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# ORAL PRESENTATIONS

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**Topic:**  
**COVID-19 outbreak and its consequences.**

ID 11

**THE IMPACTS OF THE COVID 19 CRISIS ON PURCHASES, PERCEPTIONS AND ATTITUDES TOWARDS FISHERIES AND AQUACULTURE PRODUCTS (FAP) IN FRANCE**

**Fabienne DAURES<sup>1</sup>**, Sterenn LUCAS<sup>2</sup>

<sup>1</sup>*Ifremer (UMR AMURE), PLOUZANE 29280, France,* <sup>2</sup>*IA-INRAE (UMR SMART), Rennes, France*

In 2020, the global Covid 19 pandemic has affected the consumption habits of French people. Highly reduced trade, restaurants closed, modification of the supply chain, the French people had to adapt their food consumption behavior. The consumption of fisheries and aquaculture products (FAP), highly dependent on imports, and of which 20% of the volume of sales in France concerns out-of-home consumption channels, was no exception. One year after the beginning of the crisis what were the impacts of the Covid 19 crisis on eating behavior and more specifically on FAP consumption?

Based on a survey carried out in March 2021 among 1500 people in France and econometric models, we tried to evaluate the changes in purchases, motivations and preferences induced by the Covid crisis on the consumption of FAP. We suppose that FAP perceptions influence FAP consumer profile. We first look at the crisis impact on FAP perceptions, then we estimate the factors influencing consumer profile, including FAP perception. Finally, we estimate factors influencing the evolution of FAP consumption during pandemic, including consumer profile.

Results underline that perceptions and values of FAP consumers were impacted by Covid crisis particularly health risk perceptions and universalism values, which strongly influence in return FAP consumer profiles. The changes in individual FAP purchases during lockdown or curfew periods is depending on sociodemographic factors, including work at home situation, but also pre-covid profile of the FAP consumer.

**Keywords:** Covid, Seafood, Consumption, Preferences, Motivations, France

## CAN PRODUCT CERTIFICATIONS PROTECT THE ECONOMIC PERFORMANCE OF EUROPEAN AQUACULTURE FIRMS: ANALYSIS OF THE COVID-19 OUTBREAK

José Luis Fernández Sánchez<sup>1</sup>, Jose Manuel Fernandez-Polanco<sup>1</sup>, Ignacio Llorente<sup>1</sup>, Manuel Luna<sup>2</sup>  
<sup>1</sup>Universidad de Cantabria, Santander, Spain, <sup>2</sup>Universidad de Oviedo, Oviedo, Spain

Due to the Covid-19 outbreak, limited international and national movements disrupted worldwide supply chains translating into decreases in demand and prices of consuming products, as well as in input shortages and increased production costs in many economic sectors worldwide (Bashar et al., 2022). Recent surveys have indicated that, on average, the impact of Covid-19 has been negative on the income side, increasing cost and therefore negative with respect to the profit of the EU aquaculture firms (Nielsen et al., 2023). On the other hand, consumers' perception to maximize physical health and minimize the risk of diseases during the pandemic period could have influenced in their buying decisions requiring products with higher standards of quality and sustainability (Latip et al., 2021). We suggest that quality and eco certifications can provide better marketing opportunities for aquaculture companies that are using product certifications to differentiate their products in the market. The purpose of this research is, hence, to test whether product certifications have could protect the economic performance of European aquaculture firms after the Covid-19 outbreak. For it, we have selected a wide sample of European aquaculture firms, with and without product certifications, and applied the difference-in-difference (DiD) method over the former sample using economic data of those firms before and after the Covid-19 outbreak. Our results show that the Covid-19 outbreak caused, on average, a reduction in the return on assets and profit margins of European aquaculture firms. However, we have found statistical evidence that European aquaculture firms with quality and eco certifications of their products obtained, on average, significant positive effects on their market shares after the disease outbreak.

**Keywords:** aquaculture, performance, certification, Covid-19, resilience, Europe

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## COVID-19 AND SMALL-SCALE FISHERIES: IMPACTS AND ADAPTATION STRATEGIES

Cristina Pita<sup>1</sup>

<sup>1</sup>*Cesam – Centre For Environmental And Marine Studies, Department Of Environment And Planning, University Of Aveiro, Aveiro, Portugal*

The COVID-19 pandemic resulted in unprecedented lockdowns worldwide, with devastating health, social and economic consequences. Fisheries and supply chains of fresh seafood were initially hit hard and the restrictive measures against the pandemic were especially damaging for small-scale fisheries. The sector is essential to nutrition, food security, sustainable livelihoods, and well-being worldwide. We conducted a rapid assessment collecting information from 249 representatives of fishing organizations (either exclusively small-scale or small and larger/industrial fisheries) from around the globe to quantify the immediate socioeconomic impacts of the COVID-19 pandemic on small-scale fisherfolk, identify the causes for such impacts and adaptive responses. The restrictive measures implemented to tackle the COVID-19 pandemic resulted in a high economic loss for small-scale fisheries activities. Many factors contributed to this, including the loss of usual customers, HORECA channels and international markets, a decrease in prices and lack of buyers at first-sale and logistical challenges related to transportation. Measures adopted to cope with the impacts caused by COVID-19 included mostly financial aid from national governments and direct selling, but also decreasing fishing effort, finding new markets and buyers and stocking. The results can inform the development of future adaptive capacity measures and resilience of the small-scale fisheries sector to social-ecological shocks.

**Keywords:** [artisanal fisheries](#), [pandemic](#), [Europe](#), [Asia](#), [Latin America and the Caribbean \(LAC\)](#)



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## UNDERSTANDING SUPPLY CHAIN IMPACTS TO SUPPORT SUPPLY CHAIN RESILIENCE

**Ana Witteveen<sup>1</sup>**, Arina Motova-Surmava

<sup>1</sup>*Seafish UK, Edinburgh, United Kingdom*

In the UK, we export a large proportion of the seafood we catch and import much of the seafood we eat. Our seafood supply chain is heavily integrated into the global seafood supply chain. Therefore, both local and global changes have consequences for the UK seafood industry. However, seafood industry data is rarely linked across the supply chain, making it difficult to track these impacts across industry sectors and extract valuable insights to inform decision making.

In 2020 we began to integrate and report qualitative and quantitative data from across the supply chain on a quarterly basis. These new reports and accompanying interactive Tableau dashboards explore factors impacting UK seafood markets, seafood business operations and consumer behaviour, highlighting key risks and vulnerabilities in the supply chain. Since January 2020 we have tracked the impacts of Covid-19, Brexit, the war in Ukraine and the cost-of-living- and energy crises in the UK. These quarterly reports then inform and contextualise more detailed reporting at the sector or issue level.

This paper will focus on how we combine official trade, landings, retail and foodservice statistics with qualitative industry intelligence to produce meaningful and accessible industry insights which support supply chain resilience. We will demonstrate examples of how our quarterly reports allow users to track changes in one part of the supply chain over time and follow specific shocks through the supply chain to understand wider impacts. We will also consider the broader question of how large national datasets can be better integrated and presented through public facing data visualisation platforms to inform industry and government decisions.

## Topic:

Implementation of the CFP; Quota management in mixed fisheries; Brexit, Discards.

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## THE ROLE OF PRODUCER ORGANISATIONS IN ALLOCATION AND CONSUMPTION OF FISHING QUOTAS: CASE STUDY ON SOLE IN THE BAY OF BISCAY

Benjamin Dudouet<sup>1</sup>

<sup>1</sup>*lfremer, Brest, France*

The Bay of Biscay sole fishery was one of the first fisheries to introduce individual quotas. Subject to a Total Acceptable Catch since 1984, although it is one of the most regulated, recruitment problems have led to a 37% decrease in the number of fish caught between 2021 and 2022.

Because of its economic importance on the French Atlantic coast, this fishery offers a subject for study that raises the question of the effectiveness of collective management and makes it possible to analyse the way in which the effectiveness of collective management and allows us to analyse the way in which the management of fishing opportunities in this fishery has evolved since that time. This gives us the opportunity to better describe and understand the dynamics, evolutions and determinants of the management of fishing opportunities by Producer Organisations.

Indeed, this fishery is managed collectively by a set of Producer Organisations responsible for allocating fishing opportunities among their members. This distribution is made according to criteria for each of them. The last study reporting on this distribution dates from 2012 (Lagière et al 2012), this work aims both to update this knowledge and to understand the implications of such management.

This study is based on a literature review, surveys of fisheries stakeholders and economic data analysis.

This work has enabled us to update the role of POs within the fishery as well as the management methods implemented over the last 10 years (Lagière, Macher, et Guyader 2012; Bellanger, Macher, et Guyader 2016; Carpenter et Kleinjans 2017). Also to identify the objectives and strategies of adaptation of the POs to the constraints of the management of sole fishing opportunities in the Bay of Biscay, and to identify the internal decision-making mechanisms of the POs, at inter-annual, annual and infra-annual levels.

**Keywords:** Quotas, fishing opportunities, Producer organisations, Mixed fisheries, strategies

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## MEASURING USER RIGHTS IN THE ICELANDIC FISHERIES

**Birgir Runolfsson<sup>1</sup>**

<sup>1</sup>*University Of Iceland, Reykjavik, Iceland*

In recent decades there has been a substantial movement towards rights based fisheries management. Property rights in fisheries may alternatively be referred to as user rights in fisheries, as they are the rights of fishers to harvest from fish resources. In terms of attributes of exclusivity, security, duration and transferability these rights can be strong, or they can be weak. TURFs and ITQs may be classified as strong user rights, while non-transferable vessel quotas and limited open access based on permits are weak user rights. The different attributes mentioned may be measured on a scale from 0 to 1. An attribute's measure of zero means that the property right holds none of that attribute, and a measure of unity means that the property right or holds that attribute completely. Together these attributes give a Quality measure of a property right. This flexible numerical measure of property rights quality is the so-called Q-measure of property rights quality proposed by Arnason (2000) and a high Q-score indicates property rights that correspond to the efficiency of a fishery.

Here we develop the Q-measure and the attributes further and then attempt to measure the quality of property rights in an actual fishery. We apply this to the development user rights in Icelandic fisheries management, as it evolved from open access fishery in the 1970s to a full fledged ITQ system in the 1990s and 2000s. We show that with stronger user rights efficiency increased over time, as seen in the higher value of ITQs.

**Keywords:** Fisheries management, ITQs, property rights



## LANDINGS CONTROL IN ITQ FISHERIES; MISREPORTING OF CATCH IN THE ICELANDIC FISHERIES

**Birgir Runolfsson<sup>1</sup>**, Dadi Kristofersson<sup>1</sup>, Stefan Gunnlaugsson

<sup>1</sup>*University Of Iceland, Reykjavik, Iceland*

For any system of fisheries management an accurate measure of landings is essential. In Iceland fisheries management builds on ITQs and all catch is weighed on officially approved scales at landing and recorded by certified persons. Emphasis in recent times on improving quality of landings, where fishing vessels use ice to chill the catch, complicates the weighing of landings and the gross weights at the official scales must be adjusted. Many fish buyers have permission to reweigh the fish they buy, allowing the separation of ice and fish and report the net weight to officials. This also maintains the incentive for vessels to use ice. About half of all landings go through reweighing. Reweighing opens the opportunity of overreporting ice in the landings. The incentive would be high for integrated firms, who both harvest and process the catch. Although the Directorate of fisheries monitors some reweighing, their ability to detect fraudulent reporting is limited.

We present a case-control analysis of monitored reweighing of landings versus unmonitored reweighing of landings to estimate the extent of misreporting of ice in 2012-2022. Here, we report a case-control analysis of monitored reweighing of landings versus unmonitored reweighing of landings to estimate the extent of misreporting of ice in the Icelandic fisheries in 2012-2022. Our results indicate that there is much fraudulent reporting, but the vast majority is limited to a small group of firms. We provide an analysis of the effects of various factors, such as vessel type, location, fishing season, and integration level of firm, have on the level of misreporting. We also analyze the effectiveness of initiatives implemented by the Directorate of fisheries halfway through this period to reduce fraudulent reporting. The results have policy implications regarding how best to combat this problem while maintaining the reweighing system and the positive effects it has on ice use and catch quality.

