ecoTech application report

Water quality

Monitoring the water quality of lakes using measuring buoys and EXO multi-parameter probes in Lower Saxony

Measuring water quality parameters, including blue-green algae and chlorophyll to monitor the water quality of Lake Steinhuder and the Dümmers.

Lake Steinhuder and the Dümmer are the two largest lakes in Lower Saxony. As Special Areas of Conservation (SAC), they are important nature reserves and offer people opportunities for water sports and local recreation.

In order to measure the chemistry and water quality of the two shallow lakes, the Sulingen office of the Lower Saxony State Office for Water Management, Coastal and Nature Conservation (NLWKN) uses measuring buoys with YSI EXO multi-parameter probes. The buoys sit in the middle of the lake, where representative data is collected and transmitted via a data logger, providing the NLWKN an overview of the current water quality in the two lakes. The measuring buoys monitor pH, conductivity, temperature, oxygen, chlorophyll a and blue-green algae.

Fig. 1: Measuring buoy on Lake Steinhuder Meer. The red flag makes the measuring buoy visible to sailors even when the waves are high. Source: NLWKN

Fig 2: 'Measuring buoy 50' (left) and 'Measuring buoy 150' including three solar panels (right) Modification on customer request are possible Source: ecoTech

Chlorophyll a and blue-green algae data is important, particularly in regard to the use of the lakes for swimming, allowing the authorities to detect concentrations of blue-green algae or cyanobacteria, both dangerous to humans and fauna, at an early stage. As public safety is a major concern, the NLWKN closely observes phytoplankton development, which also includes blue-green algae, in its investigations.

The measuring buoys consist of a weather-resistant PE foam core that is attached to a stainless-steel frame. With a waterproof lid, the measuring buoy has a protected cavity for instruments and data transmission technology. At the request of the NLWKN, the buoys were modified to accommodate a data logger with power supply. The green colour was also a special request, as local water sports enthusiasts were concerned about the original yellow.

The measuring buoys are each equipped with an EXO 2 multi-parameter probe from YSI. With up to six sensors, the probes can deliver a wide range of water quality data. The central wiper prevents biofouling by gently removing deposits and growth from the sensors. This means that the measured values remain stable and reliable for extended periods of time.

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The measured values of the multi-parameter probe are regularly checked by the NLWKN by means of comparative measurements on site in order to guarantee the quality of the data. A monthly maintenance and calibration cycle has proven to be sufficient. The ease of maintenance of the EXO probes is a great advantage and valued by the client. In addition, individual sensors, with calibration data already saved, can be easily exchanged on site, as they work with digital transmission.

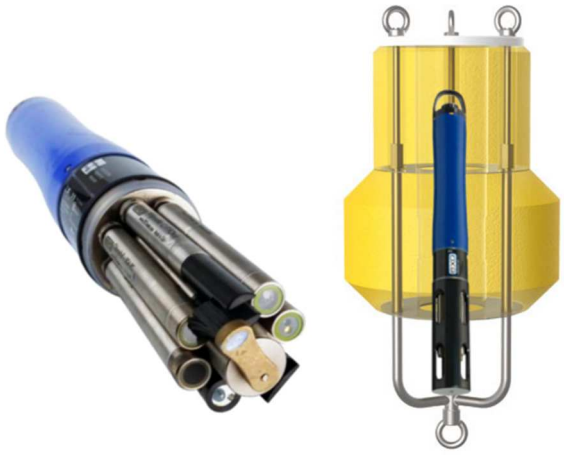

Fig 2: YSI EXO2 multi-parameter probe with central wiper against biofouling during long operations (left) and schematic representation of a measuring buoy 50 equipped with an EXO2 multi-parameter probe. Source: ecoTech

Equipped with this robust and powerful measurement technology, the NLWKN can observe and compare the seasonal course of the phytoplankton development and other water chemistry quality parameters over the monitoring period. Important measured values include photosynthetic oxygen production and the nocturnal oxygen consumption of the flora occurring in the lake. Important changes and processes in the lakes can also be seen from the other measured values. The evaluations showed that the two lakes, despite their morphometric similarity, show different compositions of the seasonal phytoplankton community.

In 2018 the NLWKN will deploy a third measuring buoy on Lake Zwischenahner, giving the NLWKN a good overview of the three largest lakes in Lower Saxony and

Fig 4: Released measuring buoy in the Dümmer See. The lake is a maximum of 1.5 m deep and the Hunte flows through it. Source: NLWKN

thus optimally protecting water sports enthusiasts, residents and the natural environment to ensure the water quality in the long term.

Area of application: Long-term, continuous water quality measurement on inland waters with a measuring buoy, equipped with a multi-parameter probe and data logger.

Devices used: modified measuring buoy 50, YSI *EXO2 multi-parameter probe*, YSI *Sensor temperature and conductivity*, YSI *Sensor pH*, YSI *Sensor optical oxygen*, YSI *Total algae sensor* (measures chlorophyll a and BGA), data logger with remote transmission

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Learn more:

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