs. No shrub layer.
3. Tussocks. No tussocks are observed.
4. Stability. The community is quite stable and has a characteristic species composition, but owing to the absence of mowing, nitrophites of the *Galio-Urticetea* class such as *Urtica dioica, Calystegia sepium, Galium rivale, Rubus caesius* begin to dominate there too or other species of the *Magnocaricion* such as *Phalaroides arundinacea* begins to grow.
5. Variations of species composition. Sometimes communities are found where *Phalaroides arundinacea* along with *Alopecurus pratensis* dominates.
6. Successions, reasons and tendency. The communities on alluvial soils on the upper levels of the less floodplain of polder have formed under the influence of constant mowing. Because of absence of mowing, formation of *Urtico-Calystegietum* or *Phalaridetum arundinaceae* starts. Such a process is observed already in Šyša polder. Because of heavily grazing *Deschampsietum cespitosae* or *Rorippo-Agrostietum* grassland can be formed.
7. Farming and intensity. The area has not been mowed.
8. The key factors in the development of community. Mowing and poor flooding.
9. Vegetation changes. Plant communities have vanished and they are replaced by *Lysimachio vulgaris-Filipenduletum.*

Festucetum pratensis

1. Physiognomy. Mesophytic meadows are formed on much higher levels of flood-plain of polder not like *Alopecuretum pratensis* grassland. In phytocenosis *Galium mollugo, Carex praecox, Achillea millefolium, Alopecurus pratensis, Festuca pratensis, Galium boreale, Heracleum sibiricum, Veronica longifolia, Vicia cracca, Potentilla reptans* and *Rhinanthus minor* are dominants
2. Coverage of shrubs. No shrub layer.
3. Tussocks. No tussocks are observed.
4. Stability. The community is quite stable and has a characteristic species composition, but because of insufficient mowing, nitrophite of the *Galio-Urticetea* class such as *Galium rivale* begins to dominate there.
5. Variations of species composition. The communities are rare, therefore variations are not observed.
6. Successions, reasons and tendency. Communities on alluvial soils on much higher levels of the less flood-plain of polders have formed under the influence of constant mowing. During the time of investigations, invasion of *Galium rivale* was observed and because of insufficient mowing, formation of the *Urtico-Calystegietum* grassland may begin. Due to excessive grazing Deschampsietum cespitosae can be formed.
7. Farming and intensity. Extensive mowing.
8. The key factors in the development of community. Mowing and poor flooding.

9. Vegetation changes. Plant communities' area decreased in extant up to 0.59 ha. Alteration of communities' species composition has been observed. Species like *Carex praecox* and *Galium boreale* vanished. New species such as *Lathyrus pratensis, Glechoma hederacea, Lysimachia nummularia, Rhinanthus minor, ranunculus repens, Potentilla anserina* found their niche there.

Anthoxantho-Agrostietum tenuis

1. Physiognomy. Xeromesophylous grassland plant meadows are formed on the highest level of non-flooded plains of polder. In phytocenosis *Agrostis capillaris, Poa angustifolia, Achillea millefolium, Carex praecox, Galium album, Galium verum, Rumex thyrsiflorus, Sedum acre* and *Dianthus deltoides* dominate.
2. Coverage of shrubs. No shrub layer.
3. Tussocks. No tussocks are observed.
4. Stability. The community is quite stable and has a characteristic species composition.
5. Variations of species composition. Communities are found in small plots, therefore variations of species composition are not observed.
6. Successions, reasons and tendency. In principal, these communities thrive in dry pasture. In the event that the area is ungrazed, the possibility of succession is poor, because the communities are formed on poor sandy soil in the highest non-flooded plains of polder.
7. Farming and intensity. Grazing in some places.
8. The key factors in the development of community. Dry habitats and grazing.
9. Vegetation changes. Plant communities as well as their areas have not altered, except the fact, that *Glechoma hederacea* and *Berteroa incana* started to grow in it.

Ranunculo-Alopecuretum geniculati

1. Physiognomy. Tramped and scarce in species meadow communities on the flooded plain level of polder, which are formed of carpet and dwarfish plants where *Alopecurus geniculatus* dominates.
2. Coverage of shrubs. No shrub layer.
3. Tussocks. No tussocks are observed.
4. Stability. The stadial communities.
5. Variations of species composition. Not established.
6. Successions, reasons and tendency. These communities have come to replace *Phalaridetum arundinaceae,* due to excessive grazing in the area. After cessation of grazing, formation of *Phalaridetum arundinaceae* starts again.
7. Farming and intensity. Excessive grazing.
8. The key factors in the development of community. Excessive grazing.
9. Vegetation changes. Neither plant communities' species composition nor their coverage have changed.

Rorippo-Agrostietum

1. Physiognomy. Trampled and scarce in species meadow communities are found on the flooded plain level of polder, which are formed of carpet and dwarfish plants, and are very similar to the *Ranunculo-Alopecuretum geniculati* community but *Agrostis stolonifera* is more prevalent there.
2. Coverage of shrubs. No shrub layer.
3. Tussocks. No tussocks are observed.
4. Stability. The stadial communities.
5. Variations of species composition. Not established.
6. Successions, reasons and tendency. These communities have come to replace *Phalaridetum arundinaceae,* due to excessive grazing in east part of heavily grazed territory of Šyša polder. The communities encompass a large area comprising a mosaic

with *Phalaridetum arundinaceae*. After cessation of grazing, formation of the *Phalaridetum arundinaceae* community starts again.

7. Farming and intensity. Excessive grazing.
8. The key factors in the development of community. Excessive grazing.
9. Vegetation changes. Species such as *Lysimachia nummularia, Alopecurus pratensis, Rorippa sylvestris* vanished in these plant communities. Increase of species like *Leontodon autumnalis, Mentha arvensis, Rhinanthus minor* have been observed. The coverage of plant communites decreased by 5 ha.

