Macrophytes as an indicator for environmental changes in Lake Durowskie

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Introduction
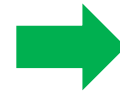
- Tourism
- Anthropogenic activities
- Historical disposal from upper catchment

Hyper-eutrophication → **Cyanobacterial bloom**

Macrophyte
- Floating
- Submerged
- Emergent
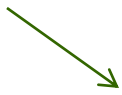
→ **Indicator for water quality**

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Objectives

- To understand the role of macrophytes
- To determine ecological status (ESMI and MIR)
- To compare with previous years

Phragmitetum communis   *Nupharo-Nymphaeetum*   *Typhetum angustifoliae*

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Study area
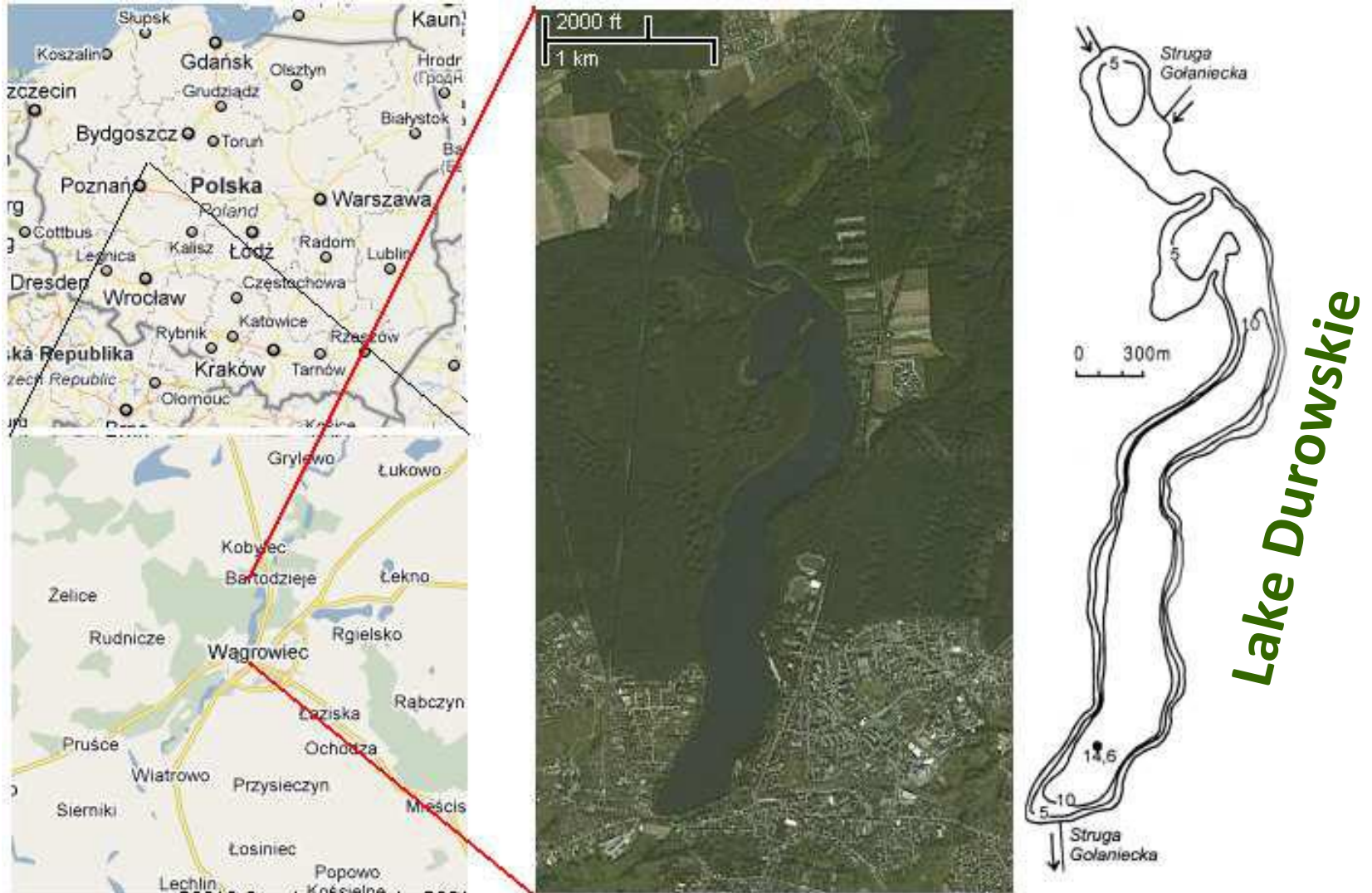
Lake Durowskie

