Latvia Lithuania

bringing neighbours closerer

Cross Border Cooperation for Sustainable Management of Lake Areas in Kurzeme and Lithuania (LLIV-326)
Lakes for Future

Main activities of Klaipėda University (CORPI) team

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Klaipeda University
Costal Research and planning Institute

kick-off meeting
2012 04 24
Saldus

PROPOSED ACTIVITIES:

1. Preliminary survey of **invasive, potentially toxic algae** and **cyanotoxins** distribution in the lakes and public ponds of recreational areas and elaboration of monitoring and management strategies for harmful algal blooms (HAB)

2. **Bathymetric survey** by depth-sonar and lake **sediment coring** in order to undertake a paleolimnological assessment.

3.Bottom **habitat mapping** and monitoring applying remote underwater video techniques.

4. **Zebra mussel** (*Dreissena polymorpha*) **cultivation** as a tool for controlling eutrophication in lakes and its remediation.

5. **Assessment of wetlands** role in regulation of water quality in lakes of the protected nature areas.

ACTIVITY No. 1

Preliminary survey of invasive, potentially toxic algae and cyanotoxins distribution in the lakes and public ponds of recreational areas and elaboration of monitoring and management strategies for harmful algal blooms (HAB)

The survey will be performed in selected lakes in Siauliai and Telsiai counties

Main tasks:

✓Invasive cyanobacteria and algal species inventory, their productivity estimation in specified lakes and ponds

✓Bloom-forming cyanobacteria and algae, the potentially toxic species productivity estimation and cyanotoxins distribution in lakes

The investigations will be performed from June till October. Evaluation of the main abiotic condition in lakes will be carried in parallel with phycological investigations.

Task 1: Invasive cyanobacteria and algal species inventory, their productivity estimation in specified lakes and ponds

✓7 non-native, cryptogenic algae and cyanobacteria species are recorded in inland waters of Lithuania:

Cyanobacteria

Anabaena bergii var. *limnetica*
Cylindrospermopsis raciborskii
Geitleribactron periphyticum
Gloeotrichia echinulata
Raphidiopsis mediterranea

Raphidophyceae

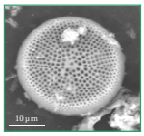
Gonyostomum semen

Diatoms

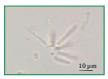
Actinocyclus normanii f. *subsalsus*

Anabaena bergii var. *limnetica*, Lake Gineitiškės

Gonyostomum semen, Lake Natalka



Actinocyclus normanii f. *subsalsus*, Lake Kirkilai

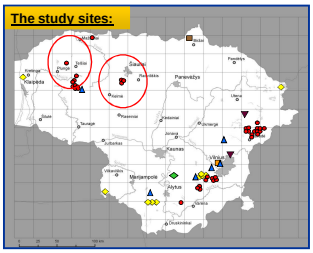


Geitleribactron periphyticum, Lake Gulbinas

Raphidiopsis mediterranea, Lake Didžiulis

Task 1: Invasive cyanobacteria and algal species inventory, their productivity estimation in specified lakes and ponds

The study sites:

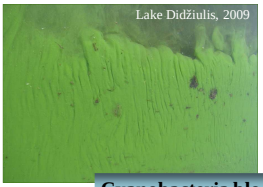


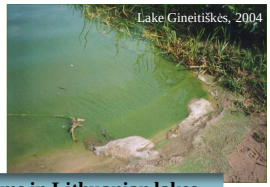
- *Gonyostomum semen*
- *Gloeotrichia echinulata*
- *Anabaena bergii* var. *limnetica*
- *Raphidiopsis mediterranea*
- *Geitleribactron periphyticum*
- *Cylindrospermopsis raciborskii*
- *Actinocyclus normanii* f. *subsalsus*

Highly productiv lakes and public ponds of recreational areas for inventory of alien cyanobacteria

Humic lakes for inventory invasive raphidophyte *Gonyostomum semen* distribution

Task 2: Bloom-forming cyanobacteria and algae, the potentially toxic species productivity estimation and cyanotoxins distribution in lakes

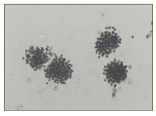




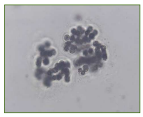
Cyanobacteria blooms in Lithuanian lakes

Task 2: Bloom-forming cyanobacteria and algae, the potentially toxic species productivity estimation and cyanotoxins distribution in lakes

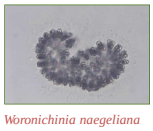
✓ More than 50 potentially toxic cyanobacteria species are found in Lithuanian lakes
✓ 17 toxic species form lakes blooms



Microcystis aeruginosa



Microcystis viridis



Woronichinia naegeliana

Planktothrix agardhii

Anabaena flos-aquae

Aphanizomenon sp.

