

# Sustainable Aquatic Food Supply

## Guidelines for an Interdisciplinary Research Program

Short version, compilation date: 01.07.2013



Photo: Bruno de Giusti, Wikimedia Commons

**Klaus Lucas, Peter Roosen**



Supported by the Volkswagen Foundation

## Contents

<b>1 Introduction</b>	<b>2</b>
<b>2 Interdisciplinarity</b>	<b>3</b>
2.1 Global Perspectives . . . . .	3
2.2 Detailed Interdisciplinary Research Suggestions . . . . .	4
<b>3 Methodological Aspects</b>	<b>5</b>

## 1. Introduction

Throughout history oceans have been important to human civilization. They are important factors in the earth's weather and climate systems, serve as a major route of human dispersion, trade and transport, provide important natural resources and represent a significant contribution to recreation and tourism in our days. A particularly important ocean utilization is the **harvesting of oceanic bio-resources for human nutrition**, such as fish, crustacea, seaweed and a range of others. Global seafood production, by wild catch or mariculture, is the world's biggest single source of protein: presently about 20% of the total animal proteins used in human nutrition stem from fish. The demand for fish and seafood in general increases at a considerably faster rate than is to be expected from the world's population increase. To match this increase, the prevailing global crisis of overfishing needs to be resolved, potentially by utilizing the means of aquacultures in an even more frequent way. The historic assumption of an unexhaustible richness of marine resources (as a precondition of the historic Law of the Sea) has proven to be a fatal misinterpretation of reality, especially so in the light of modern fishing techniques. The fishing intensity led to an extreme selection pressure on certain species with the consequence of evolutionary changes and severe impacts on marine food webs, leading to imbalances which may be irreversible.

A variety of international, multilateral and bilateral negotiations on matters of ocean utilization, especially with respect to fisheries exploitation, has resulted in a multitude of respective treaties to bar non-sustainable over-exploitation and unregulated access to the oceanic commons. The sheer existence of these treaties indicates that a general political will of cooperation, an attitude of environmental conservation and a basic support of the notion of sustainability does exist world-wide. But as of today they have a very limited effect on over-exploitation.

With a multitude of interdependent effects and interests at play the marine resource sciences are a perfect example of an area in which **international and interdisciplinary collaboration** in research programs is of crucial importance. International research structures already exist at the European level. However, they are essentially organized along the classical scientific disciplines with little interdisciplinary interaction. For optimum benefit of the societies and a broad consideration of the full spectrum of concerns it is essential that findings from disciplines such as **engineering, biology, physical oceanography** interact with insights developed in the **social sciences and the humanities, such as sociology, economics, law, history and philosophy**. **Even art and literature** may contribute as there are lots of works related to marine affairs, reporting the attitude of people towards the sea. Together these and other disciplines provide sources of knowledge for organization and guidance of fishing and mariculturing activities. At this time it is not clear how multidisciplinary or even interdisciplinarity in this sense can effectively be integrated in the research programs.

There is an urgent need to improve understanding of the processes at work, balancing risks and benefits, and provide policy-makers with sound scientific advice on how to operationalize the nutrition from the sea best and ensure its sustainable availability for the future. The sought scientific advice must not be overshadowed by the suspicion of partiality and inclination to a certain subset of stakeholders. Therefore a new approach was tested: to let an academy of

sciences and humanities, which is by principle geared to and experienced with the generation of interdisciplinary discussion of a topic, organize an interdisciplinary discourse that identifies and reports respective interdisciplinary research objectives.

Accepting the very complex disciplinary interconnection framework as a starting point for an **improved interdisciplinary advance to the target objective “sustainable aquatic food supply”** two possible paths appeared as promising that have been combined into one comprehensive approach:

i) **Identify research topics by stimulated discussion** of engaged disciplinary representatives that are willing to cross their disciplines’ boundaries. The stimulation is performed by calling research suggestions that are requested to contain interdisciplinary aspects, and redistributing these suggestions back to all participants of a subsequent workshop with trans-European participation (Sect. 2.1). The workshop is segmented by a steering committee in a way that inspires cross-disciplinary linking of individual topics. Identified suggestions for further research efforts are collected and summarized.

ii) Evaluate and inspect the individual interdisciplinary research propositions that were collected prior to the actual workshop from every prospective participant. **Extract interlinking thematic suggestions in a more detailed manner** by cross-over analyses, leading to a multitude of area-specific but intrinsically interdisciplinary research suggestions. This path has been taken additionally by the organizers of the workshop (Sect. 2.2).

