# Ecological Status of Durowskie Lake

## Macrophytes

**Łukasz Styperek**

**Marta Męczekalska**

**Yang Yu**

**Iyan Robiansyah**

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# Introduction

# Durowskie Lake

- Durowskie Lake is post-glacial water body. The lake is elongated in north-south direction.


Ryc 1.- Demonstrative map of Durowskie Lake

# Catchment area

- The kind of catchment area has got really significantly influence on the water area. Near the Durowskie Lake, we can observe two types of catchment:

- afforested catchment
- urbanised catchment

# Comparing two types of catchment

# About the Durowskie Lake

- The Durowskie Lake is ranged into the grup of pollution lakes.The lake is used for tourism and fishing purposes.

**Ryc. 2- The example of algal blooms.**

**Przykład zakwitu glonów.**

# Methods

# Macrophytes

- A **macrophyte** is an aquatic plant that grows in or near water and is either emergent, submerged, or floating. In lakes macrophytes provide refugium for fish and substrate for aquatic invertebrates, produce oxygen, and act as food for some fish and wildlife.

# Data that were recorded

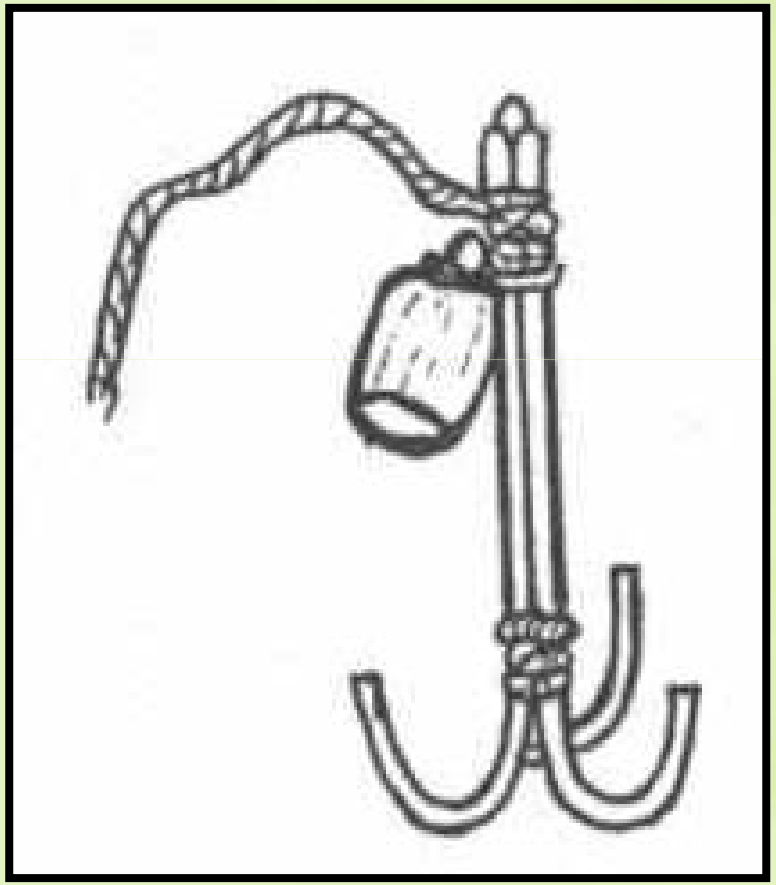
- A species composition with coverage for each species in Braun Blanquet scale
- Geographical position
- Maximum water depth of each patch
- Maximum distance from the shore
- Length and width of each patch

# The equipment

- The Geographical position was localized by GPS GARMIN Vista. The results has been elaborated in **Google Earth** software.


Ryc 3.- exemplary GPS of Garmin brand

# The equipment



- Maximum water depth was measured by special anchor. It be used also to sampling the submerget plants.

