Book of Abstracts

2018 Biennial Conference of the
International Institute of Fisheries Economics and Trade

Adapting to a Changing World: Challenges and Opportunities

July 16-20, 2018

University of Washington
Seattle, Washington USA
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The price tag of regulated open access for for-hire recreational fisheries

Abstract

Saltwater recreational fisheries receive little attention compared to their commercial counterparts. Yet recreational fisheries can suffer from many of the same symptoms of open access as commercial fisheries. Regulations designed to allocate a scarce supply, such as seasonal closures augmented with bag and size limits, can result in significant losses of welfare to anglers. We provide an estimate of these foregone benefits by estimating the potential gains to implementing rights-based reforms of the headboat portion of the recreational red snapper fishery in the US Gulf of Mexico (GOM) – a fishery which has suffered from a regulatory spiral of shortened seasons and lowered bag limits in spite of rebuilding stocks. We gather primary survey data of headboat anglers that elicits their planned number and seasonal distribution of trips under status-quo management and alternative arrangements with year-round retention of red snapper and compensating increases in prices or lowered bag limits. We utilize these data to estimate a Kuhn-Tucker demand model of anglers’ seasonal demand for trips as a function of the ability to retain red snapper and bag limits and prices. We find that a hypothetical rights-based policy under which vessels could offer their customers year-round fishing, in exchange for lower per-angler retention and increased prices, could raise individual headboat anglers' welfare by an average of $139/year. These estimates, when placed in the context of the overall scope of recreational fishing around the world, suggests that status-quo management of scarce fish stocks may cost anglers billions of dollars a year.

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Catch more to catch less: Estimation of fishing timing choice as bycatch avoidance behavior in the Bering Sea Pollock fishery

Part of
Special Session: Different approaches and priorities for modeling fisher behavior (2)
11:00 AM - 12:30 PM

Major Theme
Open Session: Different approaches and priorities for modeling fisher behavior

Abstract
This study develops a dynamic model of the harvesters’ choice of when to use individual fishing quota (IFQ), considering time-varying rates of potentially limiting bycatch, and a time-varying outside opportunity. The temporal allocation of IFQ over a season by harvesters has not been well-studied empirically due to complexity of the dynamic problem. In this paper, we focus on participation and target species as the harvester’s margin, which is flexibly chosen under IFQ management. To explore the incentive, we theoretically model harvesters’ seasonal profit maximizing behavior under constraints provided by regulations in the target, bycatch, and alternative fisheries. The solution motivates us to incorporate the dynamic quota use in a simple discrete choice model to estimate the harvesters’ choice. To link the shadow cost of quota in our theoretical model and harvester behavior in the data, we construct a variable which is the speed of quota usage relative to the remaining season weighted by the revenue opportunity and captures the harvesters’ forward-looking decision. The application of this empirical model is implemented with the AFA Alaskan pollock catcher-processor fleet. The result indicates that the harvesters are less likely to participate in the pollock fishery when the quota usage is too fast relative to the remaining time, suggesting that the dynamic planning plays a role, and the estimates of the coefficients on bycatch rate supports the dynamic avoidance behavior of bycatch.

Author(s)
Keita Abe, University of Washington
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Coastal Areas Household Fish Demand and Supply Assessment in Nigeria: “Any Future Threat or Hope?”

Part of
Understanding Small-scale and Developing Country Fisheries (2)
01:30 PM - 03:00 PM

Major Theme
Understanding Small-scale and Developing Country Fisheries

Abstract

This study accessed household fish demand and supply in the coastal Areas of Ondo State, Nigeria. Multistage sampling technique was used. The study areas were purposively selected because it falls along the coastal areas of the country. Three villages/towns where fishing activities are dominant were randomly selected while 60 respondents were also randomly selected and interviewed using structured questionnaire. Both primary and secondary data were used. Focus Group Discussion (FGD) was also used to get raw data from respondents. Data were analyzed descriptively using Kobo collect method. The result of socioeconomic characteristics of the respondents revealed that most of the respondents were within the active age group of 26-50 years. Most of the respondents (72%) were female and 60% of the respondents were married. The household size of (1-3) members recorded the highest percentage (33%). 60% of the respondents had formal education, 61% of the respondents engaged in other occupation apart from fishing. 37 species of fish were found during the course of the study, tilapia species (32%) and croaker fish (27%) were the most captured fishes. Croaker fish (47%) is of the highest demand. The study revealed that fish supply cannot meet with the demand of fish as a result of over-fishing as well as environmental and human factors prevailing in the area. It is therefore recommended, that Government should intervene, through enforcement of fishing regulations/laws. There should be general sensitization on the effects of over-fishing both to the fisher folks and the water body for economic sustainability.

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EDUCATION AS A DETERMINANT OF FISHER FOLKS INTEREST IN FISH FARMING IN IBEJU-LEKKI LOCAL GOVERNMENT AREA OF LAGOS STATE

Abstract

Supply of fish from the natural waters is declining as a result of over-exploitation and environmental degradation especially in the coastal areas of Nigeria. In order to arrest the attendant effects of food and economic insecurity as well as undesirable migration to cities, fish farming has been suggested as an alternative livelihood. This study examines education as a factor of willingness of fisher folks in fish culture in fishing communities of Ibeju-Lekki LGA of Lagos State. Three (3) communities in brackish water environment were purposively selected viz: Igbo-olomi, Idata and Ise. Simple random sampling method was employed to select 86 respondents from these communities. Semi-structured interview schedule was used to collect socio-economic data, occupational features, willingness of fisher folks to invest in fish farming and factors responsible for their choice. The data were subjected to descriptive statistics and Chi-square test. Logit regression was employed to assess the influence of socio-economic and technical factors on the respondents’ decision to integrate fish farming in their enterprise mix. The results of the study show that 81.4% of the respondents were willing to adopt and integrate fish farming into their fishing and other economic activities. Logistic Regression result revealed that the major determinant of willingness was the educational status of the respondents. The result of Chi Square Analysis showed that there was significant relationship between willingness of the adoption of fish farming and Education Status (X2 = 4.626, p < 0.05).

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EMPOWERMENT OF WOMEN IN NIGERIA’S SMALL-SCALE FISHERIES: A TOOL TO SUSTAINABILITY

Part of
Special Session: Bringing Gender Discourse in Fisheries Economics and Trade (1)
02:00 PM - 03:30 PM

Major Theme
Open Session: Bringing Gender Discourse in Fisheries Economics and Trade

Abstract

In Nigeria, women play major roles of at least 75% in the fisheries and aquaculture value-chains from production, processing, storage, marketing and trade. Unlike the men, women have not received commensurate levels of attention and empowerment largely because their roles are perceived as ‘invisible’, poorly evaluated and undocumented without substantial sex-disaggregated data as proof. For these reasons above and in furtherance of identifying key areas in which empowerment needs to be strengthened thus closing the gender gap, this study was undertaken to contribute to information on the nature and empowerment of women and the factors influencing their participation in the small-scale fisheries. The study also aimed at determining relationship between the extent of the women’s empowerment and some selected determinants using a cumulative empowerment index (CEI). A mix of transdisciplinary, quantitative and qualitative methods was used for this study in Ikosi in Agbowa and Igboolomi fishing communities of Epe and Ibeju-Lekki Local Government Areas of Lagos State respectively. Ten indicators of empowerment: contribution to household income, decision making ability, spending ability, ownership of assets, access to resources, membership in economic or social groups, time allocated to household, productive tasks and leisure activities, coping capacity to household shocks and political awareness were chosen for this purpose. Results obtained in this study showed that women are still very low in the CEI and it is hoped that this will pave way for a strategic framework for including gender –responsiveness in policies and developmental planning.

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Adeola Ayano, Bells University of Technology

Mercy Adeogun, Federal College of Fisheries and Marine Technology,

Jacinta Eze-Uramah, The Green Generation

Folashade Adeboyejo, Mundus maris-Sciences and Arts for Sustainability of Nigeria
Performance and economic assessment of “Wastes to Nutrients” in Smallholder Fish Husbandry in Lagos, Nigeria

Part of
Poster Session
05:00 PM - 07:30 PM

Major Theme
Economics of Aquaculture

Abstract

Experts often encourage incorporation of wastes into feeding programmes in aquaculture, envisaging a concomitant enhancement of fish growth and reduction in cost of feeding the fish. Livestock droppings-generated maggots, food/agro processing wastes, offals and carcass of fish and chicken are classic examples of such items and could be given directly to the fish or processed into meals to enrich the aquafeeds. This study investigates the bioeconomic values of using wastes as nutrients in small scale farming in Ebute Afuye and Ikorodu in Lagos State, Nigeria. Data on production, costs and earnings were collected from small holding fish farms, on the basis of the use of wastes to augment fish pellets The production performance parameters considered are final average weight gain, production cycle, average biomass storage, survival index, and dressing values. Data collected were analysed using descriptive statistics, net income model, the ANOVA, and the stochastic trans log frontier production models. The indicators revealed better performance and efficiency in resource use in farms where wastes were utilized but with marginal profit. There is need to understand the level of use of both categories of feed to optimised growth performance, product quality and profit for sustainable small-scale aquaculture.

Author(s)

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Marketing Efficiency of Some Selected Seafood Markets in Lagos State, Nigeria

Abstract

Fish is an important source of protein which is essential for humans to meet up with their body’s nutritional requirements so as to achieve necessary growth and development. Efficient marketing of fish is therefore necessary to boost its benefits to both consumer and fish seller and contribute towards sustainable local economic development. This study examined the efficiency of marketing seafood in some selected markets in Lagos state (Badagry, Epe and Makoko market) with a view to identifying factors militating against the efficiency of these markets. Primary data was collected cross sectionally from 150 fish marketers using a multistage sampling technique to obtain the demographic features of the markets, their marketing costs and retail prices. Results showed the cost spread and net margin amongst the seafood market channel actors (fishermen, wholesalers and retailers) and it was revealed that daily revenue was quite high and the wholesalers had the highest profit margin followed by the retailers and least were the fishermen. The major problems that militated against local seafood marketing in the study area were a combination of lack of storage facilities and capital. There is need for government to assist in the development of infrastructure for the seafood markets to be more efficient.

Author(s)

Yetunde Agbeja

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GENDER PARTICIPATION IN FISHERIES FOR SUSTAINABLE LIVELIHOOD IN THE COASTAL REGION OF ONDO STATE, NIGERIA

Part of
Poster Session
05:00 PM - 07:30 PM

Major Theme
Open Session: Bringing Gender Discourse in Fisheries Economics and Trade

Abstract

About 6 million coastal and riverine rural fisher folks in Nigeria are engaged in artisanal fish production and its subsidiary activities as major sources of livelihood for the fisher folks. This study was carried out to investigate gender participation in fisheries and sustainable livelihood in the coastal areas of Ondo State, Nigeria. Multistage sampling technique was used to select the respondents and the study area. Data were collected from 100 fisher folks from Ilaje and Ese-odo Local Government Areas (LGAs), using a well-structured questionnaire and interview schedule. Data were analyzed descriptively. Kruskal Wallis test (KWt) was used to determine the level of livelihood diversification among the fisher folks. The most prominent roles of men in the study area are fishing (66%), boat owners (61%), and gear preparation (56%). On the other hand, the participation of women in fisheries are mostly sorting of fish caught (81%), salting for processing (79%), washing of fish and fishing gears (69%), and smoking (66%). Women also dominate fish distribution and marketing activities which include transporting, display and bargaining. The result of the Kruskal Wallis test (KWt) revealed that the main occupation of the different groups is fishing, where the married class was the most predominant group. For gender, fishing remains the most engaged main occupation with more male than female. It is recommended that fisher folks especially women should be encouraged to diversify their means of livelihood for sustainable fisheries and to reduce the dependency on the susceptible coastal resources.

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Diversification, efficiency and productivity in catch share fisheries

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (6)
01:30 PM - 03:00 PM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract
This study investigates the relationship between diversification, efficiency and productivity following the adoption of catch shares. Although diversification is expected to moderate revenue fluctuations, the US experience with catch shares fisheries indicates that most vessels have become more specialized, potentially forgoing risk management gains. Our analysis examines productivity and efficiency effects associated with vessel diversification/specialization using the Gulf of Mexico red snapper fishery as a case study. To this end, we used a stochastic production frontier to measure TFP and the inverse of the Herfindahl–Hirschman Index as a measure of output diversity. Preliminary results indicate that technical efficiency increases with output diversification.

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How efficient is pond and tank freshwater aquaculture fish farming in Ghana. A Cob-Douglas Production Stochastic Frontier Analysis

Part of
Economics of Aquaculture (1)
11:00 AM - 12:30 PM

Major Theme
Economics of Aquaculture

Abstract

There are a range of smaller-scale fish farms operating in Ghana producing mainly tilapia and catfish based on extensive (stocking of small reservoirs), intensive and semi-intensive (earthen ponds & tanks) techniques. Aquaculture production in Ghana plays a significant role in the economic development of livelihoods of fish farmers and contributes significantly to the country’s Gross Domestic Product (GDP). Production increased from 10,200mt (2010) to 44,610mt (2015). Production of fish is faced with many challenges. Some of these are related to availability, accessibility and price of feed, quality, quantity and price of seed, training of fish farmers, disease and water quality among others. This paper therefore examines the technical efficiency of its operators. Primary data collection was undertaken using semi-structured questionnaire transferred unto KoBo Toolbox on a phone tablet. The study sampled 346 fish farmers across the country. Method employed in sampling were stratification and multistage simple random sampling. SPSS and STATA were employed in analysis. Regression analysis employed Cob-Douglas Production Stochastic Frontier model. A total of 323 males (93.4%) and 23 females (6.6%) were sample for the study. Production system undertaken in the country are intensive, semi-intensive and extensive with most respondents undergoing semi-intensive system of production (72.5%). The mean technical efficiency of pond and tank fish farmers is estimated to be 70%. It implies that the pond and tank fish farmers are operating 30% below the production frontier given level of technology and it’s quite significant. Age of fish farmer, household size are significant determinants of technical efficiency.

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The State of Farm Raised Catfish Consumption in Ghana. A Case of the Ashanti Region (In Press)

Part of
Poster Session
05:00 PM - 07:30 PM

Major Theme
Understanding Small-scale and Developing Country Fisheries

Abstract

This study aimed to explore the status of farmed raised catfish consumption in Ghana focusing on the Ashanti region as a case study. Data was collected using a semi-structured questionnaire from 240 respondents from 4 out of 7 zones in the region. The method of data collection were purposive, stratification and simple random sampling. The study employed descriptive analysis as well as logistic regression for data analysis. Results points out that about 59% of the consumers of farmed fish consumed catfish. Furthermore, 62% of consumers of catfish had ever consumed fresh catfish. Reasons provided by those who did not eat fresh catfish are: it taste less better than captured catfish from the wild, has an unpleasant odour and slimy in nature, is a taboo due to religious belief, and higher price. Most respondents (63%) who patronized catfish preferred smoked catfish. About 80% of the respondents are willing to eat catfish if it is processed. The logistic regression results showed that the determinants for consumption of processed catfish are age, gender, where fish is consumed, and frequency of farmed catfish purchased. It is recommended that government should come out with policies, plans and strategies as well as incentives to enable fish farmers produce and process catfish. Since a greater percent of consumers preferred processed catfish compared to fresh, value addition to the catfish product should be encourage for higher patronage.

*http://www.sciencedomain.org/journal/70/articles-press*

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Optimal Catch of Anchovies as Bait for Tuna and Food for Local Communities in Developing Countries.

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (7)
03:30 PM - 05:00 PM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract
Bait tuna fleets in developing coastal countries compete for small pelagic stocks such as anchovies that are primarily targeted by artisanal fishers. The tuna vessels are typically foreign owned, their catches are exported, and the vessels pay taxes to the resource-rich countries; whereas the artisanal fishers exploit the small pelagic stocks to support the livelihoods of the poor. In addition, the technologies employed in catching the bait (i.e., intermediate input) destroy the benthic floor of the management area of the artisanal stocks. Although these resource-use conflicts are common, bioeconomic models that seek optimal fish allocation, as well as account for environmental opportunity costs, are scare. In this paper, such a model has been developed to verify the extent to which non-cooperative solutions deviate from social optimal outcomes. Moreover, we have derived an expression for optimal ad valorem tax that is necessary to maximize catch net revenues from the two stocks. The optimum and comparative static solutions are simulated using data on tuna and anchovy fishing in Ghana.

Author(s)
Wisdom Akpalu, UNU-WIDER
Do Regulatory Policy Measures Affect Seafood Exports to the EU? Empirical Evidence from Oman

Part of
Seafood Markets and Trade (2)
11:00 AM - 12:30 PM

Major Theme
Seafood Markets and Trade

Abstract

As net exporter of seafood products, investigation of potential impacts of domestic regulatory measures such as ban on export of certain fish species and ban on demersal trawl fishing on seafood export performance is of eminent practical importance to Oman. To this aim, the main purpose of this empirical work is to examine the influence of regulatory policy measures on Oman’s seafood export supply to the European Union (EU) market covering the period 2001-2015. Influences of other potential economic factors such as relative price, production capacity, gross domestic product and seasonality are also investigated under a partial adjustment modeling (PAM) framework through the use of multiple regression techniques. It is found that the regulatory policy measures and the relative price variable are significantly affecting the export supply. The result in relation to export ban suggests that such measures generate competition between the domestic and the EU market. The empirical result also indicates a considerable time lag in export supply. The policy implications of the results are also discussed in the paper. Management authorities, policy makers and seafood companies of the respective countries may find these results useful for formulating appropriate strategies to address such concerns.

Author(s)

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Evaluation of Two Feed Types on The Growth Performance and Cost-Effectiveness of Nile Tilapia (Oreochromis niloticus) Cultured in Ponds

Part of
Economics of Aquaculture (6)
03:30 PM - 05:00 PM

Major Theme
Economics of Aquaculture

Abstract

A study was conducted to evaluate the growth performance of Nile tilapia Oreochromis niloticus and the profitability of its culture when fed two feed types; a formulated commercial feed (FCF) and a farm-made feed (FMF) in ponds. Triplicate groups of fish (initial body weight 24.9 ±0.05g) were stocked at a rate of 2/m² and fed one of the test diets between 3 – 6% of body weight twice a day for 18 weeks. At the end of the feeding trial, weight gain (WG), specific growth rate (SGR), and Protein efficiency ratio (PER) of fish fed FCF were significantly higher (P≤0.05) than those of fish fed FMF while FCR was significantly lower (P≤0.05) in fish fed FCF than FMF. Survival rate recorded during the trial was 83% with no significant differences between the treatments. FCF produced an estimated yield of 16,957kg/ha while FMF produced 7,982.1kg/ha after the feeding trial. After cost-effective analysis, it costs 0.56 Ghana Cedis (GH₵) (US$ 0.13) and GH₵ 0.33 (US$ 0.07) to produce a kilogram of tilapia with FCF and FMF respectively. However, the FCF yielded a higher profit index (PI) of 3.84 compared to the 2.99 from the FMF. Based on growth performance, feed utilisation and cost-effectiveness, FCF supports a better growth performance, feed utilisation and cost-effective culture than the FMF in tilapia farming. The average ranges of water quality parameters measured during the study were; temperature (26.7°C - 29.5°C), dissolved oxygen (1.98mg/l - 6.5mg/l) and pH (6.47 - 7.62).

Author(s)

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Daniel Boateng, Kwame Nkrumah University of Science and Technology
**BREXIT and the economic consequences for fisheries – the Danish case**

**Part of**  
**Fishery Governance, Policy and Management (3)**  
**03:30 PM - 05:00 PM**

**Major Theme**  
Fishery Governance, Policy and Management

**Abstract**

UK will not be a member of the European Union by April 2019 and fisheries will be an important part of the BREXIT process. An array of theoretical and empirical aspects follows by UK BREXIT decision.

Focus in this paper is on the Danish fishing sector and the access to UK Economic Exclusive Zone (EEZ). The first part of the paper gives a picture of the importance of access to UK fishing waters. The second part is a presentation of the applied model and the results. Overall, the Danish fishery sector is very depending on landings from the UK Exclusive Economic zone (UK-EEZ).

Three scenarios are analysed and compares to the present situation (i.e. a continuation of the current EU Common Fisheries Policy):

1. All Danish (and other EU) vessels are excluded from fishing in the UK-EEZ and can only fish in NEW.EU.EEZ.
2. As in scenario 1, all Danish (and other EU) vessels are excluded from fishing in the purely UK-EEZ rectangles but the fishing activity taking place in the UK part of the divided ICES-statistical rectangles can continue.
3. Catches taken in UK-EEZ before BREXIT can for the top-5 most important species to a varying degree be caught in the NEW-EU-EEZ.

The overall picture is that the economic consequences for all fleets and for all scenarios are severe.

**Author(s)**

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Ayoe Hoff, University of Copenhagen, Dep. of Food and Resource Economics  
Lisa Ståhl, University of Copenhagen  
Jesper Andersen
Consequences of Recovering Enforcement Costs: The Fisheries Case

Part of
Special Session: Session in honor of contributions by James Wilen to marine resource economics (2)
01:30 PM - 03:00 PM

Major Theme
Open Session: Session in honor of contributions by James Wilen to marine resource economics

Abstract

The recovery of management cost is an important but often overlooked topic. However, in fishery management, fishery management costs from the fishing industry are becoming increasingly common among the fishing nations of the world. Countries such as Australia, Canada, and New Zealand have led the way in applying user charges and other cost recovery mechanisms in their commercial fisheries. The United States and other countries have increased their use of cost recovery for fisheries management in recent years. Although some aspects of cost recovery mechanisms are well studied and documented, there remain some important consequences for fisheries policy that have not been adequately studied. To partially address this gap in knowledge, this paper investigates how cost recovery in the form of a user charge influences producers’ behavior and optimal policy for managing a fishery. This is done by extending our earlier economic analysis of fisheries law enforcement to examine the economic and policy consequences of using a royalty on production to recover the costs of enforcement services for fisheries management. We find that who pays and how they pay for governance services influences economic performance of a fishery, as well as the nature and extent of governance expenditures.

Author(s)

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Jon Sutinen, bDepartment of Environmental and Natural Resource Economics, University of Rhode Island
The Fishery Performance Indicators for Global Tuna Fisheries

Abstract

Globally, tuna fisheries generate US$12.2 billion in landed value, yet successfully coordinating management among coastal states and on the high seas could yield even more benefits. We apply the Fishery Performance Indicators (FPIs) to characterize the ecological, economic, and community performance of 21 major tuna fisheries across all five tuna RFMOs, accounting for at least 77% of global tuna production. Our analysis reveals that the biggest variations in performance among tuna fisheries are not found among the RFMOs that manage them, but rather among the final markets that they target: international sashimi market tuna fisheries considerably outperform a comparison set of 62 non-tuna fisheries in the FPI database, international canned tuna market fisheries perform similarly to the comparison set, and tuna fisheries supplying local markets in coastal states considerably underperform the comparison set. Differences among RFMOs primarily reflect regional species composition and market access, despite stark variation in governance, management, and other enabling conditions. With a legacy of open access, tuna’s harvest sector performance is similar across all fisheries, reflecting only a normal return on the capital and skill invested: industrial vessels slightly outperform semi-industrial and artisanal vessels. Differences emerge in the post-harvest sector however, as value chains able to preserve quality and transport fish to high value markets outperform others.

Author(s)

Jessica McCluney, McCluney Seafood Strategies

Chris Anderson, University of Washington

James Anderson, Uninversity of Florida
Abstract

The Fishery Performance Indicators (FPIs) is a new evaluation tool that measures performance of fishery management systems according to environmental economic and community outcomes in a quantitative and cost-effective manner. Their applicability in data-rich and data-poor circumstances enables collection of data in developed and developing countries where assessment is often rare. Data on more than 120 case study fisheries have been collected with the FPIs and the FPIs have been used in a variety of ways to shed light on fishery management systems, policy reform and investment decisions. The FPIs have been used to compare fishery management systems according to environmental, economic and community outcomes. In addition to outcome measures, the FPIs collect data on management and enabling conditions, and have been used to make inferences on how to improve fishery outcomes. The FPIs are also well suited to make comparisons over time and have evaluated the impact of fishery investments. This talk will provide an overview of the FPIs and discuss its various applications and potential.

Author(s)

James Anderson, University of Florida
Madagascar National Marine Fisheries Governance Strategy

Abstract

Any fisheries governance system is made up of policies and institutions in the broad sense of the term that govern the sector. When a system of governance is unsatisfactory, in particular because of the inadequacies and dysfunctions of these policies and institutions, and the way in which public action is designed and implemented, the fisheries sector is not able to contribute fully to the economic and social development of a country and the conditions for the sustainability of the fishery resources and the ecosystems that support them are not met. This is the case today for the maritime fisheries sector in Madagascar and this is the reason why the Malagasy Government, through its Ministry of Fisheries, initiated a process of reform of its maritime fisheries sector.

This initiative was expressed during the sub-regional programming workshop of the EU-funded IOC SmartFish Program, held in Mauritius from 27 to 30 September 2011, during which Madagascar authorities requested the program support in the development of a National Marine Fisheries Governance Strategy (hereafter referred to as the National Strategy). The purpose of the National Strategy is to guide the process of reform of the current governance system. The current Malagasy context, characterized by a lack of fisheries policy and planning framework for nearly 5 years (the latest sectoral policy document, now obsolete, is the 'Master Plan for Fisheries and Fisheries Aquaculture 2004-2007 '), a process of updating and revising the legislative and regulatory framework for sea fishing 1 initiated in 2006 and still ongoing.

Author(s)

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Are fishers happier? An evidence from a large-scale Indonesian happiness survey

Part of
Understanding Small-scale and Developing Country Fisheries (1)
11:00 AM - 12:30 PM

Major Theme
Understanding Small-scale and Developing Country Fisheries

Abstract
Almost all recent empirical literatures that study the subjective wellbeing of fishers lack of relevant control as they are only based on surveys among fishers. Therefore, they cannot really answer whether being a fisher generate higher or lower life satisfaction, after controlling for other aspects of life. This study is based on Indonesian Family Life Survey (IFLS), a survey of almost 20,000 individuals which contain information of various socio-economic and employment characteristics as well as several life-satisfaction question which include their subjective happiness (generally how happy they are with the scale from 1 to 4) and their subjective position on economic ladders (5 ladders, from poorest to richest). For the economic ladders they are also ask their current and their future position from which we can infer how optimistic they are in their life. From the data, we can also identify whether an individual work as a fisher or other type of occupations within the category of self-employed without worker, self-employed with worker, unpaid family worker, and casual worker. We apply ordered-probit regressions (given the nature the life satisfaction data). We find that, after controlling income, demographics, education, health and regional characteristics, fishers in general are not happier compared to other type of jobs except those under the category of self-employed with workers and casual workers. However, we find that fishers are more optimistic in life as being a fisher is associated with positive attitude toward the change in the economic status.

