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The Hanöbukten ecosystem is part of a complex network of interactions at multiple temporal and spatial scales and reflects many structural and functioning aspects common to marine ecosystems such as species interactions, food web dynamics, and environmental/climate forcing. Ecosystems are adaptive systems and have emergent properties therefore is complex to predict changes at different level of organization.

The report provides a summary of observations and hypotheses regarding recent changes in the state of the environment. However, the information is scattered and further work is needed to shorten the list of plausible explanations and synthesize the evidence of hypotheses that cannot be rejected.

In particular further attention should be given to address the role of autotrophs and marine microbes in relation to thiamine dynamics and thiaminase activity in pelagic foragers e.g. clupeids. In this respect HMI is currently developing a food web model that includes thiamine dynamics across trophic level to detect potential mechanisms that may be responsible for the physiological poor conditions of cod population in the Hanöbukten. Therefore further considerations may be given to the following aspects:

- *Thiamine food web model (HMI).*
- *A growth model for cod combining physiological parameters that may be related to the decrease in cod condition, including diet composition.*
- *SMHI predictive model for cyanobacteria blooms and the relation to thiamine concentrations and availability to other trophic level, in liaison with HMI food web model project.*

- *The information that the ICES WGIAB provides is relevant, however the information should be combined with the work of the ICES Working Group on Multispecies Assessment Methods (WGSAM). This aspect may be relevant for further understanding of the Hanöbukten ecosystem dynamics since within WGSAM multispecies assessment models are evaluated for the Baltic Sea.*

Changes in the riverine input of organic matter and the evidence of brownification of freshwater and seawater is another aspect that deserves further attention. HM has recently, together with scientists from SMHI and SLU, finalized a critical review of nitrogen and phosphorus carried by Swedish rivers, and that study could be augmented with a review of chemical parameters related to organic matter (TOC, COD, and absorbance in river water and secchi depth in sea water).

We are grateful to have had the opportunity to comment on this report and look forward to future interactions, thank you.

Yours sincerely,

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