**Keywords:** Fisheries management, ITQs

## FISHING AND THE EU GREEN DEAL – WHAT IS AT STAKE?

**Sébastien Metz**<sup>1</sup>, Nicolas Fournier<sup>1</sup>, Marie-Pierre Mommens<sup>1</sup>

<sup>1</sup>*Sakana Consultants, Brest, France*

The European Green Deal is a set of policy documents published by the European Commission approved at the beginning of 2020 by the European Parliament. With an overarching aim of climate neutrality by 2050, the Green Deal is a collection of political declarations setting objectives for various European policies that may affect directly or indirectly the fishing sector:

- the EU Biodiversity Strategy for 2030: minimum of 30% of the EU sea area legally protected by 2030, with at least 10% of the EU sea area strictly safeguarded.
- the EU Strategy to harness the potential of offshore renewable energy for a climate-neutral future: increasing the EU offshore wind capacity to 60 GW by 2030 and 300 GW by 2050.
- the Farm to Fork Strategy, for a fair, healthy and environmentally friendly food system: sustainable seafood production and the development of sustainable aquaculture (including algae aquaculture)
- the recent package released by DG MARE in 2023, notably for its objective to reinforce the effort to safeguard protected species and limit the deployment of demersal mobile gears in protected areas drastically.

This communication aims to explore the global effect the Green Deal may have on European fisheries. Each of these declarations may impact the fishing sector, but combining all these objectives at once may have potential interactions. After quickly presenting each political declaration, we analyse the spatial distribution of activities based on the most recent years for fishing, offshore wind, protected areas, and aquaculture. We then project the potential spatial needs for achieving the Green Deal objectives. This allows us to analyse how the proposals may affect European fishing fleets.

**Keywords:** [EU Green Deal](#), [MPA](#), [offshore wind](#), [sustainable aquaculture](#), [protected species](#), [demersal mobile gears](#)

## Topic: Coastal development.

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### PREPARING FOR ITQS IN SWEDISH DEMERSAL FISHERIES

Staffan Waldo<sup>1</sup>, Elvira Wiktorsson, Kristian Sundström

<sup>1</sup>*AgriFood Economics Centre, SLU, Lund, Sweden*

The use of Individual Transferable Quotas (ITQs) has spread among fisheries worldwide contributing to a growing knowledge on how the quota system affects not only the fishing fleets, but also coastal communities, processing industries, fish markets, etc. For countries about to implement ITQs there are lessons to be learnt.

Swedish demersal fishing quotas are currently managed by a unique system where individual quotas are possible to lease in one-year contracts, but not permanently traded. However, the Swedish managing authority (Swedish Agency for Marine and Water Management) has proposed an ITQ system. Following discussions with stakeholders, several issues are to be further analyzed before deciding on the system. Many of these are related to social and economic consequences for coastal communities.

In this presentation, the key issues raised concerning a Swedish ITQ system will be discussed. Focus will be on the processing industry and on quota concentration. Based on a literature review of international experiences on how ITQs affect the processing industry, at least some impact is expected. However, it is less clear how and how much. While some processing industries have declined, others have prospered. Interviews with Swedish processors show no consensus in expected impacts, although many processors are concerned that a larger share of the landings will take place abroad. Turning to concentration, the observed leasing of quotas provide information on how fishers allocate quotas over the year. This information can be used to predict trade patterns in a future ITQ system and how the fleet is expected to develop.

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## NEW SHADES OF BLUE: LINKING THE BIOECONOMY AND REGIONAL FOOD SYSTEMS IN COASTAL AREAS AND THE ROLE OF FISHERIES LOCAL ACTION GROUPS

Richard Freeman<sup>1,2</sup>, **Janne Posti**<sup>1</sup>, Matthew Rudh<sup>1</sup>

<sup>1</sup>FAMENET Support Unit, Brussels, Belgium, <sup>2</sup>Newcastle University, Newcastle, UK

Coastal economies across Europe have undergone significant structural changes which have created challenges for territorial cohesion in coastal areas. Markedly, there has been a disconnect between industry and local communities, with food production (i.e., fisheries and aquaculture) being largely seen as national sectors, producing bulk commodities for wide-ranging global markets. Regional food systems are therefore a focal point for Fisheries Local Action Groups (FLAGs) in (re)localising these sectors as a means of territorial development. However, in recent EU economic development and innovation policies, sustainable blue growth across several sectors is now a key goal, with FLAGs now expected to broaden their focus to wider blue economy objectives. In particular, the bioeconomy presents coastal areas with opportunities to capitalise on and localise alternative aquatic resources (e.g., algae, sponges, and microorganisms), and to connect such resources to existing regional food systems through new circular processes, and new and innovative products and services. This paper examines the impact and role of FLAGs on integrating the blue bioeconomy with existing regional food systems through the lens of social capital theory. Drawing on a quantitative survey of the EU's network of FLAGs and the qualitative case study of two EU coastal areas, the analysis explores the role of interventional programmes, particularly FLAGs, in identifying and mitigating the challenges of integrating the bioeconomy at local level and the impact it may have on the transformation and survival of Europe's coastal areas.

**Keywords:** bioeconomy, blue economy, fisheries, aquaculture, local food systems, territorial development, coastal areas

Topic:  
Social dimension.

ID 18

## DEPLOYED... SO WHAT!? ARE ARTIFICIAL REEFS STILL USEFUL DECADES AFTER THEY WERE SUNK?

**Jorge Ramos**<sup>1</sup>, Francisco Leitão<sup>1</sup>

<sup>1</sup>*University of Algarve, Faro, Portugal*

**Abstract:** Once sunk, modular artificial reefs and other structures, benefiting from their three-dimensionality go through a maturation process that manifests itself fundamentally via an ecological succession and an increase in biodiversity. From the biological and ecological point of view, if some key concepts are safeguarded within the knowledge that has been developed in recent decades, through the accumulated knowledge of scientists from the most varied areas and users of structures; it can be said that, as a rule, the impact generated by the deployment of artificial reefs is mostly positive. However, it is very important that the human users, namely those whose economic activities can be boosted by the presence of the structures, can understand the presence of artificial reefs as an added value for their activity (usefulness). Knowing whether fishing and leisure or tourism activities become more resilient due to the existence of artificial reefs is of great importance for managers of coastal areas. In the present study, we present some evidence based on reef monitoring using Industry 4.0 tools.

**Keywords:** fisheries, leisure, monitoring, socioeconomics, tourism, usefulness

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## DIMENSIONS OF NON-COMPLIANCE IN CAPTURE FISHERIES: PERSONAL NETWORKS, TRUST, ECONOMIC VULNERABILITY, AND VALUES

Dražen Cepić<sup>1</sup>, Ivan Puzek<sup>1</sup>

<sup>1</sup>*University Of Zadar, Zadar, Croatia*

Non-compliance with fishing regulation has been one of the central challenges of fisheries management. While fishers are subject to numerous regulations, such as reduction of the number of fishing days, imposition of catch and fishing capacity limits for targeted species, and closure of protected areas, it has been widely recognized in the literature that their behaviour does not always match the rules. In this paper, based on the sample of 550 fishers from Croatia, we explore association of non-compliance with various socio-economic factors. We test the importance of personal networks by evaluating how fishers acquire information about fishing. Furthermore, we address the issue of trust in state bodies, scientists and environmental organisations. We also analyse the impact of economic vulnerability on degree of non-compliance, both with regard to objective and subjective indicators. And finally, we encompass the normative dimension by looking at fishers' values and normative statements. The sample collected as a part of the project "Sustainable fishing: social relations, identity and co-management of Adriatic fishery resources", funded by the Croatian Science Foundation, includes a general population of fishers, including large scale, small scale, and recreational fishers, allowing a comparative perspective.

**Keywords:** non-compliance, capture fisheries, personal networks, trust, economic vulnerability, values



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## SOCIO-ECONOMIC IMPACT OF THE FISHING INDUSTRY: CASE STUDY IN GALICIA (NW SPAIN).

Gonzalo Rodríguez-Rodríguez<sup>1</sup>, Fernando De la Torre, González-Rodríguez Andrés, Eduardo Sánchez-Llamas, Helena Martínez-Cabrera, V. Hugo M. Ballesteros, Xesús Pereira

<sup>1</sup>*University of Santiago de Compostela, Santiago de Compostela, Spain*

This research analyses the socio-economic impacts of the Galician (NW Spain) fishing industry. The study covers shellfishing; 9 types of fishing fleets based on tonnage and gear, from artisanal fishing to long-distance water fishing; mussel farming, marine aquaculture and processing and preserving seafood industry.

Activities in the marine sector not only directly affect the industries in the sector but also influence other sectors through inter-sectoral linkages. This paper uses an Input-Output (IO) methodology to depict the production function of each activity and examine the linkages and production effects of the Galician fishing industry on the economy, particularly, inter-industry linkage effects and inputs and employment multipliers. Results found an important role within the wider Galician economy and a comparably high direct and indirect impact. Keywords: input-output, socio-economic impact, Galician fishing sector

## WHAT STARTS THE ENGINE? MOTIVES AND OBJECTIVES OF GREEK FISHERMEN.

Alexandra Sintori<sup>1</sup>, Vasilia Konstantidelli<sup>1,2</sup>, Angelos Lontakis<sup>3</sup>, Mr Stamatis Mantziaris<sup>1,2</sup>, Irene Tzouramani<sup>1</sup>  
<sup>1</sup>*Agricultural Economics Research Institute (AGR.E.R.I.) – ELGO-DIMITRA, Athens, Greece,* <sup>2</sup>*Department of Agricultural Economics & Rural Development, Agricultural University of Athens (A.U.A.), Athens, Greece,* <sup>3</sup>*Department of Agribusiness and Supply Chain Management, Agricultural University of Athens (A.U.A.), Athens, Greece*

Fishing is a traditional and well-established activity along the Greek coastline. The Greek fishing fleet consists mainly of small-scale fishing vessels that offer primary or supplementary income to thousands of families. However, fishing is an intense and often risky activity subject to weather conditions that significantly affect income variability. Furthermore, imperfect market structures, external shocks, and increased costs, e.g., energy costs, often depress profit margins; thus, the resilience and sustainability of the sector may also rely on other non-monetary values and motives. These non-monetary values may involve job satisfaction, quality of life, and social recognition. In parallel with estimating economic indicators, their investigation may be useful in understanding fishing enterprises' decision-making. This will allow for the design and implementation of more effective policy measures and management of the fishing activity.

This study uses statistical analysis methods to explore monetary and non-monetary motives and objectives of Greek fishermen and uncover similarities and differences between small-scale and large-scale fishing activity. Data on motives and objectives were gathered from the Greek fishing vessels that also provide the economic data within the Greek National Fisheries Data Collection Program framework. The data refers to two consecutive years, namely 2019 (765 vessels) and 2020 (751 vessels), covering the period before and after the COVID-19 pandemic. In addition, the motives and objectives of fishermen were approximated using 5-point Likert scale questions.

Preliminary results of the analysis indicate that though profit maximization is essential for all fishing vessel owners, other motives and objectives receive a higher evaluation from the respondents. Fishermen appear more dedicated to providing high-quality products, value quality of life and work by the sea, and independence in their work. An interesting and important outcome of the study is that in large-scale fisheries, social recognition also receives a high rating as well as the attribute of “being an innovator”. On the other hand, expanding the business and investing in fisheries receive low ratings from Greek fishermen, especially in small-scale fisheries.

