



Algae
Service
for
Life



Tools to manage cyanobacteria agglomerations in freshwater ecosystems

Judita KOREIVIENĖ¹, Elžbieta WILK-WOŹNIAK², Jūratė KAROSIENĖ¹,
Jūratė KASPEROVIČIENĖ¹, Loreta JuŠKAITĖ^{3,4}, Ričardas PAŠKAUSKAS¹,
Zenonas GULBINAS⁵, Vaidotas VALSKYS^{5,6}, Beata MESSYASZ⁷,
Bogusława ŁĘSKA⁸, Radosław PANKIEWICZ⁸, Wojciech KRZTON²,
Edward WALUSIAK², Małgorzata ŁACIAK²

¹ Nature Research Centre, Vilnius, Lithuania

² Polish Academy of Sciences, Institute of Nature Conservation, Kraków, Poland

³Baltic Environment, LTD, Vilnius, Lithuania

⁴Vilnius Gediminas Technical University, Vilnius, Lithuania

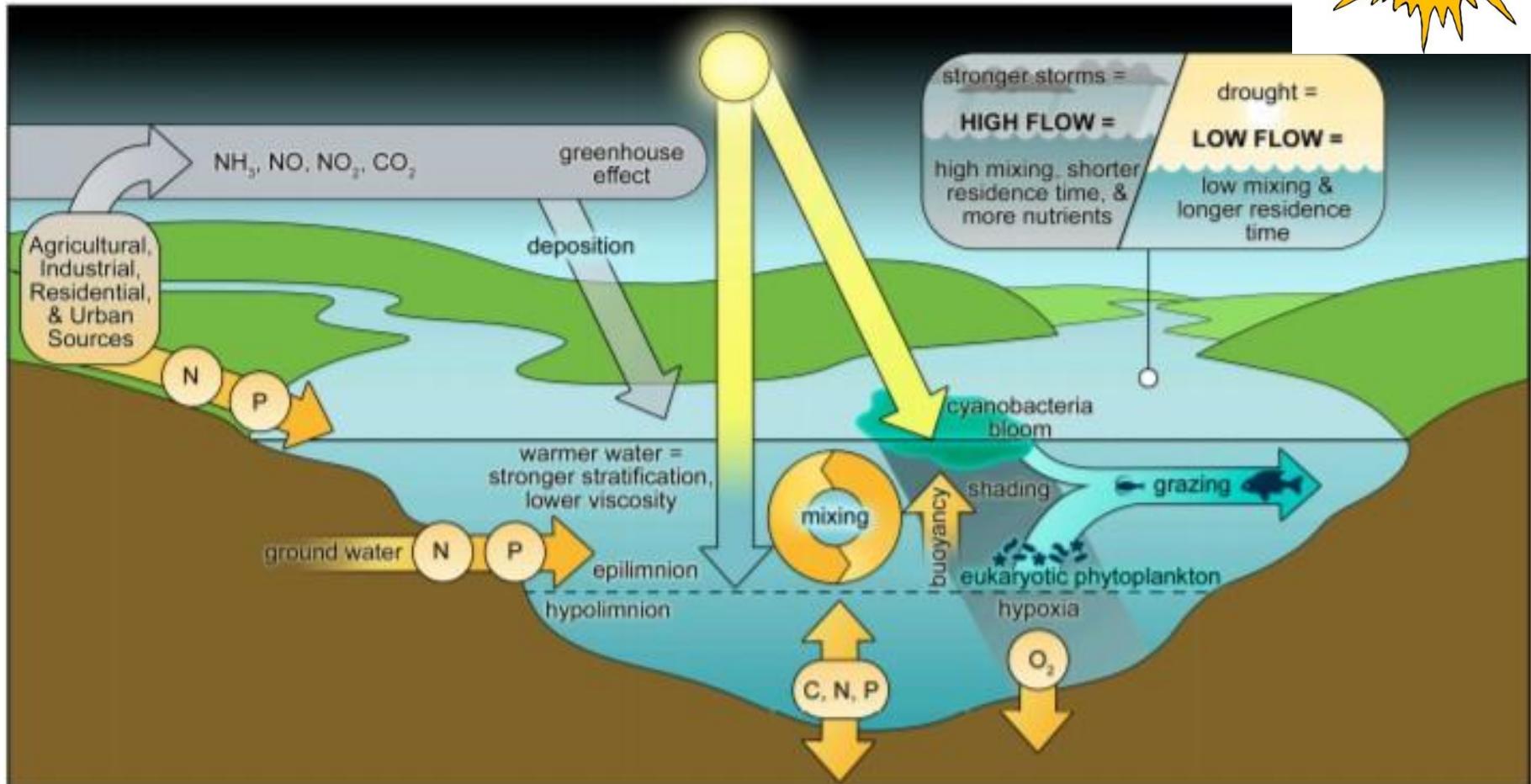
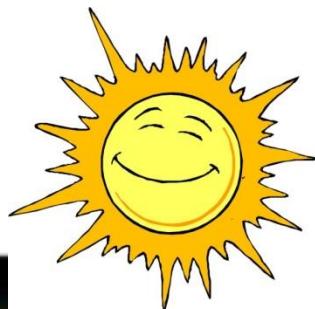
⁵ Nature Heritage Fund, Vilnius, Lithuania