Author(s)
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Armida Alisjahbana, Universitas Padjadjaran
Rahma Rahma, Universitas Padjadjaran
ECONOMICS OF AQUACULTURE PRODUCTION IN NIGERIA

Abstract

Aquaculture in Nigeria is expanding at a very rapid rate from around 85,000 metric tonnes in 2007 to over 250,000 metric tonnes in 2017. However, a great concern for fish farmers in Nigeria is the economics of fish farming, an indication of the profitability of the business and major factors responsible for the high production cost. Many fish farmers in the country do not carry out feasibility studies and economic appraisals prior to commencement of the project and hence incur quite enormous loss of funds. Several factors have been identified which affect the profitability of aquaculture ventures. Some of these factors which may increase production cost and low profit margins include, high cost of fish feed, high cost of energy, inadequate fish pricing, poor marketing skills, poor water quality, lack of skilled manpower, poor knowledge of the behaviour/physiology of the cultured fish, ineffective fish farm management, poor business capability, under-capitalization, poor funding and inappropriate choice of project site. It is highly recommended that fish farmers should subject their projects to intensive economic analysis and feasibility studies based on the factors highlighted above to determine if the aquaculture venture will be profitable. KEY WORDS: AQUACULTURE, ECONOMICS, PROFITABILITY

Author(s)

PATRICIA ANYANWU, Nigerian Institute for Oceanography and Marine Research, Lagos
Valuing the Groundfish Portfolio in the Eastern Bering Sea Under Alternative Management & Temperature Considerations

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (2)
01:30 PM - 03:00 PM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract

Recent work has demonstrated how bioeconomic models can be used to provide a wealth-based metric for the sustainable management of portfolios of ecologically and economically interconnected species. We apply these results to evaluate alternative management approaches to the management of three species - pollock, Pacific cod, and arrowtooth flounder - in the Eastern Bering Sea groundfish fishery. The EBS fishery is subject to substantial variability, in part due to significant temperature anomalies and climatic change. Understanding how alternative allocation formulae and multispecies harvest control rules can help managers adapt to this variability is critical to the sustainable management of this fishery. The bioeconomic management model includes three essential components: a representation of multispecies stock dynamics, an economic program characterizing the harvest behavior of the various fleets, and a description of the management such as harvest quotas and allocations. Our approach adds to the literature by explicitly incorporating temperature as a state variable in the calculation of ocean wealth and incorporating correlated stochasticity in the growth rates of stocks. Using this approach, we are able to approximate the shadow prices of fish stocks under different forward-looking temperature and management scenarios. This allows us to examine how the different ``portfolio rebalancing rules'' embedded in allocation policies and multispecies harvest control rules can help maintain the value of the portfolio of managed groundfish stocks in the face of climatic uncertainty.

Author(s)
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Alan Haynie, NOAA Fisheries
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Bumpy or smooth road ahead in compliance with European Union regulations? Challenges and opportunities for smoked catfish export from Nigeria.

Part of
Special Session: Barriers to fisheries markets and trade in the developing world
10:30 AM - 12:00 AM

Major Theme
Open Session: Barriers to fisheries markets and trade in the developing world

Abstract
Trade in smoke dried fish is driven by demand from Africans in the European Union (EU) and United States. The EU hygiene package follows the principles of the farm to table promoted by the World Trade Organisation (WTO) and was designed to protect the health and safety of consumers as well as addressing animal welfare, plant health and environmental protection. Nigeria is allowed to export all forms of fishery products to the EU community except aquaculture products. EU rules have become more stringent and in the case of aquaculture products include compliance with raw material traceability, existence of an aquaculture residue plan on heavy metals, contaminants, pesticides and veterinary drugs. Presently, the country is still in the process of adopting requirements to meet the EU regulations on quality control for farmed products. This paper is exploratory in nature and focuses on the smoked catfish export being mostly an aquaculture produce. Large consignments of smoked fish have been rejected due to mould growth, insect infestation, inappropriate packaging and occurrence of contaminants. Huge public investment is required for setting up a certification system and update administrative provisions, monitoring technologies and sanitary control. In light of this, Nigeria is challenged with inadequate technical infrastructure for environmental management of aquaculture. Therefore, what are implications for small-scale commercial catfish farms and fish processors in smoked catfish export in overcoming these technical barriers within a short period? What should be the roles of the State and regulatory agencies in surmounting these obstacles?

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Natural Resource Use: What is the Appropriate Discount Rate?

Ragnar Arnason
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ABSTRACT

Discount rates, it is well-known, play an important role in the determining optimal extraction paths for natural resources. In fisheries analysis, as well as other natural resource use, constant discount rates are customarily assumed. In practical applications, the constant discount rate is often taken to be the social rate of discount which is usually assumed to be quite low.

Incorporating the fishery in a two-sector economic growth model, it is easy to show that this customary approach is inappropriate. The appropriate discount rate to use in the fishery is at all times the marginal production of capital in other sectors of the economy and vice versa. It immediately follows that the appropriate discount rate varies with the state of capital accumulation as well as over the business cycle. A further consequence is that in developing countries where the marginal product of capital is typically high, high fish stock exploitation levels may be perfectly compatible with what is socially optimal.

Keywords: Natural resources, discount rates, appropriate discount rates

JEL classification: Q2,Q3,O41

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Does Context Matter for Intersectionality? Comparing Gendered Adaptation Responses to India’s Seasonal Marine Fishing Ban

Abstract

Recent research demonstrates that livelihood responses to fisheries policy requirements are differentiated by gender. However, constraints on such decision sets, and the propensity for reactive coping strategies (rather than proactive adaptation choices), are also differentiated within gender groups. In particular, among women in Tamil Nadu and Puducherry, India, social networks and wealth can counteract the constraints faced by other women (Novak Colwell et al 2017). In other words, intersectionality provides a better understanding of adaptation choices than gender alone.

This previous research was conducted in the context of livelihood responses to a seasonal fishing ban in two nearby villages that employ similar governance frameworks and compensation plans. This research design limited the ability to assess whether culture and institutions also moderate the gendered impact on adaptation options. We have now collected additional data from Kerala state, on India’s west coast, in order to test whether these institutional factors moderate or exacerbate such impacts. This paper replicates the previous study in a new context, to evaluate how culture and governance affect livelihood adaptation choices. We draw on a survey of 1800 fishing community members to compare their responses to the seasonal fishing ban, and specifically to unpack whether and how people experience the policy constraint differently depending on their gender. Findings will allow us to make governance recommendations on the basis of how results vary across different institutional contexts.

Author(s)

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The Power of Sight: Impact of Aquaculture Sight Value on Coastal Homes

Major Theme
Economics of Aquaculture

Abstract
POSTER SUBMISSION:
Hundreds of millions of individuals depend on aquaculture, which provides nearly half of all fish consumed in the world. The increasing global population, coupled with diminishing fisheries potential, has emphasized the demand for a sustainable ocean food option. Despite this expansion, negative perceptions of aquaculture remain a major concern. The aesthetics of aquaculture has become a divisive issue between coastal homeowners and mariculture operators. Sight of an aquaculture operation can have negative impacts on site location choices for residents, visitors and producers. This paper utilizes a Boolean viewshed model and hedonic pricing framework to estimate the impact of sight value on coastal homes in Maine. Maine’s unique and extensive history of supplying North American markets with fresh, healthy seafood, highlights its potential for aquaculture production growth. Using data for Maine coastal home sales between 2012 and 2014 in conjunction with aquaculture siting data provided by the Maine Department of Marine Resources, we aim to measure the marginal impacts of aquaculture sightings on Maine’s coastal homes. Preliminary results suggest that line of sight for aquaculture can have wide-reaching effects on residential property prices. These results may inform policy makers and stakeholders of social costs related to future site selection for sustainable marine aquaculture.

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Ways to integrate gender equality into fisheries management and development: interview study from the Pacific Islands

Part of
Special Session: Bringing Gender Discourse in Fisheries Economics and Trade (2)
04:00 PM - 05:30 PM

Major Theme
Open Session: Bringing Gender Discourse in Fisheries Economics and Trade

Abstract

Many people working in fisheries management and development are unconvinced that gender is an important issue to tackle. Even fisheries managers who believe that gender is important do not see it as core business, and do not know how to address gender in their work. This paper asks how we can better integrate gender concerns into fisheries management and development. The work is based on qualitative analysis of: 1) 40 semi-structured interviews conducted in 2017 with fisheries managers and stakeholder organisations in Solomon Islands, Vanuatu and Kiribati and key informant researchers and professionals in Pacific regional fisheries-related organisations; 2) and key fisheries policy documents; and 3) institutional relationships. We found three key ideas to pursue in the Pacific, but which may also apply elsewhere. First, a good starting point is the common ground that the wellbeing of fishing communities is important, and address social inequalities, including gender, as part of working towards improving community wellbeing as a whole. Second, the most effective way of making gender part of the core business of fisheries organisations is to build it into staff and organisational reporting, such as monitoring and evaluation frameworks, and managers’ key performance indicators. Third, cultural norms around gender are often an obstacle to achieving greater equality, but they are also the only way by which to effect socially acceptable change. The people designing interventions must have a thorough understanding of local cultural contexts so they can creatively use normative frameworks to encourage greater equality.

Author(s)

Kate Barclay, University of Technology Sydney
Designing Regulatory Options and Innovations for Tuna Fisheries in ABNJ

Part of
Special Session: Incentive based tools for highly migratory and transboundary fisheries
03:30 PM - 05:00 PM

Major Theme
Closed Session: Incentive based tools for highly migratory and transboundary fisheries

Abstract
A well designed regulatory regime has a number of structural (design) features that will facilitate the achievement of regulatory objectives. For tuna and highly migratory fisheries in areas beyond national jurisdiction, our main objectives are preventing overfishing and destructive fishing practices, whilst enhancing the nutritional, social and economic returns from the fishing activity in a way that is consistent with the UN Sustainable Development Goals. This paper explains and shows how a range of regulatory design features can be developed and used to facilitate investment and change in the regulation of global tuna fishing to help meet these objectives.

These features include: developing combinations of public and private regulatory instruments, targeting regulatory interventions at point of maximum impact, empowering a wider range of regulatory actors, and acting consistently with institutional and governance limitations. These will be illustrated with brief case studies.

Since tuna fishing is a complex and dynamic system, and any regulatory intervention will change this system, we must be sensitive to the impact of such interventions and be prepared to continually adapt them in light of new information and experiences. For example, the introduction of property rights may make future regulatory change more difficult to implement because holders of rights will resist regulation that diminishes the value of their holding.

Author(s)
Richard Barnes, University of Hull
Modelling spatial interactions among fish communities, fishers and other marine activities: comparing five European case-studies

Part of
Marine Spatial Planning and Multiple Use Management
01:30 PM - 03:00 PM

Major Theme
Marine Spatial Planning and Multiple Use Management

Abstract
Sophisticated computer simulations can support effective science-based evaluations to facilitate better governance of the marine space. We developed a range of spatial fisheries models, integrating biological with fisher decision-making dynamics and management for assessing management of multiple activities. We present the outcomes of case-specific evaluations with different ecological and socio-economic characteristics i.e. Adriatic, Ionian, Black, Baltic and Celtic Seas, and priorities like fisheries, aquaculture, offshore wind energy or conservation areas. For each case we applied the DISPLACE agent-based modelling platform for simulating bioeconomic dynamics and clarifying options for sustainable and viable fisheries in presence of other marine sectors. The approach is specifically suited for evaluating whether the benefits of spatial plans compensate for the additional economic and ecological costs of displacing fishing to the surroundings including vulnerable habitats or unfished areas. The models generate a comparative overview of short to medium-term impacts of changing spatial footprints both on the fisheries economics and on the underlying ecosystem components by aggregating the individual fishing operations, at the same time detailing the spatiotemporal dimensions for particular fishing activities, harbor communities or national fleets. We discuss some lessons learnt when developing operational modelling frameworks that incorporate stakeholder responses to spatial management options. Results show that the models enable comprehensive evaluation of spatial management strategies, taking account of underlying biological dynamics, interactions among fisheries and other marine activities. Comparison of case studies reveals how spatial management can mitigate conflicts and impacts on ecosystems at spatial and temporal scales relevant to fisheries interests and policy makers.

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Federico Fuga
An Integrated Economic Model of Global Fisheries, Aquaculture, and Agriculture

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (7)
03:30 PM - 05:00 PM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract

We present the results of integrating the fisheries sector into an existing computable partial-equilibrium global model of agriculture, livestock, bioenergy, forestry, and land use. The model is constructed by reconciling publicly available global datasets from the FAO as well as the literature. The model of the fish sector represents capture and aquaculture at the country level. Capture is further differentiated at the level of FAO Major Fishing Areas, while aquaculture differentiates between subsistence systems and systems fed commercially formulated aquaculture feeds. Seafood is split into 10 commodity groups. International trade is bilateral and the model differentiates between food, feed, and other uses of fish. Using projected changes in population and income, future demand for seafood is estimated to exceed 250 million tons in 2050. Future supply from capture fisheries is expected to be determined by fishery policies and to remain limited, and the remainder of the demand shall be satisfied from aquaculture. The aquaculture production systems of the 10 commodity groups are characterized using varying feed ratios and varying feed composition of fish meal, fish oil, soybean meal, rapeseed meal, maize, wheat, and groundnut meal. We estimate that the aquaculture sector will require an additional 120 million tons of terrestrial feed products in 2050. Due to the relatively high efficiency of the aquaculture sector, this translates into relatively minor land-use effects, namely an additional 12 million hectares of cropland in 2050.

Author(s)

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The Noah’s Ark problem and biodiversity trends for commercial fisheries in the Western and Central Pacific Ocean.

Part of
Ecosystem-based Management and Integrated Assessments
11:00 AM - 12:30 PM

Major Theme
Ecosystem-based Management and Integrated Assessments

Abstract

The Noah’s Ark problem is concerned with determining the optimal survival probabilities of species that maximizes the expected sum of biodiversity and the direct utility of species survival. The study of this problem has given rise to a considerable literature in economics and biology on the problem of how to appropriately measure biodiversity, many of these measures are now routinely applied in both economics and biology to assess ecosystem health. Eco-system based fisheries management has largely concentrated on ways to extend existing capital theoretic based bio-economic models to multi-species ecosystem based models for management purposes. These models continue to focus on fish stock and abundance as measures of the health of fisheries. In this paper I examine the use of biodiversity measures as indicators of the health of fisheries using data from the Western and Central Pacific. A spatial analysis of alpha, beta and gamma diversity between exclusive economic zones in the region is conducted and the temporal change in diversity is studied in an effort to identify trends in biodiversity among the primary commercial fish species.

Author(s)

Rodney Beard, University of Glasgow
Investigating tradeoffs in alternative catch share systems with a vessel-based bio-economic model

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (6)
01:30 PM - 03:00 PM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract
A vessel-based bio-economic model (IAM) is presented and applied to the Bay of Biscay sole fishery to investigate alternative quota management systems from a multi-criteria perspective. For this study, the model integrates several institutional arrangements related to catch share management. The current French co-management system with non-transferability of quota is compared to an alternative ITQ system in a context of transition to maximum sustainable yield (MSY). Trade-offs between ecological and socio-economic impacts are highlighted and the effectiveness of governance scenarios is discussed in regard to the challenge of capacity adjustment. Results emphasize that the introduction of ITQ is expected to reduce by 40% the number of vessels in the fishery. While effectively mitigating the economic impacts of the transition phase to MSY, ITQs are also expected to significantly increase the fishing effort by trawlers, which may cause ecological concerns. The scenarios tested also include the simulation of a decommissioning scheme where subsequent decommissioned vessels are significantly different from the vessels that would lease out their quotas in an ITQ system, resulting in differentiated ecological and socio-economic impacts between scenarios.

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Bio-economic model of genomic technologies as a fishery management tool using Fraser Coho salmon as an example

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract

Even in the absence of commercial fishing, Coho salmon (Onchorhynchus kisutch) originating from the Interior Fraser River (IFR) watershed have yet to recover from the low returns experienced since 1992. Coho are in a low productivity regime in which the number of recruits per spawner (R/S) averages around one, coupled with a low rate of marine survival and exploitation from bycatch and U.S. interceptions. New fishery management tools based on genomic technology have been developed and may soon be implemented to address the low returns of IFR Coho. Parentage based tagging (PBT) and genomic stock identification (GSI) are used as a way to identify the origin and age of individuals caught in a mixed-stock fishery. These tools are becoming vital for decisions on the timing and fishing areas for salmon, and to minimize bycatch of endangered stocks. Additionally, these genomic technologies provide insight into proper enhancement rearing practices and improve the ability of hatchery fish to survive to adulthood with minimal genetic and ecological impacts. Here, we present how these genomic technologies can provide a more accurate and cost-effective alternative to the coded-wire tag (CWT) recovery system in place today. By minimizing bycatch and improving the efficacy of hatchery enhancement efforts, IFR Coho abundance could grow back to levels capable of commercial fishing and allow for economic opportunities within the coastal communities of southern British Columbia.

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Rashid Sumailla
Why do fishers exit?

Part of
Fishery Governance, Policy and Management (2)
01:30 PM - 03:00 PM

Major Theme
Fishery Governance, Policy and Management

Abstract
In most developed countries, the number of fishers is steadily declining, and there are complaints that recruitment is difficult. This trend is evident in Norway, where the number of fishers has been declining for decades. In this paper we investigate patterns with respect to who are leaving the fisheries. We use a discrete choice model and data that includes characteristics for all fishers and vessels during the period 2002-2012. The income for Norwegian fishers varies significantly with ownership and vessel type, but also over time. Income for owners varies substantially by vessel type. Owners of vessels without license on average have lower income than the national average. Crew members can expect an income slightly above the national average, indicating that vessel owners have to pay a competitive salary to attract employees. Owners in the ocean going fleet earn an income comparable to or more than skilled professionals. Income is an important variable in explaining fisher exit from the sector, but ownership status seems to be the most important variable, as most who exit are crews. Northern fishers have lower probability of exit which probably can be explained by fewer alternative occupations. Fishing seems to be a relatively attractive occupation. Recruitment of young fishers is comparable to exit of young fishers, and net number of fishers that exit it substantially lower than gross exit. This indicates that the high number of exits are primarily due to young fishers not becoming owners.

Author(s)

Ole Bergesen, University of Stavanger
Fishery or DCF fleet segment – which is the more appealing reference?

Part of
Poster Session
05:00 PM - 07:30 PM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract
In the EU Fishing Fleet Data Collection vessels have been grouped by fleet segments, a combination of length class and dominant gear class. These technical criteria are clear and allow for unambiguous assignment of vessels to groups. However, except for the case of the Annual Economic Report the resolution at fleet segment level does not meet the requirements of any other application for fleet economic data.

In most cases fleet economic data are needed with reference to a certain fishery, e.g. beam trawling on flatfish or demersal trawling on saithe. In case of the German fleet the DCF fleet segments merge flatfish beam trawlers with shrimp beam trawlers and demersal trawlers targeting saithe with demersal trawlers targeting halibut. Thus any effect of one fishery on the economic performance of a segment is biased by the figures from other fisheries.

We present an alternative approach using similarity of fishing patterns for grouping vessels. Consequences on economic figures as well as potential difficulties when following this approach will be discussed.

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Hatcheries as substitutes for ecological insurance in salmon fisheries

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (5)
11:00 AM - 12:30 PM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract
Ecosystem services can be supplemented by human investment in close substitutes for natural capital. If the resilience of the system is dependent upon common property natural capital, attempts to substitute physical capital can lead to hidden fragilities in the system. We model salmon fisheries in Southcentral Alaska, where wild salmon runs are sometimes supplemented with hatchery raised and released salmon. Our model includes commercial fisheries that are dependent on stochastic salmon returns. The commercial fishery requires some minimal return to justify capital investments in the form of boats, processors, and canneries. To ensure that minimum catch is available, managers invest in hatcheries that release juvenile salmon from harvested eggs. Hatchery salmon are imperfect substitutes for wild salmon because of lower genetic variation, and are less effective at recolonizing streams and reproducing in the wild. We show that the incentive to guarantee some minimum salmon catch can change the composition of salmon in each run, making it less resilient to negative environmental shocks. We expand upon this model to include neighboring salmon populations that may "stray", a positive externality for wild fish that allows them to recolonize depleted spawning grounds. We demonstrate that the negative externality of hatchery fish increases the vulnerability of wild salmon runs throughout the system. This occurs because the positive externality of straying wild salmon is replaced by the negative externality of hatchery salmon straying and replacing wild salmon.

Author(s)
Kevin Berry, University of Alaska Anchorage
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Exporting Ecolabels: Is Demand for Certified Sustainable Products Affecting International Trade?

Part of
Seafood Markets and Trade (4)
08:30 AM - 10:00 AM

Major Theme
Seafood Markets and Trade

Abstract

Through a literature review and two case studies, one on MSC-certified seafood and one on RSPO-certified palm oil, we examine the effects of growing demand for certified products on international trade. We hypothesize that demand for certified products could affect trade patterns in one or more of a few ways: by changing the export markets that a producer can access, by shifting the importer's preferred sources of supply, or by affecting the price at which the product is traded.

The case study on MSC-certified seafood presents export data on unit values and destinations pre- and post-certification for 9 fisheries, examining whether these data suggest export price premiums or increased access to developed country markets as a result of certification. It also provides a more detailed look at the factors influencing trade for 3 of the 9 fisheries examined (Alaska salmon, Alaska pollock, and Fiji tuna). We find that demand for MSC-certified seafood encourages global seafood processors to adapt their supply chains to incorporate more certified products. However, processors tend to do this while still processing the fish in the most efficient locations (often, this means third countries, such as Poland and China for Alaska pollock and Thailand for Fiji albacore). Because many of these supply chains have intermediate steps, using trade data to determine effects from certification is an imprecise exercise, but can yield insights about demand for certified seafood if done carefully.

Note: I am open to presenting just the seafood portion of the paper, or to providing comparisons by also presenting the palm oil highlights.

Author(s)

Renee Berry, U.S. International Trade Commission
Are the Norwegian cod fisheries caught in a value-destructive volume logic?

Abstract

Historically, cod fishing along the coast of northern Norway has been about fishing as much as possible with the least possible resource effort. This traditional logic is rooted in biology (cod’s migration pattern), meteorology (weather conditions) and traditional capture technology (small and not as seaworthy boats). The logic is further enhanced by new volume-focused capture technology (trawlers and purse seine) and of an imperfect raw fish market where quality differences are not reflected in the price of the fish. In the present study, we use 10-year data on fishing gear usage along with the industries’ product mix to get an indication of the importance of the volume logic and it’s development in the Norwegian cod fisheries. The findings show that the volume logic is still largely at work, although this results in reduced quality of the catch landed, customers having limited willingness to pay a superior price for the fish, and limited socio-economic value creation from the cod industry. We argue that institutional theory can be a fertile lens in order to understand this apparently paradoxical phenomena which is not so well explained by economic-rationalists models. To better understand the volume logic, we further argue that strong profit incentives at the catch stage in the value chain create a pressure to fish cod cost-effectively and sell the fish at a low price. Finally, we debate how a competing and more customer-oriented quality logic can help create greater export values in the Norwegian cod fisheries.

Author(s)

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Fish efficiency - the missing part for the description of the total efficiency of fish feeding.

Part of
Economics of Aquaculture (5)
01:30 PM - 03:00 PM

Major Theme
Economics of Aquaculture

Abstract

The feed conversion ratio (FCR) or its reciprocal, the feed efficiency ratio (FER) is currently used to estimate the feed requirements in aquaculture. This has a serious disadvantage. The FCR is a function of feeding rate, initial and final mass at fattening, temperature and quality of feed. Therefore the FCR is specific for any combination of these parameters and has to be adjusted whenever a parameter has changed. The feed costs and the fattening time influence the total costs significantly - a precise analysis of the relationships is necessary. For this purpose, the FER is divided into a feed efficiency factor, describing the assimilated percentage of consumed feed and a fish efficiency function, describing the percentage of assimilated food used for growth. The equation for the fish efficiency is derived from a novel growth equation which involves the relationship between assimilation rate and mass growth. The numerical relations are validated using fattening of Bluefin tuna as an example. Similar to the FCR, the fecal loss ratio (FLR) and the nonfecal loss ratio (NLR) are derived. These functions can be used to compute the quantities of waste products while fattening. In a further step, an equation for the economic feed conversion ratio (eFCR) is derived. Aquaculture facilities can also be regarded as ecosystems. It is therefore obvious to describe the eFCR also by means of sequential ecosystem equations. This allows economic optimizations of the production process with respect to the net present value, taking into account temporal changes of particular parameters.

Author(s)

Eckhard Bethke, Thünen–Institute of Sea Fisheries
Empirical Structural Analysis of Value Generation in the Northeast Multispecies Sector Program

Part of
Special Session: Seafood markets, fishing behavior, & fisheries mgmt.
03:30 PM - 05:00 PM

Major Theme
Closed Session: Seafood markets, fishing behavior, & fisheries mgmt.

Abstract
A growing body of work to evaluate the impact of catch share programs and other fisheries policy interventions relies on treatment effects models, which identify the causal net effects of the policy change. Treatment effects models typically are unable to identify the underlying mechanisms driving changes. As a result, these models can have limited relevance for proposed new (out-of-sample) policies. To shed light on mechanisms, we develop and estimate a structural discrete choice model of individual vessel behavior in order to learn more about how catch shares influence micro-level decision-making on the water. This work seeks to improve our understanding of how catch shares—and the policies that they replace—influence species targets, timing of fishing activity, and the value generated from the resource. To allow study of inter-species substitutions in pre- and post-rationalization, we implement this model using fine-scale commercial fishing data from before and after the start of the Northeast Multispecies Sector Program. We predict stock-specific production at the vessel-day level in first-stage regressions and use these predictions in a second-stage discrete choice model of targeting decisions that controls for weather, costs, and prices. We include non-groundfish species in the choice set to capture outside/non-catch share options. From this second stage we recover structural parameters that capture how policies affect micro-level incentives. The second-stage estimates are used to simulate the effects of removing days-at-sea regulations and replacing them with catch shares, and we evaluate the performance of the model using data from the post-rationalization period.

