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Special Session Report:

Sustainability of fisheries and aquaculture: the multidisciplinary approach as a key for success: an active discussion

Transdisciplinary research towards fisheries and aquaculture: a road to sustainability and social acceptance

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Authors: Ravagnan, Elisa¹; Gjerstad, Brita²; Provan, Fiona¹; Gomiero, Alessio¹; Hynes, Stephen³; Lestariadi, Riski Agung⁴; Charles, Anthony⁵; Rodriguez Rodriguez, Gonzalo⁶; Timor, Julien⁷; Wakamatsu, Hiroki⁸; Adhuri, Dedi Supriadi⁹; Imran, Zulhamsyah¹⁰; Le Gallic, Bertrand¹¹; Salas, Silvia¹².

¹ International Research Institute of Stavanger, Environment Dept., Stavanger Norway

² International Research Institute of Stavanger, Social Sciences Dept., Stavanger Norway

³ SEMRU (Socio-Economic Marine Research Unit), Whitaker Institute, National University of Ireland, Galway

⁴ Graduate School of Biosphere Science, Hiroshima University, Japan

⁵ School of the Environment and School of Business, Saint Mary's University, Halifax, Canada

⁶ Dept. of Applied Economics, University of Santiago de Compostela Spain

⁷ Ifremer, Univ Brest, CNRS, UMR 6308, AMURE, Unité d'Economie Maritime, IUEM, F-29280, Plouzane, France

⁸ National Research Institute of Fisheries Science, Yokohama, Japan

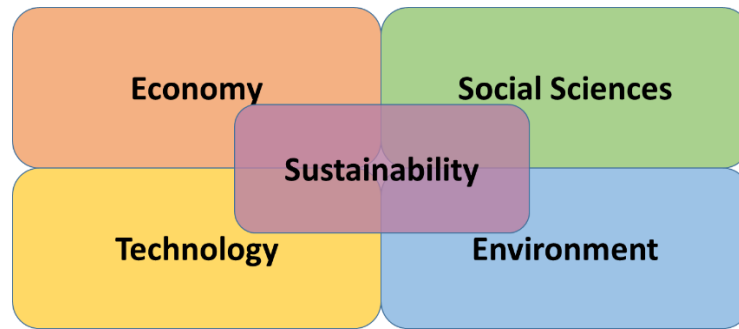
⁹ Research Centre for Society and Culture (PMB), Indonesian Institute of Sciences, Jakarta Indonesia

¹⁰ Blue Carbon Consortium, Bogor, Indonesia

¹¹ Université de Bretagne Occidentale – UMR AMURE, Brest, France

¹² National Polytechnic Institute, Marine Resources Dept., Mérida México

It is foreseen that fisheries and aquaculture can provide valuable proteins and other nutrients to the ever-growing global population. However, the sustainability of aquaculture/mariculture is a matter of concern and can be a limiting factor with regards to further expansion of seafood production. With the increasing focus on sustainability, it is also relevant to ask how aquaculture and fisheries can contribute to the developing “Blue Growth”, where renewable resources, sustainable exploitation of natural resources, societal development and innovation are key features. To achieve sustainability multiple aspects must be considered, like economic revenue, ecosystem carrying capacity and social attitudes towards the industry, good environmental standards and technological development. The multiple use of the marine areas creates conflicts among activities and stakeholders in the coastal areas (among others: small-scale fisheries, aquaculture, tourism, special protected areas, marine renewable energy).



For these reasons, the increasing and diverse use of the marine resources calls for a holistic approach to seafood management that combines environmental, social and economic aspects for achieving sustainable development. Environmental aspects are important since seafood production uses natural resources and interacts with the environment. The use of natural resources must be performed efficiently, minimizing negative environmental impacts. Social aspects should be considered, among other reasons because the public plays an important role as consumers and in supporting reforms, and because the perception of aquaculture is entangled in social acceptance issues. Economic aspects can be evaluated on local, regional and international levels, as fisheries and aquaculture represents jobs and incomes from export and taxes. On the technical side, the effective use of waste and by-products as raw material in other processes may implement sustainability by both increasing profit and reducing environmental impacts.

The traditional sectorial approach has not been successful in marine management, with its tendency to favour one sector over others. There is clearly a need for integrated, adaptive and participatory solutions, as required by the Ecosystem Based Management Approach.

A special session at the IIFET conference in Aberdeen 2016 was directed to discuss the relevance to incorporate a multidisciplinary approach towards sustainable seafood production. Talks were presented dealing with economic, social, environmental and technological challenges from a holistic point of view. The session has been inspired by a project developing novel socio-environmental indicators and management tools for sustainable aquaculture (<http://www.iris.no/research/environment/aquaaccept>), financed by the Norwegian Research Council. The focus of the project is to apply a transdisciplinary approach to map and understand interactions in the activities based on marine areas.