Expectations:

The data of investigations is expected to be important to implement monitoring, prevention and management strategies over biological invasions and harmful algal blooms control measures

Special needs:

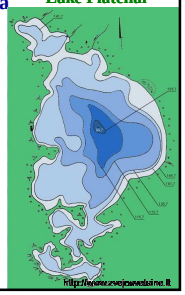
Good contacts and collaboration with local authorities in order to have access to the objects (lakes and ponds) ☺

in summer  and/or winter 

ACTIVITY No. 2

Bathymetric survey by depth-sonar and lake sediment coring in order to undertake a paleolimnological assessment.

Lake Plateliai



The survey will be the first comprehensive examination of the depths of Lake Plateliai

Modern echosounding equipment allows to make full coverage of lake bottom in rather short time.

The current study will be carried out by integrated high-resolution multibeam and side scan sonar system mounted to the special boat. This information will help identify the materials that make up the lake floor, such as rock, sand, or mud. The new equipment allows to reach up to 1 cm resolution, but we expect to compile the bathymetric map of at least 10 cm resolution.

GeoAcoustics GeoSwath Plus Compact offers very efficient simultaneous swath bathymetry and side scan seabed mapping. It is designed to be deployed on small vessels like dinghies and jet skis equipped with a 24 V power supply.

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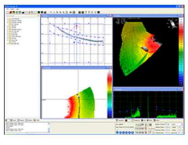


Up to 12 times water depth coverage

GeoSwath Plus Compact- Shallow Water Multibeam echosounder

Bathymetry survey planning:

1. **Defining the profiles – for full coverage distance between profiles should be 60% of "12 times water depth" (10 m depth; distance – 120*0,6 = ~70 m.)**
2. **Setting up the equipment – calibration;**
3. **Sound velocity measurements in the water basin – CTD measurements;**
4. **Surveying – data collection;**
5. **Post processing, filtering, corrections, etc..**
6. **Map (depth chart) compilation.**

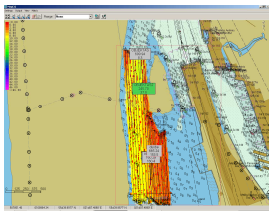
The survey is to be scheduled to perform in May – August depending on ship availability and weather condition.

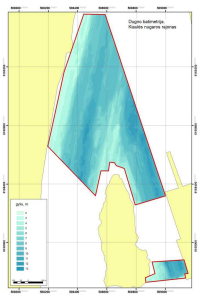
In order to fulfill 100% coverage of the lake:

- estimated profiles length: **130-150 km**
- estimated workhours: **32-35** (3-4 days with good weather conditions)
- stuff needed **1** helmsman and **2** surveyors
- one day boat rental - **892** EUR (including fuel, VAT);
- one day set of equipment (MBES, CTD, Navigation, Motion sensors) rental - **1080** EUR ;
- MOBILZATION/DEMOBILIZATION costs (car and trailer rental, fuel) - **150-200** EUR

Result: depth scheme at requested resolution

Examples from latest surveys in the Curonian Lagoon





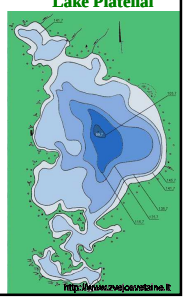
Special needs:

Ship launching place

ACTIVITY No. 3

Bottom habitat mapping and monitoring applying remote underwater video techniques

Lake Plateliai



The survey will be performed in Lake Plateliai

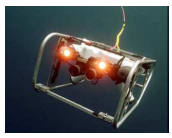
Main tasks:

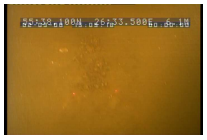
✓ Assessment of *status quo* of environmental habitats while mapping it with non-destructive remote methods

✓To select sampling sites for monitoring program in accordance with WFD requirements

Task 1: to map benthic habitats with non-destructive remote methods

1.1 Drop-down camera & remote operating vehicle





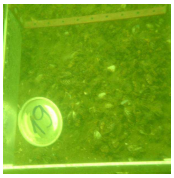
Information from video footage:

- Coverage of habitat forming species, %
- Substrate type
- Coordinates
- Depth, m

Not possible to take macrofauna samples

Task 1: to map benthic habitats with non-destructive remote methods

1.2 SCUBA diving surveys



Information from diving surveys:

- Coverage of dominant species, %
- Substrate type
- Depth, m

Possible to take macrofauna samples

Task 1: to map benthic habitats with non-destructive remote methods

1.3 Grab sampling

- Macrofauna diversity
- Macrofauna abundance, ind m^{-2}
- Macrofauna biomass, g m^{-2}