# The parameters

- Vegetation coverage classes according to Braun-Blanquet (1928)

**Braun Blanquet scale**

| Code | Coverage (%) |
|---|---|
| + | <1 |
| 1 | 1-10 |
| 2 | 10-25 |
| 3 | 25-50 |
| 4 | 50-75 |
| 5 | >75 |

# The parameters

- **ESMI index** which has been developed in Poland in order to estimate the ecological status of lakes to comply with the European Water Framework Directive.

| Ecological status of lake<br>Stan ekologiczny jeziora | Value of ESMI index<br>Wartości indeksu ESMI |
|---|---|
| Very good (class I)<br>Bardzo dobry (klasa I) | 0,680-1,000 |
| Good (class II)<br>Dobry (klasa II) | 0,340-0,679 |
| moderate (class III)<br>Średni (klasa III) | 0,170-0,339 |
| Poor (class IV)<br>Słaby (klasa IV) | 0,090-0,169 |
| Bad (class V)<br>Zły (klasa V) | <0,090 |

# The parameters

- **MIR -** the index used to evaluate ecological conditions for the river reaches is the Macrophyte Index for Rivers.

| Ecological status<br>Status ekologiczny | Sandy and organic rivers<br>Piaszczyste i organiczne rzeki |
|---|---|
| very good<br>bardzo dobry | ≥44,5 |
| good<br>dobry | (44,5-35,0> |
| moderate<br>średni | (35,0-25,4> |
| poor<br>słaby | (25,4-15,8> |
| bad<br>zły | <15,8 |

# Results and Discussion

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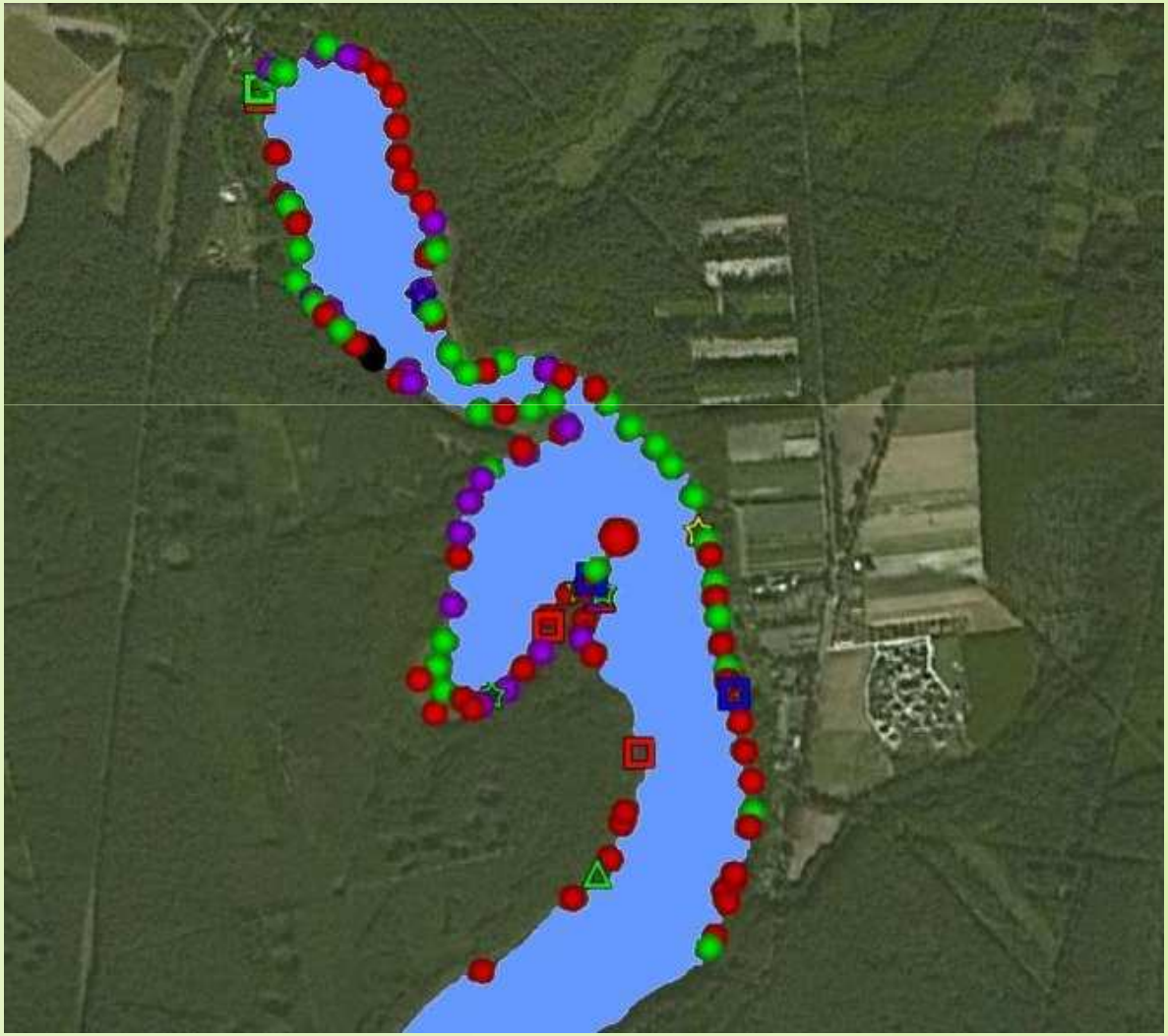
In 2010 we observed 17 various associations.