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Price premiums for eco-labelled seafood: Effects of losing the MSC certification in the Baltic Sea cod fishery

Part of
Certification of Fisheries and Aquaculture (1)
08:30 AM - 10:00 AM

Major Theme
Certification of Fisheries and Aquaculture

Abstract

The use of ecolabels in fisheries has increased dramatically in the recent decade. However, in the long run it is crucial for the fishing industry that the benefits of certification exceed the costs. While consumers appreciate the labelling by paying a price premium in the retail market, there is not much research on whether the premium transmits to the fishing industry. This paper adds to the literature by studying price premiums at port for the Baltic Sea cod fishery that lost its Marine Stewardship Council (MSC) certification in 2015. Using the loss of certification to identify the price premium offers an advantage compared to analysing a newly gained certificate. This is because a loss implies an immediate loss of markets for already certified products, while the benefits of gaining a certification may take time to realize. The result shows that Swedish cod fisheries had a price premium of approximately 10 % for small-size cod prior to the suspension of the certification, but no premium for larger cod. Cod of different sizes are used for different products and the result is thus in line with studies at the retail level that show heterogeneity in price premiums across products. The lost price premium is important to the fishery since about 70 % of catches consists of small cod and recent management developments affect the size distribution though a reduced minimum size and a landing obligation.

Author(s)

Johan Blomquist
The introduction of a voluntary sustainability assessment scheme in the Belgian fishery based on the VALDUVIS tool

Part of Certification of Fisheries and Aquaculture (1)
08:30 AM - 10:00 AM

Major Theme
Certification of Fisheries and Aquaculture

Abstract

The Belgian fishing fleet, mainly composed of beam trawlers, has faced numerous challenges in the past decade. As a consequence the number of fishing enterprises decreased considerably. One of these challenges was the increasing demand for sustainable seafood. Due to the nature of the fishery, fishermen could not get MSC certified unless they made drastic adjustments. All the main stakeholders agreed on the necessity to define goals to reach a sustainable fishing fleet by 2020 and with it a need to assess and monitor the sustainability of the Belgian fishery.

This led to the development of a sustainability assessment tool called ‘VALDUVIS’ (Kinds et al., 2016). It would be able to measure the progress made to reach these goals and to visualise and to communicate the efforts and achievements of fishers to the market. A participatory approach involving fishers and their representatives, government officials, NGOs, fish auctions, distributors, processors, retailers and researchers remained a strong focal point throughout the process. The aim has been to apply a step-by-step approach with progressively increasing thresholds for participation and to gradually convince and prepare fishers to change their current practices. This would enable the entire fleet to evolve in a more sustainable direction that would benefit everyone in the long-term. We explore the participatory process that shaped the tool and its subsequent applications and assess its effectiveness as a new governance framework for the Belgian fishery.

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CONTRIBUTIONS OF THE AQUACULTURE & FISHERIES GROUP OF WAGENINGEN UNIVERSITY & RESEARCH TO THE SUSTAINABILITY OF SHRIMP FARMING

Part of
Poster Session
05:00 PM - 07:30 PM

Major Theme
Other Theme

Abstract
Since 2005, WUR-AFI has been involved in projects aiming to improve the sustainability of shrimp farming. First projects increased our understanding of planning, disease impact and cost-benefit-analysis (CBA) of farming systems. Later projects focus on: (1) decision-making support tools (DST) including mangrove, (2) ecosystem services in CBA, (3) efficiency of feed use, (4) ingestion of ω3-PUFA (polyunsaturated fatty acid) from the pond’s food web, and (5) knowledge transfer to farmers.

DSTs used agent-based-models to assess local impact of policies (Joffre et al. Agricultural Systems 141:149-159). The model development was supported by board games that are now used for raising awareness (Bosma et al. IIFET2018).

For a village on Java’s north coast, a scenario study using Cost-Benefit-Analysis shows that no-intervention would cost about 3x10^6 USD in 25 year. Investing 88,000 USD on recovering mangrove-only or improving aquaculture-only, would generate 7.8x10^6 and 1.0x10^6 USD, resp., but doing both would yield almost double: 15x10^6USD (Bosma et al. IIFET2018).

Excluding fish oil and meal from diets, while stimulating biofloc, did not influence biomass and protein production during the first 2 months. Although this gave less PUFA in shrimp, about 30% of this PUFA originated from the pond’s biofloc while reducing feed input by 40% without causing a significant decline in shrimp production (Hermsen et al. WAS2017).


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INVESTING SIMULTANEOUSLY IN MANGROVE AND AQUACULTURE FOR CLIMATE CHANGE MITIGATION AND ADAPTATION, IS HIGHLY BENEFICIAL

Part of
Special Session: Sustainable management of coastal fisheries and aquaculture (1)
08:30 AM - 10:00 AM

Major Theme
Open Session: Sustainable management of coastal fisheries and aquaculture

Abstract
Large areas along Java’s north coast are threatened by subsidence and abrasion. Subsidence is even faster than sea level rise. Although forbidden by law, farmers have cleared the mangrove forest almost up to the coastline, thus reducing sedimentation and increasing exposure to coastal abrasion. Four interventions are needed: reduce groundwater abstraction, protect the residual coastal mangrove, give up ponds along sea and rivers for mangrove recovery, and improve aquaculture (using a field school approach). The Building with Nature project, funded by the Indonesian and Dutch governments, and partners of the Ecoshape consortium, is currently implementing the latter three interventions in Demak district together with Indonesian institutions and villages.

For Tambakbulusan, a village in Demak regency, north-east of Semarang, covering about 750 ha, we estimated the benefits of these actions with a Cost-Benefit-Analysis. We accounted, next to investments and profits including those for fisheries, the cost of destroyed houses and ponds, and of forgone benefits due to new mangrove forest and loss of land.

Our baseline scenario assumes subsidence and abrasion similar as villages closer to Semarang, where most lands were gradually engulfed the last 25 years. For such a period, a no-intervention scenario would cost close to 3 million USD due to loss of land, infrastructure and livelihoods. Investing 88,000 USD on recovering mangrove-only or on improving aquaculture-only, would generate benefits of 7.8 and 1.0 million USD, resp.. Simultaneously investing on both mangrove recovery (climate change mitigation) and aquaculture improvement (adaptation) would yield almost double: 15 million USD.

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USING BOARD GAMES TO RAISE AWARENESS AND VALIDATE AGENT-BASED-MODELS FOR SUSTAINABLE SHRIMP FARMING IN THE VIETNAMESE MEKONG DELTA.

Part of
Special Session: Sustainable management of coastal fisheries and aquaculture (2)
10:30 AM - 12:00 AM

Major Theme
Open Session: Sustainable management of coastal fisheries and aquaculture

Abstract
Most mangrove forests are located in tropical deltas with high economic potential. Poverty and demographic pressure drove governments to increase livelihoods opportunities and sacrifice mangrove forest. Nevertheless, in its Mekong Delta Vietnam maintained a protected zone of mangrove, and behind this a buffer zone with Integrated Mangrove Shrimp farming systems (IMS). Conservationists would like to expand the IMS to other areas, but voluntary adoption of IMS beyond the buffer zone is hampered by assumptions farmers and policy-makers have about prospective profits. Expansion of mangrove in the estuaries aims to restore and enhance the ecosystem services provided by mangrove forests. Several studies have shown that the Total Economic Value of land-use systems combing shrimp, mangrove and fisheries can be at least as high as intensive shrimp monoculture.

To improve the adoption of sustainable shrimp farming systems WUR-AFI uses various approaches in different projects (Bosma & Verdegem IFET2018). Based upon several PhD and MSc projects, CTU and WUR developed an Agent-Based-Model, mimicking the yield and spatial distribution of shrimp farm types, which serves as a decision-making support tool (Joffre et al. Agricultural Systems 141:149-159). To calibrate the model we used a board-game which allows players, i.e. farmers, to experience the financial consequences of their decisions. Together with IUCN (International Union for the Conservation of Nature), the ALEGAMS project furthered the board-game into a learning tool. Using a longitudinal framework, ALEGAMS has assessed the effectiveness of this board-game in triggering farmer’s social learning on, and willingness to adopt, IMS. Preliminary results will be presented.

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Online vs. In-Person: Impact of Product Presentation on Consumer Preferences for Wild-Harvested and Farm-Raised Seafood

Part of
Poster Session
05:00 PM - 07:30 PM

Major Theme
Economics of Aquaculture

Abstract
Developing domestic aquaculture is critical: currently, the United States faces a large seafood trade deficit in part due to importing 91% of its seafood. However, with around 40% of Americans living in counties directly on the shoreline, public support for aquaculture may be key to expansion of the industry. Aquaculture operations often face negative public opinion in part due to the potential for diminished viewscape and generation of negative externalities (e.g. water pollution, smell and noise). This paper employs a combined stated and revealed preference approach to examine citizens’ choices in valuation of household proximity to aquaculture lease sites. We combine two unique data sets: a subset of transactions data for single-family homes sold in coastal Maine between 2012 and 2014 and citizens’ stated preferences elicited through a mail survey to these same households in 2018. The combined dataset will allow for analysis of choice across time and the comparison of citizens’ hypothetical and revealed preferences with regards to the proximity to aquaculture. Combining the two valuation approaches will provide additional information about the factors affecting citizens’ acceptance of aquaculture operations in their communities. This information may be especially useful for industry stakeholders and policy-makers that work to raise public support for domestic aquaculture.

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Reconciling TAC limits for mixed fisheries using a co-viability approach: the Bay of Biscay study-case

Part of
Special Session: Modelling social-ecological systems
03:30 PM - 05:00 PM

Major Theme
Open Session: Modelling social-ecological systems

Abstract

The species-based approach currently implemented in Europe where catch limits (TAC) are set for each stock independently, is not adapted to the management of mixed fisheries that harvest various species. The economic efficiency of those fisheries is often constrained by the existence of « choke species » for which catch quotas are reached before the ones of more valuable species. Conflicting TAC limits can also have ecological consequences as fishers are encouraged to discard the less valuable and constraining catches, thus inducing additional mortality on already vulnerable stocks. Finally, setting catch limits without accounting for the technical interactions that can exist among the different fleets of a fishery can have important social implications if some fleets are more severely impacted by the management measures implemented.

A more integrated evaluation of regulation measures that would assess their ecological, economic and social impacts is therefore needed for a satisfactory management of such complex fisheries. Viability theory is an interesting framework to address such multi-criteria evaluation and has successfully been applied to single species, input-based marine fisheries management. We propose to use this approach in an operational context to explore the possibility of setting TAC limits on individual stocks that could reconcile ecological, economic and social objectives for the Bay of Biscay mixed fishery. The bio-economic modelling platform IAM (Impact Assessment Model for fisheries management) enabled both the representation of the multi-species and multi-fleet interactions at the heart of the studied fishery and the inclusion of uncertainty on specific biological and economic parameters.

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Buying information or warm-glow? The relationship between ecolabels and seafood

Part of
Seafood Markets and Trade (2)
11:00 AM - 12:30 PM

Major Theme
Seafood Markets and Trade

Abstract
Since the last decade, a growing demand for ecolabels displaying environmental and sustainable information is observed, also in the seafood market. Hence, it seems that consumers are willing to pay price-premiums for ecolabels to know that the underlying fishery is sustainable. An interesting question is whether consumers are really interested in fisheries problems, or whether ecolabels may be products themselves that produce warm-glow. In this paper, a discrete choice experiment with two different treatments is used to investigate these issues in Germany. In one treatment the respondents are confronted with contradictory attribute level combinations (“overfished and labeled”) to test the “buying information" and the “buying warm-glow" explanation. Using a mixed logit model, the random parameter specification indicates substantial variation in consumer preferences. With respect to the main question, it can be shown that introducing contradictory attribute level combinations leads to a decrease of the willingness to pay for ecolabels of nearly 70%. This drastic reaction in relative terms does not support the idea that uninformed consumers treat ecolabels as a decoupled product that produces warm-glow. But on the other hand, shocking the relationship between ecolabels and seafood does not devalue ecolabels.

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Trading off Tourism and Fisheries

Part of
Spatial Management and Marine Protected Areas
03:30 PM - 05:00 PM

Major Theme
Spatial Management and Marine Protected Areas

Abstract

This paper presents a deterministic bioeconomic model with a marine protected area (MPA) including both fisheries management and tourism development goals. A weighting parameter is added to the model to allow tradeoffs between management preferences regarding the two sectors affected by the MPA. The theoretical model is illustrated with analysis of the Nha Trang Bay (NTB) MPA in Khanh Hoa province in Vietnam, where the anchovy fishery is considered. An amenity value function of the NTB MPA is estimated from a discrete choice experiment (DCE) among national tourists. Both the theoretical models and the empirical application show how the added amenity values affect optimal fishing practices as well as the identification of the optimal MPA size. Our applied analysis shows that contrary to the argument in most MPA studies with multiple stakeholders, the current management practice in Khanh Hoa prioritizes the fisheries sector heavily compared to tourism, despite high economic cost.

Author(s)

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Bioeconomic analysis of international coalitions

Abstract

Conflicts over the sharing of transboundary resources have often led to their depletion. Countries unable to agree to management goals and how to share in the benefits of fishery resources default to a system of competition and yet another example of the “tragedy of the commons”. When it comes to management of transboundary or straddling stocks, there are two main challenges: 1) achieving sufficient management scale, and 2) designing the system to attain desired management goals. Attaining sufficient scale means that a sufficient number of countries can agree to jointly manage a resource to agreed-upon goals and do so in a way that A) steers that resource to desired population targets, and B) returns benefits to the members of that coalition. This does not necessarily mean that those countries control all of the waters where a transboundary resource exists, and indeed in many cases it is technically impossible to do so. The question becomes, at what size is a coalition large enough to sufficiently steer the direction of a transboundary resource and return economic benefits to the members of that coalition? Here I describe a bioeconomic modeling framework that has been deployed in some fisheries to estimate whether a coalition can attain sufficient scale, and if not, how to get there.

Author(s)

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Behind the claims: The private politics of incentive-based tools for fisheries improvement

Part of
Special Session: Incentive based tools for highly migratory and transboundary fisheries
03:30 PM - 05:00 PM

Major Theme
Closed Session: Incentive based tools for highly migratory and transboundary fisheries

Abstract

The tuna sector is subject to a wide range of consumer-facing claims facilitated by the proliferation of private improvement mechanisms. Early eco-labels such as the Dolphin Safe tuna have been supplemented with third party Marine Stewardship Council certification and Fair Trade certification, as well as first party claims around the positive social and environmental impacts of ‘One-by-One’ pole-and-line fisheries. These private mechanisms aim to provide assurance to buyers, using a variety of measures, that claims of ‘responsible’, ‘effective’, ‘equitable’ and/or ‘sustainable’ management can be made in consumer markets. But as the number of claims in the market has increased, so too has the potential for conflict. The aim of this paper is twofold. We first compare the claims made by several incentive mechanisms targeting tuna by analysing the credibility of their standards and measures and the extent to which they are concordant to the transboundary nature of tuna fisheries. Second, we explore the strategies taken by the owners of some mechanisms to challenge the credibility of others. The paper concludes with a discussion on the expanding political economy of incentive-based mechanisms and the consequences ongoing conflict may have on their role in promoting sustainable transboundary tuna.

Author(s)

Simon Bush, Wageningen University

Hanna Schebesta
Only one path to sustainability? Understanding the role of MSC certification in regional fisheries management organisations

Part of
Special Session: Next generation RFMO governance: Climate change, allocations, and privatization, oh my!
03:30 PM - 05:00 PM

Major Theme
Open Session: Next generation RFMO governance: Climate change, allocations, and privatization, oh my!

Abstract
Regional Fisheries Management Organisations (RFMOs) facilitate international cooperation for the management of shared transboundary fish resources like tuna. However, RFMOs are challenged with dynamic interests which have slowed progress towards collective decisions on establishing key management measures such as harvest control rules (HCRs) and target and limit reference points. The introduction of market institutions like the Marine Stewardship Council (MSC), a third-party certification standard, have been introduced to incentivize the adoption of these and more measures. The role of MSC as a market institution is thought to work in a linear way – providing economic incentives for meeting its standards. However, based on a comparison of three RFMOs in the Indian, Pacific and Atlantic Ocean, this paper shows how the MSC influences decision making in very different ways. In doing so we demonstrate different ‘pathways’ through which MSC has been applied to create change at the RMFO level. The findings hold relevance for a wider understanding of how third party certification contributes to change beyond market incentives alone.

Author(s)

Simon Bush, Wageningen University

Agnes Yeeting, University of the South Pacific
Developing the Blue Economy in Sierra Leone: Driving Sustainable Economic Growth and Food through Empowering Local Fishers

Abstract

The concept of the Blue Economy, coined by James Michel, President of the Seychelles (2004-2016) applies the widely understood concept of the green economy, one built on low-carbon, environmentally sound policies to the oceans. Climate change, the ongoing depletion of global fish stocks and renewed focus on maritime security makes the sustainable development of the oceans increasingly challenging. By definition, the Blue Economy envisions policies which empower local communities and artisanal fishers, build inclusive economic development, food security and use the oceans in a sustainable, environmentally friendly way. This paper looks at the challenges of developing the blue economy using Sierra Leone as a case study. West African maritime economies are relatively underdeveloped, but subsistence fishing is essential to coastal populations. In developing maritime ventures states need to tackle maritime criminality, IUU fishing, corruption, and neo-colonial, and neoliberal challenges. The Yaoundé Summit in 2013 and subsequent Code of Conduct Concerning the Repression of Piracy, Armed Robbery Against Ships and Illicit Maritime Activity in West and Central Africa demonstrated these states’ commitment to work together to develop a secure maritime environment. Developing their Blue Economies could lead to significant economic development and improved living conditions for coastal communities if implemented correctly. However, it will require competition among regional states for FDI, and poorly implemented policies or inappropriate subsidies, for example, encouraging bottom trawling, could easily lead to further environmental degradation, significantly damaging coastal subsistence fishers, increasing criminality and likely conflict in the region.

Author(s)

Anna Butchart, University of Hawaii at Manoa
Global tilapia markets observer: methodology and results

Part of
Seafood Markets and Trade (5)
10:30 AM - 12:00 AM

Major Theme
Seafood Markets and Trade

Abstract
Seafood is the most traded food commodities. Tilapia is the most popular aquaculture species farmed in over 100 countries. Tilapia is one of the most traded seafood commodities. This paper conducts an in-depth analysis of the international markets of 4 major tilapia commodities (fresh whole, frozen whole, fresh fillet and frozen fillet) as well as their aggregates at the national (country or territory), regional (including geographic regions, trade blocks and ad-hoc groups) and global levels. As tilapia import statistics are not readily available in all tilapia importing countries, we supplement import statistics with export statistics in order to account for global tilapia markets more comprehensively. We examine the status and trend of global tilapia markets in 2014, 2015 and 2016 (the latest years with available data), with focus on assessment of the status in 2016 and monitoring of the trend between 2015 and 2016. We use a suite of indicators to assess and monitor tilapia international markets, including indicators of basic market conditions (e.g. market size and price), those of market structure (e.g. number of suppliers and effective number of suppliers) and those of market potential (e.g. share of frozen whole tilapia in all frozen whole fish and per capita tilapia import).

Author(s)
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Management Challenges of Indigenous Fishers in the Philippines

Abstract
Climate change has aggravated the marginalized condition of indigenous fishers in the Philippines. It is worth noting, however that the relationship of many indigenous peoples to their natural environment such as the land, the sea, plants and animals incorporates them as part of the same environment. The cultural and religious belief systems of indigenous peoples influence their interaction with the natural environment to shape their environmental adaptation. There are cases of seasonal immigration of fishers like the “Tumondoks” who visit other islands where the fishing grounds are rich. They coexist harmoniously with the “Pangayaws”, another indigenous group, without any issue on territorial rights. The “Maguindanaons” chant prayers while on their way to fish and sightings of floating dead snails or shells in the waters is a sign that should not proceed to fish. Climate change has however, proven that their traditional fishing methods and practices are not enough. The “Badjaos” have a unique coastal based resource management of their own. Through a UNDP study tour, they realized that artificial reefs and marine protected areas have been successful with other indigenous peoples like the “Tinigbas”. Success stories like these when imparted to their fellow indigenous fishers are easier to adapt. Likewise the same was done in the case of “Badjao” seaweed farmers in Tawi-tawi who provided best case practices to the seaweed growers in Surigao. The strategy framework to climate change for local resilience is proposed and recommended to all institutions and indigenous communities concerned for environmental adaptation to climate change.

Author(s)
Maria Rebecca Campos, University of the Philippines Open University
A study of economic performance and input oriented capacity utilization in the purse seine fishery in Nha Trang, Khanh Hoa province, Vietnam

Part of
Managing Small-scale and Developing Country Fisheries (1)
02:00 PM - 03:30 PM

Major Theme
Managing Small-scale and Developing Country Fisheries

Abstract

This study identifies differences in fishing efficiency of vessels operating in the Nha Trang purse seine fishery in Vietnam. The deterministic DEA methodology is used to assess relative capacity utilization of the fishing fleet. Double bootstrap DEA method is adopted to overcome some of the drawbacks of nonparametric DEA methodology and provide consistent inference regarding factors affecting the capacity utilization. The study is based on a survey of cost and earning data from 52 purse seiners in Nha Trang, Vietnam in 2016, and reveals that the vessels had an average profit margin of 11.2%. The mean capacity utilization while assuming variable returns to scale is 0.724, using the double bootstrap DEA. Corresponding capacity utilization rate when adopting the deterministic DEA method is 0.813. These results suggest that it is possible to sustain the catches with reduced use of input factors in the fishery. The study indicates that factors influencing the capacity utilization are size of vessel, fishing experience and family size of skipper. The two latter are interpreted as proxies for skilled crew and low crew costs.

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Improving international fisheries management by prioritizing social and geo-political issues: A case study on Atlantic shortfin mako management

Part of
Special Session: Next generation RFMO governance: Climate change, allocations, and privatization, oh my!
03:30 PM - 05:00 PM

Major Theme
Open Session: Next generation RFMO governance: Climate change, allocations, and privatization, oh my!

Abstract
Managing internationally-shared fish stocks, those that migrate from one country’s coast to another is incredibly difficult and requires international cooperation. The International Commission for the Conservation of Atlantic Tunas (ICCAT) is the regulatory body responsible for managing tuna and tuna-like species in Atlantic and adjacent seas fisheries. Although ICCAT has a strong conservation mandate, the abundances of pelagic species they manage have plummeted under their oversight. This is the case for Atlantic populations of shortfin mako sharks. In recent (2017) negotiations held in Marrakech, Morocco, delegates failed to agree on scientifically-advised catch limits and monitoring measures for Atlantic shortfin mako recovery. Most notable were objections by Spain, Morocco, and Portugal, who presented strong opposition to placing observers on industrial tuna fishing vessels. The Strait of Gibraltar, an area heavily fished by these countries, is also a well-known route for human trafficking from Northern Africa into Europe. Could the motivations behind the negotiating stances of Spain, Morocco, and Portugal be due to fear of exposing the interconnection between their industrial tuna fisheries and human trafficking? Put more simply: When are fisheries management decisions not even about fisheries at all? This research will shed light on the social and geo-political issues, like human trafficking, that are influencing the decisions being made in international management of shared fish stocks.

Author(s)
Emma Carmichael, Dalhousie University
The I, the T, or the Q? Analysing the effects of individual transferable quotas on the health of fish stocks

Part of
Special Session: Financing, Incentive Structures, & Sustainability
10:30 AM - 12:00 AM

Major Theme
Open Session: Financing, Incentive Structures, & Sustainability

Abstract

A growing practice in fisheries management is the allocation access rights to marine fisheries through individual transferable quota (ITQs) – limits on the amount of fish allocated to individual licences as transferable permits. By establishing an ownership claim over the right to fish and a market for exchange, ITQs are purported to provide a conservation incentive that reduces or eliminates overfishing while increasing economic efficiency. Yet despite enthusiastic support for ITQs as a conservation tool, the connection between ITQs and stewardship remains a theory in need of validation. Where research has found that ITQs outperform non-ITQ fisheries in protecting against overfishing, this has been demonstrated through problematic control groups that cover a wide range of systems including unregulated fisheries. As ITQ systems are a collection of management features, there is a lack of understanding of which attribute is associated with positive outcomes – the I, the T, or the Q. This paper explores this question through a statistical analysis of 150 fisheries from around the world, documenting their changes in fisheries management system (e.g. ITQ, IQ, quota pool, effort-based) and the health of the corresponding fish stocks (e.g. fishing mortality, biomass). The results indicate that a more nuanced view of ITQs and conservation incentives is required as ITQs are neither necessary nor sufficient to deliver positive environmental outcomes. An understanding of ITQs/catch shares and other allocation systems as a combination of design attributes would greatly improve debates surrounding fisheries management.

Author(s)

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Value Hierarchies, Conflict and Consensus in Ireland's Salmon Aquaculture Space

Part of
Special Session: Sustainable management of coastal fisheries and aquaculture (1)
08:30 AM - 10:00 AM

Major Theme
Open Session: Sustainable management of coastal fisheries and aquaculture

Abstract
Ireland currently produces approximately 12,000 tonnes of farmed salmon per annum, approximately one percent of the global share of production, and have proposed reaching 22,000 tonnes per annum by 2023. Proposed growth carries concomitant environmental and socioeconomic impacts, and conflict arises between stakeholder groups when there is a lack of agreement on issues or courses of action. A 56-statement Q Methodology constructed a hierarchy of values from the views of eighty-six high-level, well-informed stakeholders. These values, sorted by z-scores, provided a direct comparison on the strength of stakeholder views on specific issues associated with salmon aquaculture. By clustering issues within eight interrelated social-ecological systems discourses and performing Principal Components Factor Analysis, five stakeholder types were identified. These stakeholder types were then compared at the level of both individual issues and overarching discourses, to identify strength of agreement to other stakeholders. Where between-group agreement was strong, a measure of “consensus” was estimated from z-scores. Stakeholders broadly agree that Ireland’s salmon aquaculture sector would benefit from an independent regulatory body, and that controlling sea lice present a persistent challenge. Stakeholders would like to see integrated, ecosystem-based and community-centred approaches to management within a marine spatial planning context. Q Methodology has the capacity to quantify values hierarchies within communities and highlight areas of stakeholder consensus. In doing so, Q Methodology allows policy makers, managers, and stakeholder leaders to better define common ground, so that necessary deliberations can instead focus on those remaining areas where agreement is either weak or wholly absent.