⁶Vilnius University, Life Sciences Centre, Institute of Biosciences, Vilnius, Lithuania

⁷Adam Mickiewicz University in Poznań, Faculty of Biology, Poznań, Poland

⁸Adam Mickiewicz University in Poznań, Faculty of Chemistry, Poznań, Poland

A few words to begin with...



Pael, H.W., 2018. *Toxins*, 10(2), p.76.



According to a study by Hong et al. 2012, there is a north-south gradient in the net anthropogenic input of nutrients in the Baltic Sea catchment area (Figure 2.4).

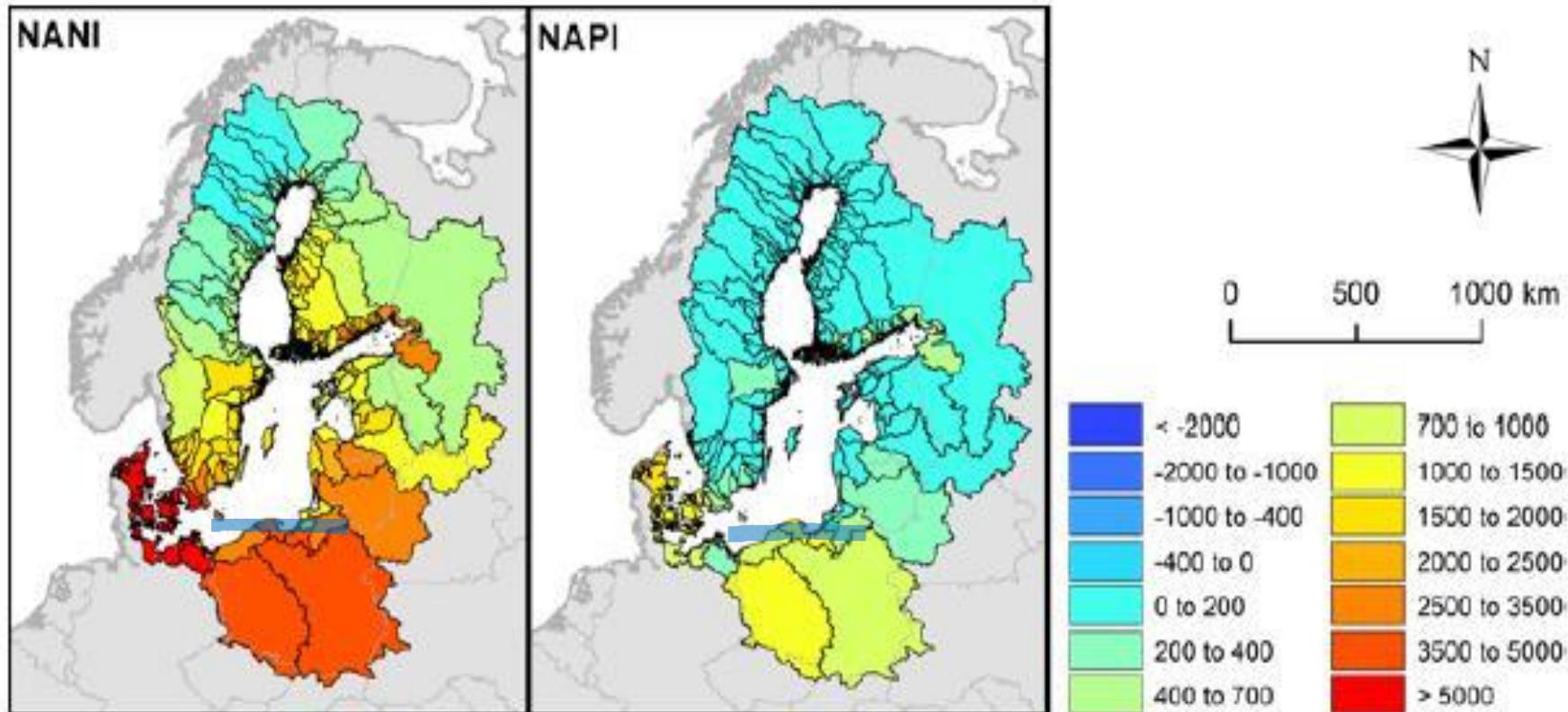


Figure 2.4. Net anthropogenic nutrient inputs for nitrogen (NANI, left panel, kg N km⁻² yr⁻¹) and phosphorus (NAPI, right panel, kg P km⁻² yr⁻¹) for the catchments.