**Keywords:** fishermen objectives and motives, non-monetary values of fishing, fisheries management, Greece

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## REMUNERATION IN FISHERIES: HOW ATTRACTIVE IS THE SECTOR?

Jordi Guillen<sup>1</sup>, Natacha Carvalho, Antonio Borriello, Simone Quatrini

<sup>1</sup>*Joint Research Centre, Ispra, Italy*

There is the common perception that fishers receive low-income salaries. However, there are few examples in the literature showing that some fishers in developed countries are doing relatively well. This could be partly explained by the capacity to capture a portion of the resource rent through shared remuneration systems when the economic performance improves. By looking at the remuneration of more than 130,000 fishers in the 22 coastal EU countries, this study confirms that in all EU countries fishers are paid on average less than the national average salary. However, when looking at the different fleets and countries, some significant exceptions arise. The causes are further investigated using an hedonic analysis.

## Topic: Small-scale fisheries.

ID 19

### COASTAL FISHERIES 2045 – OPINION LEADERS’ PERSPECTIVES ON THE FUTURE OF A CHANGING MARITIME SECTOR IN GERMANY

Tobias Lasner<sup>1</sup>

<sup>1</sup>*Thünen Institute of Sea Fisheries, 27572 Bremerhaven, Germany*

Climate Change, degrading fish stocks, fishing bans, BREXIT, bureaucracy, an overaged fleet, a lack of successors, Covid-19 and increasing spatial competition: Nowadays, coastal fisheries in the North and Baltic Sea face many challenges, which jeopardize the economics of commercial fisheries. A group of 14 inter- and transdisciplinary opinion leaders from municipal politics, nature conservation, tourism, seafood trade, marine spatial planning, science, commercial and recreational fisheries were selected to develop a shared vision for German fisheries in a future workshop according to Robert Jungk and Norbert Müllert (1987, Vidal 2005). Shared “visions of the future” are forward-looking target pictures that are specific enough to guide decision-making in ocean and fisheries management on the one hand. On the other hand, the set time frame up to 2045 allowed participants to conceptualize solution-oriented thinking and scenarios without being totally affected by present events. We discuss the ambitious method and share our experience with this specific form of participatory research. In the second part of our talk, two constructed target pictures of future marine economics for Germany will be presented. The target pictures draft marine space as a bustling area, where many different users will operate and exploit marine resources. Green energy, tourism and nature conservation would dominate a multi-use sea. After a phase of ecological regeneration, which would simultaneously lead to a decline of fisheries at first, fisheries will be permitted in most marine areas as secondary user thereafter. Notwithstanding, fisheries would have to diversify its business strategies. Aquaculture, processing and marketing are part of an enhanced regional value chain in the target pictures. In addition, future fisheries’ organisations would offer different kinds of marine and touristic services as part of their tomorrow business portfolio. The presented target pictures illustrated by the artist Fanouss Grosse-Adda show a demanding transmission process, which enables a economical feasible, commercial small-scale fishery, but which leaves many questions open at the same time. Our outlook will discuss, how to close the gap of knowledge and how politics could make use of the target pictures.

**Keywords:** future workshop, coastal fisheries, sociology, structural change, qualitative group discussion

## CO-PRODUCTION OF ECOSYSTEM SERVICES PROVIDED BY SMALL-SCALE FISHERIES IN THE ATLANTIC AREA. A FUZZY COGNITIVE MAP APPROACH TOWARDS AN ECOSYSTEM BASED MANAGEMENT

Arantza Murillas<sup>1</sup>, Laura García de la Fuente<sup>2</sup>, David Castilla<sup>3</sup>, Juan José García del Hoyo<sup>3</sup>, Richard Curtin<sup>4</sup>, Angela Muench<sup>5</sup>, Inés Soussa<sup>6</sup>

<sup>1</sup>Azti, Sukarrieta, España, <sup>2</sup>UNIOVI, Mieres, España, <sup>3</sup>UHU, Huelva, España, <sup>4</sup>BIM - Bord Iascaigh Mhara, Dublin, Irlanda, <sup>5</sup>CEFAS, Weymouth, United Kingdom, <sup>6</sup>UALG - University of Algarve, Faro, Portugal

Identifying the provision of ecosystem services (ES), provisioning, regulating and cultural ES, linked to Small-Scale Fisheries (SSF) and integrating their quantitative assessment into an Ecosystem Based to SSF Management Approach (EBMA) is a challenging task. A deeper knowledge about the drivers of change affecting ES supply needs to depict the structure and flows governing the relationships between social, economic, environmental and institutional variables in the SSF social-ecological system. The co-production of ES (natural and non-natural capital co-production of ES) represents an operational way of integrating their quantitative assessment into an EBMA, although it requires to catch fuzzy interactions between multiple interconnected variables. This research combines Delphy methods with Fuzzy Cognitive Mapping (FCM) to bring support to stakeholders and experts to scenario-based decision making (future real scenarios, such as, the promotion of the SSF sustainable economic growth, the social employment, the minimization of the SSF marine impacts, or their contribution to advance towards a carbon neutrality).

This work addresses the co-production of ES provided by vessels under 18 metres of total length in the European Atlantic Area (small scale vessels from SP, FR, PT, IR and UK). First, the research developed a set of indicators of the different forms of capital involved when co-producing cultural and fish provisioning ES by SSF, as well as potential trade-offs among these and the regulating ES. The database used was based on both EU standardised data and local/regional information. Secondly, FCM were built at country level but also at ICES Areas (where different countries interact) to describe connections and quantify levels of co-production under different scenarios opened to stakeholders' perception.

Policy options simulations arise as one of the most promising results for policy makers and small-scale fishing managers to know in which way ES supply will be altered under different measures if compared to a steady state.

**Keywords.** ES trade-offs, social capital, manufactured capital, scenarios

## HOW MARINE SPATIAL PLANNING (MSP) PLANS TAKE INTO ACCOUNT FISHERIES ACTIVITY IN THE ENGLISH CHANNEL (FRANCE)

Eider Graner Urtizbera<sup>1</sup>, Adeline Bas<sup>2</sup>, Katia Frangoudes<sup>1</sup>

<sup>1</sup>Université De Bretagne Occidentale - UMR 6308 AMURE, Brest, France, <sup>2</sup>IFREMER, BREST, France

Small and large-scale fisheries in the English Channel (France) is an important activity in terms of economic opportunities (job creation on board and on land with related activities such as processing, fishing nets fabrication and maintenance, transportation ...), development of fisheries communities and food security at a national level. Fisheries are in direct competition with other activities that co-exist in the fishing areas – such as offshore wind farms, new aquaculture projects or Marine Protected Areas. Marine Spatial Planning (MSP) is a tool that is supposed to guarantee the practice of these activities through a geographical delimitation of uses.

In France, MSP plans are produced through a participatory approach where regional advisory councils have been established for each of the country's 4 maritime facades (South Atlantic, North Atlantic-West Channel, East Channel-Northern Sea, Mediterranean). The first MSP plans are now under revision. During this process, European Union has launched different projects in order to evaluate how MSP plans at Member States level integrate the objectives of the European Green Deal (EGD). MSP-Green is one of those projects and aims to assess the 4 French MSP plans through the lens of EGD by using a specific analytic framework. The aim of this presentation is to analyse how the fisheries issues are taken into account in the decision-making process of MSP plans in relation to other economic activities and Green Deal issues. In order to understand the power plays between traditional activities – fishing – and new activities – e.g. offshore windfarms – and marine conservation issues in the MSP plans, we will; (i) show how the MSP plan of the English Channel takes into account the objectives of EGD through the case study of fisheries; (ii) point out fishers' opinions regarding the decision-making process of this MSP plan.

**Keywords:** Fisheries, Marine Spatial Planning, European Green Deal, English Channel



ID 41

## CAN LOCAL ECOLOGICAL KNOWLEDGE OF ENGLISH-CHANNEL LINERS (SSF-FRANCE) CONTRIBUTE TO ECOSYSTEM BASED FISHERIES MANAGEMENT?

Katia Frangoudes<sup>1</sup>, research assistant Eider Graner<sup>1</sup>

<sup>1</sup>*University of Bretagne Occidentale, Brest, France, Brest, France*

The local ecological knowledge of small scale fishers targeting European seabass and pollack in France (English Channel) provides useful information on fishing areas, seasonality, behaviour and species association, spawning areas.. This empirical knowledge should be integrated into the preparation of ecosystem-based fisheries management plans, in complement to scientific knowledge. Through focus groups and semi-structured interviews, fishers identified the main reasons explaining the changes in the presence of pollack and European seabass in coastal waters. Besides listing these causes, commercial fishers also had the opportunity to make management proposals to modify the current situation. They also call for a more holistic approach in fisheries management, taking into account potential shifts to other species or fishing areas (effort reallocation) in the case of spatial restrictions. The aim of this presentation is to develop the different visions of SSF about resources, ecosystem and water quality, and management proposals on how to improve this situation. We will then discuss how fisher's proposals can be integrated or not into Ecosystem-based fisheries management (EBFM) multiannual and multispecies plan.

**Keywords:** LEK, SSF, EBFM, France, English Channel

## HOW DO INVASIVE FISHES CHALLENGE SMALL SCALE FISHERIES: THE CASE OF RABBITFISH IN GREECE

Angelos Lontakis<sup>1</sup>, Vassiliki Vassilopoulou<sup>2</sup>

<sup>1</sup>Department of Agribusiness and Supply Chain Management, Agricultural University of Athens, Theves, Greece, <sup>2</sup>Institute of Marine Biological Resources & Inland Waters, Hellenic Centre for Marine Research (HCMR), Athens, Greece

The raise of seawater temperature may have diverse impacts on marine organisms. In the case of the Mediterranean Sea, climate change has been accused, at least partially, of native multi-species collapses, with the expansion of specific alien species from the Red Sea that have invaded particularly the southeastern part of the region, causing even ecosystem regime shifts.

Among invasive alien fish species, the rabbitfishes were introduced to the Mediterranean through the Suez Canal and ever since the opening of the Canal, they have become established in several areas. Those species can significantly affect the ecosystem as they can outcompete native species for food and habitat, while as they are voracious herbivores they have degraded important algal habitats of the southeastern Mediterranean. Parallel to these environmental effects, they also have major economic effects on the fisheries sector, especially on small-scale fisheries that operate mostly in shallow waters. Indeed, fishers tend to avoid, if possible, areas where those species tend to concentrate (i.e., rocky habitats with epilithic algae), as they are, in general, a clearly unwanted catch due to their negligible commercial value and their time-consuming (and painful if not reckless) disentanglement from fishing nets.

This study explores the economic consequences of rabbitfish invasion in the métier targeting red mullet and common cuttlefish using trammel nets, in the Ionian Sea and Argosaronic gulf, Greece. Unlike most studies in the relevant literature that evaluate invasion impacts in a more aggregated manner (i.e., economic valuation of fisheries ecosystem degradation), we shift our focus on the short-term direct/perceptible effect of rabbitfish invasion on fishers' income. In this manner, the analysis results can be useful for management design and policymaking (e.g., potential subsidies for income losses). To do so, we utilize input from field research and secondary data aiming to understand how the invasion of rabbitfish alters fishers' behaviour and fishing patterns.

Outcomes of the analysis reveal significant economic losses mainly caused by the diminishing catch share of target species, the additional cost of avoiding highly-concentrated rabbitfish areas, and the extra workload and relevant costs for disentangling rabbitfish from trammel nets.

ID 60

## A BRIEF HISTORY OF THE UK INSHORE FISHING FLEET

Marta Moran Quintana<sup>1</sup>, Kirsten Milliken, James Warwick

<sup>1</sup>*Seafish, Edinburgh, United Kingdom*

Inshore fisheries management in the UK had a reputation for being unnecessarily complex, lacking consistency in its approach and being ineffective in delivering on long-term sustainability goals. To address these issues the Future of Our Inshore Fisheries (FOIF) project launched in 2019 as an industry-led project aiming to transform inshore fisheries management in the UK, bringing together fishers, industry representatives, Government and academia.