Author(s)

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Fishing gears’ effect on ex-vessel fish prices

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (5)
11:00 AM - 12:30 PM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract

There is a longstanding public discussion on the impacts of various fishing gears, and some gears are promoted as more environmentally benign than others. The aim of this contribution is to investigate how the fishing gear used to target given fish species is likely to impact the ex-vessel price of the fish in the market. We will use USA fisheries data to determine if there has been a change in the ex-vessel price commanded in the market by the same species caught by different gear types. We hypothesize that different prices may be attributed to a given fish species due to gear type effects on quality, and broader awareness of environmental impacts of different fishing practices. We used the National Marine Fisheries Service commercial landings and ex-vessel price data by gear type to analyze this effect. We used a fixed effects linear regression model to analyze the effect of gears that are perceived to be environmentally benign compared to those that are often cited for their environmental impacts. Specifically, we look to demonstrate the effect of gear choice on two major products: tuna caught by pole-and-line to purse seine and longline tuna, and shrimp caught by pots or traps compared to shrimp caught by various types of bottom trawls. Preliminary results suggest a significant effect of the difference of fishing gear type when accounting for species fixed effects. Follow up research will continue to isolate this effect from other possible determinants of the ex-vessel price.

Author(s)

Tim Cashion, University of British Columbia
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Global use of marine fishing gears from 1950 to 2014: Catches, landed values, and future directions

Part of
Special Session: Global-scale fisheries economics research
08:30 AM - 10:30 AM

Major Theme
Closed Session: Global-scale fisheries economics research

Abstract

We present the first summary of globally reconstructed fisheries catches by major gear categories for 1950 to 2014. We used the Sea Around Us reconstructed global catch database, and associated all its catches to a fishing gear category. We found that two industrial gear types, bottom trawling and purse seining, jointly account for over 53% of all catches, while bottom trawling alone dominated discarded catches. Small-scale fisheries contributed most to the value of landed catches, while industrial bottom trawlers were less economical due to their discarding of potentially valuable catches. This newly available data will be combined with existing databases on the cost of fishing and fisheries subsidies for a greater understanding of fisheries benefits globally by gear type. In addition, this can be combined with knowledge of fishing gears divergent environmental impacts should allow a new wave of research into the global costs and benefits of fisheries by gear type.

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Constructing catch expectations in fisheries discrete choice models

Part of
Spatial Management and Marine Protected Areas
03:30 PM - 05:00 PM

Major Theme
Spatial Management and Marine Protected Areas

Abstract

In order to compare expectations of catch at different locations in discrete choice models of fisher behavior, researchers typically construct proxies using fishery-dependent data. However, economic principles from a standard random utility model (RUM) suggest that catch data observed by the researcher and chosen by the fisher are non-randomly sampled. In this paper we illustrate how selection by the fisher biases catch expectation proxies constructed using fishery-dependent data and how this results in incorrect econometric inference. By using a flexible correction function approach (Dahl 2002), we can test if bias exists and correct for selection. We find that full information maximum likelihood estimation can completely correct the bias in the discrete choice parameters, where expected catches are overestimated and welfare losses from spatial closures are underestimated when selection is ignored. As an application, we apply the model to the Bering Sea catcher vessel pollock fishery.

Author(s)

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Chris Anderson, University of Washington
Impact evaluation of a fisheries development project

Abstract

Fisheries development projects are undertaken every year in recognition of the important role fisheries play in many coastal communities. The objectives vary, but typically go beyond a limited focus on fisheries management and the ecosystem. This makes it difficult to evaluate the contribution of a project, particularly in data-poor environments such as most developing countries. This paper is based on recently published work in Marine Policy that used the Fisheries Performance Indicators (FPIs) to evaluate the impact of a World Bank development project in a Liberian coastal community. The FPIs are designed to capture economic and social performance of a fisheries system in addition to the management and environmental impacts. Improvements occurred in most ecological dimensions, and in many social and economic dimensions targeted by the project. These results will be discussed in addition to developments occurring after the paper was published.

Author(s)

Jingjie Chu, The World Bank
Seasonal Harvest Patterns in Multispecies Fisheries

Abstract

Fishermen face multidimensional decisions: when to fish, what species to target, and how much gear to deploy. Most bioeconomic models assume single-species fisheries with perfectly elastic demand and focus on inter-seasonal dynamics. In real-world fisheries, vessels hold quotas for multiple species with heterogeneous biological and/or market conditions that vary intra-seasonally. We analyze within-season behavior in multispecies fisheries with individual fishing quotas, accounting for stock aggregations, effort constraints, and downward-sloping demand. Numerical results demonstrate variation in harvest patterns. We specifically find: 1) harvests for species with downward-sloping demand tend to spread out; 2) spreading harvest of a high-value species can cause lower-value species to be harvested earlier in the season; and 3) harvest can be unresponsive or even respond negatively to biological aggregation when fishermen balance incentives in multispecies settings. We test these predictions using panel data from the Norwegian multispecies groundfish fishery and find evidence for all three.

Author(s)

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Valuing marine aquaculture in a residential equilibrium sorting model

Part of
Poster Session
05:00 PM - 07:30 PM

Major Theme
Economics of Aquaculture

Abstract

Global aquaculture production has experienced rapid growth over the last decade and the FAO announced in 2016 that production now matches wild harvest in volume produced. Also in 2016, NOAA established a target of growing U.S. marine aquaculture production up to 50% by 2020. While demand for seafood continues to grow and wild fisheries become less viable as an option, it is more important than ever that the aquaculture industry continues to grow sustainably on local, national, and global levels. However, there is a paucity of research on the impacts this growth could have on other markets that are competing for coastal resources. This paper employs a pure-characteristics equilibrium sorting model to investigate the non-marginal impacts of expanding marine aquaculture on residential property values in Maine. With this in mind, we compile transactions data for single-family homes sold in Maine between 2012 and 2014. This data is coupled with spatial information on aquaculture produce and leases issued between 1996 and 2014. Preliminary results suggest that several compelling challenges face coastal resource managers. They also indicate there are potential benefits of collaboration in aquaculture siting choices between coastal resource users with diverse interests. The objective of this paper is to provide stakeholders and legislators with information necessary to secure long term growth of the aquaculture industry, and to further explore the efficacy of equilibrium sorting models in predicting how markets and people adjust to non-marginal change.

Author(s)

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The Impact of the Affordable Care Act in North Carolina's Commercial Fisheries

Part of
Special Session: Financing, Incentive Structures, & Sustainability
10:30 AM - 12:00 AM

Major Theme
Open Session: Financing, Incentive Structures, & Sustainability

Abstract
We provide an initial look at our follow up study on the impact of the Affordable Care Act (ACA) on U.S. commercial fisheries. Earlier work found that in the years immediately preceding the passage of the ACA, North Carolina’s commercial fishermen were more likely to purchase health insurance coverage on the private market if they worked in a more dangerous environment or were more highly vested in fishing. Our preliminary results show that North Carolina’s commercial fishermen are indeed purchasing health insurance through the ACA in significant numbers. Insurance coverage has risen overall, although some fishermen are still choosing to remain uninsured. We provide early estimates on the size of the ACA subsidies and changes in fishing behavior and investment.

Author(s)
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A text-book case study: Economic analysis informing governance and management of scallop fishing in the UK

Part of
Fishery Governance, Policy and Management (6)
01:30 PM - 03:00 PM

Major Theme
Fishery Governance, Policy and Management

Abstract

Situation

UK scallop fishing is input measures, with effort limits applied to >15m vessels only. There are no output limits. Industry members noted a decline in profits, and suggested that the effort regime was to blame. Government asked for evidence to support the claim and asked Seafish for economic analysis and evidence.

Analysis

Analysis covered all vessel sizes and sea areas, for 2008 to 2016. Seafish used vessel-level annual data collected from vessel owners, combined with official government fishing statistics at trip level to identify key vessel groups, and analyse technical and business performance over a 10 year period.

Findings

Key findings showed declining profits, due to declining technical catching efficiency rather than to the effort restrictions. Other key findings included: 1. Most scallops landed by UK vessels are landed by vessels that are >80% revenue-dependent on scallops. 2. Catch rates are declining all around UK. 3. Effort has been going up and landings volume going down. 4. Effort has been going up in the under 15m vessel group, which is not restricted by the effort regime (a classic boundary effect) 5. Operating profits would have fallen further if not for low fuel prices and high scallop prices.

Governance

This paper will present the history, the analysis and the key textbook examples of unrestricted fishing, economic incentives and how the policy discussions accepted economic analysis of their highlighted problems.

Author(s)

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Aims, ambitions, challenges and early progress from a new ICES expert group on Economics

Part of
Fishery Governance, Policy and Management (3)
03:30 PM - 05:00 PM

Major Theme
Fishery Governance, Policy and Management

Abstract

Demand for science and advice to address economic considerations is increasing, but the International Council for the Exploration of the Seas (ICES) does not engage many economists or address economic issues in many member countries. The Strategic Initiative on the Human Dimension (SIHD) has raised the profile of economics, but no existing Expert Group addressing economic issues focuses on developing the economic metrics and core economic analyses that are demanded in the ICES network (e.g. further development of ecosystem overviews) and by some ICES clients.

Outcomes of recent meetings reflect the need to expand economics work in ICES, as do high aspirations for Blue Growth globally, the interest in managing fisheries for Maximum Economic Yield and a desire to understand economic consequences of human-induced changes in the sea. ICES ecosystem overviews would be more complete with economic metrics and would better recognise people and their livelihoods as part of the ecosystem. Aquaculture science will also require economic inputs.

The authors are co-chairs of a new ICES expert working group on Economic science established to begin addressing these needs within ICES. The group first meets in June 2018 and will report to the Human Activities, Pressures, and Impacts Steering Group. This presentation will review the terms of reference of the new WGECON, initial progress made during the first meeting of the group, and present thoughts about the challenge of bringing fisheries economics right into the heart of ICES, its science and advice.

Author(s)

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SEAFISH bio-economic model: enhanced utilisation of data available for policy support

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (8)
08:30 AM - 10:00 AM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract

The SEAFISH model developed out of the Landing Obligation Economic Impact Assessment project, which started in 2014. The model is now a separate modelling tool, which can be used for Economic Impact Assessments of different management options for the UK fleet. The purpose of the model is to provide information that supports decision-making and understanding at the fleet segment, species, home nation and national level.

The model consists of three structural parts: Data Input Framework; Bioeconomic Simulations and Data Output Framework. All three parts are connected through a standard data flow and were developed in R and VBA programming languages, ensuring that the data input and results are updatable when new data sets are published. The model is able to utilise a range of information available from different administrative and other institutional data sources (e.g. STECF FDI data base, ICES stock assessment, EU FIDES database, etc.) at the lowest available aggregation level. The incorporation of the metier approach to economic fleet segment analysis also strengthens the model, allowing economic performance indicators to be linked with activity information and gear use by area.

The simulations that have been developed and tested to date consider the relative impact of the following EU policy levers: quota adjustment, catch allowance for zero-TAC stocks, survivability for certain stocks, vessel movement between metiers to better utilise PO quota, simulation of moving unused UK quota between fleets and simulation of end of year UK quota allocation (including national and international quota swaps).

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**Analysing the new Faroese fisheries policy**

**Abstract**

The Faroe Islands recently adopted a reform of their fisheries policy, which is to be implemented gradually in 2018 and 2019. Faroese fisheries policy has for the last two decades focused on restricting effort of the fleet with fishing days, area closures, and technical regulations. This approach has failed. The demersal stocks are severely depleted and the fleet is largely unprofitable. The Faroese economy relies heavily on the fishing industry, so it is vital that the new system is successful, both biologically and economically. This paper provides a descriptive account of the newly adopted fisheries policy for the Faroe Islands, which plans to use individual transferable quotas for trawlers, pairtrawlers and longliners, and continue to rely predominantly on fishing days for the coastal fleet. Faroese authorities are planning to allocate additional harvesting rights using a range of auction scenarios. These will also be described and analysed. Finally, we discuss the main problems in Faroese fisheries policy to date in order to determine if the new policy adequately addresses these, and if fisheries policy in the Faroe Islands is likely to produce more sustainable and profitable outcomes in future.

**Author(s)**

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**Sveinn Agnarsson**, University of Iceland
Fisheries policy in the Faroe Islands: managing for failure?

**Abstract**

The Faroe Islands have gone through several different fisheries management regimes for their demersal home fleet in the last seven decades – open access, regulated open access, a licensing system, a brief period of individual transferable quotas, and, since 1996, an effort quota system, where the main control component consisted of fishing days. The Faroese demersal stocks are severely overexploited and there is risk the commercially important cod and haddock stocks cannot replenish. The Faroese economy relies heavily on the fishing industry and the fleet is largely unprofitable. In this paper, we describe and analyse the main characteristics of the above regimes and developments in policy to identify problems that have caused mismanagement of the stocks. We then compare this to the management of the Faroese pelagic and distant-water fleets, which have largely been managed with TACs and in collaboration with coastal states, to identify policy inconsistencies. We conclude that Faroese authorities have 1) persistently believed that fishing effort can be directed away from overfished stocks but have failed to do so; 2) shown systematic short-sightedness in management of their fishery; 3) demonstrated an inability to sacrifice jobs for the sake of profitability and sustainability, and 4) that the pelagic fishery has been managed rationally and is both sustainable and profitable, indicating that the Faroese are able to manage their resources rationally but are largely unwilling to make the hard choices when it comes to the demersal home fleet.

**Author(s)**

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**Sveinn Agnarsson**, University of Iceland
Economics behind alterations in the management practices of composite farming of Indian major carps in 24 Parganas (N) district, West Bengal.

Part of
Managing Small-scale and Developing Country Fisheries (3)
08:30 AM - 10:00 AM

Abstract

The present status and deviations from the classical management practices of composite farming of Indian major carps (IMC) have been investigated in North 24 Parganas district of West Bengal, India. Classical six species combination, ratio of IMC and exotic carps were not being followed by any of the farmers as 75% fish farmers polycultured 7-10 species with stoking density of 15000 nos. fingerling ha\(^{-1}\) though six species combination has been proved to be optimal for fish yield. 71.68% farmers who produced more than 5 tonnes ha\(^{-1}\) yr\(^{-1}\) stocked their pond twice in a year instead of once. With regards to annual yield, Application of 350-400 and 200-250 kg ha\(^{-1}\) agricultural lime and fertilizer (urea + single super phosphate = 1:1) respectively, was found to be optimal towards fish production. Production level declined as the depth of the pond increased from 5 to 9 feet. Inclusion of readily available carbohydrate source like molasses and boiled starch in supplementary feed preparation was conspicuous. Because of better economical returns from minor fishes, remarkable introductions in the original six species combination were minor carps like bata, Japani punti, tilapia; minor fish like mola (Amblypharyngodon mola) carplet and scampi (Macrobrachium rosenbergii). Majority of the farmers used to stock more silver carp because of faster economic returns though it had a direct bearing upon the major carps.

Author(s)

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Product differentiation in the French Seabass market: is there a price premium for small-scale artisanal vessels?

Part of
Certification of Fisheries and Aquaculture (1)
08:30 AM - 10:00 AM

Major Theme
Certification of Fisheries and Aquaculture

Abstract

Seafood consumers increasingly ask for high quality, freshness, sustainable and safe products. This could be a good opportunity for small-scale vessels to differentiate their landings, particularly when they compete with large scale vessels and/or farmed products. Nevertheless, labelling initiatives still raise unanswered questions about buyers’ effective behaviour and specifically the gap between willingness to pay for high quality – labelled – products and actual purchases. Seabass, as a major species of the seafood market in France, provides an interesting framework to assess the existence of price premium for a labelled small-scale fish competing with farmed imported Seabass and landings from large scale trawlers. The label “Seabass from Brittany liners” was implemented in the beginning of the 90s to face the growing supplies of farmed Seabass from EU Mediterranean countries and the sudden fall in ex-vessel prices. However, and since then, the label “Seabass from Brittany liners” has been exposed to an increasing competition on stocks and markets from other French fleets. Differences in ex-vessel annual Seabass prices between groups of vessels over the period 2000-2015 were assessed using ANOVA and Post-Hoc tests. Our results show increasing price premiums for labelled liners compared to all other fleets over the period. The labelling strategy paid off and the observed trends refute some arguments on instantaneous and fashion effect of labels and underpin its relevance for small-scale artisanal vessels. Results also show that EU stock management remains critical and that price differences exist among small-scale fleets, which raises more questions on SSF certifications.

Author(s)

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Myriam Nourry
Seeing Through Murky Waters: FPIs and Data-Poor Fisheries in Southeast Asia

Abstract

Stock assessments measure the abundance of fish populations and paint the most accurate picture of the health and sustainability of fisheries. Assessments are common throughout the developed world, but in Asia, Africa, and Latin America, unassessed fisheries are the norm and even landings data are frequently suspect. The majority, by landings, of the world’s unassessed fisheries are in Asia, where some of the largest harvests reported by FAO fall into the category of Marine Fish NEI; in other words, unidentified. But that does not mean there is no data on these fisheries. To date, over half (60+) of the fisheries in the FPI worldwide database consist of unassessed fisheries from less developed countries, providing data not only basic ecological health and trends, but on the economic and social performance of those fisheries. This data is especially valuable in LDCs where many depend on fisheries for livelihoods and food security. FPIs reveal a large difference between developed countries and LDCs in aggregate ecology and economic scores, but also highlight that even underperforming fisheries may provide significant community benefits. An overview of the state of fisheries revealed by FPIs in Asia will be presented, as well as the potential for FPI measures of ecological, economic, and social performance to identify focal points for fishery improvement efforts.

Author(s)

Michael De Alessi, University of Washington
Characterizing the domestic use of shark meat and fins in Peru

Part of
Seafood Markets and Trade (5)
10:30 AM - 12:00 AM

Major Theme
Seafood Markets and Trade

Abstract
Shark populations show evidence of declines at a global scale. Knowledge of the socio-economic consequences of changes in their abundance is limited. Framed within Peru’s National Plan of Action for the Conservation and Management of Sharks, Rays and Chimeras, the present study sought to: (1) describe the domestic market and trade flows of shark commodities; (2) estimate the apparent consumption of shark meat and fins in Peru; and (3) reconstruct the catches required to maintain the estimated local levels of shark consumption; using public data. Shark meat consumption in Peru is high and growing, although its contribution to national food security remains low. Nonetheless, most shark meat consumers are not aware that they are eating sharks due to deceptive advertising. Improvements on seafood traceability have only been observed on exports, as data associated with landings, local markets and imports remains highly aggregated. Moreover, official statistics severely underestimate the catches required to maintain the Peruvian supply (by 39%) and demand (by 85%) of shark products. The implications of these findings are discussed and framed within: the Peruvian gastronomic boom; seafood fraud; and international trade and the conservation of key marine megafauna.

Author(s)
Santiago De la Puente, University of British Columbia
Good for what and for whom? - A review of the biological, social and economic effects of the implementation of an Individual Vessel Quota System in the Peruvian anchoveta fishery

Part of
Poster Session
05:00 PM - 07:30 PM

Major Theme
Rights-based Fishery Management and Co-management

Abstract
An individual vessel quota system (IVQS) was introduced in Peru in 2009 to mitigate the growing race-to-fish and fleet overcapacity that was being experienced in the industrial anchoveta fishery – one of the world's largest mono-specific fisheries. The effects of this change in management are explored over a series of performance indicators including: (i) fishing days per year; (ii) effective fleet size and overcapacity; (iii) daily, seasonal and annual catches; (v) harvest control rules and sustainability; (vi) juvenile discards and high-grading; (vii) vertical integration of fleet and processing plants; (viii) concentration of fishing and processing power; (ix) industry revenue; (x) contribution to national employment; (xi) governmental expenditure in management and monitoring; (xii) taxes and other industry contributions; among others. The observed effects are discussed in relation to other fisheries under IVQS and framed within the Peruvian context providing advice to strengthen fisheries management and governance.

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Melanie Pajuelo, Oceana Peru
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Is it worth insuring fishers' salaries as a tool to protect the Peruvian industrial anchoveta fishery?

Abstract

The Peruvian anchoveta stocks are prone to severe fluctuations due to changing environmental conditions and fishing pressure. In recent years, concentration of power amongst industrial fishing companies has intensified. This has alarmed environmental organizations seeking long-term resilience of marine food webs, ecosystems and the fisheries that depend on them. They fear that fishing companies’ will use their political and economic power to demand higher short-term catches at the expense of sustainability. To reduce overfishing incentives, these organizations have suggested insuring a fraction of the industrial fishermen’s salaries. We thus developed an ecological-economic model and used it to assess the feasibility of an insurance fund that would cover part of the fishermen’s salaries in years of poor recruitment (i.e. low or no catches). The proposed fund would be financed through a levy charged to the industry in good years, and via contributions from government and/or private entities (e.g., foundations and non-governmental organizations). The costs and implications of funding this endeavor, as well as the fund’s overall success are discussed focusing on: (i) harvest strategies; (ii) manager’s attitudes towards risk; (iii) moral hazard; and (iii) funding priorities for the Peruvian anchoveta management system.

Author(s)

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Isaac Jonas, University of British Columbia
Rashid Sumaila
Nutrition value chain analysis: Place of Women Fish Processors

Part of
Understanding Small-scale and Developing Country Fisheries (3)
03:30 PM - 05:00 PM

Major Theme
Understanding Small-scale and Developing Country Fisheries

Abstract
The fisheries value chain of Sri Lanka consists of actors who participate in the coordinated production and value-adding activities which fulfilling the country’s animal protein requirement by 53%. The study was taken up with the objectives of assessment of nutrition value: nutrient density, food safety, food quality, food quantity, food prices, profit, market margin, identify the points where safety, quantity, quality, prices, profit/market margin enhanced or diminished in the fishery value chain and time allocation of each value chain actors: production-men/women; processing-men/women; marketing men/women The study methodology included four case studies and focus group discussions based on both dry fish and Maldives fish value chains in Southern coast of Sri Lanka. Upstream of the postharvest chain, dry fish and Maldives fish was female dominated while males were allocating more time as producer, collector, wholesaler, retailer and exporter. The women processors were concern more on economic returns and they have limited concern on food safety, hygiene and quality measures where standards available. Downstream of the local value chain paid minimum effort on quality signals. Fish and fishery products exporters for both international market and ethnic markets manage quality signals strictly. Fisheries sector supply country’s protein demand by quantitatively. Poor postharvest management, high cost of certification and quality management hinder the process. Attitudes and perception of value chain actors on food safety and quality were negative and contamination and nutrient losses were common evils.

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Social Accountability of fishermen and women

Part of
Poster Session
05:00 PM - 07:30 PM

Major Theme
Open Session: Bringing Gender Discourse in Fisheries Economics and Trade

Abstract
Social accountability in fishery as an approach towards building accountability that reaches an engagement of fishermen and women. Focus of the study was exploring the fishermen & women’s perspective, defines, and measures the social accountability. Through purposive, and simple random sampling study completed semi-structured, interviews with 36 fishermen, 28 fisherwomen, 12 processors, 10 boat owners, 10 officials of ministry of fisher and 3 members of NGOs. Data were analyzed using flexible, iterative and qualitative process. Interview filed notes, audio and video recordings and village resource maps were main sources of data. Majority (85%) of the sample believed and agreed that both fishermen and women have a responsibility to be socially accountable in use of common pool resources, sustainability of resource base and global citizenship. Themes emerged in regards to defining social accountability; 1. Creating a diverse and responsible fishing workforce to care and manage the common pool resource and minimize illegal, unreported and unregulated fishing; 2. Ensuring ethical fishery production through wellbeing of fishermen and women and eradicate labor abuse; 3. Holding the responsibility of giving birth to successors, caring, feeding and educating the next generation, develop skills, attitudes & values; and strengthen community bonds. Reported barriers to achieving social accountability included lack of financial stability, social pressure, political intervention, influence of social media and miss use of communication technology, and societal trends. Methods for measuring social accountability included reviewing types of boat gear combinations, fishing grounds, life style analysis, savings culture, crimes and anti-social behavior, alcoholism and drug abuse,

Author(s)
Achini De Silva, Sabaragamuwa University
The Feminist Approach to Value Chain Membership: Case of Small Scale Fishery Value Chains in Sri Lanka

Part of
Managing and Understanding Small-Scale & Developing Country Fisheries
10:30 AM - 12:00 AM

Major Theme
Understanding Small-scale and Developing Country Fisheries

Abstract

The fisheries sector of Sri Lanka means of livelihood for 2.6 million people and the vast majority of them are involved in small scale fisheries. The study was taken up with the objectives of to identify social &political membership status of small scale fishery value chain members, to assess the level of decision making power of both men and women, identification of the governance: who has power to decide what to produce, when to market, what price, to whom to sell and evaluate the level of entrepreneurship and level of leadership of both men and women in small scale fishery value chain. The study methodology included rapid market chain analysis to collect primary data and assessment of the level of decision making power & identification of the governance was done by using the Gender in Value Chains Practical Toolkit (Agri-ProFocus 2012). The study identifies the majority of value chain members of small scale fisheries are having strong membership status in both social and political aspects and decision-making power of production, distribution &marketing decisions are mainly governing by men while women invest their resources, making decisions in relation to fish processing activities, very little on retailing and have autonomy in household income managing. And also in analysis of both level of entrepreneurship & level of leadership, women got high score than male. Further, limited number of studies touched this area and our efforts tried to identify gaps of feminism in small scale fisheries &empower the role of women by providing equal opportunities.

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Livelihood Diversification by fisher women as a Climate Change Adaptation Strategy: evidence from a small scale fishing community in Southern Sri Lanka

Part of
Special Session: Bringing Gender Discourse in Fisheries Economics and Trade (2)
04:00 PM - 05:30 PM

Major Theme
Open Session: Bringing Gender Discourse in Fisheries Economics and Trade

Abstract

Coping with climate change is one of the most serious issues confronting small scale coastal fishing communities today. This study examined how small scale fisherwomen diversified their livelihood as an adaptation strategy against climate related risks. The study was conducted in Nilwella fishing village of Southern Sri Lanka. Focus group discussions and a structured survey of 94 fisher women were the tools employed for data collection. As revealed by the results, majority of the respondents have observed an increase in the intensity of rainfall and a shift in rainy seasons. As a result, 46% was revealed that they suffer with 15 – 21 ‘zero catch’ days per month. These changes have prompted the small scale fisherwomen to adapt different strategies to smoothen fluctuations in inter-temporal flows of fishing incomes. Among several alternative livelihoods, majority of small scale fisherwomen were engaged in fish drying and producing “Maldive fish” (umbalakada) to smoothen income fluctuations. These alternative livelihoods contribute up to 50% of the monthly average household income. A significant positive relationship was found between the number of livelihood activities and average monthly household income (r=0.307, p

Author(s)

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Revealing the public preferences of wetland attributes for a sustainable wetland management scenario: The Case of Bundala Wetland, Sri Lanka.