(Source: Hong et al. 2012)

Why we want to manage cyanobacterial blooms?

WARNING

Avoid Harmful
Blue-green Algae Blooms
while swimming, fishing and boating



Keep kids and pets away from areas with blooms or scum.
Swim, fish and boat in areas with no blooms or scum.

Contact can make people and animals sick.

If contact occurs, rinse with clean water.
If symptoms occur, contact a medical provider.

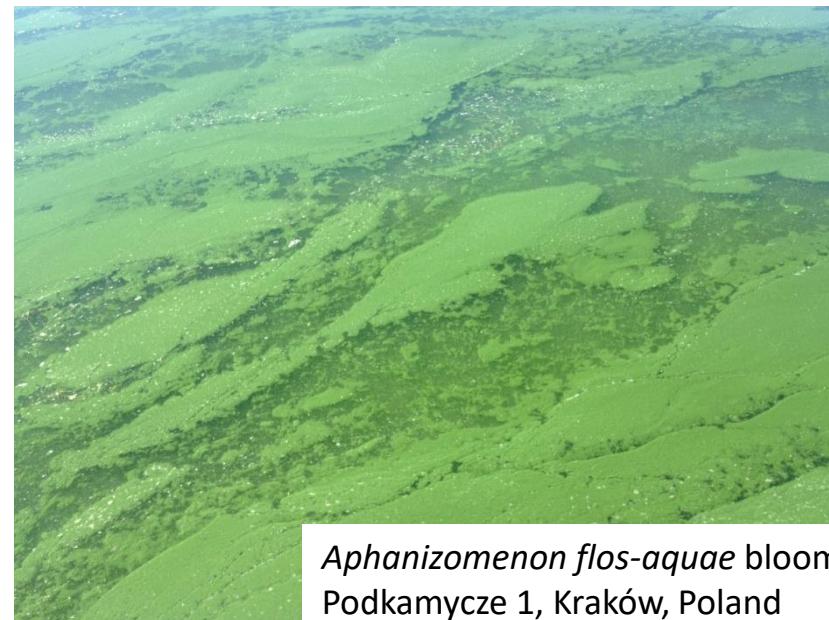


Blooms can look like streaks, spilled paint, pea soup, floating clumps or dots.