Understanding the consequences and impacts of past policy decisions (both intended and unintended) is a vital component for successful future decision making. As part of the FOIF project, our research aims to understand the factors and policies that have influenced the development of the UK inshore fishing fleet since the 1980s until the 2020s. A mixed methods approach was used, drawing on the available fleet datasets and historical policy documents as well as the knowledge and experiences of professionals from across the industry spectrum. We used quantitative data to illustrate the narrative described by these industry professionals in the context of the policy framework so that we could accurately describe how the UK inshore fleet has developed over time and what impact past policy decisions have had.

Our analysis found that to some extent, past management of the UK inshore fleet has been reactionary, ad-hoc and lacking an understanding of the negative incentives being created. As a result, the recent history of the UK inshore fishing fleet could be summarised as one of “unplanned industrialisation”. Such unplanned industrialisation was driven by three key elements: displacement, increased capacity and technical development. The focus of early regulatory measures on larger fishing vessels inadvertently made the inshore sector a more attractive option for vessel owners seeking to reduce their administrative workload, while the looser regulatory regime for inshore vessels allowed for unchecked technological development and capacity increase in this sector of the fleet.

## Topic:

# Human pressure in the ecosystems and environmental degradation.

ID 21

## DEVELOPING HUMAN INTEGRATED ECOSYSTEM BASED FISHERIES MANAGEMENT CONCEPTUAL FRAMEWORKS IN SICILIAN GULFS

Claudio Pirrone<sup>1</sup>, Gioacchino Fazio<sup>1</sup>, Stefano Fricano<sup>1</sup>

<sup>1</sup>University of Palermo - Department of Economics, Business and Statistics, Palermo, Italy

Since the 2000s growing literature has focused on “Ecosystem based fishery management” approaches. At the date we write, a simple query on the SCOPUS database relates 640 papers in scientific reviews about this specific topic, among which 70% were published in 2015 or more recent years. In their great majority, this production is led by agricultural and biological sciences (511), environmental science (414), and earth and planetary sciences (216). Only 80 papers relate to economics or social science. Similar dynamics are found querying SCOPUS about “integrated ecosystem assessment”, which account for 97 papers, among which 14 relate to economic or social science. In very late years, there is an increasing demand for integrating economic analysis into ecosystem approach. Some examples of this engagement are the creation of ICES WGECON, as well as the “Human Integrated Ecosystem Based Fisheries Management” program by NOAA, suggesting the development of conceptual frameworks, preliminary to the generation of proper integrated operational models. In our contribution we illustrate the experience running in three Sicilian gulfs. These are interesting objects to study because all of them benefit from a trawling ban since the 1990s, and are marked by strong presence of small-scale fishery. This ban is now put under question from the regional authority. If the ban was removed, impacts are expected both on the living stocks and ecosystem, as well as on the configuration of the local fishery industry, hence on the local community as whole. Consequently, adopting a HI-EBFM-like approach appeared to be adequate, and a conceptual framework was proposed. This framework is structured as a two-side model. First side, ecosystem-centred, models humans as marine predators which interacts with living stocks, but also with the benthos and the water column, thus influencing the ecosystem production function. Second side, according on how humans interact with the ecosystem, evaluates the expected economic impacts on the industry and the community. To empirically validate the models, ad-hoc data collection is carried out within the project. Finally, by adopting AI-like tools, joint optimization is evaluated, in order to answer policy related questions.

[Human pressure, HI-EBFM, fishery, sustainability](#)

ID 56

## THE GROWTH MODEL IN FISHERIES THE CATCH – EFFORT MODEL WITH TECHNOLOGICAL PROGRESS

Gianluigi Coppola<sup>1</sup>, Monica Gambino

<sup>1</sup>*Department of Economics And Statistics - University Of Salerno, Fisciano (Salerno), Italy*

In this paper We consider a Catch-Effort Model with the Technological Progress that affects the carrying capacity. As it is well known, the Catch-Effort model is a set of infinite stable equilibrium levels, each of them associated with one level of effort (Gordon Shaefer Model). The model is named biological because the main two parameters (e.g. the intrinsic growth rate and the carrying capacity) are considered biological. By adding costs and revenues, it becomes a bioeconomic model. The Catch Effort model is a static and long-term model, where the Maximum Sustainable Yield depends only on the intrinsic growth rate and on the carrying capacity while the technological change affects the catchability coefficient

On the contrary, introducing a new "Bio-technological function" based on the hypothesis that both the dynamics of the population and the Maximum Sustainable Yield depend on the technological change, it is possible to explain the effects on the dynamics of the catches and of the effort.

Topic:  
Fisheries and aquaculture economics.

ID 6

## IS A BAN OF DRIFTING FISH AGGREGATING DEVICES BENEFICIAL FOR ALL COASTAL COUNTRIES IN THE INDIAN OCEAN? THE PARTICULAR CASE OF SEYCHELLES

M. Sharif Antoine<sup>1</sup>, Manuela Capello<sup>1</sup>, Laurent Dagorn<sup>1</sup>, **Patrice Guillotreau<sup>1</sup>**, Frédéric Salladarré<sup>1</sup>, Alex Tidd<sup>1</sup>  
<sup>1</sup>Ird, Sète, 34200, France, <sup>2</sup>Seychelles Fishing Authority, Victoria, Seychelles, <sup>3</sup>Nantes University - LEMNA, Nantes, France

Competition between fishing gears in tuna fisheries conceals bigger stakes about rent sharing issues between distant water fishing nations (DWFN) and coastal fishing nations (CFN) operating in the Indian Ocean. Several countries advocate a significant reduction of drifting Fish Aggregating Devices (dFADs) deployed by DWFN vessels in the Indian Ocean tuna fishery to reduce the detrimental impacts of industrial purse-seine fleets on tuna stocks and ecosystems, jeopardizing small scale fisheries of CFN (pole and line, longline, gillnet, etc.) harvesting within their EEZ. However, the economic interests of some SIDS are narrowly entangled with large-scale tuna fisheries through payment of fishing right fees, fish processing and other value-adding activities, while others are not. In such circumstances, what would be the outcome of a partial or full dFAD ban in the sole case of Seychelles? A cost-benefit analysis based on various models (Data Envelopment Analysis, bioeconomic operating model, social accounting matrix...) is developed in the case of Seychelles under different scenarios of both SSF and purse-seine fisheries. It shows the high degree of dependence of this country on foreign landings and the difficulty to move rapidly towards a more endogenous growth pattern.

**Keywords:** drifting FADs, time closure, Cost-Benefit Analysis, Seychelles, tuna fisheries



ID 7

## SUPPLY CHAINS ON THE CARP MARKET IN POLAND

Magdalena Raftowicz<sup>1</sup>

<sup>1</sup>*Wroclaw University of Environmental and Life Sciences, Wroclaw, Poland*

Carp (*Cyprinus carpio*) is the flagship product of Polish aquaculture, whose breeding is consistent with the assumptions of sustainable development.

The main goal of the study was to identify the existing supply chains on the carp market in Poland, together with the valuation of the profitability of sales in these chains.

The research tools were questionnaires. The respondents for the questionnaire were the owners of carp farms in Poland from the database of the Polish Fisheries Society (110 entities). 37 questionnaires from 15 provinces were returned.

Research has shown a large diversity of supply chains in the carp market depending on the size of the farm. The larger the farm, the less carp it sells in short supply chains, however, the market leader in sales in long supply chains is farms with 300 to 1000 ha, not those over 1000 ha as originally assumed.

Research has also shown that the larger the farm, the lower the profitability of sales. In the case of the largest farms (over 1000 ha), the level of production costs is so high that a loss is incurred on the sale of carp, which means a negative level of profitability. So we are dealing here with diseffects of scale.

**Keywords:** [supply chain](#), [carp](#), [cyprinus carpio](#), [Poland](#)

ID 8

## OPTIMAL FISHERIES MANAGEMENT USING TRANSFERABLE SHARES OF A CONVEX TAX

Helge Berglann<sup>1</sup>, Trond Bjørndal<sup>2</sup>, Francesc Maynou<sup>3</sup>

<sup>1</sup>Norwegian Institute of Bioeconomy Research (NIBIO), 1430 Ås, Norway, <sup>2</sup>SNF, Bergen, Norway, <sup>3</sup>Spanish National Research Council - CSIC, Spain

In this paper we show that, in the absence of regulations, competition between vessels represents a competitive game where the outcome is inverse related to a classic Cournot-Nash equilibrium of oligopolistic competition: a monopoly gives the best outcome while full competition gives the worst. Focusing on management to avoid these inefficient outcomes, we introduce a scheme that regulates the fishing industry with a convex tax on effort (or harvest). Shares of this tax can be traded on a market, thus making the scheme efficient under asymmetric information about vessels' costs. This is possible since heterogeneous fishing firms are individually induced to solve the same problem as a social planner. For demonstration the model is applied to the Northwest Mediterranean demersal fishery.

**Keywords:** Fishery management, Transferable quotas, Convex taxation

ID 17

## INCREASED GROWTH AND PRODUCTIVITY WITH THE HELP OF INVESTMENT SUPPORT? EVIDENCE FROM AQUACULTURE AND FISH PROCESSING FIRMS IN SWEDEN 2007-2019

Johan Blomquist<sup>1</sup>

<sup>1</sup>*Swedish University of Agricultural Sciences, Sweden*

The European Maritime, Fisheries and Aquaculture Fund (EMFAF) and its predecessors provide investment support to firms in aquaculture and the fish processing industry. The aim of the support is to stimulate investments in efficient and sustainable production processes that can increase growth, competitiveness, and an environmentally sustainable development of these sectors. It is, however, not obvious that the investment support will generate more investments. Profit maximizing firms have an incentive to invest also without the support, if the investment increases profitability. Therefore, there is a risk that the support will fund investments that would have been undertaken anyway.

This paper analyses the extent to which the investment support to aquaculture and fish processing has increased competitiveness and growth in Swedish firms that received support during the period 2007–2019. Firm competitiveness is measured by total factor productivity (TFP) and labour productivity and growth is measured by value of production and employment. The empirical analysis is based on panel data including all firms in these sectors in Sweden over the period 2007-2019. The availability of panel data makes it possible to address the selection problem inherent in program evaluation studies. The analysis also makes use of newly developed econometric methods that are suitable for staggered support schemes that spans multiple time periods and varies in treatment timing (e.g. Callaway and Sant’Anna, 2021, *Journal of Econometrics*, Vol. 225:2).

**Keywords:** [Common Fisheries Policy](#), [investment support](#), [aquaculture](#), [fish processing](#).

## MESOPELAGIC FISHERY IN THE BAY OF BISCAY: IS A REAL ALTERNATIVE FOR THE BASQUE FLEETS?

Marga Andrés Ortega<sup>1</sup>, Dorleta García<sup>1</sup>, Paula Álvarez<sup>1</sup>, Josu Paradinas<sup>1</sup>

<sup>1</sup>*Azti, Sukarrieta, España*

In 2014 the estimation of mesopelagic biomass (100 billion metric tons), resulted 10 times larger than previous estimates. As the protein content of mesopelagic resource is typically high and the amino acid composition deemed sufficient for use in feeds for farmed fish, this fishery could be a new business opportunity for the Basque fleets given the increasing demand of aquaculture feed.

But exploiting a new fishery that has not been exploited before requires a previous assessment of the three pillars of sustainability of this fishery. The environmental pillar of the fishery was assessed by estimating for the first time the potential biomass of the main mesopelagic stock (*maurulicus muellery*) in the Bay of Biscay and its resilience to be commercially exploited. The economic pillar was studied through the selection of the most suitable fleet to exploit this resource. Both, the biological and economic perspectives were integrated into a bio-economic model, from which economic and biological indicators were calculated. In the model several scenarios related to stock productivities and catchabilities were run. From the social perspective, a qualitative assessment on how the mesopelagic fishery commercial exploitation could impact on region, especially to the existing fisheries related sectors.