Deschampsietum cespitosae

1. Physiognomy. Meadow communities of the mid or upper level of flood-plain of polder where *Deschampsia cespitosa, Mentha arvensis, Festuca rubra, Potentilla anserina, Ranunculus repens, Ranunculus acris, Lathyrus pratensis, Rumex acetosa, Glechoma hederacea* and *Stellaria palustris* are more prevalent there. Some hygrophytes such as *Iris pseudacorus* and *Phalaroides arundinacea* were found there.
2. Coverage of shrubs. No shrub layer.
3. Tussocks. The area is poor in tussocks, which are formed by *Deschampsia cespitosa.*
4. Stability. The key factor in the development of the community is regular grazing. These communities are stable and have a characteristic species composition, as long as a treatment of grazing is preceded. In heavily grazed areas grow species belonging to the *Bidentetea* class such as: *Persicaria hydropiper* and *Bidens tripartita.*
5. Variations of species composition. Some communities occur where *Cirsium arvense* grows abundantly.
6. Successions, reasons and tendency. The communities confined to areas where on alluvial soils of higher level of less flooded plain of polder traditional grazing of meadow has been applied. On referring to the literature, in reaches of Nemunas, due to changes in treatment practice (starting of excessive grazing) of the *Alopecuretum pratensis* grassland community, the *Deschampsietum cespitosae* grassland forms in a couple of years. Under the influence of cessation of grazing, formation of the *Lysimachio vulgaris-Filipenduletum* community may start but *Alopecuretum pratensis* replaces it, if intensive mowing will be applied there.
7. Farming and intensity. Grazing applied in some places.
8. The key factors in the development of community. Dry habitats and grazing.
9. Vegetation changes. There are no changes established.

Lysimachio vulgaris-Filipenduletum

1. Physiognomy. Meadow communities of the mid level of flood-plain of polder where *Lysimachia vulgaris* or *Filipendula ulmaria* dominates. These communities are rich in sedges such as: *Carex acuta* and especially *Carex disticha* and also *Phalaroides arundinacea* grows there.
2. Coverage of shrubs. The communities are not covered or slightly covered by shrubs.
3. Tussocks. No tussocks are observed.
4. Stability. The communities are stadial. A composition of species is mixed and often is rich in nitrophites especially *Calystegia sepium*. Most likely, the origin of communities is different. In the drier and less flooded plain of polder these communities are formed of *Caricetum distichae*, under the influence of cessation of mowing because of *Carex disticha,* and for now, is an abundant component in phytocenosis of species composition. Moreover, *Caricetum distichae* often tends to comprise a mosaic with the communities of *Lysimachio vulgaris-Filipenduletum*. In wet habitats these communities have formed from the *Caricetum gracilis* and *Phalaridetum arundinacea,* which became extinct, under the influence of longer floods than normal. This assumption has been confirmed also by the fact that in some plots of communities the abundance of *Carex acuta* and *Phalaroides arundinacea* is observed.

5. Variations of species composition. *Lysimachia vulgaris* (mostly) or *Filipendula ulmaria* dominates.
6. Successions, reasons and tendency. The communities have formed under the influence of cessation of mowing of the *Caricetum distichae* community in drier habitats or due to the saturation of *Phalaridetum arundinacea* or *Caricetum gracilis* phytocenosis in more soggy habitats. Because of absence of mowing, formation of *Urtico-Calystegietum*, which comprises a mosaic with *Lysimachio vulgaris-Filipenduletum*, starts and the community can be invaded by shrubs. It's possible that as a consequence of constant mowing, communities of sedge regenerate.
7. Farming and intensity. No farming.
8. The key factors in the development of community. Cessation of mowing and waterlogging.
9. Vegetation changes. Coverage of plant communities increased even by 12.18 ha. Due to floods, which were longer than normal, part of these communities have succeeded from the *Polygono-Bidentetum, Caricetum distichae Lysimachia vulgaris* facies and *Poo palustris-Alopecuretum pratensis*. In previously identificated and still present plant communities' plots, significant species' composition changes have not been established.

Glycerietum maximae

1. Physiognomy. The overgrowth of *Glyceria maxima* monodominats.
2. Coverage of shrubs. No shrub layer.
3. Tussocks. No tussocks.
4. Stability. Under the constant hydrological conditions, communities are quite stable.
5. Variations of species composition. In some plots *Carex acuta* flourishes.
6. Successions, reasons and tendency. The communities are formed in the wettest habitats of polder replacing *Caricetum gracilis.* In literature it is noted that due to water level, variations of that kind are constant there. *Caricetum gracilis* regenerates in the same habitat again after it becomes drier.
7. Farming and intensity. No farming.
8. The key factors in the development of community. Waterlogging of habitats.
9. Vegetation changes. Essential species composition changes have not been established, but phytocenosis coverage increased more than double in the area.

Phragmitetum australis

1. Physiognomy. The overgrowth of *Pragmites australis* monodominats.
2. Coverage of shrubs. No shrub layer.
3. Tussocks. No tussocks.
4. Stability. Under the constant conditions communities are stable and expand in area very quickly.
5. Variations of species composition. No variations.
6. Successions, reasons and tendency. In various areas communities are formed in the wettest and waterlogged habitats of polder and have come to replace sedges and Reed canary grasses (*Caricetum gracilis, Caricetum distichae, Phalaridetum arundinaceae*) because of absence of farming. A constant mowing would give opportunity for communities of sedge or Reed canary grass to regenerate.
7. Farming and intensity. No farming.
8. The key factors in the development of community. Mowing had been abandoned and partly – flooding of habitats.
9. Vegetation changes. Alterations have not been established, but plant communities' coverage increased in extent.

Rorripo amphibiae-Sietum latifolii

1. Physiognomy. The overgrowth of *Sium latifolium* monodominats.
2. Coverage of shrubs. No shrub layer.

3. Tussocks. No tussocks.
4. Stability. Unknown.
5. Variations of species composition. No variations.
6. Successions, reasons and tendency. Phytocenosis have formed instead of saturated *Caricetum distichae* plant community. Further successional ways are unknown.
7. Farming and intensity. No land use activities.
8. The key factors in the development of community. Waterlogging of habitats during springtides.
9. Vegetation changes. Phytocenosis are ascertained just in 2013.

Sparganio-Glycerietum fluitantis

1. Physiognomy. The overgrowth of *Glyceria fluitans* monodominats.
2. Coverage of shrubs. No shrub layer.
3. Tussocks. No tussocks.
4. Stability. These plant communities are usually short-lived.
5. Variations of species composition. No variations.
6. Successions, reasons and tendency. In polder, these plant communities have formed under the influence of sudden waterlogging of habitats by replacing the grazed *Rorripo-Agrostietum stoloniferae* plant community. Influenced by abating of water level and changing of grazing to mowing, sedge overgrowths and reedbeds should be formed there.
7. Farming and intensity. No land use activities.
8. The key factors in the development of community. Sudden waterlogging of habitats.
9. Vegetation changes. Phytocenosis are ascertained just in 2013.