Part of
Ecosystem-based Management and Integrated Assessments
11:00 AM - 12:30 PM

Major Theme
Ecosystem-based Management and Integrated Assessments

Abstract

Wetlands are the ecosystems enrich in biodiversity and capable of minimizing the adverse impacts of climate changes. At present they are rapidly deteriorating and destroyed due to various unplanned development activities. Hence, sustainable wetland management is an effective strategy to reduce such adverse impacts and conserve. Taking this into account, this study was designed to investigate the public preferences on attributes for a sustainable wetland management scenario for Bundala Wetland. Choice experiment method was administered to collect data consisting five attributes with different levels considering ideas of the people representing all stakeholders in the wetland. Primary data were collected from randomly selected 236 respondents beyond 10 km of the Bundala Wetland. A conditional logit model was employed to estimate Marginal Willingness-to-Pay (MWTP) for each attribute. Results reveal that all attributes; lagoon fish production, biodiversity, eco-tourism, participatory governance, payment are significantly accepted and positively affected to the choice except payment attribute as it is having a negative impact on the utility of selecting a choice with a higher payment value. People responded for a higher MWTP for participatory governance as they preferred to have a governance including government, community and private sector rather than having one party and it was highlighted by majority. Meanwhile least MWTP was estimated for eco-tourism as they disagreed on introducing new economic activities. Therefore, this study implies that people mostly prefer participatory governance followed by lagoon fish production, biodiversity and eco-tourism as attributes for a sustainable wetland management scenario for Bundala Wetland.

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An exam of Fish Trade determinants using the gravity approach

Part of
Seafood Markets and Trade (3)
01:30 PM - 03:00 PM

Major Theme
Seafood Markets and Trade

Abstract
European trade flows of seafood show a different pattern depending of the region where captures are located. Mediterranean captures and trade are concentrated among Italy and Eastern Mediterranean countries, whereas Atlantic captures and trade are concentrated around Spain as the most important market and producer. The gravity model is employed in order to analyze the factors underlying seafood’s’ trade recent evolution, not only in reference to European legislation on seafood exploitation, but also in reference to the most usual factors utilized in the standard gravity model approach. The results of estimating the gravity equation have been used to calculate the export potential in the seafood sector of the Spanish economy. The country with which Spain has a bigger trade potential is Germany. This result is consistent with the enormous economic importance of Germany, its level of development and the limited presence of Spanish companies in the German fish market. Other countries with which Spain still enjoys ample opportunities for increased sales are other big European countries such as Italy and France. By contrast, countries outside the European Union such as Morocco or Turkey show lower export potential figures.

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Analysis of price transmission between Spanish hake value chain and its imports

Part of
Seafood Markets and Trade (5)
10:30 AM - 12:00 AM

Major Theme
Seafood Markets and Trade

Abstract

The aim of this paper is to analyze the degree of interdependence and the mechanisms of transmission between the hake prices in the Spanish market along the value chain and the international prices of the different species of hake that are marketed in Spain for the period 2003:01 - 2016:12. Due to the fact that the internal market of the Spanish hake is highly dependent on imports, the evolution of international prices for hake may condition the price transmission mechanisms along its value chain. On the basis of a cointegration analysis and the Law of One Price, a battery of hypothesis contrasts (ie, cointegration, proportionality, exclusion and causality) are performed, through which we examine the potential effect of flows from the international market along the hake value chain; we verify if the prices that form the Spanish hake market are cointegrated and, therefore, constitute a single market; and, finally, we check if international prices lead the national value chain, thus conditioning the economic sustainability of the sector.

Author(s)

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Understanding the effects of the spatial scale of analysis: an original empirical approach.

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (1)
11:00 AM - 12:30 PM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract
Spatially-explicit models of fishery dynamics are commonly used to carry out welfare or policy analysis. Although they have become more complex and refined over time, the reliability and applicability of their results still hinges on the definition of the spatial units of analysis.

Here we examine the impact of the choice of the spatial scale used in a discrete choice model (DCM) of fishing locations. We take on an original empirical approach that relies both on simulated and real data, and consists of estimating the same DCM at varying spatial resolutions. We first draw insights using simulated datasets of fishing locations, before taking advantage of newly available geospatial data for vessels monitoring to apply our analytical framework to real data.

We show that, even when the decision-making process is correctly specified, models can be structurally inconsistent because of the aggregation of data at an improper spatial scale. This inconsistency cannot be detected by a researcher conducting analysis at only one spatial scale but we show that, when data allows it, considering various aggregation levels can help assessing the robustness of a model’s results.

Applying this approach to the assessment of the impact of a hypothetical Marine Protected Area in the Gulf of Mexico, we find that estimated welfare losses can vary drastically from one spatial configuration of fishing sites to another. This calls for systematic sensitivity analyses of spatial models to the spatial definition of choice alternatives and highlights the value of having access to more spatially disaggregated datasets.

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Compliance dilemma in the open-access fisheries of Lake Victoria, Tanzania

Part of
Managing Small-scale and Developing Country Fisheries (3)
08:30 AM - 10:00 AM

Major Theme
Managing Small-scale and Developing Country Fisheries

Abstract
At Lake Victoria, neither entry into the fishery nor the harvested amount is restricted, but a few technical regulations exist that rudimentary serve to protect the sustainability of the fish stocks. However, compliance with these technical regulations remains a challenge to managers. Ensuring compliance is an essential step towards effective management and is high on the policy agenda. Direct observation of non-compliance behavior is difficult due to its very nature. Here we use data collected from 500 respondents in Mara and Mwanza regions on the Tanzanian side of the lake. We classify estimates of non-compliance prevalence according to fishery type, socio-economic status, and risk- and social preferences that we elicited using incentivized economic experiments.

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Deregulating fishing gear in catch-share fisheries: A comparison of biomass and number quotas

Part of
Rights-based Fishery Management and Co-management (2)
04:00 PM - 05:30 PM

Major Theme
Rights-based Fishery Management and Co-management

Abstract

Gear restrictions are a traditional fisheries management tool to protect juvenile fish. We question their need in `modern' fisheries that have introduced individual fishing quotas. In a setting where gear choice is deregulated, we study economic and biological outcomes for two types of individual quota management: Conventional biomass quotas and number quotas that specify the number of fish allowed to be caught. Number quotas could improve the incentives to target larger fish, thus solving the persistent growth overfishing problem without gear restrictions. We develop the economic principles in a simple analytical model and present two empirical examples: For the North-East Artic Cod trawl fishery and the Eastern Baltic Cod trawl fishery. We find that steady-state profits under deregulated number-quota management are only 0.1-1.1% below the theoretical optimum.

Author(s)

Florian Diekert

Max Stoeven, Kiel University

Martin Quaas, University of Kiel
An attempt to safeguard the livelihood of small-scale anchovy fishers in the west coast of Sri Lanka

Abstract

A very productive year around anchovy fishery has been practiced in the west coast of Sri Lanka for the last few decades making a significant economic contribution to the coastal livelihood. But, recent observations revealed the local depletion of anchovy stocks. This study evaluates the socioeconomic background of anchovy fishers and possible measures for sustainable utilization of this resource in order to safeguard the coastal livelihood. Catch, effort, biological and socioeconomic data were collected at anchovy landing sites in the west coast of Sri Lanka from January to December 2015 by making bi-weekly field visits. Around 250 fishermen exploit anchovies using drift gillnets with 1.1, 1.2 and 1.8 cm stretch mesh sizes, while 62 fisherwomen contribute to dry anchovy production. Though there are seasonal variations in anchovy catch rates (56±42 kg/boat/day), average monthly income of fisherman is around 820 US$. Fisherwomen mainly in 40-49 age range, having only primary education involve in the dry anchovy production earning monthly wages of 180US$. Biological analysis showed that anchovies spawn throughout the year, having a peak spawning in August and their size at first sexual maturity is 7.4 cm. The gillnet selectivity study revealed that the optimum length ($L_{opt}$) and selection range of anchovies varies with mesh sizes and estimated $L_{opt}$ for 1.0 cm, 1.2 cm and 1.8 cm mesh sizes were 5.6 cm, 6.4 cm and 9.2 cm, respectively. Ban or limit of gillnets with 1.0 cm and 1.2 cm mesh sizes, is recommended for sustainable utilization of this resource.

Author(s)

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Distribution of economic returns from fishers to exporters: A case study from the sea cucumber fishing industry in the north and northwest coasts of Sri Lanka

Major Theme
Interdependency of Fishery Management and Seafood Markets

Abstract
This study evaluates the distribution of economic returns among key players in the sea cucumber value chain of Sri Lanka. Data were collected from sea cucumber fishers (167), processors (16) and exporters (7) in the north and northwest coasts of Sri Lanka from November 2015 to January 2017 through direct observations, questionnaires, semi-structured interviews and group discussions. Nine sea cucumber species are dominant in the commercial catches. The sea cucumber value chain consists of ~2200 of fishers, 48 processors, 8 exporters and 3-5 international buyers. Fishermen play a dominant role in fishing (96%), processing (98%) and marketing (100%) giving limited opportunities for fisherwomen. The price markup for all commercial species increased along the value chain marking significantly higher income for exporters (~2.6 times) than fishers (ANOVA, p < 0.05). The price markup ranged from 18 ± 5 to 118 ± 2 US$. Although, comparatively lower price markup is received by fishers due to lack of price transparency, proper handling and processing, coordination and bargaining power, only 31.34% buyer dissatisfaction was recorded. Proper training on processing and postharvest practices, increasing the governance and bargaining power of fishers though fishing cooperatives and auctions, setting minimum price limits for fresh and processed sea cucumber species are some solutions to overcome the inequality of income distribution especially among the lower level value chain actors.

Key words: Price markup, value chain, beache-de-mer

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Assessment of social and economic impacts of climate change in fisheries and aquaculture production systems – an introduction

Part of
Special Session: Economic & social impacts of climate change on fisheries and aquaculture (1)
08:30 AM - 10:30 AM

Major Theme
Open Session: Economic & social impacts of climate change on fisheries and aquaculture

Abstract

The assessment of economic impacts of changes in marine ecosystems and aquaculture production systems due to climate change is the main objective of the EU Horizon 2020 projects CERES ([https://ceresproject.eu](https://ceresproject.eu)) and ClimeFish (http://climefish.eu). The partners in CERES and ClimeFish apply a wide variety of bio-economic models to assess the impacts on a number of fisheries in the North-East Atlantic and the Mediterranean Sea. In addition to the direct effects of climate change on marine ecosystems, the CERES partners utilize a few socio-economic scenarios with different values for population, GDP per capita or percentage of renewable energy. For aquaculture production systems the CERES participants apply the typical farm approach to assess direct effects on individual farm level. In ClimeFish, the assessment of risk and opportunities from climate change and the calculation of the derived social and economic consequences are conducted in close collaboration with stakeholders, focusing on the relevant areas of concern within case studies. For some case studies the focus is on estimating the effects on the individual farms, whilst others have different geographical scopes according to the contexts of the various case studies. However, ClimeFish calculates the impacts of climate change for a range of key variables for all the case studies to allow a comparison across case studies. The paper will give an overview on the planned activities in CERES and ClimeFish as introduction to the special session on economic effects of climate change. Concrete results from these projects will be presented in the special session.

Author(s)

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Unn Laksá, Syntesa
A spatiotemporal simulation framework for assessing the ability of fisheries-dependent data to support mixed fisheries management

Abstract

Fishers exploit populations that are heterogeneously distributed in space and time without full knowledge of species distributions and with fishing gear that is not fully selective. The ability to change catch composition is limited by species mix at a particular location and time and the capture characteristics of the fishing gear. Models capturing the dynamics of the fisheries (‘fleet dynamics’ models) are often simplistic due to a lack of knowledge of the processes driving these catches, which occur both at large and small scales.

We develop a simulation framework to investigate the importance of scaling on the interactions between fish populations and fisheries dynamics. The framework provides i) a realistic but tractable biological model of fish populations in space and time, including daily population processes (mortality, growth and recruitment) and population movement implemented as a combination of diffusive density-dependent processes and migrations; and, ii) a realistic fishing simulation model to capture how fishers may exploit heterogeneously distributed fish populations with different values and uncertain knowledge about the underlying spatial processes.

We generate a model system where we investigate the consequences of scaling and data aggregation and validate this simulated data against data collected on fisheries operating in the Celtic Sea. The simulation allows a more in-depth understanding of factors important when using fisheries-dependent data to develop spatial management measures, from the micro- to the large-scale and individual to population processes, not otherwise possible due to the limitations in ‘real-world’ spatiotemporal data on fish distributions.

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Comparing models for predicting spatial effort allocation: what works well, when?

Part of
Special Session: Different approaches and priorities for modeling fisher behavior (2)
11:00 AM - 12:30 PM

Major Theme
Open Session: Different approaches and priorities for modeling fisher behavior

Abstract

Its widely recognised successful fisheries management requires understanding the human drivers that determine how fishers, individually and collectively, respond to changing fishing opportunities. Decisions about where and when to fish have a fundamental impact on the level and pattern of exploitation of different fish stocks and on the economic success of fishers. There has, however, been limited progress in integrating such considerations into operational management decision making tools thus increasing uncertainty in evaluation of management strategies. Improved understanding and prediction of effort allocation in mixed fisheries is vital if we are to design better management approaches.

We compare different methods of predicting spatiotemporal allocation of fishing effort in mixed fisheries, with a focus on clarifying the methodological similarities and differences. We distinguish statistical models (e.g. Random Utility Modelling, Markov and Semi-Markov models) from mechanistic models (e.g. gravity models, dynamic state modelling) and review their application. We highlight the key properties with some simplified examples to draw inference on their suitability to predict effort allocation under plausible management interventions (seasonal closures, gear regulations, catch restrictions). We find many similarities in formulation and structure to the models. Equally distinction between statistical and mechanistic methods may lead to the use of one or the other depending on the intended role. We consider the characteristics of the different models in application to Management Strategy Evaluation (MSE) routines, to understand how to further promote their incorporation in fisheries management advice.

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Success Where Others Have Failed: The Central Gulf of Alaska Rockfish Catch Share Program

In late 2016, the North Pacific Fishery Management Council indefinitely tabled a proposed Gulf of Alaska (GOA) trawl bycatch management action establishing a groundfish catch share program. This marked the third time since the 1990s that the Council halted an action that would have altered the fundamental structure of the fishery.

Inability to reach consensus on a GOA-wide catch share program is likely linked to the diversity of harvester, processor, and community engagement and reliance on this fishery. The stakeholder landscape is further complicated by affected communities ranging from Alaska to the Pacific Northwest and the many GOA trawl vessels that also participate in the U.S. west coast and/or Bering Sea fisheries.

In contrast, the Central GOA Rockfish Program, a catch share program involving much of the same GOA trawl fleet, was implemented in 2012 following five years of management of the fishery under a similarly configured pilot program. The Rockfish Program, featuring multiple community protection measures focused on the community of Kodiak, has succeeded when other attempts at rationalization in the GOA have failed.

This presentation, drawing on information developed for the 2016 GOA trawl bycatch management analysis and information developed for the Rockfish Program five-year review, completed in 2017, analyzes the attributes of the rockfish fishery and the Rockfish Program that have facilitated the program's adoption and success, seemingly against all odds.

Author(s)

Mike Downs, Northern Economics

Darrell Brannan
Bringing equity and distributional concerns into fisheries management

Part of
Fishery Governance, Policy and Management (4)
08:30 AM - 10:30 AM

Major Theme
Fishery Governance, Policy and Management

Abstract

Individual transferable quota (ITQ) systems are becoming an increasingly adopted management in fisheries. The system relies on transactions of the user rights to fish within a capped fish stock between fishers. The limitation of access to fish through allocation of fishing privileges produces winners and losers. This paper addresses equity and distributional issues in catch share fisheries and discuss program design measures that can be adopted to help achieve desired equity outcomes. Equity outcomes examined in this paper include reduction of fishing effort, initial allocation of harvesting rights, distribution of harvesting rights over time, and challenges related to migratory, mixed-used, and multijurisdictional fisheries. ITQs could be a promising instrument for management of fisheries precisely because these systems can be designed to resolve important socio-economic equity conflicts. Unique panel data from the Swedish pelagic ITQ system is used as a case study to exemplify the issues discussed. Our findings indicate that quota prices should be reported and public, that the financial cost of capital is important for allocation in the long run and that permanent quotas signal that catch shares are collateral to facilitate financing for fishers without large assets. Moreover, a strategy for data collection should be part of the system design, concentration of quota holdings can be counteracted with limits on quota holdings, but with returns to scale it adds a social cost compared to efficiency optimum. The period when a catch shares program is decided is the time when policies should be designed with a long-term perspective.

Author(s)

Håkan Eggert, University of Gothenburg
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Thomas Sterner
Three agents and three species on a common ground: A game-theoretic analysis

Abstract
In the North East Atlantic there are several straddling stocks, including herring, mackerel, and blue whiting, which are exploited both within coastal states' 200 nautical mile Exclusive Economic Zones (EEZ) and on the high seas. The pelagic fisheries of the North East Atlantic are all harvested by the same six countries/parties: the EU, Norway, Faroe Islands, Iceland, Russia, and more recently Greenland. For several years, there has been an unsolved dispute between these nations about the size of their respective quotas. Based on their importance and roles in the fisheries, we model the exploitation as consisting of three players, namely the EU, Norway, and Iceland. The optimization model takes into account biological interaction between the species and strategic interaction between the agents simultaneously. It is assumed that when the nations act as singletons, they behave myopically. When they are member of a coalition, they act in order to maximize the coalition’s long-term net revenue. The model is solved using DNLP (Nonlinear Programming with Discontinuous Derivatives), and shows that in most cases the biology (ecosystem) tends to approach a steady state without this being imposed.

Internal and external stability conditions, for all possible coalition structures in steady state, are analyzed in order to find out which coalition structures are most likely to occur, with and without side-payments. This is then compared with what we find in the real world, and political implications are discussed.

Author(s)

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Ecological and Energy Foot Print of Fish Processing in the Southern Coast of Sri Lanka

Part of
Understanding Small-scale and Developing Country Fisheries (3)
03:30 PM - 05:00 PM

Major Theme
Understanding Small-scale and Developing Country Fisheries

Abstract
The fisheries sector faces the challenge of determining effective management, in an ecosystem perspective in order to mitigate the Global Warming Potential (GWP). The main focus of the study was to analyze the resource utilization in the value chain of Maldives fish processing and the environmental performances of the steps involved. The study has attempted to calculate the carbon foot print and the water foot print during the Maldive fish processing. Rapid market chain analysis employed to collect the data. The sample composed of a case study of Kudawella fishing community of the southern coast of Sri Lanka. The estimation methods were based on the guidelines published by the Intergovernmental Panel on Climate Change for the preparation of Greenhouse gas inventory. The study revealed that 5kg of raw fish were required to produce 1kg of Maldives Fish. The waste produced were dumped into the sea. Energy source used for processing was combustion of coconut husks. The requirement per one kg of Maldives fish was 4kg of coconut husks. Thus resulting 4.4MT CO$_2$e per MT of Maldive Fish. The transportation of raw fish from offshores to the point of processing estimated a value of 70.484MT CO$_2$ e/MT of Maldives Fish. The estimated water requirement of processing Maldive fish ranges from 2.5-3 litres/kg of Maldives fish. The study revealed that Diesel was one of the major contributor of Carbon-dioxide in the Maldive fish value chain. Proper Post Harvest Management practices will thereby help to mitigate the GWP.

Keywords: Carbon Foot Print, Maldives Fish, GWP

Author(s)
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Women’s position in blue economy

Part of
Understanding Small-scale and Developing Country Fisheries (2)
01:30 PM - 03:00 PM

Major Theme
Understanding Small-scale and Developing Country Fisheries

Abstract
The fisheries sector is a vital oceanic resource that build the core of the Blue Economy. However the realization of the full potential of the Blue Economy calls the requirement of effective inclusion of all societal groups, especially women whose contribution is not well acknowledged. The study focused to investigate the fisherwomen’s contribution on decision making, participation and governance in production, marketing and investment and to measure the fisherwomen’s share in consumer rupee and also to find out the opportunities for traditional fisherwomen into professional careers. Questionnaires, field observations, participatory mapping, telephone interviews were applied to collect the primary data. The sample composed of 5 case studies of selected fishing communities in Sri Lanka; Kudawella, Gandara, Ambalangoda, Beruwala and Jaffna. The results revealed that the decision making power was concentrated among males. Maldive fish value chain was female dominated but pricing and investment decisions were influenced by the males members of the family. The women’s contribution towards investment decisions was poor. Fisherwomen share in consumer rupee of Maldive fish and Dried Tuna Fish ranged from 3.7- 3.9% and 8.5-10% respectively. The results indicated that the superfluous involvement of intermediaries keeps female-fishers and markets separated and discouraging them to be market responsive. The results further revealed a paradigm shift of women in these fishing communities from traditional fishing activities into recreational activities, tourism and higher education. Gender empowerment interventions on both hard and soft skills development were considered as an essential requirement to exploit the unrivalled opportunities in the blue economy.

Author(s)
Maheshwari Elapata, Sabaragamuwa University of Sri Lanka
Achini De Silva, Sabaragamuwa University
Fishery Reform in the Faroe Islands: Trial Auctions for a Public Resource

Abstract

In this paper, we demonstrate the results of a series of auctions of single-season permits for specific landings of selective stocks in 2016 and 2017 administered by the Ministry of Fisheries of the Faroe Islands. These experimental auctions were a part of an on-going reform of Faroese fishery policy driven by the need to abandon the flawed policy in which ITQs had become political gifts with little or no capture of resource value for the citizens of the Faroe Islands. The Faroese near-shore demersal fishery has been in decline for years and local processor have been unable to acquire fresh product. Processor closings and rural unemployment are serious problems demanding reform of current fishery policy. The experimental auctions show considerable promise in gradually opening up fishing livelihood prospects for new firms. The resource revenue recovered from these five limited auctions covering approximately 120,000 MT of fish—amounts to DKK 60 million (US $9,600) in 2016 and DKK 135 million in 2017 (US$ 21,600).

Author(s)

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NATURAL RESOURCES AND SHARING: THE ROLE OF TRADE

Part of
Rights-based Fishery Management and Co-management (4)
10:30 AM - 12:00 AM

Major Theme
Other Theme

Abstract

Abstract

At the 2016 IIFET meetings in Scotland, we shared our analysis of a model of how food-sharing can, serendipitously, serve as a proxy for fishery management in small coastal communities. We demonstrated how this custom can offset the externality costs of open access and has the potential to yield gains from resource conservation and from trading with neighboring communities. In this paper we extend the analysis to examine conditions in which such gains are likely and, on the other hand, conditions that lead to a different result. Empirical evidence is rather thin but, in this paper, we share what we have been able to find and suggest some "intuitive" explanations for the findings.

Keywords: Renewable Resources; Sharing, Trade and Conservation; Coastal Communities; Survival of Cultures

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Optimal Artisanal Fishery Management Under Imperfect Enforcement

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (7)
03:30 PM - 05:00 PM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract
Poaching is a major problem under the Chilean system of territorial use rights in fisheries (TURFs). Organizations of artisanal fishers that are granted spatial property rights through TURFs combat poaching by establishing their own enforcement. Although an organization must protect its benthic resources against poachers from both within the organization (“insiders”) and outside of the organization (“outsiders”), existing literature has shown that fishers are more concerned about enforcement against outsiders. Organizations know that their enforcement is imperfect - increasing enforcement increases the probability that poachers will be caught but does not guarantee that poachers will be caught. This probability depends on an “effectiveness of enforcement” parameter. With a high effectiveness of enforcement, an organization’s enforcement is more likely to lead to poacher capture. Using an optimal control framework, we analyze how a representative organization maximizes expected profit by choosing its levels of harvest and enforcement, over time. The organization incorporates the poacher’s best-response function, in which a poacher’s decision of how much to illegally harvest is influenced by the organization’s harvest and enforcement levels, the size of the stock, and exogenous parameters. In the case where the organization chooses positive levels of both harvest and enforcement, there are multiple equilibria in the steady state. One equilibrium is associated with a high level of stock while the other is associated with a low level. We show comparative dynamics on key parameters, including the effectiveness of enforcement.

Author(s)
Aaron Enriquez, University of Wyoming
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Economic Outcomes under the West Coast Groundfish Trawl Catch Share Program: Have Goals and Objectives Been Met?

Abstract

Implemented in 2011, the West Coast Groundfish Trawl Catch Share Program was designed to achieve multiple economic goals and objectives for a diverse multispecies fishery, including increasing net benefits, profitability, flexibility, and utilization of harvest allocations. Here, we leverage seven years of comprehensive cost and earnings data to evaluate progress towards these goals, with a focus on harvesters. Our assessment shows that five years post-implementation, net benefits to the nation have doubled, and indicators of productivity and profitability for the two primary fleets have increased. The fleet that targets Pacific whiting has seen the largest gains, due in part to increases in total allowable catch and the elimination of the race-to-fish, distributing landings across the season. However, increased revenues have not been realized to the degree that was expected for harvesters targeting non-whiting groundfish, likely due to lower than predicted consolidation and relatively low quota utilization. Economic outcomes indicate that trade-offs exist between certain objectives of the program, specifically between achieving full utilization and increasing flexibility for harvesters. Results are discussed in the context of the design and evaluation of catch share programs for multispecies fisheries.

Author(s)

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What is the economic value of ecological information in ecosystem-based fisheries management?

Part of
Ecosystem-based Management and Integrated Assessments
11:00 AM - 12:30 PM

Major Theme
Ecosystem-based Management and Integrated Assessments

Abstract

Ecosystem approaches to natural resource management are seen as a way to provide better outcomes for ecosystems and for people, yet the nature and strength of interactions among ecosystem components is usually unknown. Here, we characterize the economic benefits of ecological knowledge through a simple model of fisheries that target a predator (piscivore) and its prey. We solve for the management (harvest) trajectory that maximizes net present value (NPV) for different ecological interactions and initial conditions that represent different levels of exploitation history. Optimal management trajectories generally approached similar harvest levels, but the pathways towards those levels varied considerably by ecological scenario. Application of the wrong harvest trajectory, which would happen if one type of ecological interaction is assumed but in fact another was occurring, generally led to only modest reductions in NPV. However, the risks were not equal across fleets: risks of incurring large losses of NPV and missing management targets were much higher in the fishery targeting piscivores, especially when piscivores were heavily depleted. Our findings suggest that the ecosystem approach might provide the greatest benefits when used to identify system states where management performs poorly with imperfect knowledge of system linkages so that management strategies can be adopted to avoid those states.