This study developed a framework to facilitate to policy makers to improve its decision when considering an exploitation of a new fishery. Results indicate that, although the demand of raw material for aquaculture feed can increase in the future, and the mesopelagic fishery could help to further develop the fishmeal and fish oil related industry in the Basque Country, the use of mesopelagic fish captured in the Bay of Biscay is not risk-exempted. The profitability of the fleet is not assured, additionally the quality of the catches could not reach the minimum for its commercialization and the environmental impacts of these fisheries are not negligible.

ID 23

## NUTRIENT POLICIES AND AQUACULTURE IN DEVELOPED COUNTRIES - A LITERATURE REVIEW

Cecilia Hammarlund<sup>1</sup>, Anna Andersson<sup>2</sup>, Jonas Nordström<sup>1</sup>

<sup>1</sup>Lund University, , Sweden, <sup>2</sup>Swedish University of Agricultural Sciences, , Sweden

Eutrophication is a serious problem in many parts of the world and aquaculture production can increase the problem as well as be part of the solution to it. Nutrient policies that are in use in many developed countries today are often command-and-control policies that may have contributed to the slow growth of the aquaculture sector. We perform a literature review to investigate how current nutrient policies affect the sector and if economic incentive policies have greater potential to support sector growth. Although the literature is limited in many aspects, the results indicate that this may be the case. Given that measuring, monitoring and control has improved over time possibilities for using economic incentive policies have increased. A first step may be to replace feed quotas, often used in intensive aquaculture, with emission quotas. Second, subsidies, that today are based on performance, could be based on results, i.e., payments based on the amount of emissions that are reduced. Finally, it is possible for both intensive and extensive aquaculture to benefit from being included in water quality trading systems, where these are available. However, it is important to be aware of rising fixed costs of producers when implementing policies that require substantial measuring, monitoring and control. There may therefore still be a case for using command-and-control policies for small firms and entrants into the sector.

**Keywords:** aquaculture policies eutrophication

## PROFITABILITY DYNAMICS OF AFRICAN CATFISH PRODUCTION IN NIGERIA: RESILIENCE STRATEGIES DURING AN ECONOMIC CRISIS

Olanrewaju Olagunju<sup>1,2</sup>, Dadi Kristofersson<sup>1</sup>, Tumi Tómasson<sup>3</sup>, Theodor Kristjansson<sup>4</sup>

<sup>1</sup>University of Iceland, Reykjavik, Iceland, <sup>2</sup>Federal Department of Fisheries and Aquaculture, Abuja, Nigeria, <sup>3</sup>UNESCO GRÓ-Fisheries Training Program, Hafnarfjörður, Iceland, <sup>4</sup>Marine and Freshwater Research Institute, Hafnarfjörður, Iceland

Nigeria's aquaculture experienced exponential growth in the last two decades. This growth has significantly been influenced by the farming of African catfish. However, in 2015, a decline in production began which has been mostly associated with difficult economic situations impacting the profitability of the farmers and resulting in the withdrawal of some catfish farmers from operation. This challenge was further exacerbated by the COVID-19 pandemic. Notwithstanding, some farmers were still able to remain profitable. This study, therefore, investigates the factors contributing to catfish farmers' profitability across the country at periods before and during COVID-19. A total of 609 farms were randomly sampled and 1118 operations were recorded across the country for both Pre-COVID and COVID periods. Data obtained include revenue, costs, returns, markets and operational characteristic data. Coefficient of correlation and stepwise regression were used to identify factors that most contribute to profitability using the R-statistical package. These factors were ranked by average profit per kilogramme and grouped into profitable and non-profitable categories. Common factors that influenced profitability at both Pre-COVID and COVID periods include scale, experience, target market, ownership status and pond type, while, more specifically, engagement in other agricultural ventures, selling to eateries and restaurants, and having graduate studies favoured profitability during the COVID period. This study further characterised profitable and non-profitable farms based on their technical and business knowledge. While the non-profitable farms have the same poor strategy, the profitable farms achieved profitability using different strategies peculiar to their nature of operation. The unique features of the factors in the different groups were also characterised. This study demonstrated that catfish farmers can be profitable irrespective of their scale of operation or years of experience if they can adopt strategies that are most favourable to the class to which they belong. In addition, the blend of both business and technical knowledge as well as being able to understand the dynamic intrigues involved is critical for the profitability and survival of the catfish farming business during an economic crisis.

**Keywords:** [Catfish farming](#), [Profitability](#), [Economic crisis](#), [Resilience strategy](#), [Nigeria](#)

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## TAKING STOCK OF SNOW CRAB MANAGEMENT FOR THE BARENTS: LESSONS LEARNED FROM ALASKAN AND CANADIAN FISHERIES

Melina Kourantidou

<sup>1</sup>Université de Bretagne Occidentale, Brest, France, <sup>2</sup>University of Southern Denmark, Esbjerg, Denmark

The Snow Crab fishery in the Barents Sea, although very new, has already attracted sizable scientific attention in recent years, from both natural and social scientists, including conservation managers and practitioners. The interest it has garnered is largely attributed to its rapidly expanding population, its dual role as profitable fishery and an invasion and the political debate it has triggered between Norway and the EU due to unclear property rights pertaining to its distribution in the Arctic. Acknowledging that more work is needed to integrate economic connectivity into marine governance systems and efforts to achieve socially optimal goals, this work uses past and ongoing experience from Snow Crab fisheries in their native areas of distribution to elicit useful lessons for the emerging Barents fishery and its management. The lessons learned from these tightly interconnected fisheries will be relevant for better understanding and shaping socioeconomic dynamics of the Barents fishery and distribution of benefits, and can serve as input to policy-makers who are still crafting its management, including stakeholders beyond Norway with an interest in relevant governance questions. Nevertheless, unlike Snow Crab fisheries in Alaska and Canada, sustainability and social wellbeing dimensions in the Barents need to encompass and evolve in tandem with broader ecosystem considerations pertaining to the invasion, the impacts of which remain uncertain and largely unassessed.

**Keywords:** Snow Crab; fisheries management design; invasive species; socially optimal policies



## THE EFFECTS OF AUCTION SYSTEM ON OUTCOMES IN THE ICELANDIC FISH AUCTIONS

Dadi Kristofersson<sup>1</sup>, Birgir Runolfsson, Solveig Dadadottir

<sup>1</sup>*University Of Iceland, Reykjavik, Iceland*

Cod is the most important fish in the Icelandic auction market. In the years 1999-2005 both Dutch auctions and English auctions were used in the market, a time period that can be split up into three time periods. In the first period, both auction methods are used, in the second period, all auctions are English, and in the third period, all auctions are Dutch. This unique data makes for a convenient testing of the theory of revenue equivalence.

To estimate the effect auction method has on the price of cod, a Bayesian hierarchical latent Gaussian model is designed, inferred with the inference scheme Max-and-Smooth, which is a Bayesian approximation in two steps. In the step, which is a maximization step, the latent level parameters are estimated using ordinary least squares, and the likelihood statistics are stored, for each temporal point separately. In the second step, which is a smoothing step, the latent parameters are smoothed over the three time periods, using the approximated likelihood function and by assuming a priori time series model for the latent parameters. The latent level parameters are modelled as autoregressive processes of order one forming a stationary time series. This allows for an additional reduced Fourier form representation of the parameters, to estimate the seasonal variation of each model parameter, as annual patterns were clear for most parameters.

The results show very small but significant difference in cod prices depending on auction method in the Icelandic auction market. Although most seasonal harmonics were not significant, a comparison of the results to the gut ratio of cod shows a clear natural variation in the characteristics of cod that correlates to this ratio.

## A REVIEW OF THE GLOBAL FISHING SECTOR COMMODITIZATION PHENOMENA

Eduardo Sánchez<sup>1</sup>, Gonzalo Rodríguez<sup>1</sup>

<sup>1</sup>*Universidade De Santiago De Compostela, Santiago de Compostela, Spain*

The fishing industry is a vital source of food and economic activity worldwide, but it has undergone significant changes over the years. One of the main drivers of change in the fishing sector has been the commoditization phenomena. This research examines the evolution of commoditization in the fishing industry, encompassing fisheries, aquaculture, and the commercialization of marine products.

Historically, the fishing industry was mainly composed of small-scale, artisanal fishers who caught fish for subsistence and local markets. However, the development of industrial fishing techniques and technologies led to increased efficiency and enabled the expansion of fishing activities to a global scale. This led to a commoditization of fish as a product, where it became standardized, traded, and priced as a commodity, and less associated with its cultural and ecological significance. In addition to the change on the structure of extractive fishing sector, aquaculture and commercialization have also contributed significantly to the establishment of seafood as a commodity more than as source of proteins. Aquaculture contributed to the commoditization of fish, as it enabled the production of fish on an industrial scale, with standardized breeding and feeding practices to achieve efficient and predictable yields acting as a transforming sector which converts 'low value' protein in 'high value' commodity. Within this context, commercialization also played a key role, governing the production of marine products through market forces misallocating the potential negative environmental and social issues.

The commoditization of fish and other marine products has significant implications for the marine ecosystems sustainability and the livelihoods of fishers and coastal communities worldwide. It generates a mismatch between ecological and socioeconomic systems that potentially endangers the seafood supply. This investigation highlights the need for a more sustainable and equitable approach to the fishing industry, where the cultural and ecological significance of fish is recognized and where the industry's development is guided by principles of sustainability and social justice. Such an approach will require greater collaboration between stakeholders, including fishers, scientists, policymakers, and consumers, to achieve more sustainable and socially just fisheries and aquaculture practices.

ID 35

## RENTS AND INFRAMARGINAL PROFITS IN NORWEGIAN SALMON AQUACULTURE

Trond Bjørndal<sup>1</sup>, Amalie Tusvik<sup>2</sup>

<sup>1</sup>*Snf Centre For Applied Research, Bergen, Norway*, <sup>2</sup>*NTNU, Ålesund, Norway*

Keywords: Rents, inframarginal profits, salmon aquaculture, Norway

In Norway, the introduction of “rent” taxation in salmon aquaculture has recently been recommended (NOU 2019: 18) and subsequently included in the Government’s budget proposal for 2023. The details of the final proposal are not yet known, but it looks as if new taxation will be introduced retroactively from 1st January, 2023. This raise a number of questions: what kind of rent or types of rent may be present in salmon aquaculture? What is the magnitude of these rents?

A factor of production in limited supply may give rise to economic rents and infra-marginal profits. While empirical studies of rents in salmon aquaculture have been undertaken, these studies often do not distinguish infra-marginal profits from economic rent. The purpose of this article is estimate infra-marginal profits in Norwegian salmon and trout aquaculture. The results have implications for the proposed taxation on salmon aquaculture in Norway, including the effect of taxation on firms in the industry.

There are currently 166 firms in the salmon aquaculture industry, for which profit and loss statements are publicly available. Based on a data set covering several years, we estimate inframarginal, as given by the difference in profits between all firms in the industry and the marginal producer. This is done for the industry as a whole as well as for individual firms. Ignoring inframarginal profits will overestimate economic rents, and with resource taxation this could discourage industrial development and constitute unjustified confiscation of companies’ returns on other factors of production.