Figure from maps.google.com and Goldyn & Messyasz 2008 apud Robiansyah et al. 2010.

Material and Methods

Field work – Data collection

Determining the occurence of macrophytes communities in Lake Durowskie

Material and Methods

Data analysis

Mapping the data collected in ArcGIS and analysis with Excel

Report
Final results and conclusion
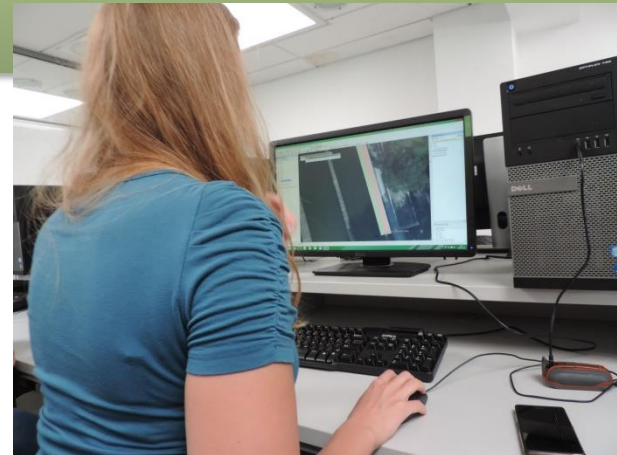
Results
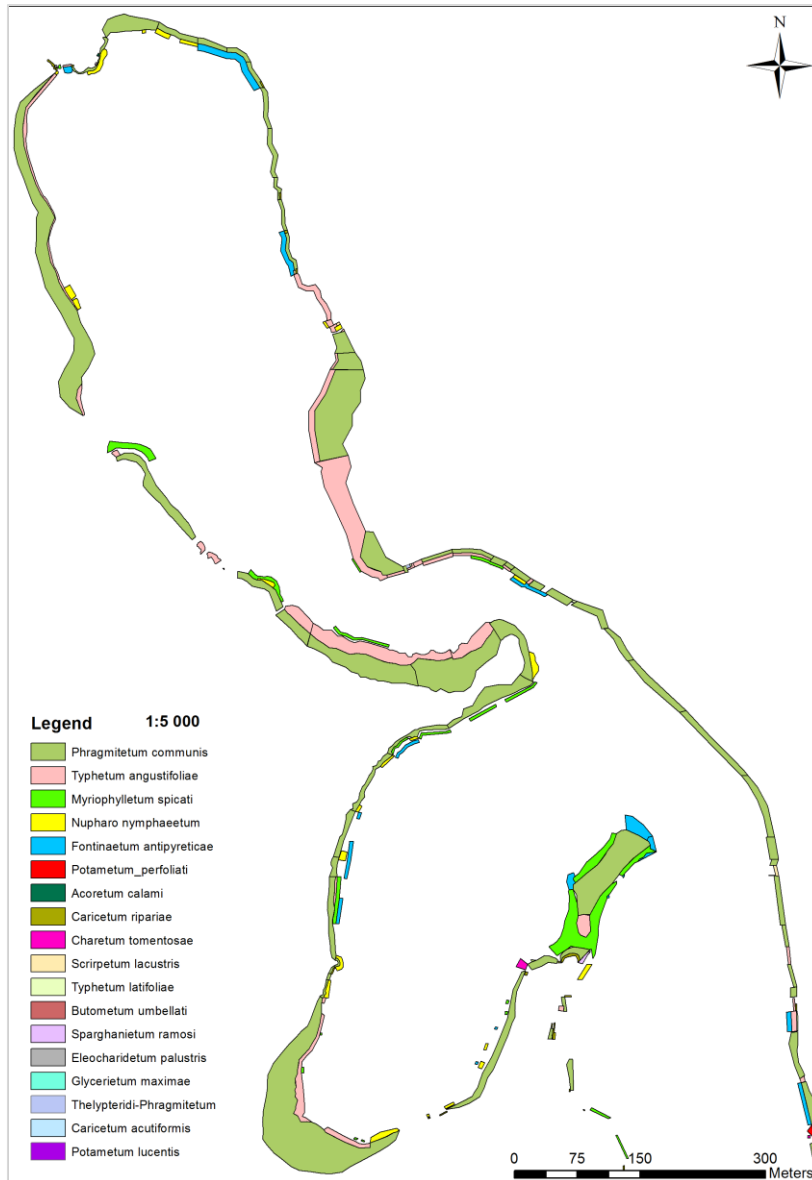
18