Three associations expressly dominate:

- ***Phragmitetum communis***
- ***Typhetum angustifoliae***
- ***Nupharo-Nymphaeetum albae***

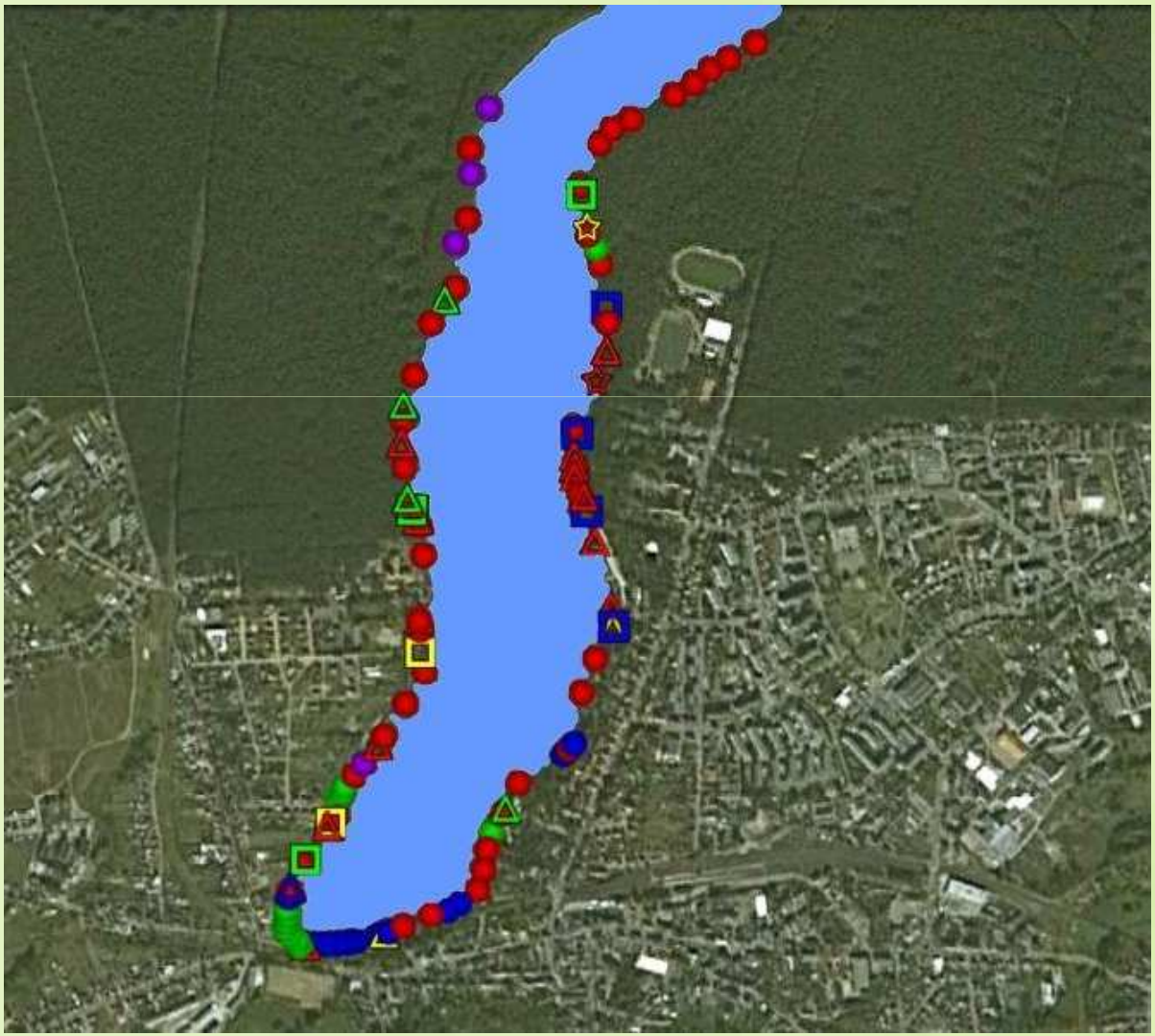
# The map of macrophytes associations

**North side**

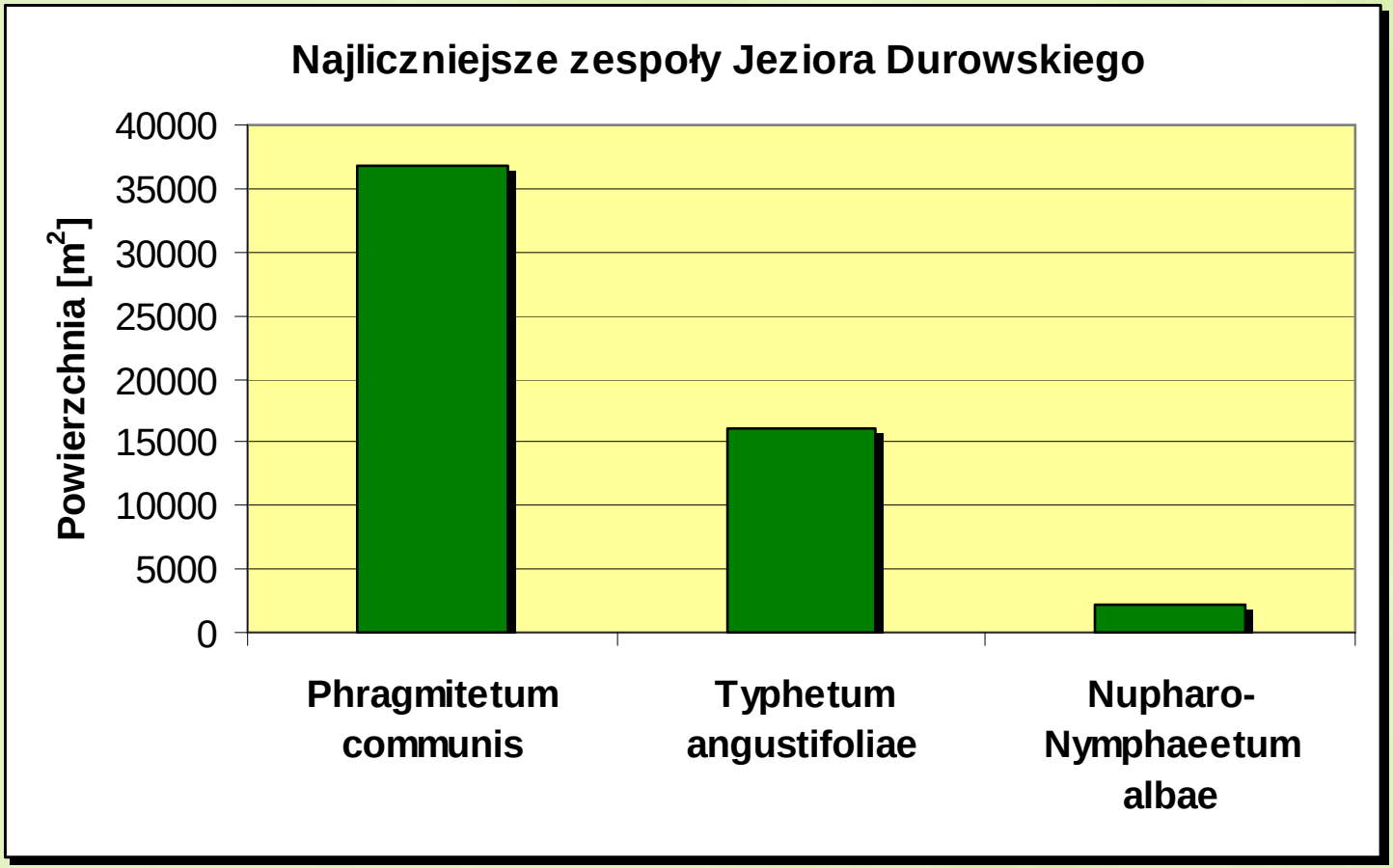


# The map of macrophytes associations

**South side**



# The dominant associations



# The discriptions of dominant associations

The most frequently observed association in Durowskie Lake **(62%)** is *Phragmitetum communis*.