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## QUOTA ALLOCATION PROBLEMS IN FAROE ISLANDS FISHERIES

Hans Ellefsen<sup>1</sup>, Daniel Bromley

<sup>1</sup>*University of the Faroe Islands, Tórshavn, Faroe Islands*

In this paper we analyze the mackerel fishery and the history of gifted mackerel quota (ITQs) in the Faroe Islands. Using data from Statistics Faroe Islands, and Fisheries Inspection Faroe Islands, we evaluate the performance of the pelagic fishery beginning in 2010. At that time, the Faroes government issued—free of charge—mackerel quota that far exceeded the capacity of the pelagic fleet to pursue and land mackerel. A few years later, seeking to provide financial relief to the distressed demersal sector, even more mackerel quota was gifted to demersal vessels unable to harvest mackerel. Owners of these demersal vessels then sold their free quota to vessels actually capable of landing mackerel. Throughout the latter phase of this period, the Faroes pelagic fleet was unable to harvest all of the quota it had been issued. In 2022, total catch was approximately 74% of the outstanding quota held by the pelagic fleet.

At the same time, the demersal sector has suffered from overfishing, falling vessel revenue, excess fishing capacity, and depreciating capital stock. The average age of the demersal fleet is now over 36 years, with several vessels dating from the 1940s. The demersal sector is managed by a days-at-sea regime. This severe incommensurability between demersal and pelagic stocks, and fishing capacity focused on those stocks, highlights severe economic and biological incoherence.

We develop an econometric model to illustrate an optimal quota-allocation regime that will correct existing inefficiencies. This approach seems useful to other fisheries with quota misallocation problems.

Keywords: Mackerel, Faroe Islands fisheries, quota allocation, policy advice

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## TRANSIENT AND PERSISTENT INEFFICIENCY IN THE GERMAN NORTH SEA BROWN SHRIMP FLEET

Tim Knöpfel<sup>1</sup>, Erik Sulanke<sup>2</sup>, Bernhard Brümmer<sup>1</sup>

<sup>1</sup>Georg-August-Universität Göttingen, Göttingen, Germany, <sup>2</sup>Thünen Institute of Sea Fisheries, Bremerhaven, Germany

The fishery targeting brown shrimp (*Crangon Crangon*) is one of the most valuable fisheries in the EU and the single most valuable coastal fishery in Germany. Besides having direct economic importance for harbors and local suppliers, it is also a central factor of coastal community culture, attracting millions of tourists annually. Despite being not only dependent on a duopsony of wholesalers but also facing overaging of the fleet due to a lack of investments, the fleet was in a healthy economic state until recent years, thanks to relatively high market prices and stable catches. However, since 2019, the fishery has come from one crisis to another. After a period of low sales prices in 2019, the sector was weakened when it faced the Covid-induced supply chain disruptions, followed by the escalation of fuel prices due to the Ukraine conflict. Further upcoming conflicts include the reduction of fishing grounds linked to expanding offshore wind farms and the potential closures of national park areas, which are among the main fishing grounds of the fleet. To support management and decision-making, we study the technical efficiency of the German brown shrimp fishery to detect trends and uncover factors explaining detected heterogeneities. We use a 4-component panel stochastic frontier model to distinguish persistent (long-term) and transient (short-term) inefficiencies. The analysis is based on landing, logbook, and vessel registration data of the German brown shrimp beam trawler fleet between 2002 and 2021. The data was aggregated into annual observations per vessel, resulting in an unbalanced panel dataset of 3991 observations on 252 vessels. Our analysis allows us to estimate the technical changes for each year, as well as the returns to scale of production. We show the level of persistent efficiency and how transient inefficiency varies after the observed period. In addition, we analyze how factors such as fuel prices, shrimp prices, the region of operation, and the number of ports used affect production efficiency.

Keywords: Coastal Fishery, North Sea, Technical Efficiency, Brown Shrimp

ID 48

## OUSTING VESSELS LONGER THAN 28 M TO OPERATE OUTSIDE 4 NAUTICAL MILES

Silje Steinsbø<sup>1</sup>

<sup>1</sup>*Nofima As, Tromsø, Norway*

Recently the Norwegian government proposed a number of new measurements to protect the coastal cod stock. One of these is to ban vessels longer than 28 meters from fishing cod inside 4 nautical miles (nm) from the coast. However, the consequences of the measure for the fleets capture and landing patterns were not thoroughly assessed prior to the proposal. This despite the fact that the Norwegian fishing fleet is subject to a comprehensive reporting system which allows detailed mapping of past activity at vessel level. Based on positioning data (ERS- and VMS-data) we analyze in which parts of the fishing fleet (i.e. divided by gear type, type of fishing rights etc.) and in which areas we can expect to see the most substantial consequences of ousting vessels longer than 28 m from fishing grounds closer than 4 nm from the coast. Our findings indicate that vessels over 28 m in the coastal fleet, fishing cod with danish seine and traditional nets, would be impacted the most. Half of their cod catches were closer than 4 nm from the coast in 2022, while the other half was caught in areas further from shore. In the northernmost county (Finnmark), as much as 2/3 of the cod was caught inside 4 nm by coastal vessels, whilst in the Nordland county only 1/5 was caught inside the same boundary. This means that the consequences of the proposal will vary strongly between regions.

**Keywords:** [Coastal cod protection](#), [Institutional limitation of operation areas](#), [Coastal vessels](#)

ID 51

## STRUCTURAL CHANGES IN THE NORWEGIAN COASTAL FISHING FLEET AND IMPLICATIONS FOR FISHING CAPACITY

Thomas Nyrud<sup>1</sup>, Dr Bent Dreyer<sup>1</sup>

<sup>1</sup>*Nofima, Tromsø, Norway*

Dividing fishing vessels into groups by vessel size has a long history in Norwegian catch regulations. In the beginning this was mainly important for avoiding conflicts at sea. Through the introduction of total allowable catch quotas and vessel quotas, vessel length became an important parameter for allocating quotas between vessel groups. However, a vessel's length might serve as a constraint on its ability to innovate and optimize fishing operation efficiency. In 2008, Norwegian policy makers changed the size unit for the largest vessels in the coastal fishing fleet from a maximum vessel length of 28 meters (m) to a maximum of 300 cubic meters (m<sup>3</sup>) of cargo space (raised to 500 m<sup>3</sup> in 2011).

In this study, we analyze the implications of this regulatory adjustment for the coastal fleet's structure and capacity. We find that the adjustment led to the immediate emergence of a new subgroup of coastal vessels longer than 28 meters and with significantly higher fishing capacity than existing vessels. From 2008 and up to today, this new group grew rapidly both in number of vessels and in catch shares, taking an increasingly dominant role along the Norwegian coast. We identify various strategies for acquiring larger vessels, where increasing the size of already-owned, smaller vessels or using the second-hand market were important strategies in the early years, while newbuilds of increasingly larger vessels became more prevalent as time went on. While this new group has grown in size, other parts of the coastal fleet have been reduced. We use a total of seven different capacity measures to document and compare the capacity development in these different groups from the early 2000s and until today.

Keywords: coastal fisheries, fishing capacity, fleet structure, size regulations



ID 52

## PASSIVE GEAR IN DUTCH OPERATIONAL WIND FARMS (OWF), A PILOT PROJECT

**Kees Taal**<sup>1</sup>, Bea Deetman<sup>1</sup>, Sophie Neitzel<sup>2</sup>, Marcel Rozemeijer<sup>2</sup>, Josien Steenbergen<sup>2</sup>, Lobke Jurrius<sup>2</sup>

<sup>1</sup>Wageningen University Economic Research (wecr), The Hague, Netherlands, <sup>2</sup>Wageningen University Marine Research (WMR), IJmuiden, Netherlands

The Dutch fishing fleet faces high competition for space in the North Sea. As a result of the ongoing energy transition many more wind farms will be built in the North Sea within a few years. Area at sea is becoming more and more scarce for fishermen and until now professional fishing vessels are not allowed to fish in wind farm areas in the Dutch part of the North sea. The Dutch government aims at providing opportunities for fishery in new wind farm projects at sea. Some studies have been carried out until now about constrains and opportunities for fisheries in those areas. In April 2023 a pilot project will be started to find out whether it is practical possible for small boats to fish with different types of passive gear in wind farm areas. It is important to know if this can be profitable for fishermen. Practical tests with four types of passive gear will be carried out and researchers of Wageningen University will investigate the practical, legal, ecological, commercial and economical aspects of fishing in wind farm areas, in this case Borssele. This presentation gives an overview of the current knowledge about the economic aspects and challenges of fishing in wind farm areas at sea.

**Keywords:** [Wind farms](#), [Passive gear](#), [Legislation/access](#), [Environment](#), [Economic performance](#)

ID 54

## LAGOON FISHERIES IN GREECE: SPECIAL CHARACTERISTICS AND EVOLUTION TRENDS

Angelos Liontakis<sup>1</sup>, Dimitrios Moutopoulos<sup>2</sup>

<sup>1</sup>*Department of Agribusiness and Supply Chain management, Agricultural University of Athens, Theves, Greece,*

<sup>2</sup>*Department of Fisheries and Aquaculture, University of Patras, Mesolongi, Greece*

Although Greece is famous for its maritime fishery and aquaculture, the lagoon fisheries also play a significant role in supporting several local communities by providing employment and income to fishers. Lagoon fisheries in Greece are still an important part of the country's cultural heritage, and their sustainable management is critical for the continued well-being of the related local communities and the marine ecosystems they depend on. Lagoon fishing occurs in about 70 lagoons around Greece that utilize barrier fish traps or other traditional and/or more modern traps usually combined with fish wintering channels. In most cases, fish harvesting is initiated by local cooperatives but also by private enterprises or other local government agencies.

This study is our first attempt to utilize a -still under construction- extensive database regarding the production and value of lagoon fisheries in Greece from 1966 to 2020. More than 60 species of various qualities which are captured in the lagoons are included in this database, with a harvest value of more than 1.3 million € per year. First, we present some main statistical figures regarding fish harvesting for the lagoon fisheries in Greece. Then, we focus our analysis on three specific species; *Dicentrarchus labrax*, *Mugil cephalus*, and *Sparus aurata*. We evaluate the harvest quantity and fish prices across lagoons and explore factors that may affect these prices, e.g., fish supply, quality categorization, seasonality, location, and lagoon-specific characteristics. Then panel unit root tests are utilized to identify the existence of the law of one price (i.e., the economic principle that states that the price of identical goods should be the same in all markets). The results indicate that there are significant price deviations among lagoons and that the Law of One Price is not universally held. This is an indication of structural deficiencies in the market which are related to specific characteristics of the lagoons and the related fisheries.

**Keywords:** Lagoon fisheries, Greece, panel data, law of one price

ID 55

## INTEGRATED ECONOMIC-ECOLOGIC EVALUATION OF MANAGEMENT OPTIONS IN THE DUTCH SHRIMP FISHERY

Hans van Oostenbrugge<sup>1</sup>, Ulrika Beier<sup>2</sup>, Pavel Salz<sup>3</sup>, Vincent Hin<sup>2</sup>, Kees Taal<sup>2</sup>, Floor Quirijns<sup>2</sup>, Karen van de Wolfshaar<sup>2</sup>, Tobias van Kooten<sup>2</sup>

<sup>1</sup>Wageningen Economic Research, The Hague, Netherlands, <sup>2</sup>Wageningen Marine Research, IJmuiden, Netherlands,

<sup>3</sup>Framian, Spijkenisse, Netherlands

The Dutch shrimp fishery in the North Sea faces various economic and ecological concerns regarding its sustainability, for example to prevent the interactions with birds, benthic disturbance, bycatches and nitrogen emissions in N2000 areas. To facilitate the discussion among stakeholders on possible future management options, we analysed the ecological and economic effects of the following management options: (1) limitation of trip duration and seasonal closure of the fishery, (2) spatial closures and combined decommissioning of vessels, and (3) separate decommissioning. The ecological effects included were bird disturbance, fish and benthic bycatches and long term effects on the shrimp population derived from population modelling. The economic effects are based on a short term economic calculation model based on historic data from the years 2016-2021 and information on the dependency of land-based sectors on the shrimp fishery. Ecological and economic effects are integrated in a single framework that supports identification of optimal management options based on management priorities and effect weighting. The results show that depending on the focus and priorities of the management, management options favorable for the ecology are different from those that are favorable for the economy of the sector.