Macrophyte associations:
North segment of Lake Durowskie
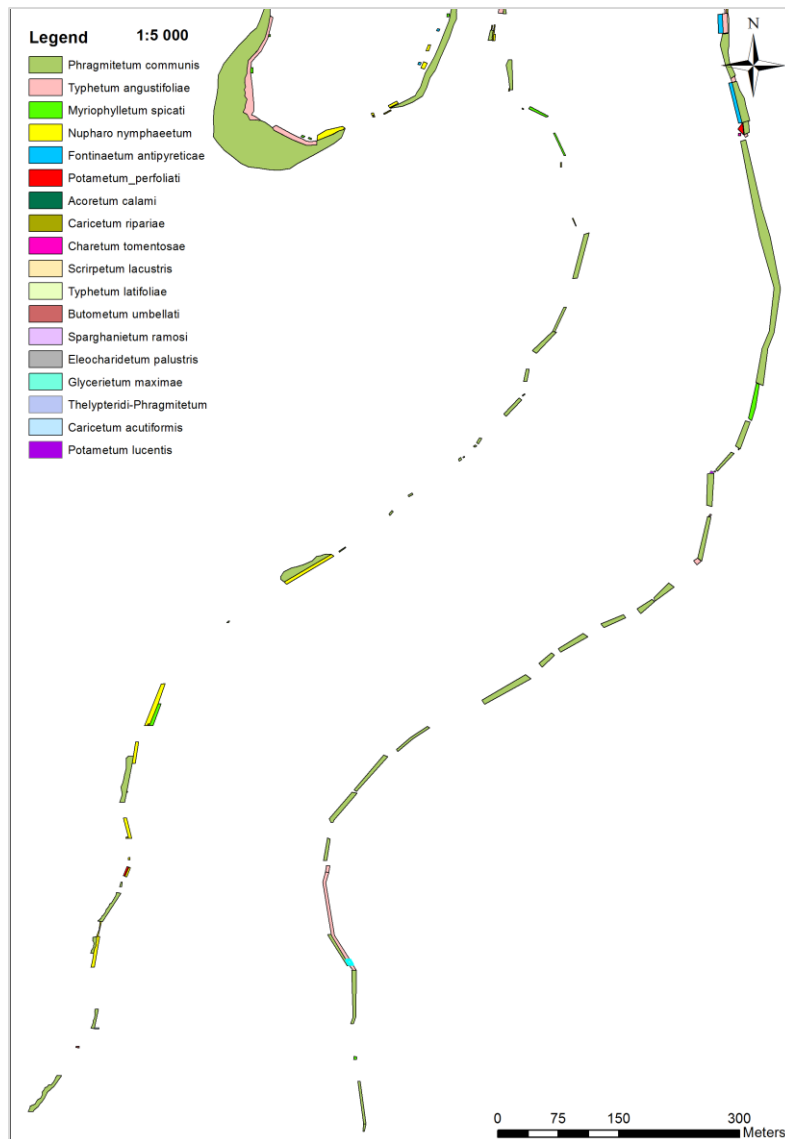
Results

