

Ecological status of macrophytes in Lake Viljandi (Sammuli)

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Aim of the study

The purpose of the expedition was to evaluate the ecological status of plants (macrophytes) in Lake Viljandi near Sammuli Holiday Village.

Study site

- The transect was in Lake Viljandi near Sammuli Holiday Village, Estonia.
- The length of our study site was 150 meters.
- The coastline is mostly artificial and it is connected to Lake Viljandi by a channel.



Figure 1. Our transect

Research question:

What is the ecological quality of the macrophytes near Sammuli Holiday Village?

Hypothesis:

The water quality (according to macrophytes) is rather poor because the shoreline is artificial.

Methods

All fieldwork was conducted on 12 August 2020. We first identified the plants growing in our area.

We then assessed the cover of the plants using the Braun-Blanquet scale (Table 1; Braun-Blanquet, 1927).

Table 1. Braun-Blanquet scale (Braun-Blanquet, 1964) for assessing macrophyte coverage.

+	< 5 %; few individuals
1	< 5 %; numerous individuals
2	5 - 25%
3	25 - 50%
4	50 - 75%
5	75 - 100%

After determining the plant coverage, we assessed different parameters of plants according to the EU Water Framework Directive and Estonian Standards (Assessment ..., 2020; Figure 3). These standards are used to determine the water quality.

We assessed six quality indicators:

- Maximum depth of the plants
- Plant community
- The abundance of *Potamogeton* (pondweed)
- The abundance of *Chara* spp.
- The abundance of *Ceratophyllum* (coontails)
- The abundance of *Cladophora* (green macroalgae)



Results

• Ecological status of macrophytes

The most frequent plants are Yellow water-lily, *Carex* spp. and Bulrush which form a continuous zone at the investigated transect.

The results for quality indicators and assessment scale with values in the research site can be found in Table 2.

By an arithmetic mean we can tell that the average water quality is moderate.

Table 2. Quality indicators and their values

Quality indicator	Unit	Value
Max depth of the plants	m	2,1 (moderate)
Plant community		<i>Nuphar lutea</i> = <i>Carex</i> spp. = <i>Schoenoplectus lacustris</i> (moderate)
Abundance of <i>Potamogeton</i>	Braun-Blanquet scale 0-5	1 (moderate)
Abundance of <i>Chara</i> spp.	Braun-Blanquet scale 0-5	0 (poor)
Abundance of <i>Ceratophyllum</i> (coontails)	Braun-Blanquet scale 0-5	1 (good)
Abundance of <i>Cladophora</i> (green macroalgae)	Braun-Blanquet scale 0-5	3 (poor)
Ecological status of plants (Average of quality indicators)	Scale 1-5	3 (moderate)

• GLOBE Data

We made atmospheric observations using the GLOBE protocols. We observed the clouds, measured the precipitation, temperature, air pressure and humidity.

The minimum temperature during our observations was 12.8 °C and the maximum temperature was 20.6 °C. The air pressure was 1020 hPa and the humidity was 39%. The cloud coverage was 50-90% and the cloud types that we observed were altocumulus and stratocumulus. There was no rainfall during our observations.

Conclusions

Number of indicator species are declining in the areas of strong human impact. *Chara* spp. were missing and Bryophyta abundance was very low.

In conclusion the ecological status in our research area was moderate.