Caricetum distichae

1. Physiognomy. The overgrowth of *Carex disticha* monodominats.
2. Coverage of shrubs. No shrub layer.
3. Tussocks. No tussocks are observed.
4. Stability. Under the constant hydrological and farming conditions, communities are stable but due to insufficient mowing or waterlogged of habitats, formation of *Lysimachio-Filipenduletum vulgaris*, rarely – *Thelypterido-Phragmitetum* starts. On the other hand, these communities are noticeably less stable than *Caricetum gracilis.* According to composition of communities of dominant species and peculiarities of vegetation mosaic, the decline of plots of the *Caricetum distihae* in Šyša polder is observed. Often *Carex disticha* remains as an abundant component of *Caricetum gracilis* and *Phalaridetum arundinaceae,* whereas *Caricetum distichae* is found in mosaic herbal layer surrounded by these two communities.
5. Variations of species composition. Two facies are described: *Caricetum distichae* and *Lysimachia vulgaris*. *Lysimachia vulgaris* begins to dominate in the communities, which have not been mowed. It's a transitional stage leading to *Lysimachio vulgaris-Filipenduletum*, however not much of meadow species are counted. Physiognomy changes intensively of these communities, therefore visually it can be taken as *Lysimachio vulgaris-Filipenduletum. Caricetum distichae* and *Phragmites australis facies. Pragmites australis* prevails in the areas, which have not been mowed too.
6. Successions, reasons and tendency. The widespread communities are formed on slightly more elevated ground than *Caricetum gracilis* in Šyša polder. Fluctuations steadily proceed under the influence of inconstant hydrological conditions i.e. *Caricetum gracilis* have formed under the influence of water balance after heavy inundation of water, but in drier seasons it withers and steps aside for *Caricetum distichae.* Very often these two communities along with *Phalaroides arundinacea* comprise a very complicated vegetation mosaic. The fluctuations previously mentioned in the lower reaches of Nemunas are described in old literature. Succession initiation proceeds differently due to cessation of mowing of plant communities or the saturation during abnormal long inundation of water. In the first case, *Lysimachia vulgaris* grassland begins to dominate in

the community and formation of *Lysimachio vulgaris-Filipenduletum* starts. In other cases the trend of succession is different – due to saturation of the *Caricetum distichae* community, in bare soil plots formation of the communities of the *Bedentetea* class annual plants starts and later it gives away to the communities such as: *Lysimachio vulgaris-Filipenduletum* and *Urtico-Calystegietum sepium*.

7. Farming and intensity. Some plots have been mowed.
8. The key factors in the development of community. The fluctuation of hydrological regime and mowing.
9. Vegetation changes. In polder habitats, due to prelonged springtides than normal, the drastic decrease of plant communities' coverage is observed there (from 65.82 ha to 7.61 ha). In many plots, *Caricetum distichae* phytocenosis have been replaced by the *Phalaridetum arundinaceae,* and in some areas – by the *Lysimachio vulgaris-Filipenduletum, Caricetum gracilis* and *Glycerietum maximae.* The *Caricetum distichae Lysimahia vulgaris* facies phytocenosis have transformed to the *Lysimachio vulgaris-Filipenduletum*, whereas, the *Caricetum distichae Phragmites australis* facies – to the *Thelypteridi-Phragmitetum*. The changes have also been established in the previously observed phytocenosis species composition – *Carex acuta* and *Phalaroides arundinacea* significantly increased in the plant communities. In the *Carex disticha* communities plenty of *Sium latifolium* and *Oenanthe aquatica* cenopopulations have found their niche.

Caricetum gracilis

1. Physiognomy. The overgrowth of *Carex acuta* monodominats.
2. Coverage of shrubs. No shrub layer.
3. Tussocks. No tussocks.
4. Stability. Like *Caricetum distichae*, under the influence of constant hydrological and farming conditions, communities are stable, but in plots which have been waterlogged for extensive periods of time, these communities are changed to *Lysimachio-Filipenduletum vulgaris* and in plots, which have not been mowed for a long time – *Thelypteridо-Phragmitetum*. However, these fluctuations are not frequent and intense like *Caricetum distichae* because of *Caricetum gracilis* is one of the most stable sedge communities in Šyša polder. This is determined by the competitive ability of *Carex acuta* and its ability to form dense overgrowth, where, under the influence of inconstant environmental conditions, plants of other separate species hardly penetrate through and grow singly. *Caricetum gracilis* phytocenosis, without having been mowed, remains stable for many years if it is not overgrown by reeds.
5. Variations of species composition. The Facies of *Caricetum gracilis* and *Phragmites australis* are described.
6. Successions, reasons and tendency. The widespread communities are formed on lower and wetter areas than *Caricetum distichae* or *Phalaridetum arundinaceae* in Šyša polder. Fluctuations steadily proceed under the influence of inconstant hydrological conditions i.e. in drier seasons *Caricetum gracilis* withers and steps aside for *Caricetum distichae* but after abnormal long inundation of water, the formation of *Caricetum gracilis* starts again. Very often both communities along with *Phalaroides arundinacea* comprise a very complicated vegetation mosaic. The fluctuations previously mentioned in the lower reaches of Nemunas are described in old literature. The succession initiation proceeds differently under the influence of cessation of mowing of the communities or the saturation during abnormal long inundation of water. In the first case, *Lysimachia vulgaris* begins to dominate in the community and formation of *Lysimachio vulgaris-Filipenduletum* phytocenosis starts and abundant rogue *Carex acuta* is observed there. In other cases, the trend of succession is different – due to saturation of the *Caricetum gracilis* community, in bare soil plots formation of the communities of the *Bidentetea* class annual plants starts and later it gives away to the communities such as: *Lysimachio vulgaris-Filipenduletum* and *Urtico-Calystegietum sepium*.
7. Farming and intensity. Some plots have been mowed.

8. The key factors in the development of community. The fluctuation of hydrological regime and mowing.
9. Vegetation changes. Alterations of the plant communities' species composition are insignificant, but they indicate the wetting of habitats. In phytocenosis *Sium latifolium, Oenanthe aquatica, Lemna minor* and *Spirodela polyrrhiza* are recorded. *Carex disticha* has vanished. Plant communities plots expanded (from 211.88 ha to 229.38 ha).