Macrophyte associations:
Center segment of Lake Durowskie
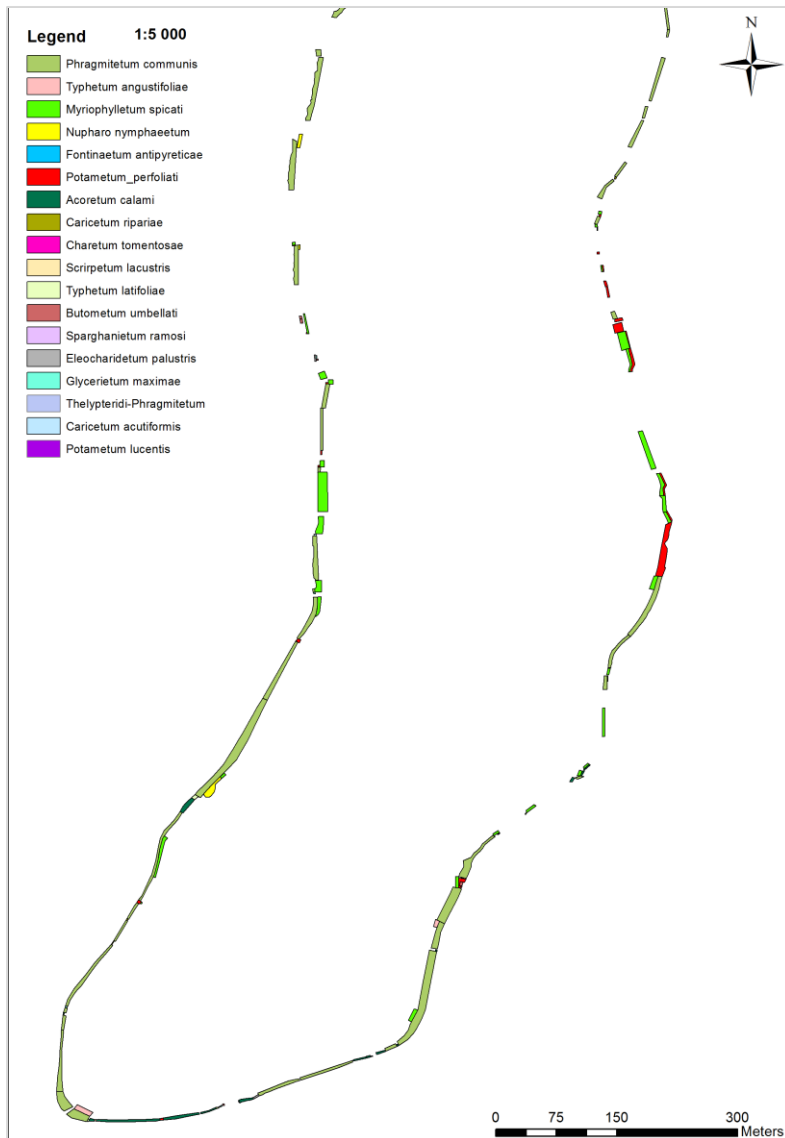
Results

Macrophyte associations:
South segment of Lake Durowskie

Results

6.76% increase in total coverage since 2015

Comparison of total coverage of macrophytes

Cover area [m²]

