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Editorial Open Access

Fake News Mussel Farming A "New Climate Bomb"

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Editorial

An article about mussel farming being a "new climate bomb" was recently published in a Danish news magazine for engineers (Ingeniøren, 18 Oct 2017). Subsequently the story has been cited in a number of other media, causing concerns among mussel farmers. The story is based on exaggerated press releases from Stockholm and Cardiff universities. But it is fake news that must be counteracted.

The original article by Bonaglia et al. [1] is based on good research, but it contains no scientific evidence of the excessive information contained in the press releases produced by apparently media-inexperienced researchers in collaboration with sensational information officers employed at the two universities. It is true that methane is a strong greenhouse gas [2], but now it is claimed that bivalve farming may have an serious effect on climate, because mussels are "important contributors of methane, due to bacteria in their gut"[3].

While it is reasonable to assume that mussels, as the Baltic clams originally studied [1], may possibly produce methane in their intestines, it should be realised that much more methane is produced in the seabed (sediment) [4]. The ventilating activity of burrowing polychaetes, clams and other invertebrates (bioturbation) implies that oxygen is brought into the sediment while methane-containing water is pumped up into the water column.

Mussels that may have some methane production in their intestine have always lived in the sea and produced methane. But this methane production is negligible in relation to the total methane production in the sediment [5-9]. The methane (CH_4) released from the seafloor does not reach the atmosphere, because it is oxidised to CO_2+H_2O by methanotrophic bacteria in the water masses [9], and the methane production of bivalves has always been part of the well-known biogeochemical cycle of methane. Exceptions to this are very restricted areas where methane, partly produced during earlier geological periods, is directly bubbling out of the seabed.

Present and future mussel farms contribute only little to the naturally occurring large numbers of bivalves and other invertebrates, for example in the Great Belt where there is a potential for a large scale environmentally friendly production of 'mini-mussels' [10]. Filter-feeding line mussels will consume some of the primary production which would otherwise settle and contribute to methane production in the sediment. Mussel farming will also cause a larger proportion of primary production to degrade under oxygenated conditions, instead of being degraded without oxygen in the sediment.

Under no circumstances is mussel farming a "new climate bomb".

Recently, the Danish government adopted new rules that allow new marine aquaculture to be established for fish farming in net cages. It only requires that the fish farmers can demonstrate compensatory measures that remove the nutrients (nitrogen and phosphorus) that fish farms emit to the sea. The most debated solution to prevent increased eutrophication from future expanded fish farms (rainbow trout, *Oncorhynchus mykiss*), is compensatory farming of blue mussels (*Mytilus edulis*) suspended on ropes or nets in the water column. The mussels filter the water for phytoplankton, and in this way N and P become stored in the mussels, and when the mussels are harvested the nutrients are removed from the marine environment [11]. This politically infected issue implies that the fake news that mussel farms can be a new climate bomb has rapidly been spread by particularly many Danish media. Thus for example it has been stated that (citation, translated from Ingeniøren 18 Oct 2017): "the Danish government's plans to allow more aquaculture in the Kattegat risk not only to affect the local marine environment. It can also turn out to be bad for the climate. This is the warning from researchers from the universities in Stockholm and Cardiff. For the first time, they have shown that naturally occurring mussels and worms in the Baltic Sea emit large amounts of methane, which, as greenhouse gas, acts 34 times stronger than CO_2."

Finally, we want to emphasise that we have no conflict of interests related to the mussels and fish aquaculture industry, but we think that fake news must be contradicted by scientific facts.

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