Copernicus for water quality assessment & status classification in Sweden

Petra Philipson - Brockmann Geomatics Sweden AB
Some first conclusions....

...there is a strong need for complementary data to support national monitoring needs, to formulate measures and restoration plans and to monitor the result of the implemented measures...

...additional European status assessment requirements related to e.g. WFD, MSFD and HELCOM further increase the demand for spatially and temporally increased measurements...

...EU member states have made significant investments in the Copernicus program, but the data and products are presently under exploited...
The Swedish WFD case

- 49 789 lakes...
  ...but fortunately only 7452 lakes/water bodies must be classified
- 654 coastal water bodies
- 19 open coastal water bodies

...and a responsibility for the open Baltics Sea, shared with all other neighbouring countries
For the Water Framework Directive (WFD), lakes larger than 50 ha (0.5 km²) have to be monitored for assessing their ecological status.

The status of a lake is presented in terms of an “Ecological Quality Ratio” (EQR) which indicates the deviation from a reference value and which should be comparable to other lake of the same type.

**EO support 1 – Define water bodies**

**EO support 2 – Determine the lake type for each lake**
WFD – Definition of water bodies

In 2016, the County Board of Norrbotten checked and revised their coastal water bodies based on EO data (MERIS).
WFD – Determination of lake type

Lake type

- Eco-region
- Size and maximum depth
- **Level of humic substances**
  - *Clear lakes, CDOM ≤ 2 m⁻¹*
  - *Humic lakes, CDOM > 2 m⁻¹*

These types are already defined for all European lakes.
WFD – Estimation of humic level

Sentinel-3, 2016-05-04
WFD Status classification – Quality factors

**Biological factors**
- **Phytoplankton** - *Phytoplankton are photosynthesizing microscopic organisms.*
- **Macrophytes** - *Aquatic plants that grows in or near water and is either emergent, submergent, or floating.*
- **Benthic fauna** - *Animals that live at the bottom surface, which is mainly crustaceans, insect larvae, worms, clams and snails.*
- **Fish**

**Physical-Chemical factors**
- **Nutrients**
- **Secchi Depth**
- **Oxygen**
- **Acidification**
WFD Status classification – Quality factors

**Biological factors**
- Phytoplankton
- Macrophytes
- Benthic fauna
- Fish

**Parameters and Indices**
- Total Biomass
- % Cyanobacteria
- Trophic plankton index (number of key species)
- Number of species
- Chlorophyll

**Physical-Chemical factors**
- Nutrients
- **Secchi Depth**
- Oxygen
- Acidification

**Parameters and Indices**
- Secchi Depth
WFD 2013 - Chlorophyll a

During 2013, EO based Chl a and SD estimations was used for the first time as an official source of data in the WFD status classification of the Swedish coastal water bodies.
WFD 2013 – Chlorophyll a

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Applera Aspöfjärden

Daily Chl a → Daily EQR → 3yr EQR → Status

Brockmann Geomatics Sweden AB
WFD 2019 – Chlorophyll a

Delivery of EO based estimations next week...
WFD Status – 2019 – **Lakes**

No official assignment to deliver EO based estimates to support the status assessment for lakes...but we are preparing...

**CyanoAlert**

Space Based Cyanobacteria Information & Services
Discussion

• Copernicus data is used for several applications in several countries, but the EO based services provided are presently on a rather minimal level...

• National legislations and guidelines need revision in order to open up for EO based products

• The parameters and indices are established for in situ data and needs to be complemented, revised or replaced
Thank you!

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