This association is the most popular in eutrofic lakes

# The discriptions of dominant associations

The second association is ***Typhetum angustifoliae*** **(27,25%).**

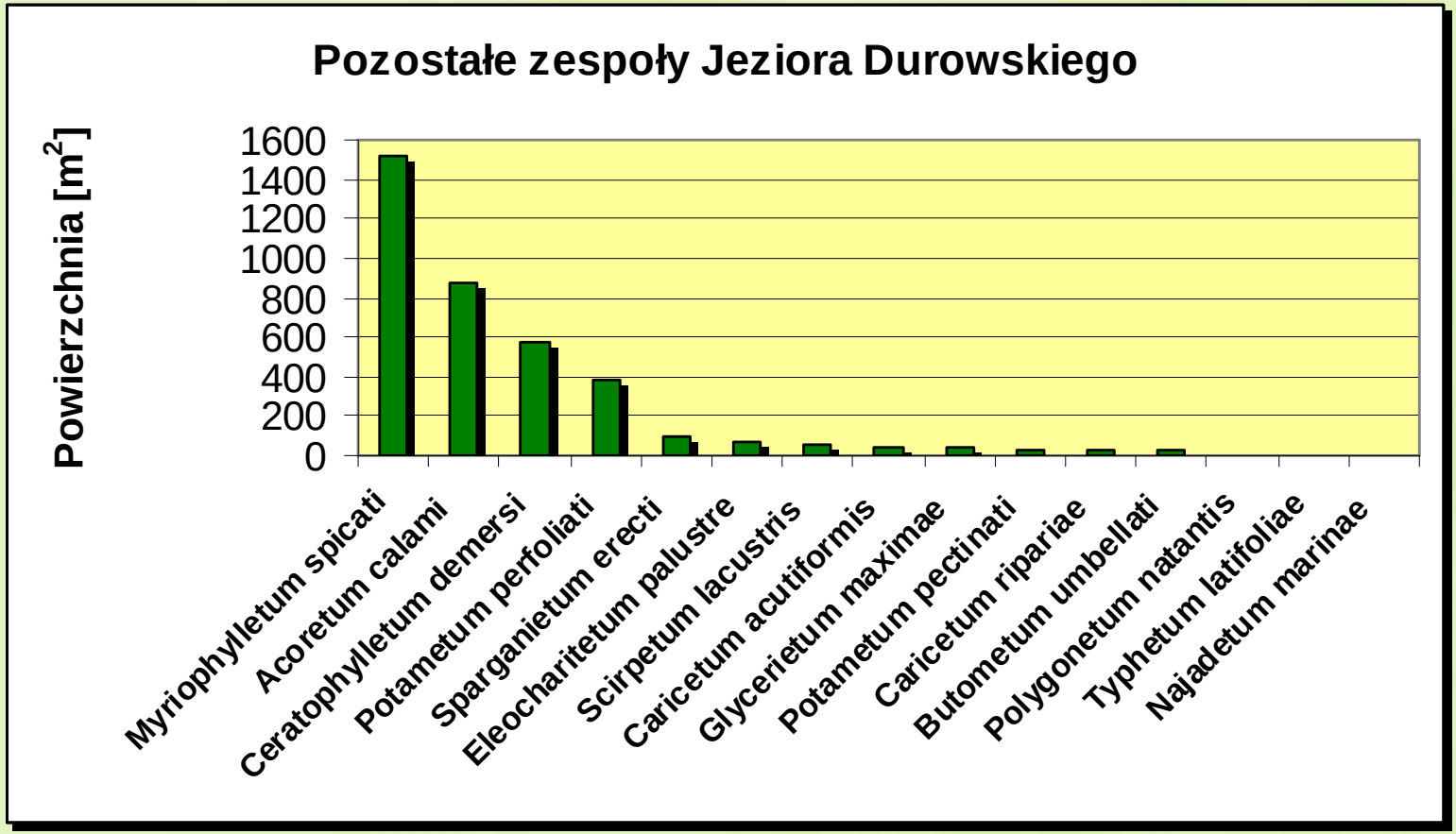
This association is observed in stagnant water bodies or in slow flowed rivers