Learn more: www.health.ny.gov/HarmfulAlgae and on.ny.gov/hab

6637

7/18



Aphanizomenon flos-aquae bloom
Podkamycze 1, Kraków, Poland

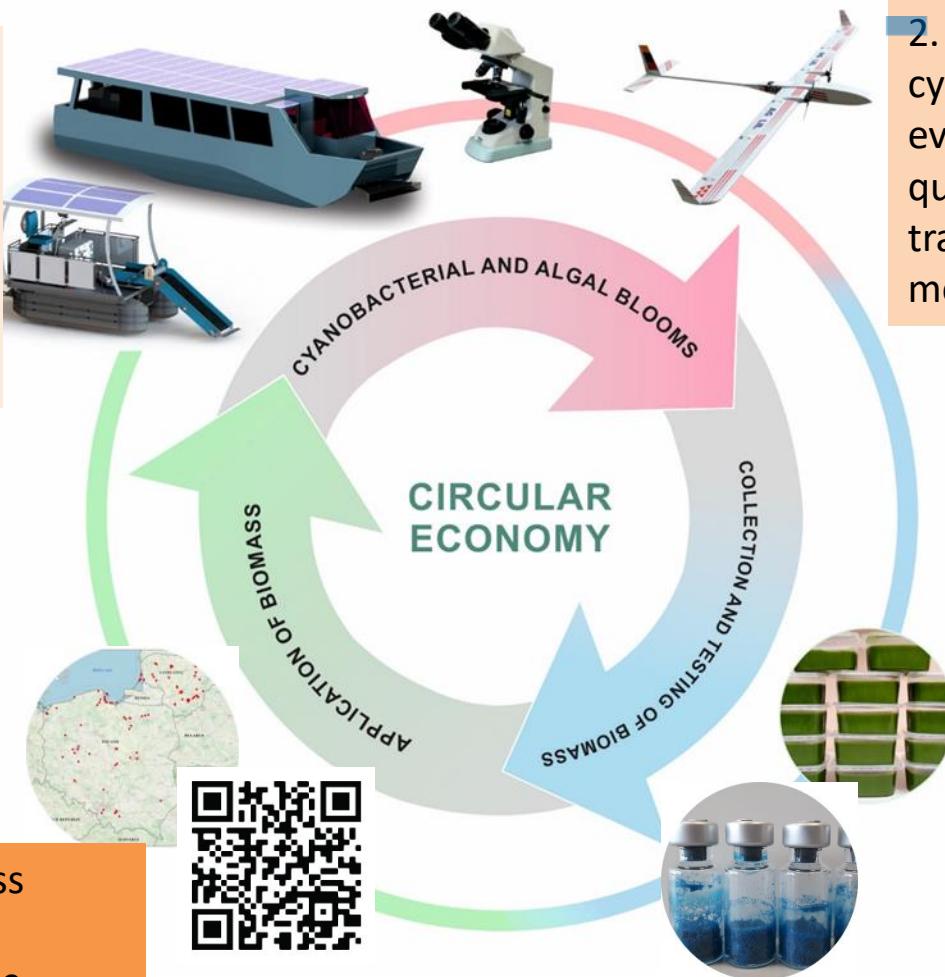


Aphanizomenon flos-aquae bloom
Podkamycze 1, Kraków, Poland



AIMS OF the PROJECT

1. Construction of two technologically different prototypes for harvesting excess biomass of cyanobacteria and macroalgae



2. Testing methods for cyanobacteria biomass evaluation *in situ*; water quality analysis using traditional and distant methods

3. Testing collected cyanobacterial biomass for potential application as low and high value bioproducts

4. Raising awareness about blooms and dissemination of the project results



Algae
Service
for
Life

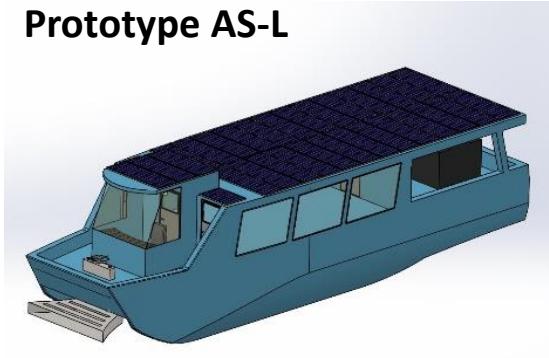
Building two prototypes



Prototype AS-S



Prototype AS-L



Building two prototypes



Prototype AS-S has two functions: collect macroalgae and collect cyanobacteria scums due to changing front head.



A box with collected cyanobacteria. It is inside of harvester when it is working, after finishing it is taken out.