- 2009: 89,925.0
- 2010: 58,726.0
- 2011: 67,213.5
- 2012: 69,048.0
- 2013: 85,298.0
- 2014: 89,320.0
- 2015: 92,066.0
- 2016: 98,286.0
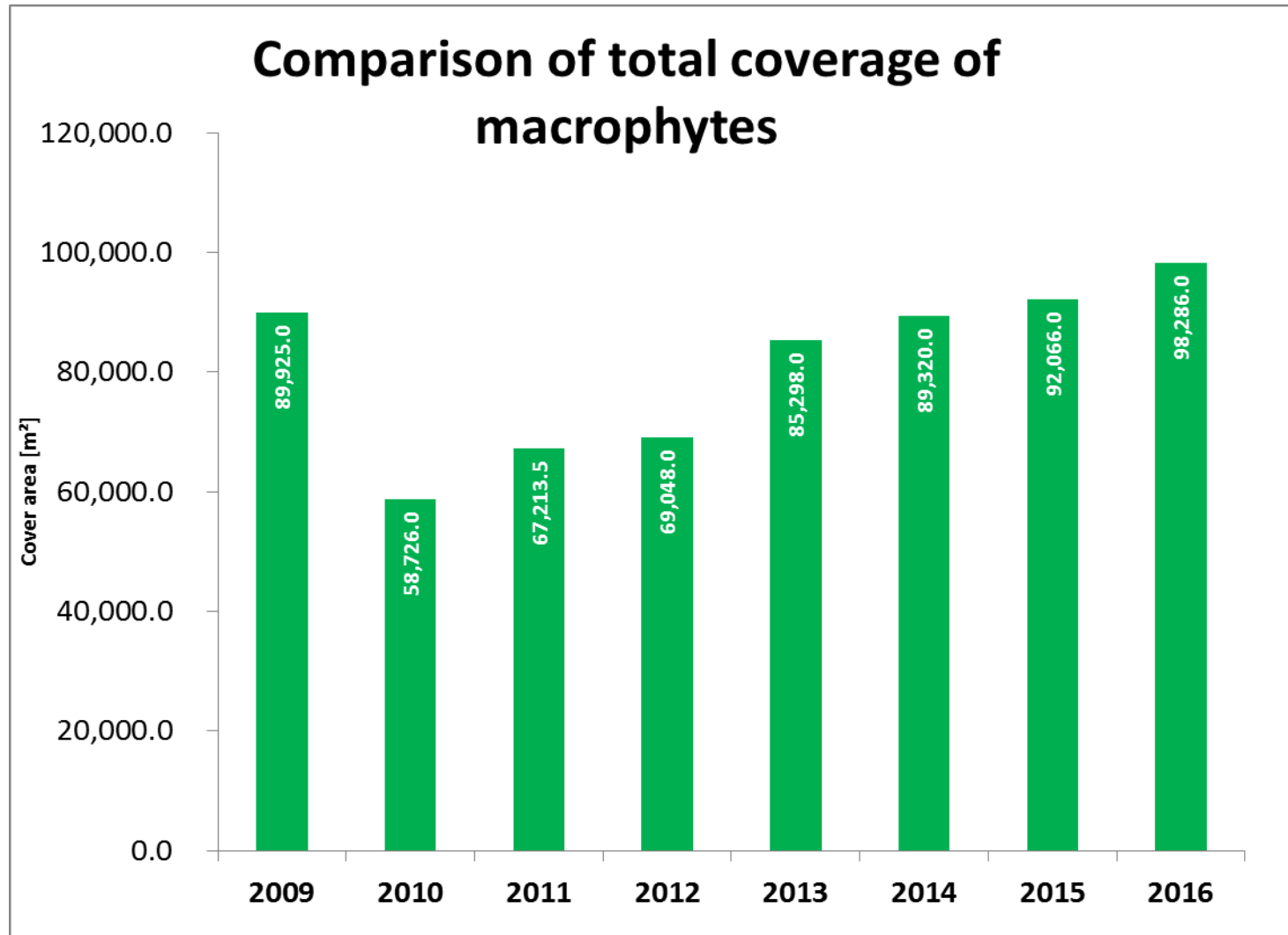
Results