These approaches serve different needs. If interdisciplinarity in the area of sustainable aquatic food generation is the primordial objective of a new research program the big questions, typically identified by approach i), may create a skeleton of suggestions to be filled by future research applicants with their own individual contributions. If, on the other hand, a more specialized research program with a strong disciplinary backbone should be enhanced and complemented by interdisciplinary objectives to be treated in context, the significantly more detailed and more area-specific extracts from the written research proposals of the participants may well serve as a basis.

## 2. Interdisciplinarity in the Scope of Aquatic Food Research

### 2.1. Global Perspectives

Interdisciplinarity in the research on *Sustainable Aquatic Food Supply* designates intensive reflection and cooperation of MINT-disciplines (especially biology, ecology, control science, information technology, and some further natural and technical sciences) on one side and SSH-disciplines (especially politics, law, history, sociology, ethics, art, and some further humanities) on the other. Those very different disciplines must be combined into a coherent framework of mutual understanding and contentual recognition, with cooperations taking place in all phases of the initiated research processes. The subsequent bullet points summarize the aggregated

discussion results on interdisciplinary research suggestions of the *Sustainable Aquatic Food Supply* workshop participants.

- Create tools to improve communication on production and consumption of seafood that will inform producers and consumers about sustainability issues: How can final seafood products be compared and how can they be backtracked through the whole value chain to establish assessment standards for the different processes of the products? Research on how consumers make choices, and how this can be coupled to production decisions in seafood generating firms, including an analysis of what kind of labelling is sensible to inform the consumers so that they will be able to make educated choices from their own values perspectives.
- Research into spatial, biological, technical, and socioeconomic aspects of sustainable local food supply through combined aquaculture and fisheries activities to identify the drivers of technological development in aquaculture and fisheries concomitant to a change of economic incentives. In how far must locally restricted aquaculture be related to more global attitudes, e.g. by questioning the procurement of fish collected for fish feeding? Research the perspective on sustainability as dependent on the scope of the involved stakeholders.
- The prioritisation of scarce resources, namely aquatic food production areas, coastlines, inland and marine space, requires a fair organisation by management and governance. Accordingly the interconnected questions of ethical, legal and social implications of fair uses and partitioning remain to be transferred into an operative approach, including the question on how fisheries can be adaptively managed balancing indispensable tradeoffs between ecosystem benefits and service provisions. Linked to this objective is the multi-scale governance question on how globally oriented EU regulations both find an expression in the context of local-scale fisheries and aquaculture governance, and allow for local-scale historically evolved structures at the same time.
- Develop a methodology to integrate new scientific findings as well as old passed-on qualitative knowledge into respective models. Derive an adaptive governance approach that relates to new upcoming information and takes the expectedly significant uncertainties into account as appeal to precautionary practical approaches. Find a common language to communicate across disciplinary boundaries.

## 2.2. Detailed Interdisciplinary Research Suggestions

In addition to the general, abstracted research suggestions presented in the last section a plentitude of potential individual interdisciplinary objectives has been identified by scrutinizing and relating the initial research suggestions of the workshop participants delivered in written form. They are **very specific** and reflect to a certain extent the disciplinary foundation and specialization of the respective contributor(s). Nevertheless **two examples** of the more detailed research proposals shall be highlighted that provide a certain comparison of the nature of

global vs. detailed research suggestions: i) the design of an appropriate simulation based scenario system, and ii) the appreciation of culturally very different risk assessment and locally implemented counteraction measures.