Galio palustris-Caricetum ripariae

1. Physiognomy. The overgrowths of monodominat *Carex riparia* are distributed in small areas.
2. Coverage of shrubs. No shrub layer.
3. Tussocks. No tussocks are observed.
4. Stability. These communities are stable under the influence of constant hydrological and farming conditions.
5. Variations of species composition. Variations are not established because of communities are rare and occupy small areas.
6. Successions, reasons and tendency. The communities are distributed in wetter or similar to *Caricetum gracilis* habitats. In Šyša polder they occupy a small area, therefore it is not very significant in vegetation mosaic.
7. Farming and intensity. No farming.
8. The key factors in the development of community. Not established.
9. Vegetation changes. Changes are insignificant.

Iridetum pseudacori

1. Physiognomy. The overgrowth of monodominat *Iris pseudacorus* is found just in one plot.
2. Coverage of shrubs. No shrub layer.
3. Tussocks. No tussocks are observed.
4. Stability. The communities are stable under the influence of constant hydrological and farming conditions.
5. Variations of species composition. Variations are not established because only one plot of the community is found.
6. Successions, reasons and tendency. The communities are distributed in damper or similar to *Caricetum gracilis* habitats. In Šyša polder they occupy a small area, therefore it is not very significant in vegetation mosaic.
7. Farming and intensity. Grazing and mowing.
8. The key factors in the development of community. Not established.
9. Vegetation changes. Not established.

Phalaridetum arundinaceae

1. Physiognomy. Overgrowth of monodominat *Phalaroides arundinacea.*
2. Coverage of shrubs. No shrub layer.
3. Tussocks. No tussocks are observed.
4. Stability. The communities are stable under the influence of constant hydrological and farming conditions, however the formation of *Lysimachio-Filipenduletum* vulgaris starts, due to the saturation of habitat in some plots but this process is not very intensive in Šyša polder.
5. Variations of species composition. The composition of species is uniform. *Phalaroides arundinacea* is a species of high competitive ability, which forms a dense and high herbal layer and it's strong rootstocks are intertwined in the soil table, therefore separate species cannot thrive there and as a result, overgrowth of Reed canary grass can expand easily in the area by rivalling tracery communities of *Caricetum distichae.*
6. Successions, reasons and tendency. The widespread communities are formed on slightly more elevated areas than *Caicetum gracilis* in Šyša polder. Very often these communities

along with *Caricetum distichae* and *Caricetum gracilis* comprise a very complicated vegetation mosaic. The communities quickly react to intensive regular grazing and as a result, they rather quickly give away to *Rorripo-Agrostietum*, seldom – *Ranunculo-Alopecuretum geniculati*. Under the influence of constant ecological conditions, Reed canary grass tends to expand in the area.

7. Farming and intensity. Some parts of area have been mowed and grazed.
8. The key factors in the development of community. Seasonal inundation of water, stability of ecological conditions and party – mowing.
9. Vegetation changes. The changes of species' composition in plant community are very similar to other plant communities from the *Magnocaricion* alliance: species, which are of poor tolerance to waterlogging, have vanished (especially *Carex disticha*) and hygrophytes (*Oenanthe aquatica, Sium latifolium, Carex acuta, Lythrum salicaria*) have come to replace them. Coverage of these plant communities expanded (from 263.71 ha to 195.74) because of vanishing of some flooded phytocenosis of the *Caricetum distichae,* which has been replaced by the *Phalaridetum arundinacea.*

Thelypteridi-Phragmitetum

1. Physiognomy. The overgrowth of monodominant *Phragmites australis* with an abundant mixture of sedge.
2. Coverage of shrubs. No shrub layer.
3. Tussocks. No tussocks are observed.
4. Stability. The communities are stable and quickly spread under the influence of steady conditions.
5. Variations of species composition. No variations are observed.
6. Successions, reasons and tendency. The communities have formed on slightly more elevated levels of polder than *Phragmitetum australis*, under the influence of absence of farming, replacing overgrowth of sedge and Reed canary grass (*Caricetum gracilis, Caricetum distichae, Phalaridetum arundinaceae*). Due to regular mowing, the overgrowth of sedge and reed canary grass has a tendency to regenerate.
7. Farming and intensity. No farming.
8. The key factors in the development of community. Cessation of mowing.
9. Vegetation changes. Not established.

Artemisio-Tanacetetum vulgaris

1. Physiognomy. The plant communities, which are formed on dry hills where *Tanacetum vulgare* attains abundancy.
2. Coverage of shrubs. Plant communities are not covered by shrubs.
3. Tussocks. There are no tussocks.
4. Stability. Stadial plant communities.
5. Variations of species composition. Variations are not established.
6. Successions, reasons and tendency. These plant communities have formed in dry and unmown meadows by replacing *Festucetum pratensis* phytocenosis. Influenced by mowing, it's possible, that *Festicetum pratensis* will regenerate there again.
7. Farming and intensity. There are no farming activities.
8. The key factors in the development of community. Not mowing.
9. Vegetation changes. These plant communities have been distinguished just in 2013.

Convolvulo arvensis-Agropyretum repentis

1. Physiognomy. The various stadial communities of the unbroken soils are formed on small hills of polder where *Elytrigia repens* dominates.
2. Coverage of shrubs. No shrub layer.
3. Tussocks. No tussocks are observed.
4. Stability. The stadial communities of the unbroken soil. The composition of species is different.
5. Variations of species composition. Variation of species composition is observed.

6. Successions, reasons and tendency. The communities are formed on the abandoned fields. According to habitats' conditions, the formation of the *Anthoxantho-Agrostietum* or *Festucetum pratensis* phytocenosis starts.
7. Farming and intensity. No farming.
8. The key factors in the development of community. Field cultivation.
9. Vegetation changes. These phytocenosis have been replaced by the *Urtico-Calystegietum sepium*, during the last two years.