**Keywords:** [management](#), [spatial closures](#), [bycatches](#), [decommissioning](#), [modelling](#)

## Topic: Markets and marketing of fish products.

ID 5

### DOES NEGATIVE ENVIRONMENTAL INFORMATION ON SALMON AQUACULTURE MODIFY CONSUMER BEHAVIOR?

Sterenn Lucas<sup>1</sup>, Pascale Bazoche

<sup>1</sup>*Institut Agro, Rennes, France*

Salmon is the most-consumed farmed species consumed in the EU. It is also the most consumed fresh species in France, in volume and value, and it is mainly originated from Norway. At the same time, Norwegian aquaculture is regularly highlighted in the press for its negative environmental impacts. Nevertheless, the method of production can be considered as credence attributes and consumers need to be informed about those attributes to consider them. But do more inform consumers will take this information into account in their preferences for salmon? To answer this question, we work on survey data collected from French consumers online in November and December 2021. Two waves a month apart have been run. The first wave covers 3,000 respondents, spread in three groups. One third received a negative information about the environmental impact of Norwegian salmon aquaculture. One third received a dramatic version of the negative information. The last third didn't receive any information. The second wave covers 1,500 respondents already included in the first wave and equally allocate across the information groups, to measure the impact of the information on medium-term behavior about salmon consumption. A discrete choice experiment is run to evaluate consumer preferences concerning salmon origin (Norway, Ireland and Scotland), price, and environmental labeling. First results suggest that negative information impacts negatively the Norwegian salmon perception but the effect remains significant in time only for the dramatic one. This negative effect impacts not only the consumer choice of Norwegian salmon, but also the choice of other origins tested (Scotland and Ireland). It means that negative information about Norwegian aquaculture is perceived as negative information on all aquaculture products regardless of the origin. Furthermore, the choice of environmentally labeled products is increased by the negative information treatment. Labeling can thus be a way to reinsure consumers. As environmental dimensions are credence attributes, the label is an effective tool to help consumers to consider the environmental impact in their consumption behavior.

**Keywords:** Seafood, Negative information, Salmon, Aquaculture, Environmental consumption, consumer behavior

ID 14

## SUBSTITUTION ACROSS WHITE FARMED FISH IN THE MEDITERRANEAN MARKETS

Jose Fernandez Polanco<sup>1</sup>, Ignacio Llorente<sup>1</sup>, Jose Luis Fernandez Sanchez<sup>1</sup>

<sup>1</sup>*Universidad De Cantabria, Santander, Spain*

The market for farmed white fish in the Mediterranean countries is dominated by European seabass (*Dicentrarchus labrax*) and gilthead seabream (*Sparus aurata*). Generally, both species are farmed and sold by the same companies, since they share the same technology and environmental conditions. Greece and Turkey lead the market in a framework of price competition and low product differentiation. Substitution across country of origin for the same species has been tested and confirmed in previous research, but there is no evidence so far regarding substitution across the two different species. Price integration is tested with the two species and countries in the Spanish and Italian markets. Both countries account for the biggest consumption of seabass and seabream.

All Italian import prices are non-stationary, allowing combined substitution analysis across countries and species. Johansen tests show one single cointegrating vector in which Turkish imports cause changes on the price of Greek imports of both species. Turkish seabass substitutes Greek seabass and seabream in the Italian market, as well as Turkish seabream, which is, indistinctly, a substitute for Greek bream and bass.

Substitution across the two species can not be rejected in the Italian market, as well as in the Turkish imports of seabass and seabream in Spain. On the opposite, Greek imports appear to be differentiated in the Spanish market, both in terms of country of origin and across the two species. Despite the strong similarities in consumer preferences in the two countries, the involvement of Greek and Turkish companies in the domestic value chains differs and may explain any differences in the properties of the price series and the results of the analysis.

**Keywords:** [Seabass & seabream](#), [international trade](#), [substitution](#), [price integration](#).

## FISHERS' PERCEPTIONS REGARDING MARKETING STRATEGY AND BUSINESS PERFORMANCE: THE CASE OF GREEK FISHERIES

Eleni Kaimakoudi<sup>1</sup>, Eirini Tzouramani<sup>1</sup>, Angelos Liontakis<sup>1</sup>, Stamatis Mantziaris<sup>1</sup>

<sup>1</sup>*Agricultural Economics Research Institute, Athens, Greece*

### Abstract

Fisheries sector is considered an important economic activity both at European level and globally. It contributes in food security, employment and social cohesion especially in coastal areas. Furthermore, it provides high nutritional value products and plays a significant role in constant supply of fisheries products in the market. However, the sector faces major fisheries resources challenges namely overfishing, depletion of fish stocks and marine invasive species.

This paper attempts to empirically investigate potentially significant differences in perceptions regarding policy and marketing strategies in fisheries sector based on the Structure – Conduct and Performance (SCP) methodological framework. This is critically important, due to the fact that there is a lack of detailed empirical research regarding fishermen's perceptions and particularly potential differentiation between small scale fisheries (SSF) and large scale fisheries (LSF). Quantitative data were gathered through personal interviews with 494 fishermen during 2022. A combination of exploratory factor analysis, cluster analysis and discriminant analysis was employed in order to identify potentially distinct groups among fishermen. Chi-square tests were also employed to examine possible relationships between fishermen' demographic and socio-economic status and cluster membership.

The results reveal two distinct groups: lowly innovative and highly innovative. The results demonstrate that there are statistically significant differences among the two distinct clusters in terms of industry structure, conduct and business performance. This study's results clearly imply the differentiation between the two distinct groups regarding the adoption of strategic policy and marketing management decisions. However, notably both clusters revealed that their strategic orientation has not changed towards a more environmental sustainable fisheries management. National development policies should focus on development of funding training seminars aiming to raise awareness towards a more sustainable perspective regarding the environmental and business aspects of fisheries sector. Overall, it should be recognized that the sustainability of fisheries resources is not optional. On the contrary, it is essential in achieving the economic growth of both sectors, SSF and LSF.

**Keywords:** fisheries, policy, marketing, sustainability, Mediterranean, Greece

## IMPROVING THE SUSTAINABILITY OF WILD SHRIMP VALUE CHAINS IN ITALY

**Monica Gambino**<sup>1</sup>, M. Cozzolino<sup>1</sup>, R.F. Grassi<sup>2</sup>, L. Malvarosa<sup>1</sup>, C. Paolucci<sup>1</sup>, D. Taskov<sup>3</sup>

<sup>1</sup>NISEA, Fishery and Aquaculture Economic Research, <sup>2</sup>University of Naples L' Orientale, FAO, <sup>3</sup>Fisheries and Aquaculture Division (NFI)

Shrimp catches in the Mediterranean represent an important share in the total fisheries landings for the region and a basis for job creation and generation of economic value along the value chain (VC). The paper presents the results of a VC analysis of wild shrimp in Italy conducted under the FAO project “Improving Fisheries and Aquaculture Value Chains in the Mediterranean within the Blue Growth Initiative” (SVC4MED) to identify weaknesses and opportunities for increasing the sustainability of related activities.

Two case studies - Giant red shrimp (*Aristaeomorpha foliacea*) and Deep-water rose shrimp (*Parapenaeus longirostris*), targeted by trawlers in Southern Sicily and Southern Adriatic, respectively, were selected due to their significant contribution to the overall shrimp catches in Italy. The analysis included mapping the selected VCs and assessing their functioning and performance in terms of economic, social and environmental sustainability with the aim develop visions and strategies for upgrading. Both secondary and primary data were used. Interviews were conducted with stakeholder representatives to collect qualitative and quantitative data. The preliminary results show that the Giant red shrimp, a high value product, is characterized by a short VC dominated by vertically-integrated companies, including two main nodes (production and wholesaling) in which the value added is almost equally distributed among them. On the other hand, the Deep-water rose shrimp VC is more fragmented, involving a larger number of actors with bargaining power concentrated in the processor/wholesaler node. Imports from other Mediterranean countries act as competitors on the Italian market.

On the basis of the findings, the main upgrading strategies identified include: improved value chain coordination at national and international level, balancing bargaining power along the VC, increasing the application of innovative technologies to reduce dependence on fossil fuels and food loss and waste under a circular economy approach. The need for improving and maintaining the sustainability of biological stocks and their responsible use is also emphasized.

**Keywords:** Valua chain, sustainability, SWOT analysis



## STAKEHOLDERS' PERCEPTION OF AQUACULTURE

Mausam Budhathoki, Sezgin Tunca, **Raquel López Martínez**, David Little, Karen Brunnsø, Bertrand Le Gallic

<sup>1</sup> University of Stirling, Institute of Aquaculture, Stirling, UK, <sup>2</sup>MAPP Centre, Department of Management, Aarhus BSS, Aarhus University (AU), Aarhus, Denmark, <sup>3</sup>Université Brest, IUEM, Brest, France, <sup>4</sup> University of Stirling, Institute of Aquaculture, Stirling, UK, <sup>5</sup>MAPP Centre, Department of Management, Aarhus BSS, Aarhus University (AU), Aarhus, Denmark, <sup>6</sup>Université Brest, Brest, France

Aquaculture contributes to around half of the global aquatic foods, but the stakeholders' perception of aquaculture in a wider context is poorly documented and understood. Thus, this article conducted a systematic scoping review to understand the stakeholders' perception of aquaculture. We identified 151 publications for inclusion, and through thematic analysis identified four themes: (1) social acceptability of aquaculture; (2) sustainability aspects of aquaculture; (3) media framing of aquaculture; (4) consumer perception towards aquaculture. The findings suggest that multiple stakeholder groups (fish farming industry, governmental officials, civil society groups, business leaders, scientists, and the public) perceived aquaculture differently, between them, and depending on the circumstances and context, their perceptions ranged from very positive to very negative. Further, multiple factors influence their perception of aquaculture including its impact on multiple sustainability dimensions, knowledge of aquaculture practices, transparency, personal interests, types of aquaculture practices, and its location, as well as sociodemographic and lifestyle characteristics such as age, gender, education, household size, occupation, income, food-related and dietary lifestyles. Environment and ecological risks were particularly perceived as negative, especially by civil society groups (environmental NGOs, activists, community groups), while economic and food security benefits were perceived positively, especially by the fish farming industry, government officials, and scientists. These findings have implications for aquaculture practitioners' responses and highlight the need for multidisciplinary solutions prioritising transparency, communication, and accountability along with providing essential knowledge that improves social acceptability and guides its growth and development.

## ANALYSIS OF DIFFERENTIATION AND STRATEGIES FOR FISHERY AND AQUACULTURE PRODUCTS IN FRANCE AND SPAIN USING ONLINE CATALOGUES OF MAIN RETAILERS

Raquel Lopez Martinez<sup>1</sup>, Bertrand Le Gillic<sup>1</sup>

<sup>1</sup>*University of Western Brittany, Brest, France*

European consumers have different consumption patterns depending on which country you look at. Thus, consumers' preferences and their perception of seafood products is also different geographically. There are a large number of papers that have studied these traits, with special interest in WTP. However, we have not found as many papers that are interested in how supply changes as a function of the attributes that inform consumers of the differences between seafood products. And therefore how distributors adapt their products according to the country in which they are located.

In this work we aim to understand what are the attributes that differentiate horizontally and vertically the main game segments mentioned by a price segment analysis.

This data were collected toward the online catalogues of two reference retailers present in both countries, Carrefour and Auchan (Alcampo) focusing on salmon and trout supply stressing the smoked salmon fillets group as is the main product and the one with highest rate of different reclaims for consumers.

