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Broadening the perspective on seafood production

Life cycle thinking and fisheries management

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Abstract

Decisions made by fisheries managers strongly influence the overall resource use and environmental impacts associated with the seafood product from capture fisheries. These findings come from Life Cycle Assessments (LCA), a method that aims at quantifying all relevant resource use and environmental impacts throughout the life cycle of a product. In this way, important hot spots or improvement potentials can be found. The integrated systems perspective can assist to avoid shifts in impacts between production phases or environmental concerns. LCA is at present a well-established tool to assess environmental impacts of products, but there is no uptake of LCA-based methods or results in fishing policies.

Methods for assessing fisheries-specific impacts within the LCA framework are however incomplete. One part of the research therefore addressed indicators related to pressures on marine ecosystems from discard to be used in seafood LCAs. Swedish fisheries on the west coast were evaluated using the trophic indicators mean trophic level (MTL) and primary production required (PPR). PPR could to some extent reflect properties of ecosystem resource use as PPR from the total catch, including discards, varied considerably between fisheries. Still, it was shown that it is difficult to interpret both indicators in relation to what is known about the ecosystems and the desired properties of the metrics. Complementing metrics of potential pressures on biodiversity are needed. The Swedish IUCN Red List of Threatened Species for fish was evaluated for this purpose. The Red List was found to be coherent with other assessments of vulnerability of fish to exploitation. Different fishing practices also showed different pressures on threatened fish species (aggregated as VEC). VEC together with PPR may thus be used in seafood LCA.

Another part of the research explored LCA-based approaches as integrated decision support to form an overall sustainable fisheries management. Studies comprised of Swedish demersal trawling fleets. In the *Nephrops* fishery, a trade-off was found from promoting species-selective trawls. Local protection of depleted fish stocks comes with an increase in seafloor area swept, fuel use and associated emissions per landed kilo. Even if the overall fuel efficiency of the Swedish demersal trawling fleet has improved between 2002 and 2010, selective trawling required higher fuel use per kilo landing than the equivalent of less selective practices. Improved fuel efficiency was seen from stock rebuilding of the Eastern Baltic cod. However, in another study, the situation of the Eastern Baltic cod fishery was found to have deteriorated in recent years. Selection towards larger size classes has resulted in detrimental ecological consequences, reverberating into poor fish yield and economy. If overall improvements of the present situation are sought for, fisheries management needs to decrease mesh size and effort in the Eastern Baltic cod fishery, as well as include more metrics to assess sustainability.

LCA-based methods can provide integrated decision support to inform various seafood policies, and integrate more objectives than is currently done in a fisheries policy context. To foster an overall sustainable seafood production, fisheries managers however need to acknowledge their role in this development. Altogether, stronger effort cuts and shifts in gear are proposed, while stressing the importance to use LCA-based assessments in order to avoid shifting from one environmental pressure to another.

Keywords: LCA, *Nephrops*, fuel use, Eastern Baltic cod, fisheries management, threatened species, trophic indicators