The more global approach (Sect. 2.1) described so far predominantly identifies the need, the aim and the limitations of a respective interdisciplinary modelling enterprise. The worked out in-detail suggestions point towards concrete details of a potential implementation of such an endeavor. Defining and explaining the mandatory objectives of **an appropriate future modelling system** (multi-target, open structure, modular, multi-species, explicit naming of modelling limitations, explicit dealing with uncertainties, concurrent disciplinary modelling, inclusion of qualitative targets, ...) the fine-grained research suggestions aim at contouring the scope of suggested research requirements that should be asked for in new transnational and at least partially interdisciplinary invitations for modelling research tenders in the pragmatically defined field of aquatic food generation.

While the mentioned modelling system should incorporate a risk and ignorance assessment the issue of how any identified risk is perceived by individuals within a certain culture and socio-economical situation is a completely different question. Depending on the differing importance of the aquatic food generation branch for any individual European society, but also taking into account its cultural roots and generally acquired views, identified risks and uncertainties are valued differently. In the international context, as well as in local discussions between representatives of different segments of the affected population, **a method of stringently communicating and arbitrating differing mindsets** must be developed. This relates both to the communication of contents, and the underlying mindsets and individual expectations of stakeholders that are engaged into the communication processes, necessitating immediate and accompanying analysing involvement of communication scientists for all layers and all contents of arising discussions and negotiations even if their contents only relate to scientific or technical details.

### 3. Methodological Aspects: Revised Concept of Interdisciplinary Research Topics Generation

Based on former experiences on interdisciplinary research topics identification the present effort was organized as a mostly linear process. By its definition it was strongly oriented towards the personages that could be enthused to participate, and their individual approaches to the topic of aquatic food sustainability. Keeping in mind that most of the numerous contributing disciplines are represented by one or two individuals only, while even each disciplinary discussion certainly comprises a facet of interpretations of respective results, the gathered research suggestions are subject to a certain amount of subjectivity and randomness even though they are sensible and logical by themselves.

Evaluating the experiences of this project **some modifications of the realized procedure are suggested for future research topics generation processes** that avoid identified shortcomings. This includes means to realize a better systematic coverage of disciplinary approaches, creates

reflection loops, and provides means to carry on discussions that are initiated throughout the process, while at the same time conserving the perceived benefits of the tested one.

The starting point of a respective process remains the identification of established capacities in the contributing fields in the sciences and humanities, with a stringent **check of sufficient disciplinary coverage** as a first issue to be resolved. A **matrix of major affected disciplinary subtopics** is set up next to create a means of attribution of interdisciplinarity in the subsequent steps of creative discussion.

Interdisciplinary research suggestions deemed important for the pragmatic problem are polled from both further established capacities and young researchers, typically on the post-doc level. A **mapping of suggested topics to the communicated topics matrix** is mandatory for a first attribution of covered and uncovered potential interconnection analyses. Based on this attribution a session sectioning of the ensuing live workshop is worked out by the members of a supporting steering committee who will support the process by chairing them as well. Sessions will address both **densely populated topic ranges, in order to connect them even stronger**, and identified void interconnection regions, in order to actively check and **inquire potential second row suggestions that have not been named** in benefit of salient ones.

Being informed about the identified thematic interconnections by a preparatory document the participants of the workshop congregate to discuss these suggestions with respect to completeness, secondary implications and feasibility. The targeted live thematisation of void interconnection ranges aims at identifying important but hitherto back-seating interdisciplinary research fields. Even though **the workshop will essentially be a single-track event** in order to call the attention of all participants to all topics there will be elements of parallelized discussion as far as concretization of already identified topics is concerned.

Even though a typical workshop will last two days the multitude of identified topics will hinder the thorough reflection and revisiting that each topic deserves. To facilitate such a deeper reflection the topics are prepared for a **subsequent virtual discussion**, organized via a web based bulletin board. Here the workshop participants and additional interested persons are asked to contribute additional thoughts for a predefined time. After closing the discussion the resultant whitelist of interdisciplinary topics will be reassembled into a final report. This report will be made publicly available without any access limitation.

It is expected that this structured procedure will lead to an improved and **systematized interdisciplinary research topics generation process that covers both general/comprehensive issues and concretized individual ones**. It should be applicable to further pragmatically defined areas of similar spans as the ‘Sustainable Aquatic Food Supply’.