Author(s)

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Marissa Baskett
Economic efficiency in the West Coast groundfish trawl fishery: 2009-2016, pre- to post-IFQ management

Part of
Rights-based Fishery Management and Co-management (3)
08:30 AM - 10:00 AM

Major Theme
Rights-based Fishery Management and Co-management

Abstract

We measure economic performance in the West Coast groundfish trawl fishery from 2009-2016. Our data period spans three management regimes: a two-year period of input control regulation (vessel entry and bi-monthly landings limits), the initial two years of an individual fishing quota (IFQ) regulation that placed restrictions on permanent quota trades, followed by four years of IFQ regulation with no quota trading restrictions. Annual variable and fixed cost data for all active vessel operations, collected under a mandatory reporting system, are combined with trip-level landings and revenue records. We estimate a multi-product stochastic cost frontier model that includes a time- and space-varying common efficiency component to control for unobserved (by the researcher) stock abundance. The model is used to evaluate (1) vessel capital shadow prices and investment-divestment incentives, (2) vessel-level economies of size, (3) changes in fishery-wide productivity that likely derive from changing stock conditions, (4) vessel-specific cost efficiency, and (5) rent generation before and after the IFQ regulation was introduced. Results find that average annual rents increased more than 200% when input-controls were replaced by IFQs. Rent gains accompanied exit of redundant capital that had accumulated under the pre-IFQ regulation. Our analysis suggests that further fleet downsizing with additional rent gains are pending after six years of IFQ regulation. These results contribute to the literature on the effects-efficiency gains-of rights-based management reform in fisheries.

Author(s)
Keith Evans, University of Maine
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Modeling the manager: getting catch right to improve integrated climate-fisheries projections

Abstract

In the United States Bering Sea and Aleutian Islands, an ecosystem cap constrains the total allowable catch (TAC) across all species in the fishery management plan to be less than 2 million metric tons. After the allowable biological catch (ABC) is proposed for each species by stock assessment scientists and approved by scientific advisory bodies, the North Pacific Fishery Management Council (Council) then decides how to allocate TAC among the managed species. Frequently, the sum of single-species ABCs exceeds the cap considerably, requiring the Council to reduce the TAC below the ABC for many species. Next, catch rarely is equal to this TAC due to a variety of policy and species-interaction reasons. Being able to predict TAC and catch from the ABC is essential to produce realistic predictions when conducting management strategy evaluations. Naively assuming that catch would equal TAC and ABC would produce very misleading predictions.

We examine and model the historical relationships among species and fleets under the ecosystem cap. We develop a model that enables us to explain and accurately predict both the TAC and catch of each species. These predictions can be incorporated into projection models, including those in the Alaska Climate Integrated Modeling (ACLIM) project. We provide an essential link for integrated model forecasts to make realistic representations of the management and fishing process and, as a result, realistic representations of what the stock will look like under future climate change.

Author(s)

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A CONTEXTUAL ANALYSIS OF SMALL-SCALE FISHERIES GOVERNANCE IN NIGERIA: BUILDING ON CHALLENGES AND OPPORTUNITIES FOR SUSTAINABILITY.

Part of
Understanding Small-scale and Developing Country Fisheries (3)
03:30 PM - 05:00 PM

Major Theme
Understanding Small-scale and Developing Country Fisheries

Abstract
Complex social–ecological systems such as small-scale fisheries require the inclusion of human dimensions in fisheries management and planning for simultaneously preserving human health and habitat health. However, linkages between ecological, social, political and economic subsystems have been largely ignored in conventional fisheries management, in Nigeria in particular. Hence, the weak governance in the fisheries sub-sector in general is marred by intra-sectoral and inter-sectoral conflicts. The Nigerian fishery is predominantly small-scale in nature yet this sub-sector is contributing about 70 percent to the total national domestic fish production. Despite the significant social, economic and cultural impacts, the small-scale fisheries currently lacks enabling conditions and receives the least priority considerations in the developmental process. This paper presents a contextual analysis of historical developments and the current status of small-scale fisheries in Nigeria. In this paper, several analytical approaches were adopted. The research design used an inductive-qualitative approach, based on papers retained for relevance to development themes and cross-cutting issues in small-scale fisheries from an extensive literature search after a scanning and selection process using a four - point criteria. From this analysis, an assessment was made against the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries (VG-SSF) in the Context of Food Security and Poverty Eradication and a framework conceptualized and discussed, based on collective action to improve the organization level and capacity building of fishers, data on capture fish production, integrating ecosystem–based management in addition to gender integration into fisheries policies and decision-making processes for improved fisheries performance and sustainability.

Author(s)
Kafayat Fakoya, Lagos State University
Captured Fish Products' Quality and International Trade in Developing World

Part of
Special Session: Barriers to fisheries markets and trade in the developing world
10:30 AM - 12:00 AM

Abstract
Fisheries products are the world's most widely traded foods. Despite the fact that global demand for fish and fishery products continues to rise every year, fish export from the developing world have faced many limitation from non-conformity with international standards to inadequate product certification. As international fisheries trade grows, governments, industry and fishers face the reality of a complex web of international trade, environmental policy and legal instruments. The objective of this study was to examine current trend in fisheries trade as it relates to product quality. The methodology used involved different approaches including secondary data, interview of processors, regulatory agents to unveil grey areas in quality of fisheries products. Results showed that there are several public/private standards and certifications involved in fisheries. These standards pose export challenges for developing countries who often find it difficult to meet the requirements of certification bodies as a result of steep certification fees, inadequate data, and small-scale business models. Consequently, up to 20 million metric tons of fish annually is either declared unfit for human consumption, destroyed or rejected at international market due to sub-standard quality problems. Furthermore, some countries are now banned from international trade due to non-compliance with international fishing standards. Poor quality practices in fisheries activities and processing contribute to economic loss in fish trade among the stakeholders. Developing countries need to intensify ways to gain credence of quality standards and certification bodies in order to compete better at international trade.

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Can U.S. import regulation reduce IUU fishing and improve production practices in aquaculture?

Part of
Seafood Markets and Trade (3)
01:30 PM - 03:00 PM

Major Theme
Seafood Markets and Trade

Abstract

Illegal, unreported or unregulated (IUU) fishing remains important challenges to the sustainability of a number of fish stocks, including cod, crabs and shrimp. The strongest initiative to combat such practices was recently taken by the U.S. in requiring chain-of-custody documentation of 17 species if they are to be imported to the U.S., showing these species to not be IUU. The fact that the U.S. is the world’s largest seafood importer makes it possible that this will provide incentives to improve management. However, there is a global market for many species, and as improved management is costly, it is not obvious that the incentives will be strong enough to foster any real change on the water. If the U.S. does not have market power, one are likely to observe a change in trade patterns, and costs associated with the documentation being transferred to U.S. consumers. In this paper, a residual supply approach will be used to investigate whether the U.S. has buyer power for the species where the U.S. market is the largest.

Author(s)

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Frank Asche, University of Florida
Walking a Tight Line: Management of a New Arctic Fishery in the Presence of Spatially Differentiated Ecological Economic Externalities

Part of
Special Session: Northern fisheries: Adapting to a changing world
08:30 AM - 10:30 AM

Major Theme
Open Session: Northern fisheries: Adapting to a changing world

Abstract

This paper focuses on bioeconomic modelling of the invasive Red King Crab (RKC) in the Barents Sea. The RKC was introduced into the Barents Sea by Russia for marine cultivation and spread westward to Norwegian waters. We investigate the impact of harvesting management decisions pursued jointly and independently by Russia and Norway. While previous RKC literature models focus on one jurisdiction, we analyze an international setting and account for the management changes that have occurred over time. Historical management of RKC in the Barents by the two nations reflects different output market choices (Russia’s large scale offshore fishing versus Norway’s small scale frozen and live crab fishery) and assumptions about the costs to the benthic ecosystem from the invasion. Since costs of invasion are quantitatively uncertain, the model uses stochastic specification along with ecological parameters from the literature and nonmarket valuation studies. We examine changes in RKC harvest from asymmetric incentives between Russia and Norway for managing the fishery under cooperation and noncooperation that has evolved over time. The asymmetric incentives include a diversified RKC stock supply for Russia away from the Barents, varied harvesting costs, and preferences for ecological amenities between the two countries. We discuss the potential impact of spatial containment of RKC in Norway along with the comparison of noncooperation and cooperation between Russia and Norway. This research sheds light on the economic and ecological tradeoffs faced in rapidly changing Arctic waters and the challenges presented by transboundary resources with differing net benefits to different groups.

Author(s)

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**Competition and Price transmission in the Spanish seafood value chains**

**Part of**  
**Seafood Markets and Trade (2)**  
11:00 AM - 12:30 PM

**Major Theme**  
Seafood Markets and Trade

**Abstract**

This work is part of the SUCCESS project (Work Package 4: Competitiveness and sustainability of European fisheries and Aquaculture sectors) funded by the EC (H2020, GA 635188). The dynamics of the value chain in eight different species at the Spanish market has been studied using price integration methodologies. Cases of market delimitation cover substitution across wild and farmed species and across imports and domestic production of the same species. Price transmission is tested in domestic and international value chains of farmed and wild species. Results from the market delimitation models show high level of differentiation across production systems, however, there is keen competition across domestic production and imports of the same species. On regard price transmission producers are more likely to be able to transfer their costs downstream in the value chain when they operate a differentiated product, concentrate large volumes of supply and participate as exporters in the international markets. Upstream price transmission, in contrast, is more frequent when the harvesting industry is fragmented in companies operating small volumes and the product is not differentiated.

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JOSE LUIS FERNANDEZ SANCHEZ, UNIVERSITY OF CANTABRIA
Market dynamics of the Mediterranean Bass & Bream Industry

Abstract

The market for seabass and seabream is concentrated in the Mediterranean and surrounding countries. Within this area Turkey and Greece are the main producers and exporters. Spain and Italy have also relevant volumes of domestic production, but it is not enough for satisfying the internal demand. Other relevant markets in terms of demand are France, Portugal, the UK and Germany. A simultaneous equation model is used to describe the dynamics of equilibrium in the long term showing significant differences across groups of countries in the factors affecting demand and supply according to the role played in the international market place. Countries can be grouped according to whether they are exporters or importers and the former according to the relevance of the domestic production. Models are consistent within groups. Imports contribute to increase the elasticity of demand in the main consuming countries. This effect benefits consumers who have more products available at cheaper prices. However, it is an inconvenient for the domestic farming industries operating with less or non elastic supply functions. Demand turns from elastic to inelastic as the volumes of imports decrease along countries. On the other side, supply is more elastic in Turkey and Greece where production is mainly driven by exports. The supply and production functions also confirm the high dependence on fish meal and fish oil which results in inefficiencies when the price of the feed increases. This work is part of the MedAID project funded by the European Commission (H2020, G.A. no. 727315).

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Economic Sustainability of Seabass/Seabream Production in the Mediterranean Sea by European Firms

Part of Economics of Aquaculture (6)
03:30 PM - 05:00 PM

Major Theme
Economics of Aquaculture

Abstract

European seabass and gilthead seabream are two economically important cultured fish species along the Mediterranean coast. Both species represent respectively 10.9% and 13.5% of the total value of the European aquaculture sector (Eurostat, 2013). The EU is one of the largest producers of seabass and seabream in the world, being Greece the largest producer within the EU, followed by Spain. However, the Turkish seabass and seabream industry has been steadily increasing production volumes for the last decade to the point where Turkey is now the world’s major producer of seabass, competing with European producers with lower prices (Globefish, 2015). As consequence, during this period of time, European firms have been struggling to maintain profitability of their farms. The main aim of this work, which is part of the MedAID project funded by the EC (H2020, GA727315), is to carry out a break-even analysis (BEA) of seabass/seabream European producers in the Mediterranean Sea. Calculation of break-even point is important for every business because it tells business owners and managers how much sales are needed to cover all fixed as well as variable expenses of the business or the sales volume after which the business will start generating profit. To perform this analysis, we have used an unbalanced panel of data composed of a sample of 16 seabass/seabream producers’ firms in the Mediterranean Sea from 7 European countries (Croatia, Cyprus, France, Greece, Italy, Slovenia, and Spain) during a period of 10 years (2005-2014). Economic data for this analysis was obtained from the Amadeus and Eumofa databases.

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PREMIUM PRICE FOR MSC OCTOPUS (octopus vulgaris): THE CASE OF SMALL PRODUCERS FROM THE ASTURIAN REGION IN SPAIN

Part of
Certification of Fisheries and Aquaculture (2)
10:30 AM - 12:00 AM

Major Theme
Certification of Fisheries and Aquaculture

Abstract

The eco-labelling of fisheries is gaining great international importance as a way to promote sustainable fisheries. On the other hand, environmental sustainability must be compatible with the economic and social sustainability of fishermen and the regions where these activities are developed. Since 2016, the artisanal fleet to fish octopus of Navia-Porcia (Asturias, Spain) is certified, being the first octopus fishery certified by MSC in the world. Western Asturias has an artisanal fleet composed of 27 vessels dedicated to the capture of local octopus (octopus vulgaris) using sustainable practices. Nevertheless, the superior quality and environmental standards of this product have not been recognized by consumers since traditionally wholesalers have sold it without any indication of their origin or sustainability. Thus, the four fishermen guilds representing the fleet of Navia-Porcia fishing ports partnered to explore the possibility of applying for an MSC certification in order to differentiate their product and signal attention to the sustainability of the fishery. The aim of this work, which is part of the SUCCESS project funded by the EC (H2020, GA635188), is to test the existence of premium prices in port auctions for octopus with the MSC eco-label. To carry out this analysis, we employ a panel of prices and quantities of octopus sold in port auctions in the Spanish region of Asturias from 2010 to 2017 in order to analyze the effect that eco-labeling could have on fishermen’ revenues (economic sustainability). We also analyze the importance of eco-labelling in social-economic sustainability of small-scale fisheries.

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LADISLAO LUNA SOTORRIO, UNIVERSITY OF CANTABRIA
What products are most important for determining ex-vessel price? Vertical price transmission in the Pacific cod fishery.

Abstract

The price margin between the first-wholesale and ex-vessel markets levels is an important feature of the supply chain for understanding the distribution of fisheries revenues. The relationship between the ex-vessel price and first-wholesale prices can be complex and the margin between these prices can be influenced by many factors. This research models the transmission of prices of different product forms sold at the first-wholesale market level and ex-vessel prices in the Gulf of Alaska Pacific cod fishery. Results indicate that changes in minimally processed product prices (e.g., head and gut) are more strongly associated with ex-vessel prices than the prices of products which undergo more processing (e.g., fillets). These results suggest that indices or averages constructed for making inference on ex-vessel markets using readily available data, such as export prices, can be improved by weighting or constraining the data to minimally processed products.

Author(s)

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Conflicting Mandates and Overlapping Institutions in Marine Conservation: evaluating the potential of alternative governance structures for salmon in the Pacific Northwest

Abstract

Marine conservation and management approaches that focus on individual species or habitats can result in overlapping and conflicting conservation policy mandates. In the Pacific Northwest (PNW) of the United States, endangered salmon occupy a diverse set of freshwater and saltwater habitats, which support a range of economic, social and cultural interests. Within these habitats, Pacific salmon interact with several other protected species, which like salmon are primarily managed on an individual species basis. Furthermore, while inherent tension exists between salmon harvest and recovery goals, these objectives are mostly governed by individual laws with little coordination between them. This situation has given rise to a complex matrix of overlapping and conflicting directives that guide management of Pacific salmon habitats. We examine the PNW salmon management experience to illustrate how governance conflicts can arise and persist; and to evaluate the potential benefits of implementing alternative governance structures. In particular, we classify governance conflicts based their (lack of) integration across species, sectors, habitats, and jurisdictions. We evaluate how certain socio-political, economic, and biophysical environments produce incentives that foster these conflicting governance structures. We then proposed alternative governance structures that (1) align stakeholder and management incentives and objectives, and (2) include frameworks for evaluating management trade-offs across competing objectives within and across species, economic sectors, and jurisdictional boundaries. We conclude by evaluating the potential for more holistic governance structures to increase management efficiency and improve conservation outcomes.

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Evaluating Adaptation Scenarios for Fishing Communities Facing Climate-Driven Species Changes

Part of
Special Session: Economic & social impacts of climate change on fisheries and aquaculture (2)
11:00 AM - 12:30 PM

Major Theme
Open Session: Economic & social impacts of climate change on fisheries and aquaculture

Abstract

Climate projections indicate that ocean temperatures will continue increasing, potentially shifting the distribution of marine fish species and affecting the economics of the fishing industry and fishing communities. In this study, an integrated ecological-economic framework is used to evaluate the economic impacts of climate-driven species changes and assesses the value of specific adaptation strategies available to fishermen. A quantitative species distribution model coupled with qualitative expert vulnerability assessment ratings is used to project relative changes in the presence of over 50 commercially important fish species out to 2050 based on ocean temperatures projected by the CMIP5 ensemble of climate models (RCP 8.5 scenario). The results are used to estimate changes in species catchability, which are used as inputs to a port-specific economic optimization model. The optimization model assumes profit-maximizing behavior by the commercial fishing fleet at each port and adjusts the effort level of fishing activities—defined by the combination of gear used, vessel size, and species targeted—to changes in catchability. Future adaptation scenarios are elucidated through interviews and focus groups with fishermen and municipal leaders in diverse New England ports. The economic model is then used to assess how adaptation scenarios can buffer climate-related impacts and to evaluate the relative value of different adaptation options, such as switching gear types, species targeted, and fishing area. We also consider specific policy changes that may be required to facilitate adaptation and measure the potential benefits of such changes.

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Dynamic Adjustment Paths in Predator-Prey Models

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (3)
03:30 PM - 05:00 PM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract

Abstract: In this paper we discuss dynamic adjustment paths towards economic optimal steady-state equilibrium in a fishery where two species interact through a traditional predator-prey relation. We set-up a general bio-economic predator-prey model based on the assumption that fishing effort is a public input applied when exploiting the fish stocks. By using specific functional forms, hypothetical parameter values and fictive starting values the general model is simulated. We show that the optimal adjustment paths can be characterized as stable-arms where a small derivation from the optimal path can lead to extinction of one or both stocks (or no fishing effort at all). The stability of the stable arms is very sensitive to the parameter values of the model, e.g. the starting value for fishing effort and the predator rate. One policy implication of these results is that traditional bio-economic predator-prey models may generate results with low practical policy relevance. However, if the models are extended to incorporate more realistically assumptions regarding economic behaviour this conclusion might change.

Author(s)

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Economic repercussions of a landing obligation policy: The European Union case

Abstract

Discard of fish is recognized as a potential economic waste and there is an increasing political focus on ways to reduce discard. As a response to the public criticism of discard in the EU fisheries, The European Union introduced a complete landing obligation (full retention) of all species subject to quota management rolled out from 2015-2019. The landing obligation applies to all fisheries irrespective of management systems. Presently, research projects commissioned by EU study the effects including economic repercussions of the discard ban and the results are used to formulate mitigation strategies. Based on a review of the knowledge base of the economic and social aspects of discarding, an evaluation system has been developed and applied. The system takes into account that profit is a main driver for the fishers’ behavior. The selected models are applied to several case studies. Preliminary results show that although short term economic losses occur, long run economic repercussions are relatively small. Management strategies are important. TACs and individual quotas reduce discard but at a high economic loss, while ITQ reduces discard to a lesser extent and the reduction in profit to the fishery is almost negligible.

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Global Fishery Performance

Abstract

In recent decades, there has been considerable effort to examine the circumstances under which fisheries are successfully managed. Recognizing that not only fish stocks, but also fleets and societies are influenced by how the fishery is performing, there has been increasing focus on sustainable economics and social well-being in addition to environmental conservation. While most evaluations have focused on the intended effects of a specific policy or in an individual fishery, global evaluation of conditions leading to fishery success along the triple bottom line is highly instructive for meaningful governance and investment. In this paper, we use a unique dataset of over 120 case studies collected using the Fishery Performance Indicators to identify policies and enabling conditions leading to environmental, economic and social success. The analysis shows that a mix of factors is needed to attain the triple bottom line of sustainability. Factors important for maintaining healthy fish stocks, such as stock assessment and output harvest controls, are less important in determining economic and social performance. Privatization of fisheries and infrastructure are noticeably more important for improving efficiency and maximizing profits, and leadership is a critical component for well-functioning fishing communities.

Author(s)

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Costs and revenues of main commercial fisheries of SE Brazil: factors affecting profitability among different fleets from Angra dos Reis to Itajaí.

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (3)
03:30 PM - 05:00 PM

Major Theme
Understanding Small-scale and Developing Country Fisheries

Abstract

In Brazil, there is a lack of information on fisheries activities from an economic point of view, with negative consequences to understanding the costs and the viability of current fisheries and for a consistent policy debate on the sector's reform. Here, a detailed financial performance was assessed for 13 different fleets, and the key factors affecting fishing costs and profitability were identified. Through an unprecedented set of field survey data from 160 fishing vessels obtained during 2013-2014, we provide a cost-benefit comparison between different fleets and landing sites. Three GAMLSS models were explored to identify major factors affecting profit and cost. Fuel consumption, vessel maintenance expenses, fish price, and volume of catch were the most statistically significant factors explaining profit margin. For trawlers and purse-seiners, technical features such as vessel size and number of fishing trips explained profitability, respectively, while the landing cost were significant to both types of fleet. Large pelagic fisheries showed the highest profit, while shrimp-trawlers, bottom-gillnetters and a purse-seining fleet showed the lowest, almost close to unviability. Cost-benefit analysis resulted critical to evidence and promote measures to increase fleet's efficiency.

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Determining vulnerability of coastal villages using SEVI: Socio-economic sensitivity and adaptive capacity of Ganjam villages, Odisha, India

Part of
Management Challenges of a Changing Environment (1)
02:00 PM - 03:30 PM

Major Theme
Management Challenges of a Changing Environment

Abstract

Impacts of climate change are of particular concern to coastal regions of tropical countries like India. This study uses a novel and scalable multi-criteria Socio-economic Vulnerability Index (SEVI) with more reliable Census data for determining socio-economic sensitivity (SI) and adaptive capacity (ACI) of villages and blocks in coastal Ganjam district of Odisha province. SEVI values revealed 14% of 528 villages being ‘highly vulnerable’ that are located mostly in Khalikote, Chikiti and Ganjam blocks. A graphical 2D decision matrix providing a snapshot of vulnerability status of villages based on sensitivity and adaptive capacity was developed to aid decision makers. Drivers - key indicators responsible for high sensitivity & low adaptive capacity - were higher proportion of small farm(er)s, less extent of net sown area, and greater distance to nearest town and hospital. Higher literacy status, good community infrastructure and stabilization of population growth acted as buffers - key indicators responsible for low sensitivity and high adaptive capacity in many villages. The SEVI framework allows us to plan location specific criteria-based mitigation strategies and development interventions at village and sub-district levels while also allowing to apply the method across the villages of the entire coastal India and over time.

Keywords: Climate change, Vulnerability, Sensitivity, Adaptive Capacity, Social, Economic

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Exploring Demand for Recreational Billfish Trips and Willingness to Pay for Billfish Conservation in the Caribbean

Part of
Economics of Recreational Fisheries and Tourism (3)
03:30 PM - 05:00 PM

Major Theme
Economics of Recreational Fisheries and Tourism

Abstract

The success of reducing billfish harvest in the Caribbean depends on finding a Coasian solution to the problem of commercial billfish bycatch and targeted catch. That means those that benefit from increased billfish stocks will have to compensate those that lose revenue by forgoing billfish harvest. Currently, billfish is typically not the preferred commercial target bringing low prices and taking up valuable hold space. It is very likely that recreational willingness to pay (WTP) for billfish exceeds commercial profits for landing them. The Caribbean Billfish Project (CBP), recognizing the need for more information on recreational billfish demand and the determinants of demand in the Caribbean, initiated an internet based survey of billfish anglers in the Caribbean. The survey assessed the potential benefit of increasing billfish conservation to recreational anglers and whether or not those anglers would be WTP to increase billfish stocks improving the quality of their recreational billfish experience. The study utilized a sample of convenience from the International Game Fish Association membership lists, various tournaments in the region and solicitations in the billfish press. Several survey methodological questions were explored including innovations in the contingent valuation question used and in survey contact modalities. In addition to the demand questions, the survey collected trip expenditure information and attitudes and opinions regarding various developments in the Caribbean, such as the increase in anchored fish attracting devices, and various strategies proposed by the CBP to conserve billfish.

Author(s)

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Fishery Performance Indicators (FPIs) for Recreational Fisheries

Part of
Economics of Recreational Fisheries and Tourism (2)
01:30 PM - 03:00 PM

Major Theme
Economics of Recreational Fisheries and Tourism

Abstract
Under the Global Environmental Facility, the overarching framework for the Caribbean Billfish Project (CBP), fishery science experts have developed a tool, the FPIs, to rapidly assess the generation of ecological, economic and community wealth from commercial fisheries, and to identify the management structures, governance methods, and regulatory instruments that promote successful wealth generation. This tool has been used to profile over 100 commercial fisheries across the world. Recently, recreational FPIs were developed by the same group of researchers with development and piloting help from additional recreational fisheries experts. The FPIs include 90 measures to assess wealth accumulation on 11 dimensions of stock, harvest industry performance, and support industry performance; and 64 measures of enabling factors—including management and governance—to associate with variation in wealth outcomes. Each measure is scored on a one-to-five scale using data where possible, but relying primarily on informal discussion with fishery participants that are then scored by a fisheries expert. This feature makes it particularly well suited to applications in data-poor countries and for quick response times. The recreational FPI test cases covered billfish fisheries in Costa Rica and Cabo San Lucas, and the lessons learned in the test cases were applied to the two CBP pilot countries of Grenada and the Dominican Republic. This presentation will briefly introduce the methodology and detail the preliminary results developed in the recreational FPI application in the Caribbean.

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Innovations in Governance Reform of Highly Migratory and Transboundary Fisheries at the Local And Regional Scales: Key Highlights and Recommendations

Part of
Special Session: Incentive based tools for highly migratory and transboundary fisheries
03:30 PM - 05:00 PM

Major Theme
Closed Session: Incentive based tools for highly migratory and transboundary fisheries

Abstract
The World Bank’s Global Environmental Facility’s empanelled the Global Think Tank (GloTT) to examine the use of incentive compatible management (ICM) in Area Beyond National Jurisdiction (ABNJ) fisheries. This presentation summarizes the conclusions project that compiled examples of the use of ICM principles in ABNJ fisheries management. This larger effort focused on the incentive compatible activities that are being planned, underway or are completed in ABNJ fisheries across the globe. The focus of this summary was on the pre-implementation, implementation, design and performance, where available, of these ICM tools. An outgrowth of this larger effort was the development of an overarching framework that describes the universe of ICM tools. This framework will be discussed in light of how these tools can be applied in the real world where the perfect, first best conditions are rarely met. The presentation concludes by drawing broad conclusions on the pre-implementation and implementation successes so that they can inform the future movement toward the use of incentive compatible interventions in transboundary fisheries to enhance triple bottom line outcomes. The practical policy advice resulting from this review of ICM in practice was binned into categories that include; motivation and cohesion, definitions, livelihoods, equity and fairness, side payments, markets and nudging, graduality, enabling conditions and non-governmental organization roles in the ICM process, and it is this practical advice that will be the focus of this presentation.