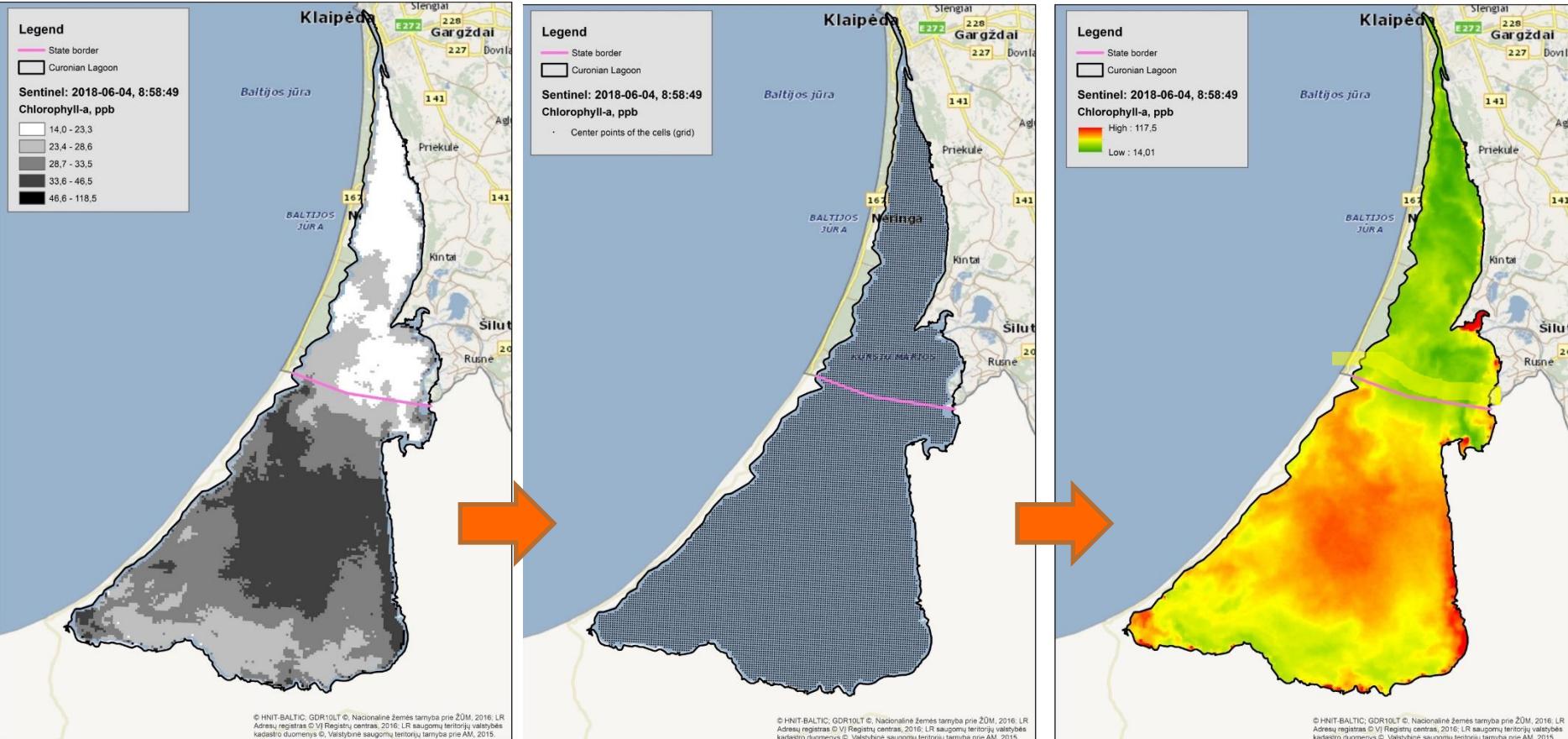




Testing methods for cyanobacteria biomass evaluation *in situ*; water quality analysis using traditional and distant methods



Testing methods for cyanobacteria biomass evaluation *in situ*; water quality analysis using traditional and distant methods in the Curonian Lagoon



Downloaded data is imported in ArcMap 10.6.1 software and raster dataset converted to point layer. Each point contains Chlorophyll-a concentration in ppb in attribute table of the layer.

Point data layer is then used for IDW (Inverse Distance Weighting) interpolation. This method allows to highlight the hot-spots of the phenomenon that is analyzed.

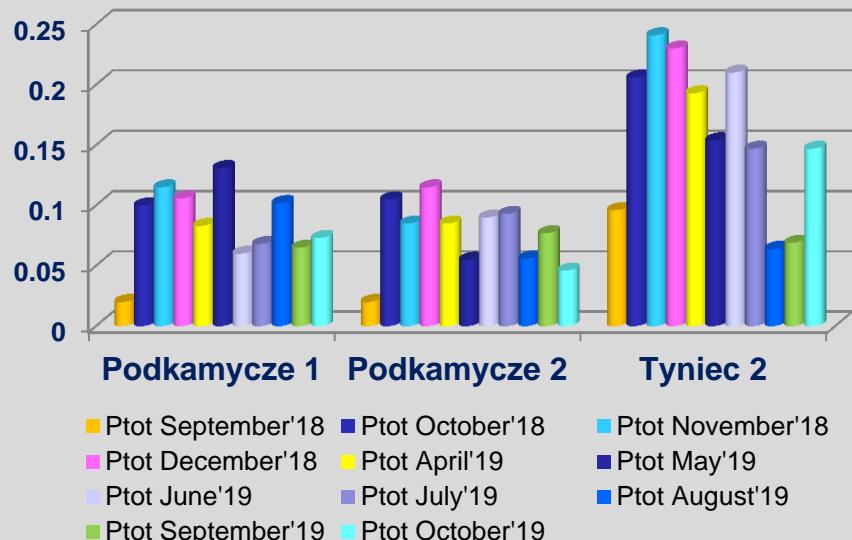
Testing cyanobacteria biomass collected from aquatic ecosystems for potential application for low and high value bioproducts

Pigment extraction - elaboration methods for phycocyanin extraction from the biomass with different dominant species of cyanobacteria.