Urtico-Calystegietum sepium

1. Physiognomy. Phytocenosis of high nitrophils are formed on the mid waterlogged floodplain of polder where *Calystegia sepium* prevails and also sedges grow abundantly (*Carex acuta, C. disticha, C. cespitosa*) and species such as: *Phalaroides arundinacea, Iris pseudacorus, Alopecurus pratensis, Rubus caesius* flourish there.
2. Coverage of shrubs. The plant communities are not covered or slightly covered by shrubs.
3. Tussocks. No tussocks are observed.
4. Stability. These plant communities are stadial and their species composition is not uniform. Often occurs as mosaics with the *Lysimachio vulgaris-Filipenduletum* communities and, more likely, they are succeeded of these phytocenosis.
5. Variations of species composition. Phytocenosis of similar species composition.
6. Successions, reasons and tendency. The communities have formed under the influence of cessation of mowing of the *Lysimachio vulgaris-Filipenduletum* or due to the overgrowing of *Polygono-Bidentetum* phytocenosis by perennial plants.
7. Farming and intensity. No farming.
8. The key factors in the development of community. Cessation of mowing and saturation of plant.
9. Vegetation changes. Considerable plant communities' changes have been established. Firstly, some part of the *Urtico-Calystegietum sepium* phytocenosis, which were formed in slightly wetter habitats, have vanished and been replaced by the *Phalaridetum arundinacea* and in some places – by the *Lysimachio vulgaris-Filipenduletum.* Secondly, the plant communities of the *Polygono-Bidentetum* and *Rumex confertus*, which thrived in less reached habitats by springtides, have vanished because of waterlogging, and therefore, they have been replaced by the *Urtico-Calystegietum sepium* phytocenosis. There, in survived *Urtico-Calystegietum sepium* phytocenosis, alterations of the species' composition and their abundance have been determined. *Galeopsis tetrahit*, which grew rather abundantly, has vanished, also, abundance decreased of *Calystegia sepium.* Cenopopulations of *Pahalorides arundinacea, Lysimachia vulgaris* and *Deschampsia caespitose* increased. Previously not described species such as *Poa trivialis* and *Carex acuta* took roots in the plant communities rather abundantly.

***Spiraea alba* community**

1. Physiognomy. The dwarfish scrub communities where alien species *Spirea alba* dominates.
2. Coverage of shrubs. Dwarfish shrub communities.
3. Tussocks. No tussocks are observed.
4. Stability. The communities are dense and distributed in large area, therefore they are stable.
5. Variations of species composition. No variations are observed.
6. Successions, reasons and tendency. The communities have formed under the influence of *Spirea alba* occupation of the area and cessation of mowing of the *Lysimachio vulgaris-Filipenduletum* or *Urtico-Calystegietum* grassland. Due to the suspension of mowing, shrubs have a tendency to expand in the area.
7. Farming and intensity. No farming.
8. The key factors in the development of community. Cessation of mowing.
9. Vegetation changes. There are no changes established.

Anthriscetum sylvestris

1. Physiognomy. Phytocenosis of high nitrophils are formed in area, which is not flooded, usually near canals and *Anthriscus sylvestris* dominates there.
2. Coverage of shrubs. No shrub layer.
3. Tussocks. No tussocks are observed.
4. Stability. Stadial communities.
5. Variations of species composition. Phytocenosis of similar species composition.
6. Successions, reasons and tendency. The communities have formed under the influence of cessation of mowing in artificial habitats near canals. Trends of succession are vague.
7. Farming and intensity. No farming.
8. The key factors in the development of community. Formation of canal embankment and cessation of mowing.
9. Vegetation changes. Alteration has been identified in the species' composition of the plant communities. Cenopopulation of *Antriscus sylvestris* became much more abunadant.

***Rumex confertus* community**

1. Physiognomy. Phytocenosis of high nitrophils are formed on the mid waterlogged floodplain of polder where alien species *Rumex confertus* is a dominant.
2. Coverage of shrubs. No shrub layer.
3. Tussocks. No tussocks are observed.
4. Stability. Stadial communities.
5. Variations of species composition. Phytocenosis of similar species composition.
6. Successions, reasons and tendency. The communities have formed under the influence of cessation of mowing of communities of *Alopecuretum pratensis* and occupation of the alien species *Rumex confertus*. Under the influence of constant mowing, *Alopecuretum pratensis* phytocenosis may regenerate.
7. Farming and intensity. No farming.
8. The key factors in the development of community. Cessation of mowing and waterlogged.
9. Vegetation changes. These plant communities have vanished and been replaced by the *Urtico-Calystegietum sepium* phytocenosis.

Polygono-Bidentetum

1. Physiognomy. *Polygono-Bidentetum* phytocenosis of annual nitrophils are formed on the mid waterlogged floodplain of polder where such species as: *Bidens tripartita, Atriplex prostrata, Persicaria* sp. dominate.
2. Coverage of shrubs. No shrub layer.
3. Tussocks. No tussocks are observed.
4. Stability. Communities are of short-term.
5. Variations of species composition. Phytocenosis of similar species composition.
6. Successions, reasons and tendency. The *Polygono-Bidentetum* community has formed in spring, under the influence of the saturation of the overgrowth of sedge. As a result, bare soil patches were supplanted by gross annual plants. Due to the steady conditions, these communities develop into *Urtico-Calystegietum*, but *Polygono-Bidentetum* phytocenosis will regenerate after heavy inundation of water, and saturation of vegetation.
7. Farming and intensity. No farming.
8. The key factors in the development of community. Cessation of mowing and waterlogged.
9. Vegetation changes. These plant communities have vanished and been replaced by the *Urtico-Calystegietum sepium* and *Lysimachio vulgaris-Filipenduletum* phytocenosis.

Fig. 1. *Phalaridetum arundinaceae* (LT03-2), Šyša Polder: A – in 2011, B – in 2013