5 dominant associations, from which 3 are water plants

Dominant associations - 2016

- ■ *Phragmitetum communis* — 69.95%
- ■ *Typhetum angustifoliae* — 12.92%
- ■ *Myriophylletum spicati* — 8.28%
- ■ *Nupharo-Nymphaeetum* — 3.11%
- ■ *Fontinaletum antipyreticae* — 3.00%
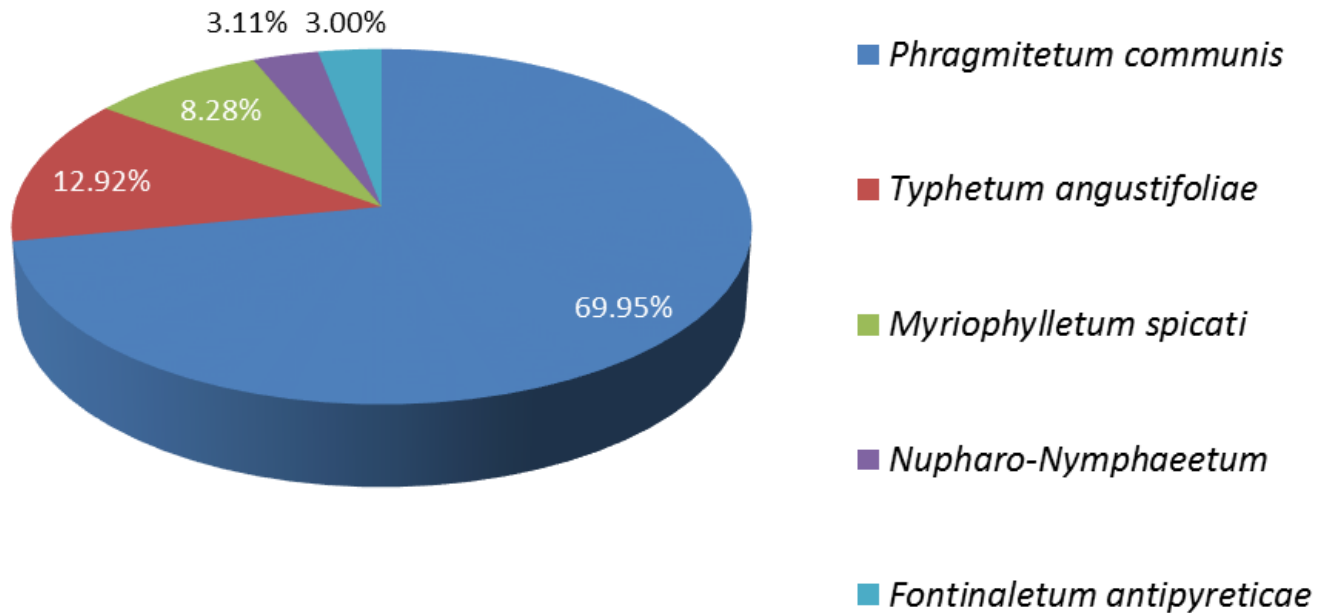
Results

Variation of water plant associations' cover area

Legend:
- Potametum lucentis
- Charetum tomentosae
- Potametum perfoliati
- Fontinaletum antipyreticae
- Nupharo-Nymphaeetum
- Myriophylletum spicati