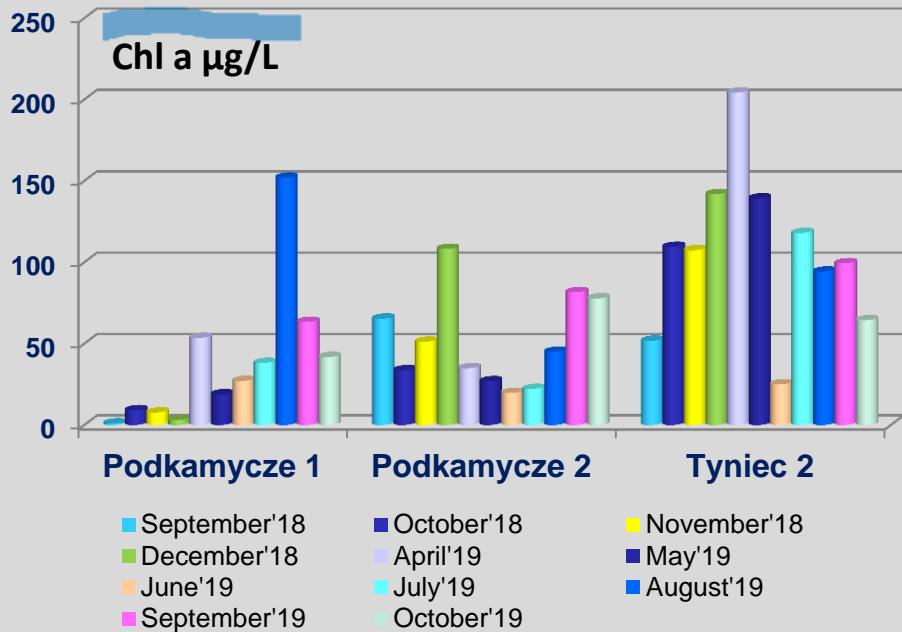
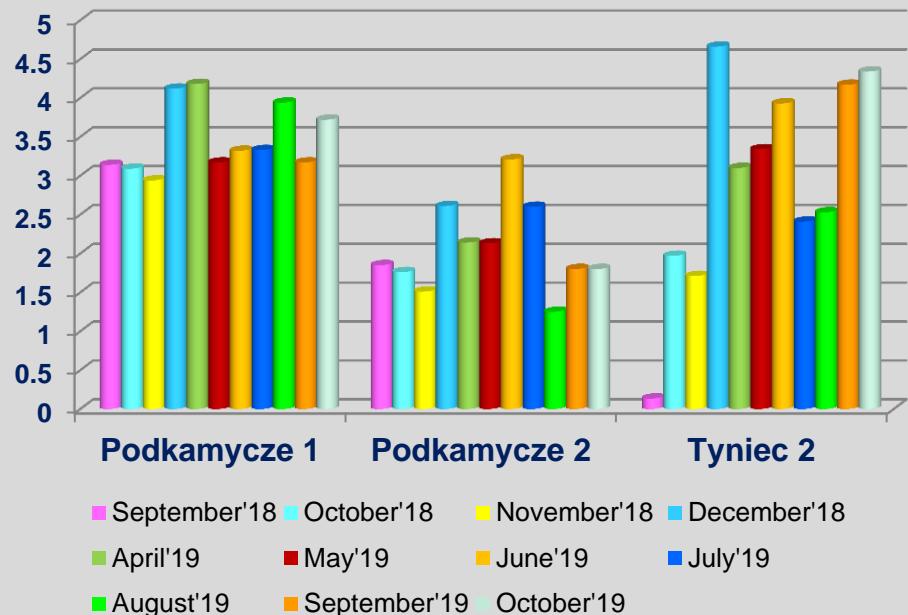


