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Implications of aquaculture policy and regulation for the development of Integrated multi-trophic Aquaculture in Norway

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Atlantic salmon is the most important farmed species in Norway, contributing 93 % of the total aquaculture production in 2011 (DoF, 2011). Underpinning Norwegian aquaculture policy is 'The strategy for an environmentally sustainable Norwegian aquaculture industry' (Ministry of Trade, Industry and Fisheries, MTIF, 2009) which focuses upon five key problem areas: genetic interaction and escape, pollution and emissions, disease, utilization of area, feed and feed resources. A change from monoculture towards integrated culture of several species from different trophic levels, also known as Integrated Multi-Trophic Aquaculture (IMTA), could offer a solution to some of these problems. This paper aims to identify the regulatory and stakeholder structure challenges for the development of IMTA in the present aquaculture industry and recommendations are proposed for possible implementation of IMTA systems at a commercial scale in Norway.

Methods

Rapid policy network mapping (RPNM) (Bainbridge, Potts, O'Higgins, 2011) was used to identify relevant legislation on EU and Norwegian level relating to aquaculture. These data were combined with a desktop study of peer-reviewed and 'grey' literature to define the existing procedures for planning and operating in aquaculture. The stakeholder analysis is conducted through stakeholder identification and power vs interest grid and actor linkage matrix.

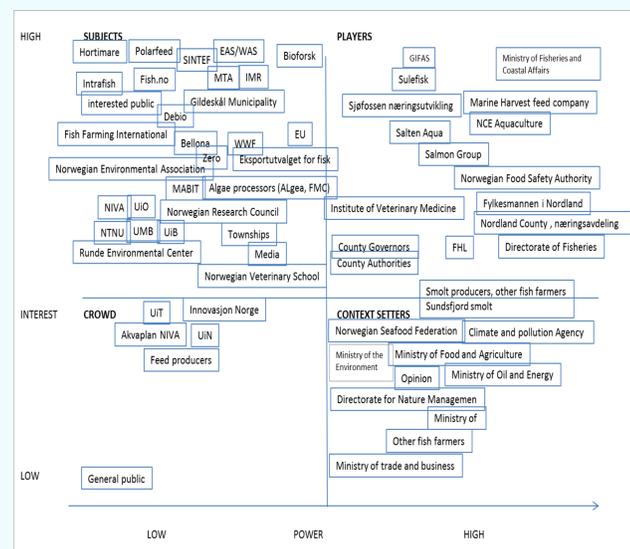
Results

Norwegian aquaculture is highly regulated and controlled. The Ministries and Authorities involved are:

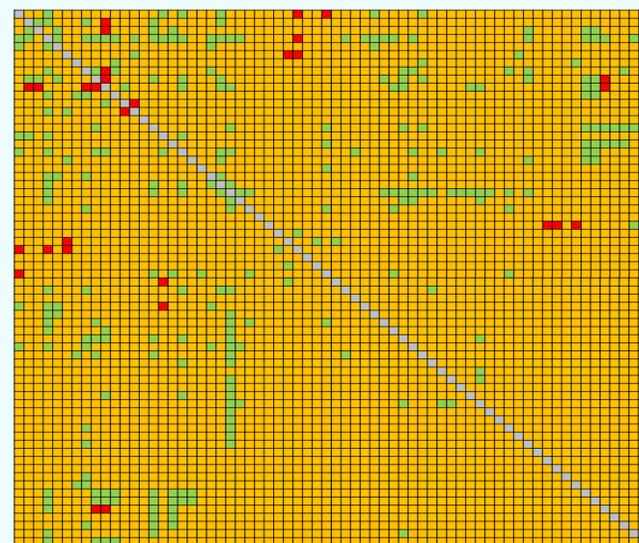
- The Directorate of Fisheries, an agency within the Ministry of Trade, Industry and Fisheries,
- The Ministry of the Environment, Petroleum and Energy,
- The Agriculture and Food and Health and Care Services (MHCS) in which The Norwegian Food Safety Authority is involved with fish health and welfare and food safety.

The production must conform to

- The Aquaculture Act 2005,
- The Food Safety Act 2000,
- The Nature Diversity Act 2009
- The Act on planning and building regulation 2008
- The Pollution Control Act 1981
- The Act on Ports and Waterways 2009
- The Water Resources Act 2000
- The Cultural Heritage Act 1978



Power versus interest grid for IMTA stakeholders



Actor-linkage matrix showing relationships between IMTA stakeholders (red:conflict, amber:complementary relationship, green: cooperation)

Conclusions

- The large majority of relationships between Norwegian IMTA stakeholders are viewed as being complementary or compatible in terms of their interests. There are few conflicting and none unco-operative relationships.
- No specific regulations exist for integrated aquaculture, even the IMTA principles have been described for environmental friendly production in the recent round of permissions for aquaculture.
- The development of IMTA in Norway will depend on active engagement of stakeholders at all levels to better facilitate the commercialization of IMTA, creating the appropriate regulations adjusted to integrated systems and allowing for aquaculture of multiple species at one location.
- The implementation of IMTA from experimental to mainstream practice will be a dynamic process and will change in response to the policy and market drivers.

We recommend the following actions for moving IMTA through all phases of the supply chain and to the consumer:

- IMTA operators should continue to monitor and engage with key stakeholders.
- Resources should be focused on maintaining the interest of stakeholders and increasing their engagement, to improve information sharing, innovation, and potentially generate new resources for IMTA development.

References: DoF, 2011, www.fiskeridir.no/statistikk/ accessed February 2014; MTIF (2009) <http://www.regjeringen.no/upload/FKD/Vedlegg/Diverse/2009/strategy%20for%20an%20sustainable%20aquaculture.pdf> [accessed 24 April 2013]; Tiller, R., Brekken, T., Bailey, J., 2012. Marine Policy, 36 (5): 1086-1095.