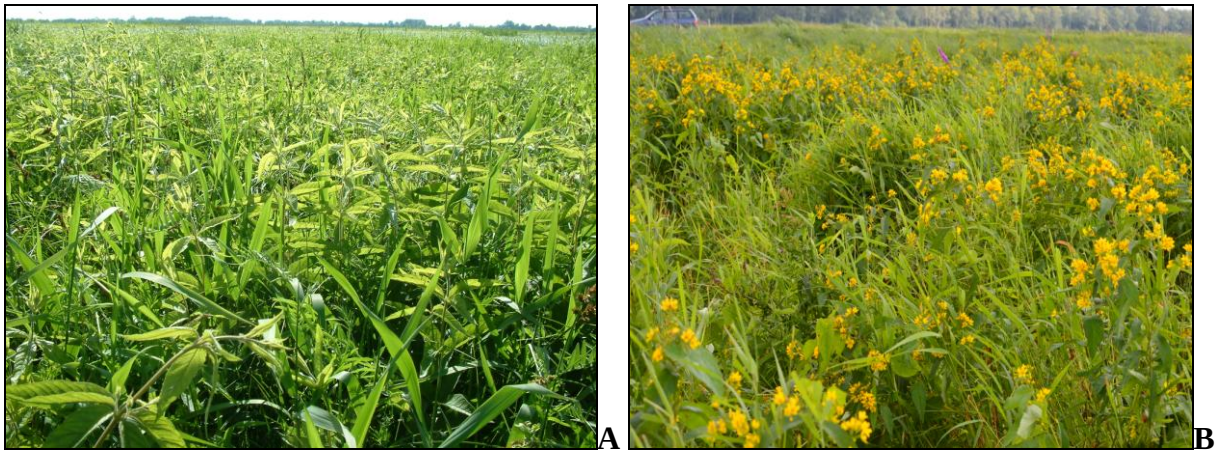

Fig. 2. *Phalaridetum arundinaceae* (LT03-16), Šyša Polder: A – in 2011, B – in 2013

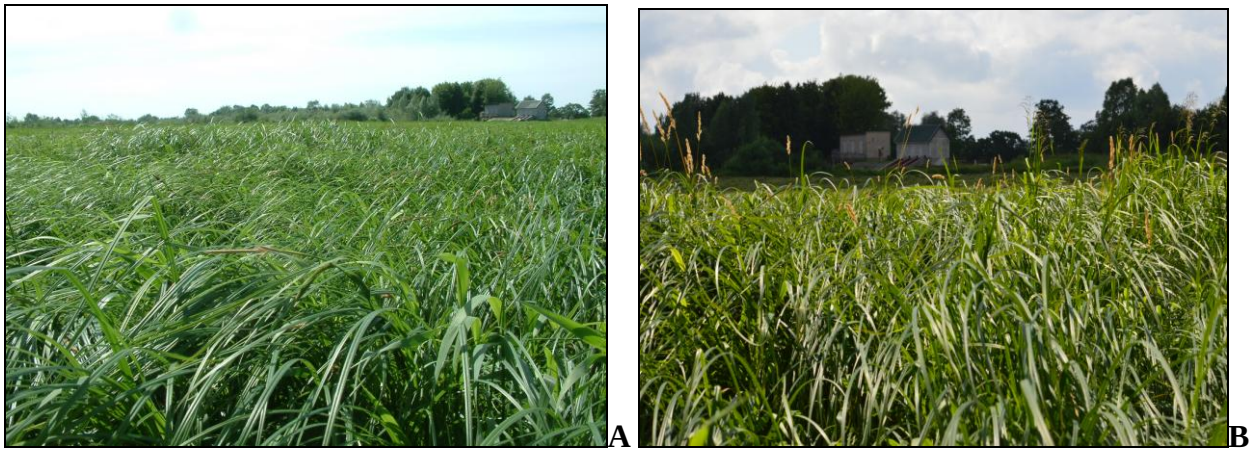

Fig. 3. *Caricetum gracilis* (LT03-2), Šyša Polder: A – in 2011, B – in 2013

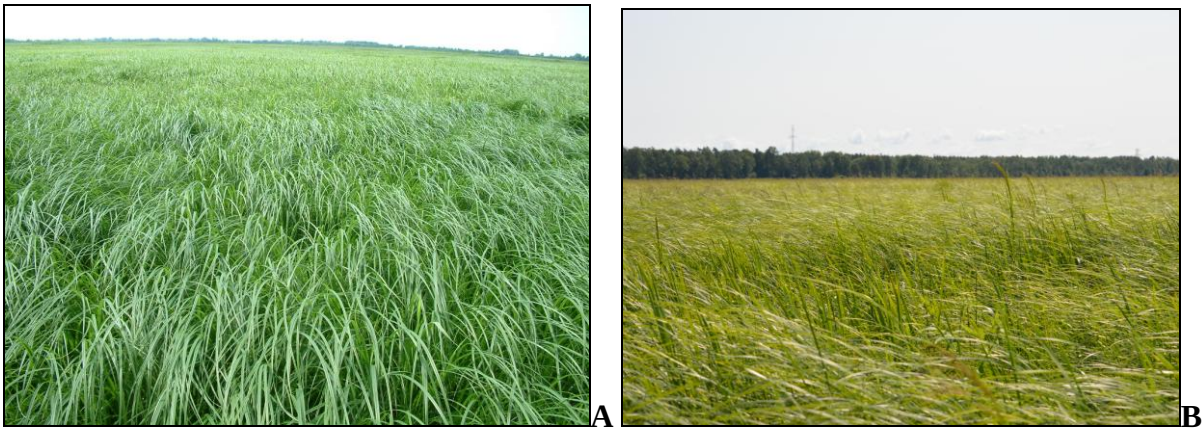

Fig. 4. *Caricetum gracilis* (LT03-8), Šyša Polder: A – in 2011, B – in 2013

Fig. 5. *Caricetum distichae* (LT03-4), Šyša Polder: A – in 2011, B – in 2013

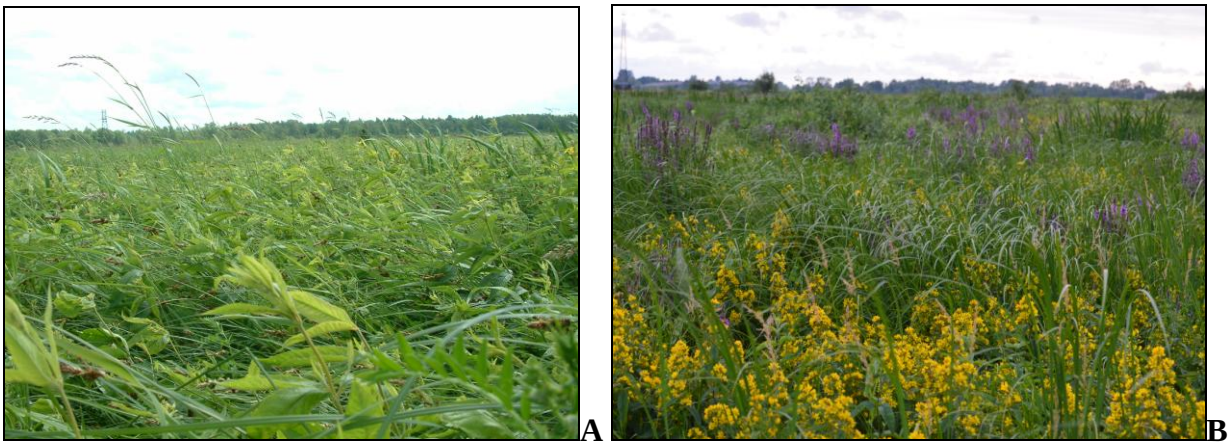

Fig. 6. *Caricetum distichae Lysimachia vulgaris* facies (LT03-41), Šyša Polder: A – in 2011, B – in 2013

6. Suitable plant communities for the Aquatic Warbler

The Aquatic Warbler (*Acrocephalus paludicola*) population locations of singing males and breeding sites are concentrated in three sites: in south, western and north-western and northern parts of polder.