EXAMPLES

TP mg/L

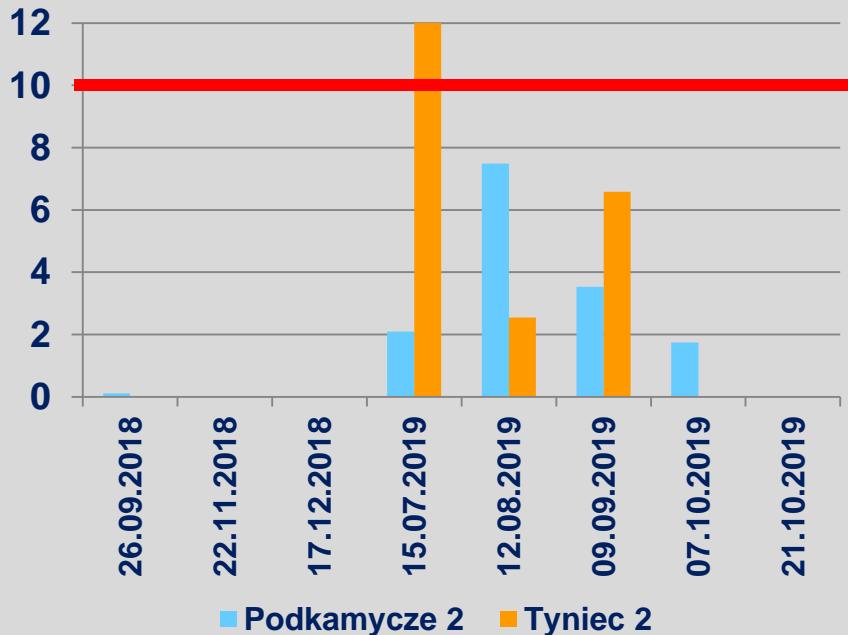


TN mg/L

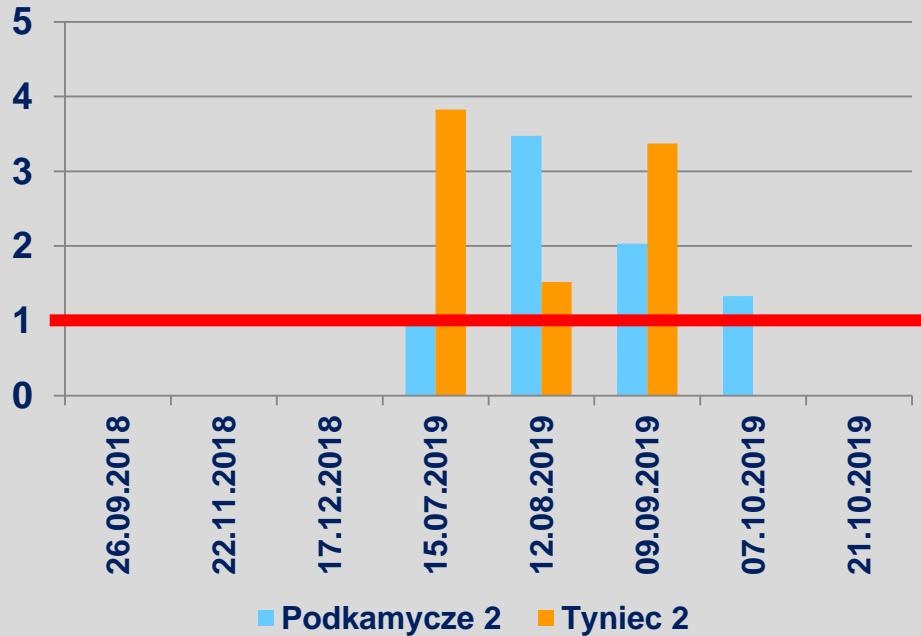


Intracellular microcystins µg/L

MCs µg/L



MC-LR µg/L



WHO guidance cyanotoxins (MC-LR)
(free+cell bound)
<1µg/L for drinking waters
<10µg/L for bathing waters

REMOVAL BIOMASS OF CYANOBACTERIA



- Totally collection up to 7.8 t of cyanobacteria biomass.
- Evaluated and validated ecological benefits:
 - up to 15 t of CO₂ reductions,
 - elimination up to 50 kg nitrogen
 - elimination up to 3 kg phosphorus,
 - elimination up to 0.38 kg of cyanotoxins from aquatic ecosystems.