We found that in Carrefour France, horizontal differentiation is mainly governed by one attribute: organic products (BIO) and it's dominated by trout. It should be noted that although there is no clear distinction, certain brands present higher prices. In contrast, this same supermarket in Spain has a lower segmentation of ranges and segment 1 shows the signature (firm) as the main differentiating attribute. In Auchan (France) the products we find in segment 1 are organic products, as in Carrefour, segment 2 is very heterogeneous in attributes but when we move to segment 3 we see that there is an important presence of smoked trout and segment 4 is composed of products that have been defrosted. In Spain, the highest ranges correspond to certain firms as well as Carrefour's strategy.

Finally, we see a much clearer tendency for French distributors to offer more information on products, as well as greater variety, while in Spain it is the brands themselves that make the difference.

ID 46

## CONSUMERS' WILLINGNESS TO PAY FOR HEALTH ALLEGATION AND ECOLABEL: EFFECT OF THE PRODUCTION METHOD

Jean-françois Dewals<sup>1</sup>, Sterenn Lucas<sup>1</sup>

<sup>1</sup>*University Of Western Brittany, Saint-jacques De La Lande, France*

Our Fishery and Aquaculture products (FAPs) sector faces challenges in providing consumers with healthy and sustainable food. There is a strong political commitment to reforming the sector. Among other things, labels have emerged as an essential key player in guiding consumers towards more sustainable behaviour. Today, labels are highly developed in the FAPs market. We are even witnessing a trend towards multi-labelling of these products. This article aims to study the willingness to pay (WTP) for FAPs bearing one label, but also two labels. The focus is on health allegations and ecolabels. A production method component is also included in this article (wild vs farmed products), as these two types of products differentiate consumers' expectations. Three different species were thus included: Salmon, Cod and Seabass. This article relies on a consumer survey realised in 2023 on the French market. Consumers were asked to realise a double bidding process with one opt-out option to study their WTP. First, our results show a positive willingness to pay for all single labels, regardless of species. Nevertheless, this WTP varies according to the production method and the species considered, with a higher WTP for wild species. Moreover, ecolabels generally create a higher WTP than health claims. Second, we found a greater WTP for FAPs bearing double labels compared to FAPs with only one scheme. However, the marginal WTP is always decreasing. Our results show that dual labelling can be attractive from a stakeholder perspective. However, it is crucial to consider the species and the production method in the decision-making process. Indeed, high-added valued species (cod or wild seabass) present more interesting opportunities to create value.

**Keywords:** Consumers' preferences, Multi-labelling, WTP, sustainability

## WHITEFISH SUPPLY TO THE UK AND THE IMPACT OF SANCTIONS ON RUSSIA

Joe Cooper<sup>1</sup>

<sup>1</sup>*Seafish, Edinburgh, United Kingdom*

In February 2022 Russia launched a military invasion on Ukraine which resulted in coordinated sanctions from the EU, UK and USA. The response from the UK was to impose trade sanctions that target Russia's economy, including a 35% tariff applied on seafood imports from Russia. These sanctions were introduced as a cost-of-living crisis hit the UK, adding to the already rising price of food.

The UK has traditionally been reliant on external supply of whitefish. Imports of cod, haddock and pollock from Iceland, Norway, China and Russia was 6-7 times higher than local production in the last decade. As Russia holds the majority share of global whitefish total allowable catch (TAC), there were expectations that these sanctions would have significant effect on the UK seafood market.

Almost a year later, HMRC trade statistics are starting to uncover the extent to which these sanctions have impacted the supply of whitefish to the UK and how the UK seafood sector started to respond. This research was undertaken to identify the products targeted and the seafood businesses affected by the additional 35% tariff. The cost to importers is analysed as well as the extent to which alternative whitefish products were sourced and if so, where from.

Analysis of trade and landings data in the months following the introduction of sanctions compared to the same period across previous years indicates there has been a disproportionate impact on smaller businesses. Imports of frozen-at-sea cod and haddock fillets destined for fish and chip shops in the UK consigned from Russia have effectively been prevented by cost. Importers have looked towards sourcing alternative frozen whitefish fillet products, seen in increased cod and haddock from Iceland, pollock from China and pangasius from Vietnam. Without the traceability data to confirm, it is indicated that a higher proportion of UK landed cod and haddock was being sourced for domestic consumption instead of reaching the export market.

**Keywords:** market, supply, whitefish, Russia, UK, sanctions

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# POSTER PRESENTATIONS

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Topic:  
Small scale fisheries.

ID 61

## ASSESSING SOCIO-ECONOMIC CONDITIONS AND FISHERS' PERCEPTIONS ON LIVELIHOODS AND CO-MANAGEMENT FOR THE SMALL-SCALE FISHERIES (SSF) SECTOR IN THE MEDITERRANEAN

Rosaria Felicità Sabatella<sup>1</sup>, **Loretta Malvarosa**<sup>1</sup>, Monica Gambino<sup>1</sup>, Paolo Accadia<sup>1</sup>, Carlo Paolucci<sup>1</sup>, Simone Niedermueller<sup>2</sup>, Marco Costantini<sup>2</sup>

<sup>1</sup>NISEA, Fishery and Aquaculture Economic Research, Salerno, Italy, <sup>2</sup>WWF, World Wildlife Fund, Rome, Italy

The presentation is aimed to report the main results of an action conducted under the WWF initiative "Transforming Mediterranean Small-Scale Fisheries" whose aim has been to improve the knowledge of the socioeconomic conditions, fishers' perceptions, socioeconomic behaviour, and impact of Covid-19 on the SSF sector. The action has been carried out over a 4-year period through the implementation of two surveys (the first held in 2018, the second in 2022) in 10 selected Mediterranean sites, located in Italy, Croatia, Greece, and Turkey.

The surveys covered three modules, each one focusing on three different aspects: 1) socio-economic aspects (activity, production, effort, costs, employment at the vessel level); 2) perceptions on the livelihoods for the people involved in the SSF activities on the selected sites; 3) quantitative and qualitative information to assess the socioeconomic impact of the Covid-19 on small-scale fisheries.

The presentation will report on the main achievements of the initiative, looking at changes occurred in indicators selected for the economic, social, livelihoods and governance dimensions. The changes occurred in the economic dimension have been assessed looking at the trend of indicators allowing to assess the profitability of the fisheries as well as the possibility for fishermen to access to income's integration. The social dimension has been assessed looking at indicators giving a measure of the social stability. The fishers' perception about livelihood has been assessed by looking at changes on the level of satisfaction in relation to selected aspects while governance has been assessed looking at changes in the perception of fishers in relation to co-management issues.

**Keywords:** Small-Scale Fisheries, Mediterranean, Livelihood, Governance, Co-management

## Topic: Climate change.

ID 49

### PUBLIC PERCEPTION OF THE IMPACT OF CLIMATE CHANGE (VIBRIO VULNIFICUS) ON THE ECONOMIC USE OF COASTAL WATERS BY LOCAL STAKEHOLDERS IN POLAND

Adam Mytlewski<sup>1</sup>, [Marcin Rakowski](#)<sup>1</sup>

<sup>1</sup>National Marine Fisheries Research Institute, Gdynia, Poland, <sup>2</sup>National Marine Fisheries Research Institute, Gdynia, Poland

The environment of the Baltic Sea is facing numerous challenges and changes. The Baltic is the fastest warming sea on earth. The dynamics of the water temperature increase and the physical and chemical conditions cause environmental changes that will have a significant impact on the coastal zone connected economic opportunities and sources of income of local communities in the nearest future.

The presentation shows the results of a survey and focus group on the knowledge of the problem of increasing pathogenic vibrio vulnificus bacteria among stakeholders benefiting from Baltic Sea coastal waters in Poland. Infection with this bacterial species is associated with a high mortality rate of infected people. According to data from the US after Hurricane Ian, the rate was about 20%. The seasonally increased presence of pathogenic vibrio spp. in the Baltic Sea is also confirmed by monitoring of the European Centre for Disease Prevention and Control.

The main sectors threatened by climate change are tourism and fisheries which are now the primary source of income for local societies. One of the issues studied was to learn about knowledge of potential threats, to rank these threats in the public awareness, and to examine the willingness to take anticipatory action. The authors also analyzed people's attitudes toward the use of natural-based solutions in reducing the problem. The result of the research is a conclusion on the need of properly designed communication strategies and possible countermeasures. At the present moment, most respondents show low knowledge of the problem despite the high probability of seasonal intensification of the occurrence of the pathogen scenario. Communication of the potential risk is an extremely sensitive aspect. As the analysis of the cases described in the media shows, there is a violent reaction of interest triggering unpredictable reactions from potential tourists and disrupting local businesses. This makes it necessary to appropriately shape, scientifically supported communication about the issue.

**Keywords:** climate change, local economy, environment, fishery



Topic:

Human pressure in the ecosystems and environmental degradation.

ID 47

## ON THE DIFFERENCES BETWEEN ECONOMIC AND ECOLOGIC SYSTEMS IN EU FISHERIES: AN ASSESSMENT OF FISHERIES DIVERSITY

Eduardo Sánchez<sup>1</sup>, Gonzalo Rodríguez<sup>1</sup>

<sup>1</sup>*Universidade De Santiago De Compostela, Alicante, Spain*

Fisheries play a crucial role in providing food and animal protein to the world population. However, the sustainability of seas and oceans worldwide is under critical threat due to various factors such as fisheries overexploitation, marine basin destruction, climate change, and marine pollution. In addition to these processes that endanger marine stock sustainability, there are other less easily quantifiable factors that exacerbate the negative status of fish populations. One such factor is the commoditization of fisheries, which has led to a concentration of fishing pressure on a limited number of fish species. The European Union's analysis of industrial fleet landings shows that a reduced number of species (12) make up a significant percentage (37% by weight and 42.5% by value) of the total catch. This phenomenon is a powerful indicator of the commoditization of the fishing sector, driven by market dynamics and fish product demand. Such differences between ecological and economic systems have significant adverse effects on marine ecosystems' biodiversity, trophic chains, and reproductive potential, leading to fisheries' underperformance and even collapse in some cases. To investigate these differences between ecological and economic systems, independent data from ICES and the EU Commission on oceanographic surveys, catches, and STEFC commercial landings were analyzed. In addition to visual analysis of differences in diversity indices, a PERMANOVA statistical test was conducted to analyze differences between the composition of catches from the commercial and oceanographic fleets. The results show significant differences in alpha, beta, and gamma diversity indicators per marine region and subregion between commercial and scientific fleet landings in the Atlantic Ocean and Mediterranean Sea.

Topic:  
Markets and marketing of fish products.

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## THE MODEL OF THE LOCAL FOOD MARKET WITH LOCAL GOVERNMENT PARTICIPATION ON THE EXAMPLE OF CARP MARKET IN POLAND

Magdalena Raftowicz<sup>1</sup>, Marian Kachniarz<sup>1</sup>

<sup>1</sup>*Wroclaw University of Environmental and Life Sciences, Wroclaw, Poland*

The aim of the research was to construct a model of short food supply chains on the example of the carp market in Poland.

The starting point for the survey was identifying the model currently in operation, along with an analysis of the sales profitability in each of the chains. Based on it, it can be concluded that shortening supply chains in the carp market is still only an adjunct to the mass sale of live carp during the Christmas period (carp is a traditional Christmas Eve dish in Poland). However, more and more farms are enthusiastic about such solutions. Medium-sized farms (from 80 to 300 hectares) and large farms (300-1000 hectares) declare particular interest in shortening supply chains. Despite these declarations, these farm groups, which dominate the carp sales structure, do not fully exploit the potential of short supply chains.

Research has shown that the potential to change this situation lies in the involvement of local government. In particular, it can help shorten the supply chain as a local market organizer and demand creator for mass caterers.

**Keywords:** carp market, local government, Poland

# Professional Congress organizer



39-41 Lykavittou, 10672 Athens

Tel: +30 210 3668854, +30 210 3668855, +30 210 3668856

Fax: +30 2103643511

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