Chart: Cover area [m²] by year (2009–2016), stacked bar chart.
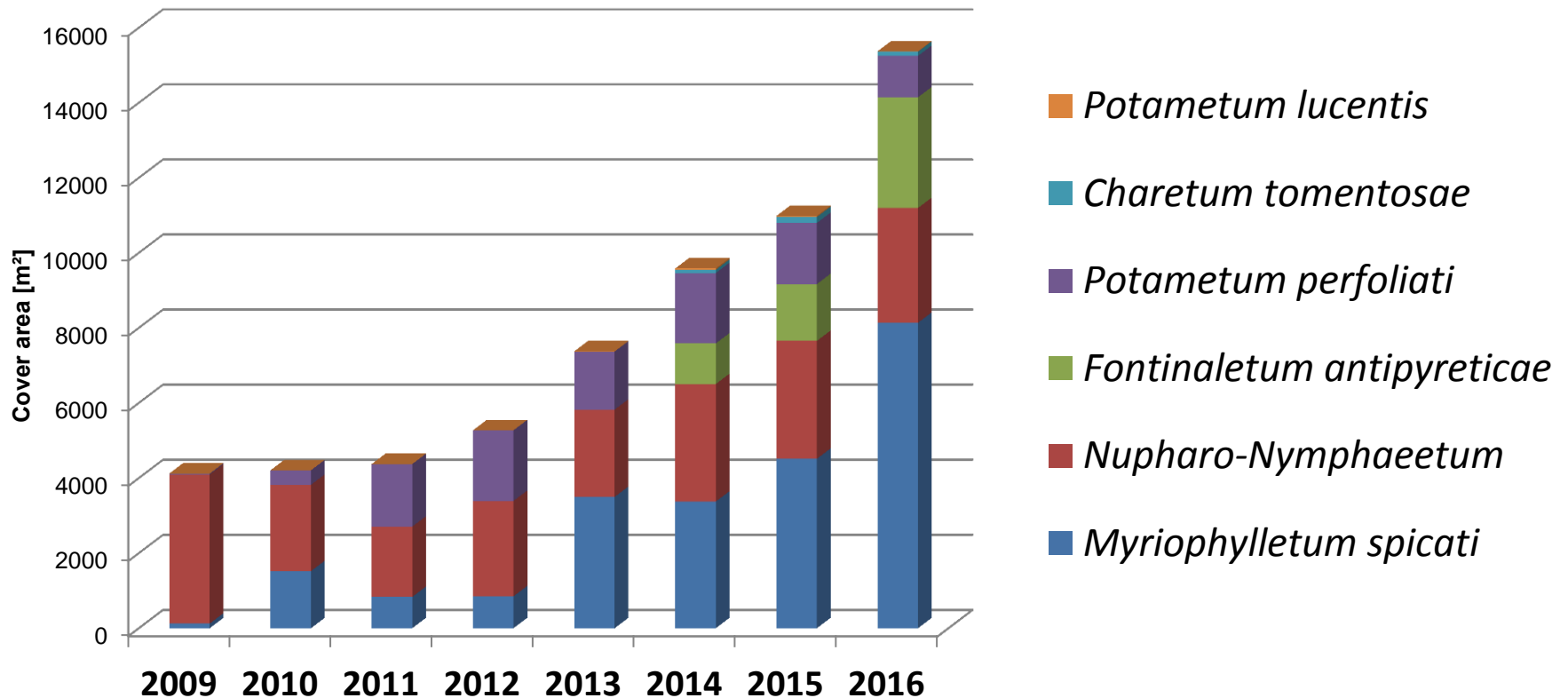
Results

Main emergent associations	Surface [m²]		Difference [m²]	Difference [%]
	2016	2015	2016-2015	
Phragmitetum communis	68,751	69,201	-450	-1%
Typhetum angustifoliae	12,694	10,144	2,550	25%

Results

🌿 *Ecological State Macrophyte Index (ESMI)*

Taxonomic composition (association) and abundance

🌿 *Macrophyte Index for Rivers (MIR)*

Identifies macrophytes to indicate the degree of degradation

Index	2009	2010	2011	2012	2013	2014	2015	2016
ESMI	0.109	0.103	0.118	0.12	0.136	0.149	0.142	0.171
MIR	30.6	31.7	29.8	33.41	26.05	28.95	36.36	37.75

Ecological state	Range of values of ESMI	Range of values of MIR
	Deep lakes	Sandy bottom
Very good	0.680-1.000	≥46.8
Good	0.340-0.679	46.8-36.6
Moderate	0.170-0.339	36.6-26.4
Poor	0.090-0.169	26.4-16.1
Bad	<0.090	<16.1

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Macrophytes conclusion

- **18** associations in total and **6** of water plant identified

- **Coverage:** slight increase of 6.76% compared to 2015

- **Water plants** increased around **40%** compared to 2015, mainly:

Association	Increase [%]
Myriophylletum spicati	80
Fontinaletum antipyreticae	95

→ Positive transition to **eutrophic**

- *Charetum tomentosae:* **-30% of area** compared to 2015. Improvement of water quality stopped

Macrophytes conclusion

- **ESMI** improved from **poor** in 2015 (0.142) **to moderate** (0.171) in 2016

- **MIR** improved from **moderate** in 2015 (36.36) **to good** (37.75) in 2016

- Possibly late response of macrophytes to changes in water quality

Thank you for your attention!