# The discriptions of dominant associations

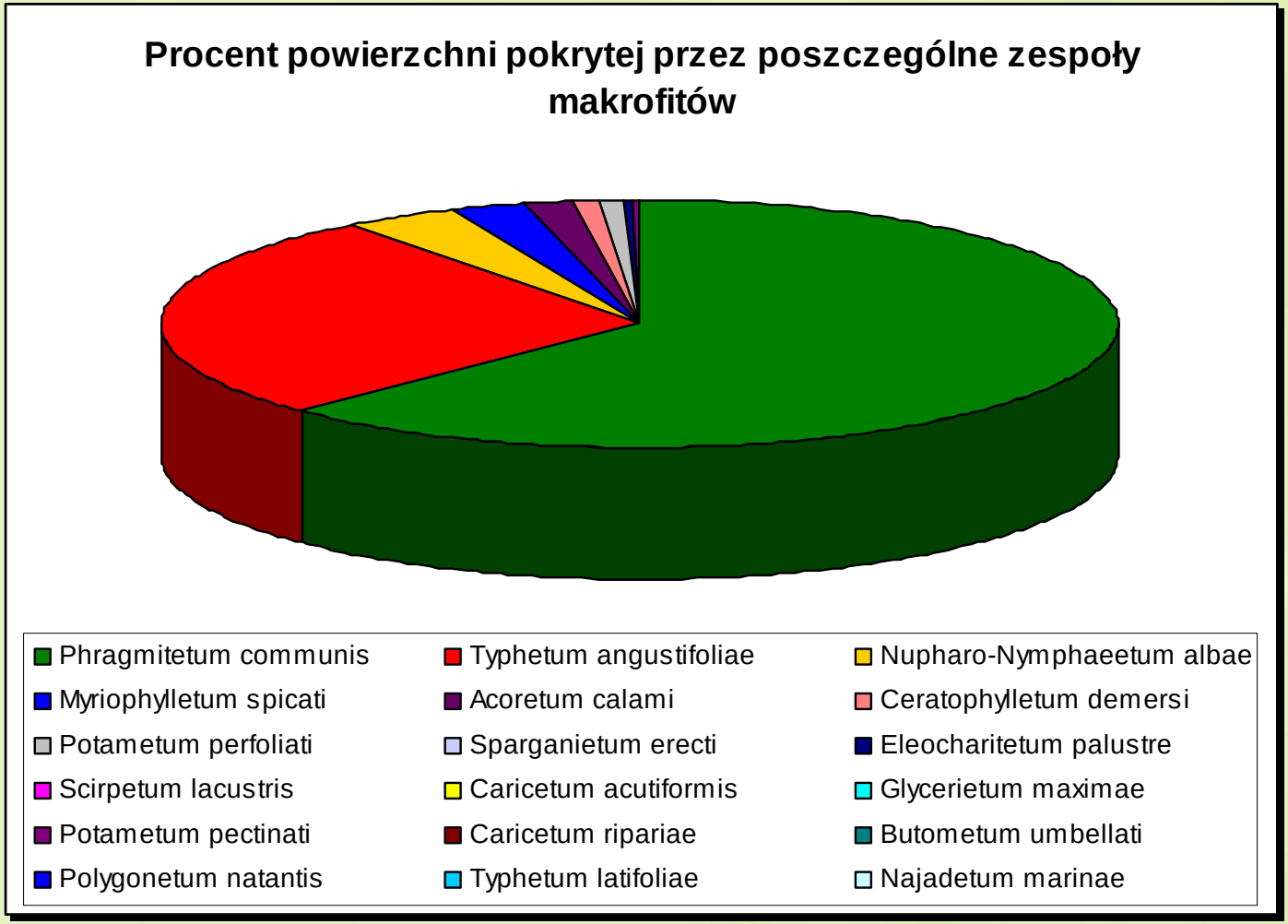
The last dominant association is ***Nupharo-Nymphaeetum albae*** **(3,92%).**

The main species of this macrophyte group are the aquatic plants with floating leafs - ***Nuphar lutea*** **and** ***Nymphaea alba*****.**