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A social-ecological approach to understanding the benefits of MPA networks

Part of
Spatial Management and Marine Protected Areas
03:30 PM - 05:00 PM

Major Theme
Spatial Management and Marine Protected Areas

Abstract
Achieving triple bottom line goals is at the forefront of marine protected areas (MPA) science and policy. Yet, robust MPA network designs require a better understanding of the types of benefits potentially produced by the network, and the factors or conditions that enable their realization. Identifying, classifying, and valuing MPA benefits can improve management and planning processes, especially in the context where trade-offs between protected area designations and fisheries are possible. An early understanding of the ecological, economic and socio-cultural benefits of MPAs can enhance the support of resource users and local communities, a condition for the long-term acceptability and success of the network. However, MPA benefits are yet poorly understood and the inclusion of potential benefits as an input in MPA network planning processes is lacking. Particularly, little attention has been given to non-material benefits such as social, cultural, and institutional. Drawing on recent advances in ecosystem services and social-ecological research we developed a framework to identify and analyze potential benefits derived from the creation of MPA networks and how they link to human well-being. This approach broadens the portfolio of benefits that could be used in MPA network planning and effectiveness assessments, especially by the inclusion of poorly considered cultural and other intangible values. A review of the tools that can be used to value benefits is also presented.

Author(s)
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Beyond Size: Identifying the 'small-scaleness' of a fishery

Part of
Understanding Small-scale and Developing Country Fisheries (2)
01:30 PM - 03:00 PM

Major Theme
Understanding Small-scale and Developing Country Fisheries

Abstract

The work being presented aims to fill a gap in small-scale fisheries research by presenting a framework for identifying the ‘small-scaleness’ of a fishery. Small-scale fisheries have been estimated to contribute up to 30% of the global landed value, which is caught by approximately 22 million fishers. The global socio-economic contribution of small-scale fisheries can be attributed to those in developing and developed countries. Small-scale fisheries provide a variety of values at local, regional and international scales but, these fisheries are often challenging to identify and manage. Often vessel size is a singular determinant of small- and large-scale fisheries. However, there are a number of other socio-economic features presented in the literature which are relevant for determining the scale of a fishery. The presented framework uses a list of re-occurring features of small-scale fisheries curated from the literature to capture physical, economic and social features of small-scale fisheries. The presence or absence of these features help to determine the ‘small-scaleness’ of a fishery therefore, the more features present in a fishery, the smaller-scale it is. The framework allows any fishery to be analysed, including data-poor fisheries commonly found in developing nations. Results from this framework can be used to assist small-scale fisheries policy as it helps to identify important features while providing a relative spectrum of ‘smallness’ across select fisheries.

Author(s)

Darah Gibson, University of British Columbia
Remittances and Coastal Fishing in a Developing Country

Abstract

Remittances to developing countries total over $430 billion annually according to the World Bank. The enormous growth in these transfers has garnered hundreds of studies by development economists, but almost none investigating the impact on coastal fisheries. How does the flow of remittances impact fishing effort and fisheries management? How does access to foreign labor markets affect the coastal household’s labor allocation? Can changes in banking policies that affect remittance transaction costs have unintended consequences for small-scale fisheries? We develop a dynamic model of the labor allocation decision of a coastal fishing household with remittance receipts as part of the budget, as a first attempt to describe and quantify their importance for coastal fisheries. Several key insights arise. If remittances are an exogenous component of income, they do not affect the steady state, but they do increase the speed of adjustment to steady state and the intertemporal elasticity of substitution. The stability of the steady state depends on whether households can afford their subsistence constraint through remittances and local non-fishing labor markets alone, and whether they have a saving mechanism. If remittances are endogenously determined through labor allocation decisions between fishing and foreign markets, then migrant wages do affect the steady state in a way that depends on both household bargaining and the substitutability of family fishing labor with other fishing inputs. We investigate these predictions with an empirical application to the Malaysian gillnet fishery, and discuss policy implications by comparing broader remittance policies to more traditional fisheries management policies.

Author(s)

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Decision making in a mixed commercial-recreational fishery for Atlantic bluefin tuna

Part of
Special Session: Different approaches and priorities for modeling fisher behavior (1)
08:30 AM - 10:30 AM

Major Theme
Open Session: Different approaches and priorities for modeling fisher behavior

Abstract

Stated choice random utility frameworks are a valuable tool for eliciting the preferences of fishermen. In typical applications, choice outcomes are known prior to choice selection, which may confound results when outcomes are uncertain. To evaluate the importance of uncertainty in decision making, we applied a contingent sequential stated choice survey to bluefin tuna fishermen off the U.S. east coast who possess a permit allowing them to fish either commercially or recreationally on a trip-by-trip basis. Given the fishery’s complex size- and sector-specific quota structure, understanding how fishermen utilize this unique permit’s flexibility is needed to reduce management uncertainty and maintain equity within and among sectors. Respondents completed an online survey that included fishing trip choice scenarios in which they were asked to make multiple sequential choices regarding fish disposition, with the recognition that each decision might impact future choice sets on that trip. A random parameters logit model with correlated random parameters was used to identify key factors governing disposition decisions, evaluate the impact of inertia (habit formation) versus opportunism, and examine preference heterogeneity. Respondents who indicated that they primarily fished commercially were more likely to exhibit inertia than primarily recreational anglers, while fishermen were significantly more likely to harvest opportunistically in some regions than in others. Furthermore, the model suggests that disposition probabilities for fish of a given size could vary by more than 60% depending on exogenous fishery and regulatory factors. Findings can be used to predict future harvest patterns and maintain landings within internationally prescribed limits.

Author(s)

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A Short-run Forecasting Model for The Price of Lobster

Part of
Seafood Markets and Trade (5)
10:30 AM - 12:00 AM

Major Theme
Seafood Markets and Trade

Abstract
Since the collapse of the groundfish fishery in Canada, crustaceans have developed into important fisheries. As prices play the important role in setting income and welfare levels of fishermen, there is policy interest in having good forecasts of the price of lobster. In this paper, Pesaran’s autoregressive distributed lag/error-correction Bounds model estimates a short-run reduced form inverse demand curve for Canadian lobster. The advantage of the Pesaran model is that it is valid regardless of the stationary/probability properties of the variables in question (i.e., ~I(1), ~I(0), or fractionally integrated) and allows the short-run model to encompass long-run equilibrium constraints and provides an estimate of the speed of adjustment to regain the equilibrium from short-run shocks. The possibility of endogeneity in Canadian landings is tested. This issue arises because lobster regulations impose restrictions on inputs; limits on number of traps and closures, but landings are a choice variable to fishermen. Boswijk and Urbain (1997) suggest a modified application of the Hausman test to test weak exogeneity. The empirical work uses monthly observations for the period 1990(1)-2015(12). The estimated ARDL/EC price model preforms well under statistical evaluation, in forecasting out-of-sample prices, in capturing seasonal effects, trends and turning points in ex-vessel prices. A number of price forecasting scenarios focus on changes in Canadian landings, shocks to the exchange rate and climate changes impacting U.S. landings. Forecasting results show the real price of Canadian lobster declining through to the end of the decade, except where climate change forces a decrease in U.S. landings.

Author(s)
Daniel Gordon, University of Calgary
Profit and Price Effects in a Rights Based Regime by Nils-Arne Ekerhovd and Daniel V. Gordon

Part of
Rights-based Fishery Management and Co-management (3)
08:30 AM - 10:00 AM

Major Theme
Rights-based Fishery Management and Co-management

Abstract

Regulators in many countries have adopted quotas as a means of dealing with the open access problem inherent in fisheries. Unit quotas for the Norwegian purse seine fleet were introduced in 1996 but consolidation of licenses has been in place since 1978. The current Norwegian regulatory system does allow for some transferability of quota. The purpose of this paper is to employ an index approach to investigate the result of changes in regulatory quota policy by decomposing vessel profitability by prices, productivity, vessel size and stock levels. The index decomposition approach was introduced by Fox et al. (2003) based on the Törnqvist (1936) index. The index can be defined over different structures of the fleet and different time periods to measure the impact of regulatory changes on the individual factors generating profit. The study uses a large individual vessel data set for the period 1994-2013. The data set provides detailed descriptions of revenues, harvests, costs, inputs and vessel characteristics. In addition, the sale of vessels and quota can be tracked over the period allowing a measure of the impact of regulatory change on consolidation of vessels and changes in capital structure overtime. This index approach, although not causal in the sense of Dickert and Schweder (2015), can measure the importance of individual output prices, factor prices, vessel structure, ownership, and stocks changes impacting profitably. Results suggest that changes in regulatory quota policy impacting the purse seine fleet has increased profitability, reduced the number of vessels and greatly increased vessel size.

Author(s)

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Direct impacts of marine species on human activities in a changing world - scientific and stakeholders perceptions

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (2)
01:30 PM - 03:00 PM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract

While the multiple impacts of human activities on marine ecosystems in the broad context of climate change are the subject of intense research, the reverse interactions - in particular how marine species (from plankton, fishes, crustaceans and shellfish to marine mammals and seabirds) might negatively impact human activities such as fisheries and aquaculture - appear much less evaluated. This limits our capacity to assess the potential impacts of changes in the structure of marine communities. The perceptions in this regard do vary, across sectors of activity as well as across latitudes and cultures, and this in turn will affect the ways in which resulting problems such as damaged fishing gears, decreasing value and quantity of catches or farmed species, increasing operating cost in fishing operations, or impaired health of targeted species will be managed. In April 2018, an international workshop organised by the Mediterranean Science Commission (CIESM), brought together biologists, economists and social scientists to discuss various perceptions of such problems, how to estimate the associated impacts, and to explore cases where stakeholders were jointly involved with scientists in their management. A special effort was made to compare current practices/ success stories/ failures derived from the Mediterranean experience with those from more distant shores. This paper presents the main points and conclusions reached during the workshop, with emphasis on the impacts of (i) invasive species on the composition and quality of fisheries landings; (ii) jellyfish blooms on fisheries and aquaculture; and (iii) marine mammals’ depredation on fisheries.

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Eliciting scientific and stakeholder representations of a marine socio-ecosystem: participatory modeling of shellfish farming in the Normand-Breton Gulf, France

Part of
Special Session: Modelling social-ecological systems
03:30 PM - 05:00 PM

Major Theme
Open Session: Modelling social-ecological systems

Abstract

Qualitative modeling of system feedback (Puccia and Levins’ “loop analysis”) is well suited in data-poor situations to holistically represent the complexity of socio-ecosystems based on participatory stakeholders involvement, and to assess system stability and its responses to long-term perturbations.

This paper presents the results of a qualitative modeling experiment that involved an interdisciplinary team across natural sciences, social sciences, and modeling. The experiment focused on the analysis of the sustainability of a socio-ecosystem specialized in shellfish farming in the Normand-Breton gulf, France. A primary objective was to involve stakeholders into the participatory development of qualitative models of the structure and functioning of the regional aquaculture systems. Six area-specific workshops were held independently with different focus groups, namely administration representatives, shellfish farmers and civil organizations to elicit key components, interactions and pressures viewed as significant to socio-ecological dynamics.

First, we identify differences and commonalities in system perceptions across areas and stakeholder groups. Despite discrepancies between focus groups, we successfully derive a common representation that reconciles all alternative views of the system; second, we predict system responses to alternative scenarios with a focus on prediction consistencies across alternative models. Overall, the participatory qualitative modelling exercise identifies key drivers of the system that has not received much attention from past research and/or management. For instance, the lack of social license appears as a major constraint limiting the potential for shellfish farming to expand in the region.

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Welfare economics and wicked problems in wet environments

Part of
Fishery Governance, Policy and Management (2)
01:30 PM - 03:00 PM

Major Theme
Fishery Governance, Policy and Management

Abstract

Fisheries and coastal governance has been characterised as ‘wicked’ problems: unlike ‘engineering’ problems, they lack a clear definition, relevant variables are deeply uncertain, and stakeholders have different and conflicting beliefs and values. Welfare economics ‘tames’ wicked problems by making a variety of positive and normative assumptions that have enabled quantitative normative statements. This paper compares the two paradigms in relation to fisheries and coastal governance.

Regarding the problem definition, welfare economics takes a consequentialist approach, assuming that the problem definition is settled before solutions are discussed. Examples in fisheries policy abound, however, where the distinction between problems and solutions are less clear-cut.

Approaches to deal with risk and uncertainty abound in the economics literature, but ‘deep’ forms of uncertainty are common where the set of relevant variables and/or their probability distribution is unknown, e.g. on the impact of new fishing technologies or exploitation of hitherto unexploited areas such as the mesopelagic zone.

Welfare-economic analysis necessarily assumes consensus on facts and values (although not necessarily preferences). Facts, however, are often disputed, for example the effects of pulse trawling on the ecosystem, or the extent of overfishing; moreover, fisheries policy and coastal governance may also involve ‘sacred’ values such as fairness, respect for nature, and safety.

These observations call for better decision-making procedures under ‘deep’ uncertainty, a better understanding of such issues as belief formation and ‘taboo’ trade-offs between secular and sacred values, especially from a psychological and sociological perspective, and a better understanding of the role that welfare-economic analysis can and should play in interactive, adaptable governance procedures.

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CO-MANAGEMENT AND COOPERATIVE SELF-ENFORCEMENT

Part of
Special Session: Game theory and fisheries mgmt.
03:30 PM - 05:00 PM

Major Theme
Open Session: Game theory and fisheries mgmt.

Abstract

The paper focuses on the combination of the cooperative fisheries management with the non-cooperative literature. It has important modeling contributions by creating a new framework on co-management. The structure of the model is repeated coalition game with the possibility to deviate combined with introduction of a variation of a club good model. The club good is defined as an information flow in the coalition implying acting as a singleton is costlier compared to joint production. This model provides a more optimistic view of coalition formation than is traditionally seen. The model can explain the real-world cases of strong fishing community cooperation arising even with a large set of players.

Author(s)

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Processor-allocated quota in IFQ programs – An analysis of the shoreside Pacific whitefish fishery

Part of
Rights-based Fishery Management and Co-management (2)
04:00 PM - 05:30 PM

Major Theme
Rights-based Fishery Management and Co-management

Abstract

Catch shares aim to increase net economic benefits in fisheries and resulting rents are distributed across diverse participants within and across the harvest and post-harvest sectors. Potential impacts of catch shares such as consolidation and shifts in bargaining power may benefit some participants while disadvantaging others. The initial allocation of property rights for catch share programs can be important for the eventual distribution of rents and for mitigating negative impacts against certain groups and several catch share programs have specifically granted property rights to fish processors to ameliorate expected losses in processor rents. One such program, the West Coast Groundfish Trawl Catch Share Program, allocated 20% of the Pacific whitefish harvesting quota to the processing sector. In this study, we develop a firm-level theoretical model supported by empirical analysis of how processors utilize their harvesting quota allocation. We pair quota transactions with fish ticket and cost-earnings data and find that, rather than selling quota directly, processors use quota to secure market share by offering quota as a percentage of landings to delivering vessels. The proportion of quota offered varies across vessel-processor relationships, allowing us to explore which characteristics of this relationship most influence quota transfer decisions. This study enhances understanding of the effects that catch share programs have for shoreside processors, which is increasingly important given the formal inclusion of the processing sector in the allocation of property rights for recent programs.

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Assessment of Gendered Value chains of small scale tuna fishery in Mainland Tanzania

Part of
Managing Small-scale and Developing Country Fisheries (3)
08:30 AM - 10:00 AM

Major Theme
Managing Small-scale and Developing Country Fisheries

Abstract

Fishing has long been considered a male occupation as women were thought to be involved only in post-harvest activities. However, there is a growing recognition of women's contribution in fisheries in all segments within the value chains. Despite women being back borne in the small-scale fisheries sectors of many communities, customary beliefs, norms and laws and existing regulatory structures reduce women's access rights to fisheries resources, assets and decision-making, confining them to the lowest segments of supply chains.

African women play a leading role in artisanal fisheries in fish trade, processing and marketing of fishery products. However in the artisanal tuna fisheries in Tanzania the situation is different. The study is examining gender dimensions within artisanal tuna fishery value chains in Mainland Tanzania by looking at the position, contribution and roles of both men and women in artisanal tuna fisheries.

The preliminary findings shows that, majority of fishers acknowledge that tuna species form an important source of their income rather than food due to its premium prices. However, women livelihood in this industry has remained poor facing challenges that increase their vulnerability. This is clearly seen in their low economic status, poor resource ownership and control; inadequate participation in household and community decision-making and inability to access resources and social services leaving them poor in access to better lives in terms of good health, feeding, housing and adequate income. The situation is calling for empowerment program that will strengthen the position of women towards tuna resources.

Author(s)
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Theorizing Gender in the Fisheries: Thoughts on a Method for Analysis

Part of
Special Session: Bringing Gender Discourse in Fisheries Economics and Trade (1)
02:00 PM - 03:30 PM

Major Theme
Open Session: Bringing Gender Discourse in Fisheries Economics and Trade

Abstract
Since the mid-1990s, research on women and gender in fisheries and aquaculture has expanded exponentially. Global conferences dedicated to gender in fisheries and aquaculture have increased in frequency since the first Global Symposium on Gender in Fisheries was held in 2004. While a considerable amount of research has made visible the multiple ways women’s labor contributes to fish economies around the world, relatively fewer studies have sought to theorize gender and gender relations within the fisheries and aquaculture in a rigorous way. Also, many of the insights gained from the research that has been conducted to date remains peripheral to fisheries science and policy. Although some progress has been made, much room remains for the development of a theory of gender within the fisheries sector as well as methodological tools for robust analysis. In what ways might insights from gender studies inform economic analysis within the fisheries? What methodological tools are needed to mainstream consideration of gender within fisheries research? Drawing on feminist commodity chain research, my own research on gender and fisheries development in India, and research conducted by others on different fisheries around the world, this paper seeks to delineate a framework for advancing gendered analysis within the study of fish economies. Particular emphasis is placed on understanding the intersections between economy and culture at multiple geographic scales, and the way particular gender ideologies emerge in the changing social, economic, political, and legal contexts in which local fisheries are rooted.

Author(s)
Holly Hapke, East Carolina University
Vulnerability, Resilience and Coping Strategies of Coastal Hilsa Fishing Communities in the Riverine system: An Empirical Evidence of Small Scale Fisheries in Bangladesh

Part of
Managing Small-scale and Developing Country Fisheries (1)
02:00 PM - 03:30 PM

Major Theme
Managing Small-scale and Developing Country Fisheries

Abstract
Bangladesh ranks fourth globally in inland fisheries production, with vast potential that has not been fully explored through sustainable resource management. Over the last two decades, the Government of Bangladesh, supported by WorldFish has taken initiatives and declared specific river areas as sanctuaries where fishing activities are restricted for a certain period of time each year to enhance Hilsa production and improve the fishers’ livelihood. This paper presents a descriptive analysis of data collected in 2016 from 1200 fishing households living in sanctuary (n=450) and outside sanctuary (n=750) areas in six districts. Propensity score matching (PSM) was applied to estimate the impact of the program on household income, food security, livelihood vulnerability to shocks, and resilience capacity. The results indicate that household income from river fishing at BDT 89,541/year is considerably higher within sanctuaries than outside sanctuaries (BDT 69,306/year). However, livelihood vulnerability and shock exposure were also found to be significantly higher (p<0.05) but a significant difference (p

Author(s)
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Contributions by women in marine capture fisheries to the global economy

Part of
Special Session: Bringing Gender Discourse in Fisheries Economics and Trade (2)
04:00 PM - 05:30 PM

Major Theme
Open Session: Bringing Gender Discourse in Fisheries Economics and Trade

Abstract
Women have largely been overlooked in fisheries accounting with major implications on the overall valuation of fisheries to the global economy, and, even more profoundly, undervaluing the substantial contributions by women to fisheries economies around the world by way of food and livelihood security. While recognition of the important roles and contributions by women in fisheries is on the rise, with an increasing body of literature on the topic, including attention on the economic involvement of women in fisheries, few studies have taken a broad global approach to assessing the economic contributions by women. We argue that sex-disaggregated fisheries economic data is necessary to raise the profile of women in fisheries around the world and to push for the widespread inclusion of women and gender in fisheries program and policy development at every level. Here we present the results from efforts to build a global database of the contributions by women to the fisheries-related economy. We include estimates of female participation in fishing and related activities for all maritime fishing countries of the world and the value associated with these contributions. Estimates are based on an extensive review of existing data at the national level, consultation with local experts to verify estimates, and use of econometric techniques to fill gaps. While the estimates carry considerable uncertainty due to the limited availability and quality of data sources, this is an important step in broadening the scope of fisheries economics to include the overlooked and undervalued contributions by women.

Author(s)
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Daniel Pauly, University of British Columbia
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Marina Adshade, Vancouver School of Economics
Potential economic impacts of shifting distributions and abundance of commercially valuable species along the west coast of the US

Part of
Special Session: Economic & social impacts of climate change on fisheries and aquaculture (2)
11:00 AM - 12:30 PM

Major Theme
Open Session: Economic & social impacts of climate change on fisheries and aquaculture

Abstract
Climate change is impacting marine ecosystems. Already, changes in species phenology, abundance, and survival have been observed with even greater changes projected. Although the ecological impacts, including localized extinction and immigration, have been widely studied, the economic impacts of climate change have received relatively limited attention. That climate change will have economic consequences is acknowledged, but the economic costs and potential impact on management have yet to be quantified. This talk will utilize observed and projected distribution shifts for species managed under the West Coast Trawl Catch Share Program to discuss various economic impacts in relation to anticipated distributional changes.

Author(s)
Melanie Harsch
Can a Buyback Program Actually Succeed? The case for a buyback in the Eastern Pacific purse seine tuna fishery

Part of
Governance and Management of High Seas and Straddling Stock Fisheries
01:30 PM - 03:00 PM

Major Theme
Governance and Management of High Seas and Straddling Stock Fisheries

Abstract

While buybacks don’t have the cache of rights-based programs they are often pre-cursors to longer-term management solutions. The authors assess a proposed buyback program in Eastern Pacific (EPO) purse seine fishery that has the potential to increase post-buyback profitability, and which could also provide the means to alleviate long-standing internecine struggles among members of the Inter-American Tropical Tuna Commission. The IATTC, which determines fishery policy, and which operates on a consensus basis among members (CPCs), is often hand-cuffed by CPC threats to hold deliberations hostage with claims for additional capacity. Closure periods (CPs), the primary tool by which the fishery is managed, increased in 2018 from 62 days to 72 days. Industry experts and manager believe that capacity in the fishery is at least 165 percent of optimal levels. As technology improves, and as financial pressures on vessel owners to increase effort intensify, reductions in capacity are seen by many as the only viable way forward, within the current regulatory and political environment. In order to reduce or eliminate CPs, a buyback program to reduce capacity has been proposed. A natural precursor to moving the proposed buyback program forward is a fishery-wide binding agreement among managers, CPCs, and vessel owners, that lays down the ground-rules for the post-buyback era. Such an agreement is seen as a necessary condition for procuring financing for the buyback program, which could cost as much as $300 million. In this assessment the analysts demonstrate the potential benefits of the buyback, and also propose an

Author(s)

Marcus Hartley, Northern Economics
Using Negative Binomial Models to Estimate Future Fishery Interactions with Endangered Species

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (8)
08:30 AM - 10:00 AM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract
As fisheries management is increasingly required to consider the full impacts of their operations, this work seeks to define the relationship between fishing effort and interactions with listed endangered species.

The study employs logbook data containing over 64,000 sets, matched with observer data from 2008 to 2015 in an undisclosed purse seine tuna fishery. Specifically, we estimate a series of family specific, negative binomial models to account for over-dispersed outcomes, while controlling for factors such as the use of fish-aggregating devises, set location, proximate coastline, season, and water temperature. The study results show statistically significant relationships between observed interactions with endangered species and fishing effort, as well as with other independent variables. The results of the study suggest that the approach can be used to assess the probabilities of relatively rare interactions between fisheries and endangered species, or with other species of particular concern.

Author(s)
Marcus Hartley, Northern Economics
Logan Blair, Northern Economics, Inc.
Quota prices, discarding and rents in a multispecies fishery

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (5)
11:00 AM - 12:30 PM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract
Based on a simple model of firm profit maximisation in a multispecies ITQ fishery, market clearing quota lease prices are modelled as a system of linear equations with dimensions dependent upon the number of quota species in the fishery and the number of different harvesting technologies. Finding a set of linear, uniform, quota prices that maximises resource rent during a fishing season reveals an interesting relationship between choke species, quota-induced discarding and the emergence of inframarginal rents. As equilibrium quota prices are jointly determined, discarding of choke species results in lower quota prices for species with quota still available and increased profits for firms with lower marginal harvesting costs for these species. The results are illustrated with a number of numerical simulations.

Author(s)
Aaron Hatcher, University of Portsmouth
Network Analysis of Pacific Halibut Quota Trading in Alaska

Part of
Rights-based Fishery Management and Co-management (3)
08:30 AM - 10:00 AM

Major Theme
Rights-based Fishery Management and Co-management

Abstract

Catch shares are a common policy instrument to mitigate the common pool resource problem associated with fisheries while avoiding perverse incentives that lead to overcapitalization of fishing fleets. A key feature of many catch share programs is that holders of quota can transfer their catch share rights, either temporarily or permanently. Previous research has noted that participation in a fishery tends to decline after a catch share system is implemented and catch share transfer prices tend to converge over time within the fishery. Here I focus on the Pacific halibut fishery which became a catch share fishery beginning in 1995. As of 2015, the number of quota holders has indeed declined by 56% compared to the initial allocation in 1995. Using data on halibut catch share trading in Alaska for the years 2000-2016, I model price dispersion and quota trading behavior over time using a network analysis approach to account for the non-independence of trades within the network. I explore the degree to which buyers and sellers remain segmented over time and the affect this segmentation has on price dispersion in the catch share market. I use this model to estimate the relationship between total allowable catch levels in each IFQ area and the corresponding prices and fishery participation decisions. I also examine how prices and trades have changed since the Guided Angler Fishing charter program was introduced in 2014.