Algae
Service
for
Life



Raising awareness and dissemination of the project results



WATER BLOOMS

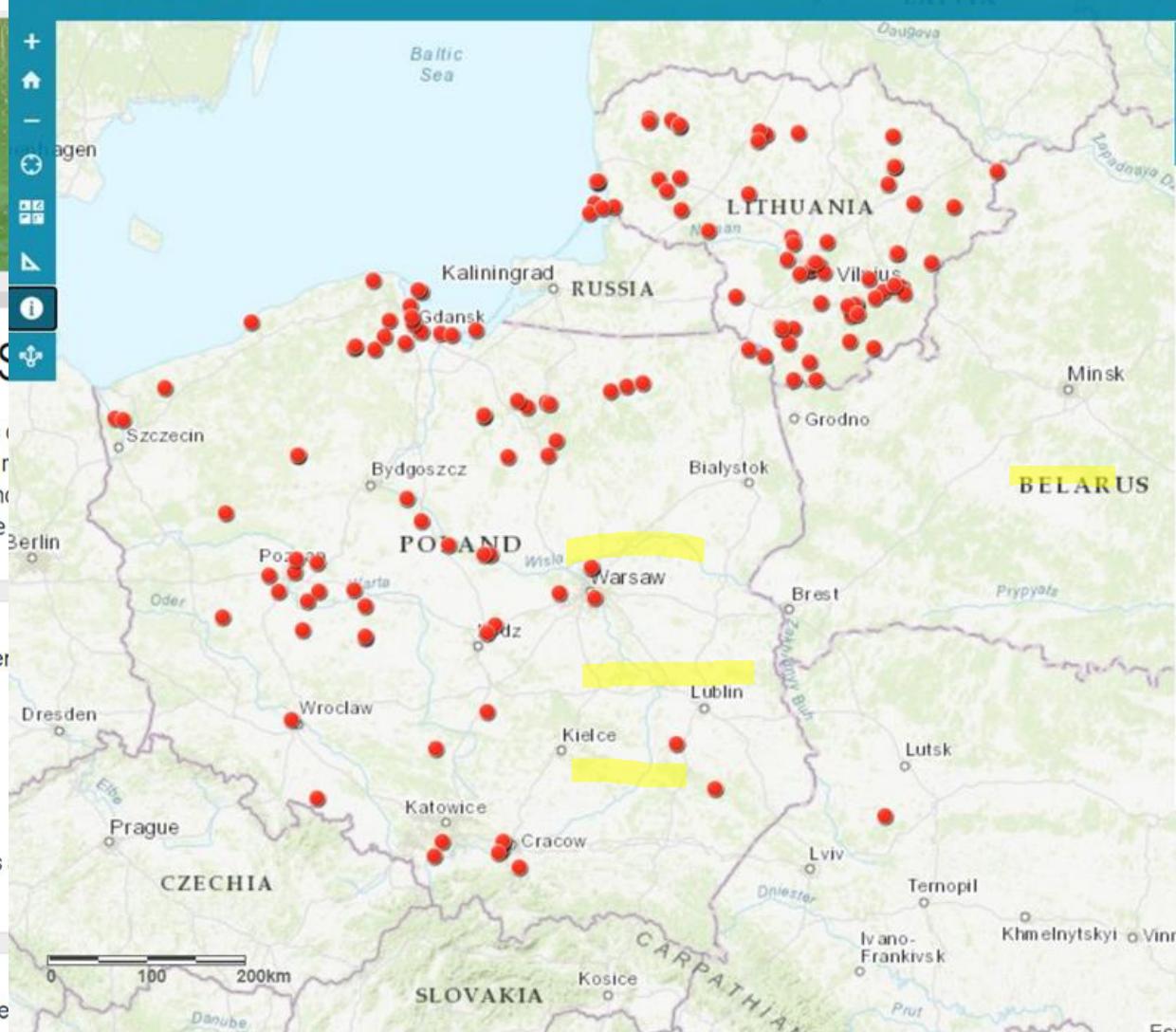
The project AlgaeService for LIFE is currently running a survey about water blooms. Thank you for taking a few moments to answer the questions. Your opinion is very important and will be used to improve the project.

1. Have you ever observed water blooms?

- Yes
- No
- I do not know what the blooms are

2. If yes, please provide more details about the following phenomena were observed (you can mark more than one answer):

Blooming water bodies



Patekти / Wyślij

For updating results please go to the website:

<https://algaeservice.gamtostyrimai.lt/category/be-kategorijos-en/>

For filling the questionnaire please go to:

https://docs.google.com/forms/d/e/1FAIpQLSd3EemWUQLa2iGsos8azU0yO7WlsolzepfUZnnFP21WP_8a-A/viewform

THANK YOU!



NaToxAq has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No. 722493.



The „Algae Service for LIFE” project (LIFE17 ENV/LT/000407) is supported by the EU LIFE Programme and co-financed by the Ministry of Environment of the Republic of Lithuania, the National Fund for Environmental Protection and the Water Management in Poland, and by the project partners. The content of this publication does not reflect the official opinion of the European Union. Responsibility for the information and view expressed therein lies entirely with the authors.