In south part of the territory, Aquatic Warbler occurs only in the *Caricetum gracilis* communities (24.93 ha; 23 and 38 contours on the map).

In western and north-western parts of the territory, Aquatic Warbler is found in the area of 109.68 ha. In this part of the territory it occurs where *Phalaridetum arundinaceae* communities dominate (92 and 119 contours) or where these communities comprise a vegetation

mosaic along with *Caricetum distichae* (115 and 118 contours) or *Caricetum gracilis* and *Caricetum distichae* (121 and 123 contours), or *Caricetum gracilis*, *Caricetum distichae* and *Glycerietum maximae* (94 and 96 contours). The Aquatic Warbler also occurs in the *Caricetum gracilis* communities (116 contour) or in sites where small patches of the *Phalaridetum arundinaceae* community are interrupted among *Caricetum gracilis* (120 contour) or where *Phalaridetum arundianaceae, Caricetum distichae* and *Glycerietum maximae* are confined to the area (122 contour).

The Aquatic Warbler, in northern part, generally occurs in the community of *Phalaridetum arundinaceae* comprising a vegetation mosaic along with *Caricetum gracilis* (155 contour) or *Caricetum gracilis* with small patches of the *Caricetum distichae* (146 contour). A bird also occurs in the *Caricetum gracilis* communities with patches of the *Phlaridetum arundinaceae* and *Caricetum distichae* (154 contour).

The results suggest that Aquatic Warbler confines to the areas where numerous plant communities of the *Phalaridetum arundinaceae* or *Caricetum gracilis* prevail in Šyša polder. In these areas, very often (but not necessary) interruptions of the *Caricetum distichae* community and rather rarely – community of *Glycerietum maximae* are observed.

7. Suitable parts of the territory for the Aquatic Warbler breeding

As it was noticed, the Aquatic Warbler population locations of singing males and breeding sites are concentrated in three sites: in south, western and north-western and northern parts of polder. More suitable breeding sites for Aquatic Warbler can be distinguished especially in western part of the territory where *Phalaridetum arundinaceae* and *Caricetum gracilis* with patches of *Caricetum distichae* dominate (25, 35, 36, 40, 41, 42, 59, 67, 69, 76, 78, 82, 86, 87, 93, 97, 101, 103, 104, 108, 113 and 114 contours). In 75, 98, 99, 102 and 111 contours *Caricetum distichae* is a dominant (40–70 % of vegetation area), *Caricetum gracilis* and *Phalaridetum arundinaceae* comprise a mosaic but there are no data collected if Aquatic Warbler prefers this type of vegetation composition for breeding because in Šyša polder neither singing birds nor nests were found in those areas where *Caricetum distichae* prevails.

More suitable vegetation plots for a bird breeding can be distinguished in eastern part of the polder too (2, 5, 9, 123, 126, 143, 147, 148, 153, 158, and 161 contours).

Very similar vegetation prevails and in south-western part of the polder, but neither singing birds nor nests were observed. The communities of the *Phalaridetum arundinaceae* and *Caricetum gracilis*, with favourable interruptions of other communities, are located in 165 and 166 contours. The communities of the *Caricetum gracilis* comprise a vegetation mosaic along with *Caricetum distichae* and *Phalaridetum arundinaceae* and dominate in 170 and 171 contours too, but a mixture of *Caricetum distichae* is greater than normal in these plots and it occupies 30–40 % of contours plot.

Rather typical vegetation structure is observed and in 169 contour but with a fairly larger mixture of the *Glycerietum maximae* (up to 30 %).

8. Not suitable (or still enough suitable but with unfavourable trends of succession) plant communities for the Aquatic Warbler and reasons of unfavourable successions

The plant communities belonging to the *Molinio-Arrhenatheretea, Artemisietea vulgaris, Galio-Urticetea* class are not suitable for the Aquatic Warbler because of they are formed on less flooded of mid damp or absolutely non-flooded and drier habitats. Thus, the management of these communities' areas, in order to save a bird, is not of primary importance.

However, there no data collected on formation trends of the *Lysimachio vulgaris-Filipenduletum, Urtico-Calystegietum, Polygono-Bidentetum, Spiraea alba* communities after being grazed. These communities, like *Caricetum distichae*, are distributed in habitats of the similar damp. As it was discussed before, characteristic of different associations or phytocenons show that just a part of the *Lysimachio vulgaris-Filipenduletum* communities on drier and less flooded plain of the habitat have formed from *Caricetum distichae*, under the influence of

cessation of mowing. Thus, very likely, that due to initiation of mowing, the regeneration of the overgrowth sedge may start. The *Spirea alba* communities have formed under the influence of invasive plant *Spirea alba* occupation of the area and cessation of mowing of the *Lysimachio vulgaris-Filipenduletum* or *Urtico-Calystegietum* grassland, therefore the regeneration of sedge communities is very likely too. The *Urtico-Calystegietum* and *Polygono-Bidentetum* communities have formed under the influence of the saturation of the overgrowth of sedge during longer floods than normal, therefore the affection of mowing to succession to other grassland type is unknown.

The origin of *Rorippo-Agrostietum* community is different. This community has come to replace *Phalaridetum arundinaceae* phytocenosis, due to excessive grazing, therefore after cessation of grazing, without doubt, it will regenerate, and very likely, it becomes suitable for the Aquatic Warbler. During the investigations, even in remained fragments of the *Phalaridetum arundinaceae*, which comprise vegetation mosaic with the *Rorippo-Agrostietum*, the Aquatic Warbler was not observed.