No visual information
No continuous information
Destructive method

Task 2: to select sampling sites for monitoring program

The benthic habitat map derived from the task 1 will enable the selection of the optimal sampling site net and sampling methods for monitoring the status of main habitat types in the lake

Special needs:

accommodation

logistic

engine boating permission and possibilities

The habitats mapping is possible to begin in June till August

ACTIVITY No. 4

Zebra mussel (*Dreissena polymorpha*) cultivation as a tool for controlling eutrophication in lakes and its remediation

The survey will be performed in selected lake of Žemaitijos NP

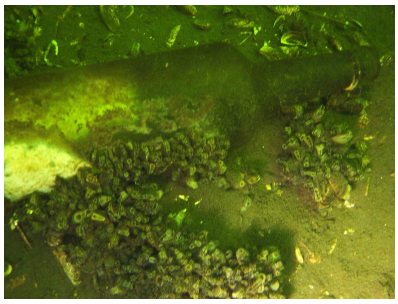
Main tasks:

✓ To analyze the environmental conditions with regards to ecological and economic threats and benefits of the zebra mussel aquaculture development in small water basin; (in Lake Palteliai)

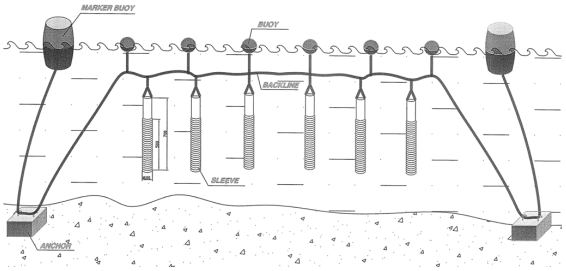
✓ To analyze the zebra mussel cultivation technology and application for lake ecosystem

Zebra mussel cultivation

Zebra mussels need a solid substrate for their development

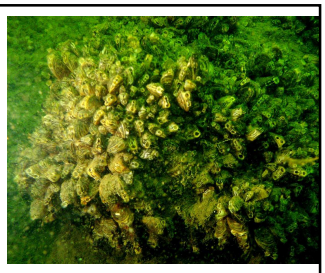


Zebra mussel cultivation



The cultivation facilities will be constructed as the experimental long-line mussel farm prototypes comprised of eight sections (not less than 2 m each), each including at least 6 cylindrical collectors (not less than 100 m diameter and 700 mm height).

Outputs:



Summary of the analysis of the potential of zebra mussel aquaculture development in small eutrophic lakes;

Assessed impact of the zebra mussels utilization: environmental quality improvement and socio-economic benefit

Special needs:

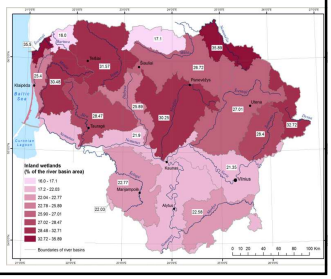
Close collaboration with the administration of Žemaitijos NP in order to perform correct decisions while choosing properly water basins for cultivation of zebra mussels.

Specific assistants will be necessary during constructing and installing the cultivation facilities

analysis the environmental condition and zebra mussel development assessment will be performed in parallel investigation with activity No 3 in June till August;
Zebra mussel cultivation is to perform not latter than in April 2013

ACTIVITY No. 5

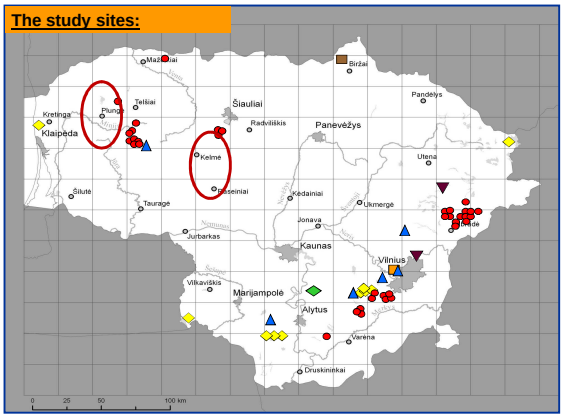
Assessment of wetlands role in regulation of water quality in lakes of the protected nature areas



Main objectives:

- To study hydrographic network and structure of wetland in the basin of lake;
- To study the use catchment land and forest' impact on water resources of lake.
- To investigate the balance and turnover of lake water.
- To study the quality of lake water (major ions, nutrients and organic matter)

The study sites:



Results

- The assessment of the wetland impact on lake water balance;
- The assessment of wetland impact on change of lake water quality.

Thank you !