# Rest of the associations of Durowskie Lake



# Percentage share of all associations



# The discription of associations

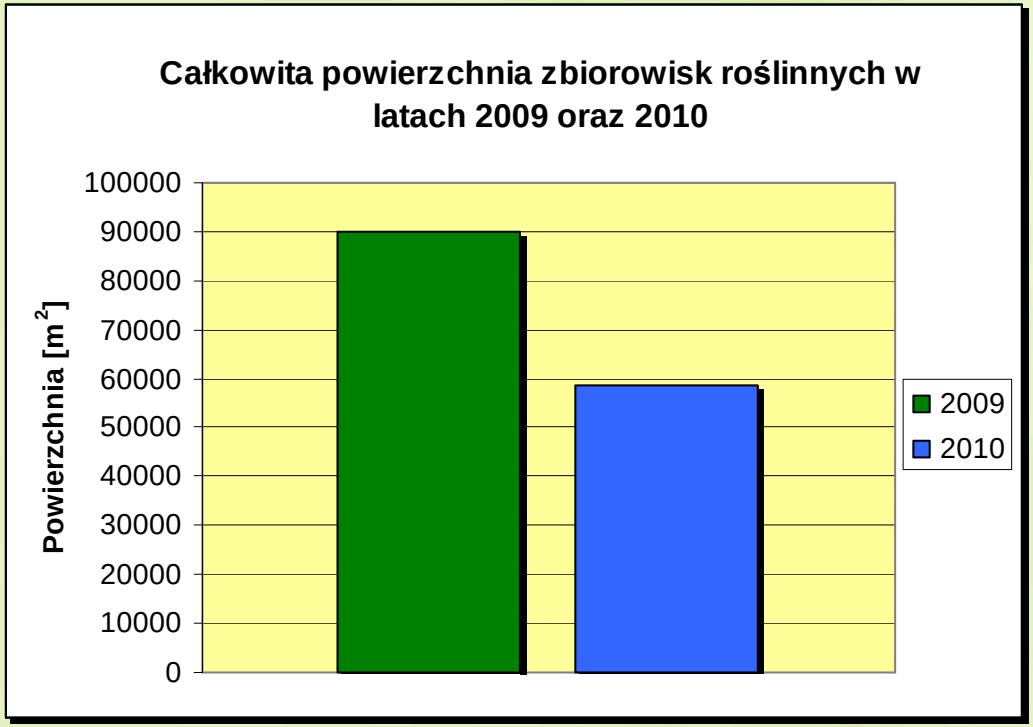
- We should pay a special attention to the **submerged plants.** They are competing with phytoplankton for sun, space and nutriens**.**
- According to this year research - we have **two new** associations of submerged plants.