The Aquatic Warbler also was not observed in most communities of the *Phragmito-Magnocaricetea* class such as *Phragmitetum australis, Galio palustris-Caricetum ripariae, Iridetum pseudacori, Thelypterido-Phragmitetum.* The occupied areas by these communities are small and have no significant meaning in forming the landscape of polder. The mowing treatment is resulting only in the communities dominated by *Phragmites australis* species (*Phragmitetum australis, Thelypterido-Phragmitetum*), believing, that preferable sedge communities for the Aquatic Warbler breeding will regenerate.

It is most likely, that Aquatic Warbler prefers *Caricetum distichae, Phragmites australis* and *Lysimachia vulgaris* facies and *Caricetum gracilis Phragmites australis* facies communities, therefore they require to be mowed immediately.

9. Recommendations on management of the territory forming suitable plant communities for the Aquatic Warbler

The communities have been formed under the influence of environmental and man-induced factors in common. The key environmental factors, which determined the distribution of vegetation are soil nutrients, and especially, the regime of damp. If we take into account that the term of spring tides partly depends on pumping station work intensiveness, and then we can treat it that the flooding factor is partly of man-induced origin. Other important anthropogenic factors are mowing and grazing. Mowing is a very important factor in the maintenance of plant communities, whereas grazing is important factor in changing of plant communities.

Thus, in order to form suitable plant communities for the Aquatic Warbler in Šyša polder, attention must be paid to the intensity of grazing and mowing and favourable term of flooding in the south part of the polder.

In the territory of the polder it is necessary to cut out shrubs, scrub's sprouts must be eliminated at least for 3–5 years according to the intensity of pullulating, otherwise, after two years, scrubs will regenerate and form a denser canopy.

The assiduous mowing must be started immediately in the area where *Caricetum distichae Phragmites australis* and *Lysimachia vulgaris* facies and *Caricetum gracilis Phragmites australis* facies communities are confined, therefore these plant communities are potentially suitable sites for the breeding of the Aquatic Warbler. We offer to mow the first grass, as well as its aftermath in the area where these plant communities are distributed and at the same time to observe the trends of succession.

Intensive mowing (two times per year) is required in the areas where *Phragmitetum australis* and *Thelypterido-Phragmitetum* communities are distinguished and the trends of succession must be observed too.

In the areas, where communities of *Lysimachio vulgaris-Filipenduletum, Urtico-Calystegietum, Polygono-Bidentetum, Spiraea alba* are distributed, the excessive mowing must be started and stages of succession observed (two times per year). If, after three years, the larger

invasion of sedges will not be observed in these areas, the intensiveness of mowing must be declined to one time per year.

The plant communities of *Phalaridetum arundinaceae, Caricetum gracilis* and *Caricetum distichae* or their comprised mosaic with *Glycerietum maximae*, require extensive mowing (not more often than two times per year).

The branches, scrub sprouts and hay must be taken away from the territory of polder.

In order to avoid further extension of the *Rorippo-Agrostietum* communities in the area and being in anticipation of regeneration of the *Phalaridetum arundinaceae* community, the grazing must be changed to extensive mowing (every two years).

In other areas occupied by plant communities belonging to the *Molinio-Arrhenatheretea* class, the extensive mowing or grazing can be applied.

However, the widespread community of the *Alopecuretum pratensis* can give away and turn to the uncharacteristic *Deschampsietum cespitosae* grassland, under the influence of initiation of intensive mowing, so some parts of typical polder landscape can be changed.

10. Vegetation changes 2011–2013

Since 2011, when vegetation monitoring has been started, until the summer of 2013, significant changes occurred in vegetation mosaic in Šyša polder. Changes were influenced by prolonged floods, which resulted in higher than normal water level. Alteration of vegetation is very significant in southern part of the polder, where water lied stagnant until the 12th of July 2013, and it is a month longer than usual.

The changes have been observed not just in separate plant communities' plots sizes and their contours, but also in plant communities' composition and all structure of vegetation. Making review of all vegetation classes, we can say, that *Phragmito-Magnocaricetea* remained as dominant and widespread plant community. By the way, occupied areas by the phytocenosis of this vegetation class have expanded in extent insignificantly (567.62 ha up to 576.71 ha), but in different plant communities of the *Phragmito-Magnocaricetea* class, noticeably changes are observed in plots' sizes and species composition. Firstly, drastic decrease of the *Caricetum distichae* plots has been determined (from 65.82 ha to 7.61 ha). This plant community is the most important for the Aquatic Warbler. Plant communities of this association have been replaced by the *Phalaridetum arundinaceae* and *Caricetum gracilis* − their plots increased (from 263.71 ha up to 295.74 and from 211.88 ha to 229.38 ha). Moreover, larger separate plots of the *Caricetum distichae* have vanished; plant communities of this association occur just in small patches along with *Phalaridetum arundinaceae* and *Caricetum gracilis.* In these plant communities, previously not observed uncharacteristic helophytes species such as *Sium latifolium, Oenanthe aquatic* occurred there. Sooner, *Carex disticha* grew rather abundantly in the *Phalaridetum arundinaceae* phytocenosis, but now it has vanished in many plots. Another association of the same class, which plant communities' plots increased noticeably – *Glycerietum maximae* (from 13.01 ha up to 27.84 ha).

Plots of the plant communities from the *Molinio-Arrhenatheretea* class (from 98.7 ha up to 101.1) expanded in extent as well. Expansion of these plots is resulted by the vanishing of the *Caricetum distichae* plant communities, and especially by the *Caricetum distichae Lysimachia vulgaris* facies, which phytocenosis have not survived. They have been replaced by the overgrowths of the *Lysimachio vulgaris-Filipenduletum* association communities (plots coverage increased from 20.23 ha up to 32.41). These vegetation changes, which occurred in two years, clearly reflect tendencies in habitats wetting and waterlogging and they are not influenced by absence or presence of farming activities.

Since 2011, two plant communities from the associations – *Poo palustris-Alopecuretum pratensis* and *Polygono-Bidentetum* have vanished. Also three associations' plant communities have been described: *Sparganio-Glycerietum fluitantis, Rorippo amphibiae-Sietum latifoliae* (due to a higher water level than normal) and *Artemisio-Tanacetetum* (influenced by absence of mowing).