The contributions presented at the session were chosen by the conveners to give an overview of the different transdisciplinary aspects that must be considered when dealing with fishery and aquaculture, as well as when evaluating the interactions between them and other activities present in the area. Here a very short summary of the presentations and the keywords inspiring the discussion.

Anthony Charles. *“Linking sustainable fisheries and biodiversity conservations: transdisciplinary approaches to governances”*. Keywords for the discussion:

- Interaction of fisheries and marine biodiversity conservation underlies many conflicts in fisheries and aquaculture, and is at the heart of many policy, regulatory and development challenges
- Governance at different levels of the resource system is essential, to recognize local to large-scale dynamics
- Integrated and holistic approaches to the problem of managing fisheries and aquaculture lead to productive integration of regulations.

Julien Timor. *“The vulnerability approach as economical analytical framework to assess aquaculture sustainability”*. Keywords for the discussion:

- Assess the impacts caused by changes in socio-ecosystems that are often linked to large external natural events.
- Investigate how transformations caused by events could spread within an industry according to the sensitivity and adaptive capacity of the industry and its companies

Hiroki Wakamatsu. *“An analysis of introducing unspawned oysters in Japan using a contingent valuation method and analytic hierarchy process”*. Keywords for the discussion:

- Consumer preferences and how they can influence the aquaculture industry

Riski Agung Lestariadi. *“Coping up with the risk, increasing sustainability: strategies for small-scale shrimp farming in Indonesia”*. Keywords for the discussion:

- Analysis the risks connected with small scale shrimp aquaculture
- Analysis of ex-ante and ex-post strategies for the industry sustainability

Gonzalo Rodriguez-Rodriguez. *“Overfishing and no substitution between wild and farmed fish. Lessons from the European seabass”*. Keywords for the discussion:

- Market interactions between wild and farmed fish
- It is not possible to generalise substitutability (lesson from for the sea bass, sea bream and turbot)
- Analysis of the possible relation between sustainable fishery and sustainable aquaculture considering this pressure vector.

Dedi Supriadi Adhuri. *“Complementing the conventional approach to fisheries which tends to focus on resources with livelihoods approach that see the people’s perspectives, needs and interest to the resources and marine ecosystem”*. Keywords for discussion:

- Community perspective,
- Combining management and livelihood approach.

An active and complex discussion started at the end of the special session, among the session conveners, the session participants and the audience.

Summary of the themes touched during the discussion:

- Sustainability aspects: Considering the gaps between the developed world and developing countries, it can be noted that, given different economic and developing conditions, countries may have different targets for economic-environmental-societal sustainability. The sustainability concept seems to enforce more stringent requirements in developed countries (towards the environment, for example), where industrial growth and welfare are reaching a high level, while in developing countries social and economic aspects could be the prioritised ones. To use sustainability as a tool to protect the environment without discouraging industrial growth and societal welfare, there is the need to increase the knowledge of the local societies while applying protection rules with some temporary elasticity. Yet, sustainability aspect must refer to sustainable development goal.
- Information-knowledge: Researchers and scientists have the instruments and the unique opportunity to investigate specific environmental, economic and societal aspects and it is their responsibility to report results. This responsibility includes finding the most appropriate way to communicate these results, taking in to account that scientific language appears awkward or poorly understandable without specific backgrounds outside Academia. At the same time, the knowledge of people working “in the field” must be valued and taken into consideration, since it represents the direct experience and the “practical” side of the industry and its issues.

- Choices: It is assumed that the increased knowledge will guide consumers and retailers to more ethical choices, hence forcing the industry (fishery and aquaculture in our case) to more sustainable behaviour. This might not be true when people lack realistic choices, for example in cases of poverty. Ethnic, cultural and geographic related habits influence the market demand, which in turn influences the type of environmental impacts. Increase in demand of products and changes in markets can also drive the level of exploitation of resources. Labelling of products, fair trade and organic certification are tools to promote a sustainable market but nowadays the proliferation of eco labels appears as a confounding factor for end-users in the European market. The eco labelling system appears to be difficult to follow up in developing and/or poor countries both because of different priorities (survival, food production, availability of resources) and because rules are set up by / for industrialized and rich countries. Besides, sustainability can be part of bigger challenges like poverty or unequal distribution of health and welfare.
- One size doesn't fit all: There cannot be a unique "recipe" for sustainability since people live under different conditions and have different perceptions of economic, environmental and societal topics. The "one size fits all" solution cannot be applied everywhere: we need to understand the background of every situation before acting.

In conclusion, the participants to the discussion agreed that the transdisciplinary approach is the best way to tackle problems presenting this degree of complexity. While general guidelines must be developed for the sake of equality, the specific requirements of each case should be considered before acting; the top-down and bottom-up approaches should be mediated in a true participatory process that collects the best knowledge in every field and give the most appropriate solution for the problem at hand.

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