**Potametum pectinati**

**Polygonetum natantis**

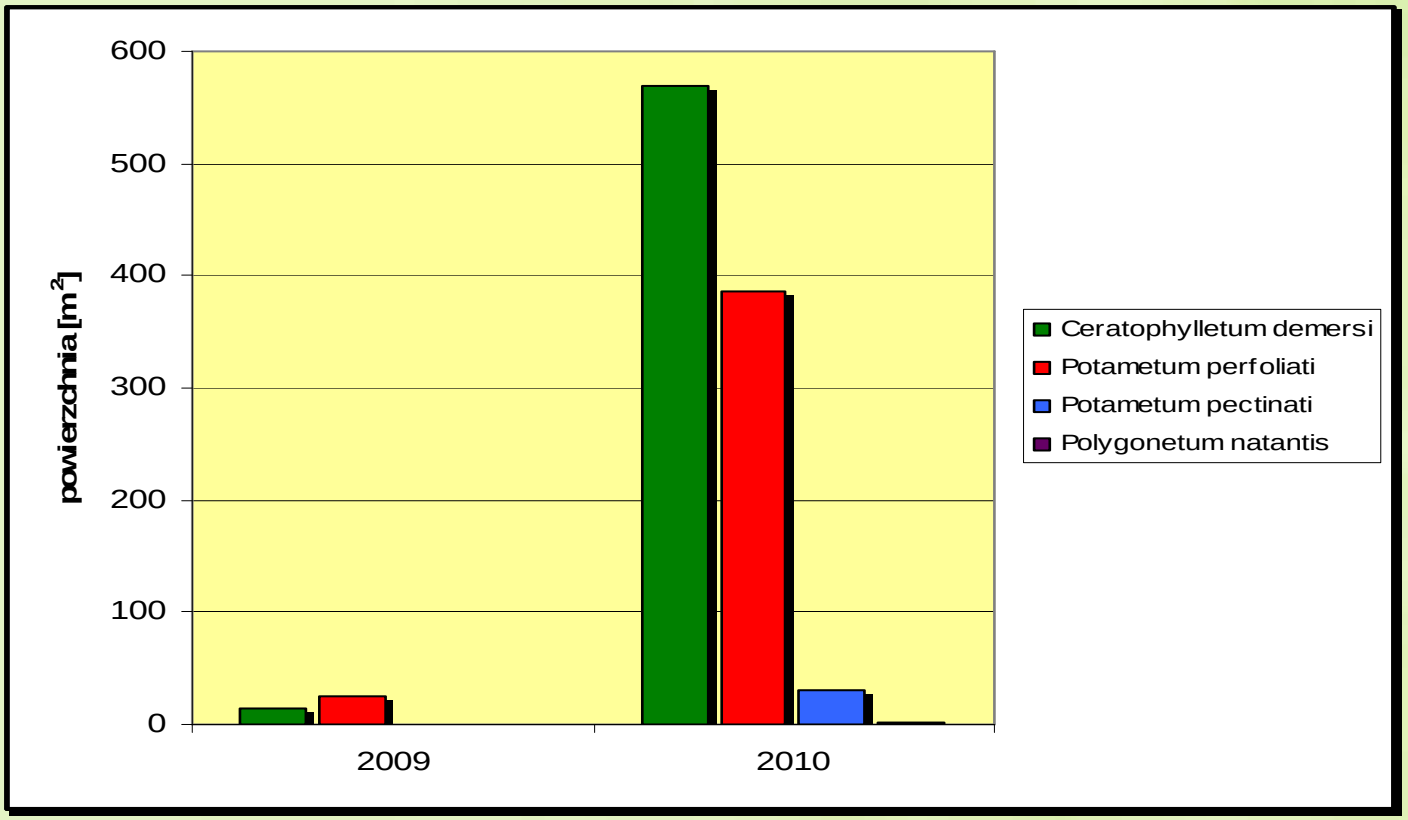
# The comparision with 2009 year

- According to the latest research, the value of total macrophytes area was changed from **89925 m² to 58725 m².** This reduction was probably caused by unusually long winter, high water level and big nutrient load, which was observed in the spring.



# The comparision with 2009 year

- The good and succesful aspect is the fact, that in 2010 the number of submerged plant associations and their surface area is higher than in last year.



# The ESMI result

- After calculations, the ESMI index in 2010 amount to **0,103**
- The ESMI parameter in previous year amounted to **0,109**

| Ecological status of lake<br>Stan ekologiczny jeziora | Value of ESMI index<br>Wartości indeksu ESMI |
|---|---|
| Very good (class I)<br>Bardzo dobry (klasa I) | 0,680-1,000 |
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# The ESMI result

- The ESMI parameter has been reduced. The reason of this is the fact, that the surface of emergent plants has beed decreased probably because of the long winter and other factores.
- **The class of quality water wasn’t changed compering 2009 - is still 4th class.**

# The MIR result

After calculations, the MIR parameter in 2010 amount to **31,6**

- The MIR parameter in previous year amounted to **30,6**

| Ecological status<br>Status ekologiczny | Sandy and organic rivers<br>Piaszczyste i organiczne rzeki |
|---|---|
| very good<br>bardzo dobry | ≥44,5 |
| good<br>dobry | (44,5-35,0> |
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# The MIR result

- This is positive tendency to change.

The latest result is better than the result of previous year.

The outflow of the lake is ranged to the **3rd class- The water quality is moderate**.

# Conlusion

# Conclusions

1. Comparing the previous year, now we can observe higher variety of macrophytes associations. In Durowskie Lake have appeared 3 new associations - ***Polygonetum natantis, Butometum umbellati, Potametum pectinati***, which contribute to stabilize the lake ecosystem.

# Conclusions

2. The surface of emergent vegetation has been decreased but in other hand, we can observe new associations and increasing area of submerged vegetation.

# Conclusions

3. Three associations which expressly dominate are the same as in the previous year:

- ***Phragmitetum communis***
- ***Typhetum angustifoliae***
- ***Nupharo-Nymphaeetum albae***

# Conclusions

4. The class of water quality and ecological status according to ESMI index wasn't changed comparing with 2009 – it is still 4th class.

# Conclusions

5. The outflow of the lake is ranged to the **3rd class** according to MIR index **- The water quality and ecological status is moderate**.

# Conclusions

6. Struga Gołaniecka flowing to the Durowskie Lake contribute to worsening of water quality. But due to numerous restoration measures, the water in the outflow is much better than in the inflow.

# Conclusions

7. The quality of water is diffrent in north side and in south side. In the north part of the lake, water is much worse  than in the south part.

# Conclusions

Finally, effect of the efforts conected with restoration start to be visible in macrophytes associations. For bigger and better effect we should arm ourself with patience and continiue the hard work.

# Thank you for your attention!