Author(s)

Adam Hayes, University of Washington, Seattle

Alan Haynie, NOAA Fisheries
How do we prepare Bering Sea Fisheries Management for Success in a Changing Environment?

**Part of**  
**Special Session: Modelling social-ecological systems**  
03:30 PM - 05:00 PM

**Major Theme**  
Open Session: Modelling social-ecological systems

**Abstract**

The Alaska Climate Integrated Modeling (ACLIM) project is a multidisciplinary effort to examine how different future climate and socioeconomic scenarios are likely to impact the Bering Sea ecosystem – and to ensure that our management system is ready for these potential changes. ACLIM integrates climate scenarios with a suite of biological models which include different levels of ecosystem complexity and sources of uncertainty. This talk focuses on coupling the project’s bio-physical models with models of fisher behavior and management. The complexity of the economic models varies to match the scale of the biological models with which they are coupled.

We identify the economic and management factors that are the core drivers of fisher behavior. For management, there are many possible future policy choices, such as changes in target and bycatch species allocations or expanded spatial protective measures. Building on common socioeconomic pathways, we define the primary mechanisms that have been shown to impact past fisher behavior and define a range of future economic changes and policy interactions under which we predict integrated modeling outcomes. We demonstrate how different policy tools can have a large impact on our ability to adapt to environmental change.

**Author(s)**

Alan Haynie, NOAA Fisheries  
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Kirstin Holsman  
Steve Kasperski, NMFS, Alaska Fisheries Science Center  
Anne Hollowed, NOAA Alaska Fisheries Science Center
Methods and Models to Assess the Economic Impacts of Fisheries Management Actions and Environmental Change

Abstract

There are large number of possible approaches to analyzing the impacts of environmental, stock, and management changes on fisheries. NOAA Fisheries and partners have worked to develop the Spatial Economics Toolbox for Fisheries (FishSET) to provide better information to managers and the public about the economic tradeoffs among different uses of our marine resources.

Since the 1980s, economists have used discrete choice models to assess the factors that influence fishers’ spatial and participation choices to understand the trade-offs of fishing under different conditions. This knowledge can improve predictions of how fishers will respond to the creation of marine reserves, to changes in market conditions, to variations in target stock abundance, or to management actions such as the implementation of catch share programs.

In addition to developing discrete choice modeling tools, the FishSET project has focused on other metrics to assess fishery performance. In many cases, metrics such as changes in location, trip length, revenue per day, and CPUE also provide meaningful insights into how behaviors have changed with variations in policy and environmental conditions.

For several years, the FishSET project has worked to make modeling easier. As well as enabling efficient data organization and communication of best practices, FishSET has worked to enable robust model development, execution, comparison, and interpretation.

Here we discuss the current status of the FishSET project and pilot projects from around the U.S. We also discuss how FishSET enables models and indices of fisher behavior to be better integrated with ecosystem and stock assessment models.

Author(s)

Alan Haynie, NOAA Fisheries
Supporting Global Small-Scale Fisheries through Policy Change

Part of
Managing and Understanding Small-Scale & Developing Country Fisheries
10:30 AM - 12:00 AM

Major Theme
Managing Small-scale and Developing Country Fisheries

Abstract

In alignment with our vision of “Save the Oceans, Feed the World,” Oceana is working to rebuild marine fisheries in the world’s largest fishing countries to support food and employment for millions of people. Small-scale fisheries are integral to Oceana’s vision, as they contribute disproportionately to human fish consumption and global fisheries employment. Small-scale fisheries also provide crucial social services to their dependent communities through food provisioning, cultural traditions, among others. Furthermore, small-scale fishing communities are especially vulnerable to the negative consequences of poorly managed fisheries.

Policies supporting small-scale fishing communities are a growing priority for Oceana’s work. For example, Oceana continues to combat illegal commercial fishing in municipal waters of the Philippines through vessel monitoring requirements and other policy reforms in order to ensure healthy fish stocks for local fishers. Oceana has also worked to improve management of tainha in Brazil to ensure that small-scale fishers’ interests are incorporated.

This session will outline on-going campaigns at Oceana that are particularly relevant to small-scale fisheries as context for discussion of two key questions: 1) given Oceana’s growing portfolio of campaigns relevant to small-scale fisheries, what are appropriate and feasible indicators of progress, and 2) as governments move forward with implementing FAO’s Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries, what do the minimum and best practice policies look like?

Author(s)

Kevin He, Oceana
Comparison of Recreational Angler Expenditures in California for Trips within and outside the US EEZ

Part of
Economics of Recreational Fisheries and Tourism (3)
03:30 PM - 05:00 PM

Major Theme
Economics of Recreational Fisheries and Tourism

Abstract
U.S. law mandates NOAA’s National Marine Fisheries Service (NMFS) to enumerate the economic impacts of the policies it implements and the economic importance of marine recreational fishing to the nation. In order to gather economic data related to marine recreational angling, NMFS conducts surveys of recreational anglers to gather anglers’ expenditures on recreational fishing trip expenditures. The San Diego based Commercial Passenger Fishing Vessel (CPFV) fleet provides recreational fishing opportunities in both US and non-US waters and the economic contributions stemming from angler expenditures support additional sales and employment to the local and national economy. While NMFS regularly surveys anglers who hold California fishing licenses, and collects data on expenditures for trips within US waters off the California coast; anglers on charter trips that fish purely in waters outside the EEZ are not required to obtain a California license, and are therefore missed in the regular survey. In 2016, NMFS addressed this data gap by conducting an in-person survey of San Diego based charter anglers who took trips both inside and outside the EEZ. Statistical analysis of the survey data tests for differences in trip expenditures between the non-US waters trip sample and those occurring in US waters based on the survey of licensed California anglers. This research helps to build a more complete picture of recreational fishing trip expenditures in the region, and provides a case-study in survey methodology.

Author(s)
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Sabrina Lovell, National Marine Fisheries Service, Office of Science and Technology
Choice Sets for Fishery Location Choice Models in the Presence of Fine-scale Spatial and Temporal Heterogeneity

Abstract

A central component of any discrete choice analysis is the selection of alternatives that determine a decision agent's choice set. Failure to properly specify choice sets will generate biased parameter estimates, inaccurate behavioral predictions, and erroneous estimates of policy relevant metrics (e.g., welfare effects of closed areas in fisheries). The development of more behaviorally realistic choice sets is integral to predicting agent behavior and informing public policy. In some contexts such as fisheries, discrete spatial choices are made repeatedly, and the decision-maker invests in the collection of fine-scale spatial information through time. For such data rich environments, we propose constructing choice sets by sampling from a fine-scale grid of location choices or from all observed tow starting points and compare this approach to a traditional conditional logit model with choices sets constructed of discrete fishing areas that aggregate many possible specific fishing locations. We present results from a Monte Carlo study that compares these modeling approaches in terms of parameter bias and prediction. We also compare results from an empirical application of the models to the Pacific Groundfish trawl fishery. We find considerable heterogeneity in the parameter estimates and support for our fine-scale choice set model in terms of both superior choice prediction and smaller parameter bias.

Author(s)

Daniel Holland, Northwest Fisheries Science Center
Rob Hicks, William and Mary University
Kurt Schnier, University of California Merced
Welfare in Discrete Choice Models under Beliefs Errors: The Case of Risk Aversion

Part of
Economics of Recreational Fisheries and Tourism (2)
01:30 PM - 03:00 PM

Major Theme
Economics of Recreational Fisheries and Tourism

Abstract
We study the use of discrete choice models in the context of recreation when there may be discrepancy between the anticipated (ex-ante) and experienced (ex-post) quality of site attributes due to imperfect information. Unlike the previous literature on the topic (Alcott 2013, Schmeiser 2014, Train 2015, and Glasgow and Train 2017), we relax the assumption of risk neutrality and are able to decompose the disparity between ex-ante/ex-post utility into bias in beliefs and willingness to pay for reducing uncertainty in the assessment of quality. We then use data from a choice experiment to conduct Monte Carlo experiments and illustrate how alternative informational settings impact anglers’ site choices and (ex-post) welfare. Of interest is the finding that partial disclosure of information on true site quality (i.e. information on a subset of sites), while reducing the risk faced by agents may result in a welfare loss. This is contrary to the intuition that more information is welfare-improving, and the conceptual result that the value of information is positive. Our findings may be relevant when the recreational sites that individuals may potentially visit are located across multiple jurisdictions, with authorities in these different jurisdictions disclosing environmental quality data at various (uncoordinated) times (e.g. beach advisories in the Gulf of Mexico or the Chesapeake Bay).

Author(s)
Jorge Holzer, University of Maryland, College Park
Kenneth McConnell, University of Maryland, College Park
**Quota Design for Multispecies with Location Choices**

**Abstract**

The design of the quota system for multispecies fisheries faces an inevitable challenge: while the quota is set for each specie using biological information, the landings are not able to match the quota structure resulting in unbinding quotas, unnecessary discards and maybe inefficient location choices. I examine the New England groundfish fishery, which was introduced sector management in 2010, under which vessel owners were allowed to form sectors voluntarily with each sector constrained by a total allowable catch. Before 2010, the fishery was regulated under a limited access program with restrictions on area closures and trip limits. Under the new regime, the catch-to-quota ratio for different groundfish varies from 3% to 100% with a very high degree of unbalance. In addition, trawl vessels increase more and more diversity of their fishing location choices over years, showing evidence of trying to utilize the quotas optimally. The objective of this project is to solve for the optimal quota design in the context of multispecies when the landings are uncertainly selective through location choices.

The data are compiled from dealer records, federal vessel permit records, vessel logbooks and cost data. I use the random forest algorithm in machine learning to predict location decisions based on fishermen’s profit maximization. I then solve for the optimal quotas for multispecies given some stock information. The preliminary results show that we not only need stock information to set the catch limit, but also need to consider the mixture of fish caught, otherwise inefficient location choices may occur.

**Author(s)**

**Ling Huang**, University of Connecticut
The Attractiveness of Life Insurance for Fishers: Lessons from Small-Scale Caribbean Fisheries

Part of
Understanding Small-scale and Developing Country Fisheries (1)
11:00 AM - 12:30 PM

Major Theme
Understanding Small-scale and Developing Country Fisheries

Abstract
Fishers' loss of life at sea, which usually occur due to mishaps, piracy, failed engines and poor weather, is an on-going concern in many parts of the world. Reducing risk in the fishing sector is needed to attract young entrants to replace ageing fishers, spur private and public investment and sustain household and community livelihoods. In this paper, we provide estimates of willingness-to-pay for life insurance and compare these estimates to private market offers for group life insurance. In addition, we explore the key reasons fishers across two national, multi-species, largely coastal pelagic fisheries choose not to consider buying life insurance. Finally, the paper estimates the size and significance of key socio-economic factors, fishing and safety attributes that determine the increasing willingness of these small-scale fishers to favour life insurance. We apply a logit model of the binary-choice problem (pay or not pay for insurance), followed by an ordered logit model (of increasing categories of willingness-to-pay) to a cross-sectional sample of 352 artisanal fishers who were directly surveyed during 2015. Results indicate that older fishers and those who engage in safety practices, such as wearing or carrying life jackets at sea, were more likely to be willing-to-pay for life insurance. Fishery managers and local fishery association leaders can use the key findings to better inform the set-up of group insurance schemes and tailor their management approaches to foster adoption of these schemes.

Author(s)
Sharon Hutchinson, The University of the West Indies
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Part of
Understanding Small-scale and Developing Country Fisheries (3)
03:30 PM - 05:00 PM

Major Theme
Understanding Small-scale and Developing Country Fisheries

Abstract
Consumers in Caribbean Small Island Developing States (SIDS) are increasingly suffering from rising overweight and obesity incidence. Increasing fish consumption is often promoted by local and international health care agencies. However, despite the easy physical access to fish, the factors affecting key aspects of consumers’ fish purchasing behaviour has not been widely studied. Estimating these relationships can assist marketers to tailor the product, place and promotion, and it can also assist fishers to increase their income through increased demand for fishery products. In this paper, we provide estimates of factors impacting the frequency of fish purchases, the location of purchase and the product form (fresh, chilled or frozen). In addition, we explore the key motivations for fish purchase, as well as the key fish attributes consumers seek out. We apply a binary logit model for estimating factors affecting purchase frequency, and ordered logit models for review of purchase locations and product form, for a sample of 515 consumers who were directly surveyed during 2016. Results indicate that the consumers’ age, income level, religion and ethnicity had significant impact of the frequency of fish purchase. Christians over 35 years were more probable to be regular purchasers of fish than younger persons of other faiths. Education, household size, gender and employment status were not found to be significant. The impact of income was also not significant across all income categories. Marketers, nutritionists and policy advisors can use the key findings to better inform strategies to boost fish consumption.

Author(s)
Sharon Hutchinson, The University of the West Indies
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Measuring the value added by changes in age distribution of recreational target species

Part of
Economics of Recreational Fisheries and Tourism (3)
03:30 PM - 05:00 PM

Major Theme
Economics of Recreational Fisheries and Tourism

Abstract

A suite of metrics may be required to characterize ecosystem status and its resilience. Simplistic models, not accounting for the age composition complexity, can fail in predicting the impacts of anthropogenic activities and may not appropriately evaluate long-term consequences of management. Old-growth age structure is necessary for maintaining long-term sustainable population levels and age truncation may be detrimental to reproductive success of the stock.

The economic consequences of the shift in the age distribution are gathering interest for some time now. However, the main focus is on the long-term economic consequences and the chain effects propagated throughout the age classes. Little attention has been devoted to the demand for fish differentiated by size.

We focus our analysis on the striped bass recreational fisheries in the Maryland portion of the Chesapeake Bay. We develop a Bayesian model of recreational harvest of striped bass where benefits are derived from stock size, as well as age structure. The age structure drives the probability of catching a fish of a particular size. Consequently, it captures the angler nonlinear preferences for catching a fish of considerable size, i.e., 'trophy fish'. The model accounts for benefits of managing stock for a more mature state of the ecosystem with a higher number of older and bigger fish of high interest for recreational fishermen. We derive benefits changes imposed on the striped bass recreational fishery as the recreational sector is becoming increasingly important and new management strategies may be necessary to address this shifting trend.

Author(s)

Barbara Hutniczak, OECD

Doug Lipton, NOAA Fisheries
Understanding progress in combatting illegal, unreported and unregulated fishing

Abstract

Illegal, unreported and unregulated (IUU) fishing represents one of the greatest threats to marine ecosystems and fishing communities as it undermines efforts to manage fisheries sustainably. IUU fishing reduces the resources available to all stakeholders involved in legal fishing activities, creating unfair competition that reduces profitability and legal employment opportunities. This in turn has an important impact on social cohesion of fishing communities and negative implications for food security in countries that depend on fishery resources.

The OECD is working on a methodology for setting-up a long-term mechanism for monitoring progress of policies against IUU fishing. The project establishes a basis for assessments and understanding of the implementation of recognised best policies and practices to deter IUU fishing over the period from 2005 to 2017. At its core, it contributes to measuring progress towards UNDP Sustainable Development Goal 14 “Life below water”. It also seeks to identify which policies and practices are widely adopted, and which areas of IUU fishing prevention are lacking behind on a global scale.

Indicators built based on communication with nearly thirty countries reflect the efforts made throughout the last decade. Detailed evaluation includes the use of market measures and economic tools against IUU fishing, including harmful subsidies or use of trade information for better detection of illegal products. Focus is also on improvement in cooperation, both international and between domestic agencies, and progress towards transparency in dealing with IUU fishing related crimes.

Author(s)

Barbara Hutniczak, OECD
Economic Impact of Highly Migratory Species Recreational Fisheries in the U.S. Atlantic and Gulf of Mexico

Part of
Economics of Recreational Fisheries and Tourism (1)
11:00 AM - 12:30 PM

Major Theme
Economics of Recreational Fisheries and Tourism

Abstract

Highly migratory species (tunas, billfish, swordfish, and sharks or HMS) are pursued by a dedicated group of anglers that spend significant amounts in pursuit of these “big game” fish. From 2013 to 2016, NOAA Fisheries conducted the most comprehensive assessment of the economic impacts of HMS recreational fisheries in the Atlantic and Gulf of Mexico. This assessment included a cost-earnings logbook study of the HMS for-hire (charter/headboat) sector (2013), HMS angler durable goods survey (2014), HMS angler trip expenditure survey (2016), and HMS tournament economic study (2016). The HMS For-hire Logbook Study collected data on vessel operator expenditures associated with for-hire HMS vessel charter trips taken in the summer and fall of 2013. The 2014 HMS Durable Goods Survey collected data on expenditures associated with fishing equipment and related goods that could be used over multiple trips (e.g., tackle, rods and reels, boats, vehicles, second homes). The 2016 HMS Angler Expenditure Survey collected data on expenditures associated with HMS trips made by HMS Angling permit holders. Finally, the HMS Tournament Economic Study consisted of a cost-earnings survey of tournament operators and an expenditure survey of tournament participants. Combined, these studies estimated over $307 million per year in expenditures associated with HMS recreational fishing activities that had a combined economic output of over $510 million per year generated by approximately 24,000 HMS permit holders.

Author(s)

Clifford Hutt, NOAA Fisheries
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Attitudes toward aquaculture and estimating the public’s willingness to pay for sustainably produced salmon: An Irish and Norwegian comparative study

Part of
Special Session: Sustainable management of coastal fisheries and aquaculture (2)
10:30 AM - 12:00 AM

Major Theme
Open Session: Sustainable management of coastal fisheries and aquaculture

Abstract

Around the world, there is a growing emphasis on developing the aquaculture industry in an environmentally, economically and socially sustainable manner and this is the case also in Norway and Ireland. The impact of aquaculture on the environment is currently evaluated by the use of a set of indicators focusing mainly on physical and chemical parameters, while to date social acceptance has not been integrated fully into aquaculture sustainability evaluation. With this in mind, this paper examines the public attitudes of the Irish and Norwegian general public to marine aquaculture. Both countries have long coastlines, a significant aquaculture industry and a strong emphasis on public participation in decision-making. The paper also estimates the Norwegian and Irish public’s Willingness to Pay (WTP) a premium for sustainably farmed salmon using the Contingent Valuation Method (CVM). Single bound dichotomous choice CVM models are estimated and we test for the impact of consequentiality on model and WTP estimates.

Author(s)

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Elisa Ravagnan, International Research Institute of Stavanger

Brita Gjerstad, International Research Institute of Stavanger
Regional Economic Integration and Economic Growth: Examining the Contribution of Cross Border Trade in Marine Fish and Fishery Products to Local Fisheries Economies in Tanzania.

Part of
Seafood Markets and Trade (1)
08:30 AM - 10:30 AM

Major Theme
Seafood Markets and Trade

Abstract
“UNU-FTP”

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Regional Economic Integration (REI) has been embraced as a key pillar for not only human development but also economic growth. This study draws on the static and dynamic effects of economic integration theories. It is argued that cross-border trade plays a central position in REI to strengthen national economies. The study does not question this narrative; but aims to discuss how REI links with local economies. The study focuses on analyzing whether local economies are expanding, creating more opportunities as a consequence of a country being a member in a regional economic body, and evaluates how regional cooperation is facilitating Tanzania’s marine cross border fish trade. The study uses gravity model, to quantify volumes and value of formal and informal marine cross-border fish trade and factors that explain the flow and pattern. The study also determines whether Tanzania, as a member to several regional economic bodies, is generating any benefits to fishers, enhancing marine fish production, processing and trading to enable the fisheries sector contribute to national economic growth. Preliminary observations indicate that, REI have enhanced cross-border trade through harmonization and cooperation of appropriate trade agreements and policies. However, there is no significant change at the local economies.

Key words: Regional Economic Integration, Marine Cross-Border Fish Trade, Economic growth and Tanzania.

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The more the merrier. Or...

Part of
Fishery Governance, Policy and Management (5)
11:00 AM - 12:30 PM

Major Theme
Fishery Governance, Policy and Management

Abstract
In Norway, structuring of the fishing fleet has been an ongoing process since the start of the 1960'ies. Since then, both the number of vessels in Norwegian fisheries and fishers have been reduced by roughly 85 %. For decades, the fisheries industry has been considered a mean to employment and settlement in rural coastal areas. As a general rule, it was not until recently that it was opened for ITQ-fashioned merging of licenses on one vessels (2004).
One vessel group, however, is exempted from such market based re-structuring measures: The smallest vessels in the coastal fleet - the most numerous vessels, both within pelagic and demersal fisheries. Their role has hithereto been found too important, as supplier of fish to local processors, and as recruiting arena and employment alternative - a role under pressure both within and outside the fisheries industry.
In this paper we explore the development in this vessel group, over various dimensions (number of vessel, catch volume and value, regulatory measures, profitability, etc.) while highlighting findings against the development in other parts of the fleet.

Findings are discussed, and implications for industry actors and management are underlined.

Author(s)
John Isaksen, Nofima
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Bent Dreyer
Incorporating ecosystem linkages adds support for cooperation in transboundary fisheries: the case of Pacific sardine

Abstract

Transboundary fish stocks can complicate sustainable fishing strategies, particularly when stakeholders hold diverse objectives within potentially quite different regulatory and governance frameworks. Pacific sardine (Sardinops sagax) in the California Current is shared by three fishing nations, Canada, the US and Mexico, and is subject to climate-driven dynamics that can be difficult to predict. Game theory models have shown that climate variability can prevent stable cooperative exploitation, leading to overfishing of sardine stocks. This study extends previous insights by explicitly integrating ecosystem linkages into a game theory model of transboundary sardine fisheries under various climate scenarios. Results suggest that cooperative fishing strategies outperform others over a range of temperature scenarios when goals incorporate ecosystem-wide economic value beyond that of sardine landings. Total landed value is maximized at a fishing rate just lower than sardine F MSY, still allowing the fishery to operate. It is increasingly practical to incorporate ecosystem dynamics into management-applicable models; given limited resources for research, such applications can highlight key issues that are relevant for optimal policies.

Author(s)

Andrés Cisneros-Montemayor, The University of British Columbia

Gakushi ishimura, Iwate University

Gordon Munro, University of British Columbia

Rashid Sumailla
Optimal Spatial Strategy of the Fishing Efforts for Heterogeneous Fishing Grounds

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (6)
01:30 PM - 03:00 PM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract

This study explores the optimal spatial strategy for fishing efforts for subdivided on fishing grounds for different economic performance. We analyze the Japanese off-shore longline fishing vessel groups targeting swordfish and blue shark in the North Pacific. The seasonal dynamic optimal spatial strategy to maximize the economic performance is explored with identified fishing grounds by the cluster analysis. This study carries out the sensitivity analysis to see how the optimal strategy changes when the input parameters (e.g., ex-vessel price), objective functions and benefit allocation scheme between vessel owners and crews are varied. The results suggest that the robust optimal spatial strategy is to minimize the days per trip to maintain flexibility of destination of fishing grounds.

Author(s)
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Keita Abe, University of Washington
Ren Odaira, Iwate University
Impact of Integrated Aquaculture-agriculture Value Chain Participation on Welfare of Marginalized Indigenous Households in Bangladesh: A Panel Data Analysis

Abstract
In the light of on-going debates about the sustainable agricultural intensification and sustainable development paradigms, this paper examined the linkages between integrated aquaculture-agriculture (IAA) value chain participation dynamics and the welfare of marginalized extremely poor indigenous households using a three-wave household panel dataset from Bangladesh. The distributional effect of IAA participation was also investigated by examining impacts across different value chain actors. We applied pooled Ordinary Least Squares, Random-Effects, and Standard Fixed-Effects, Heckit panel, and control function approaches to control for endogeneity of IAA participation and unobserved heterogeneity. We found that IAA value chain participation is positively correlated with household income and the consumption frequency of certain goods, especially fish consumption, and the benefits do not continue to accrue after discontinuing participation in the value chain. The results reveal that IAA value chain participation has higher impacts on the welfare of relatively wealthier households involved in production related IAA value chain activities than on landless, extremely poor households who were involved in upstream and downstream IAA value chain activities.

Author(s)
Abu Hayat Md. Saiful Islam, Bangladesh Agricultural University (BAU)
Explaining the growth and decline of fisheries communities

Part of
Special Session: Northern fisheries: Adapting to a changing world
08:30 AM - 10:30 AM

Major Theme
Open Session: Northern fisheries: Adapting to a changing world

Abstract

This paper discusses the importance of the fishing industry – fishing fleet and processing industry – for the development of coastal communities. Statistical analysis is performed to analyze the importance of development in the fisheries sector (catch, landings, employment et.c) and how and to what degree this explains the growth and decline of different fishing communities along the Norwegian coast. The influence of the fishing industry is controlled for by also analyzing the development of other industries important for coastal communities, as well as employment in the public sector. An important finding is that the fishing industry explains less of the development in fishing dependent communities than expected, and that general development trends, urbanization, productivity improvement, transition from primary to secondary and tertiary employment et.c, explains more of the development in all but the (few) most fisheries-dependent communities.

Author(s)

Audun Iversen, Nofima
Community-level transition process between wild-capture and aquaculture: Insights from Japan

Part of
Certification of Fisheries and Aquaculture (2)
10:30 AM - 12:00 AM

Major Theme
Other Theme

Abstract
Unlike many marine capture fisheries, aquaculture production has consistently and rapidly expanded in the last three decades, and it is expected that the global aquaculture production exceeds the marine capture production by 2030. However, the transition process between wild-capture and aquaculture production and what drives such a process at community level are not well understood. Comprehensive understanding of the community-level transition process allows fishery managers to facilitate the efficient use of aquatic resources and to minimise potential conflict between resource users. In this paper, we use Japanese fishing communities as a case study to examine whether, and to what extent, the number of aquaculture producers is affected by changes in the size of community and the structure of wild-capture fisheries in the community. We use the Census of Fisheries in 2008 and 2013 to construct a unique panel data set of 1,922 fishing communities in Japan. Our results show that most Japanese fishing communities (>86%) experienced a decline in the number of wild-capture fisheries or aquaculture producers. However, the increasing size of aquaculture producers is associated with a proportional decrease in the number of coastal capture fisheries, suggesting that many fishing communities shift their production mix between wild-capture and aquaculture. Although such a transition is slow, the increase in the number of aquaculture producers is mostly driven by an increase in the number of individuals engaged in the production of high-valued species, such as crustacean and mollusc.

Author(s)
Ho Geun Jang, Tasmanian School of Business and Economics, University of Tasmania
Satoshi Yamazaki, Tasmanian School of Business and Economics
Divergent incentives for disease control in the Norwegian salmonid industry

Abstract

The Norwegian salmonid production is affected by serious infections disease outbreaks that affect both production- and trade volumes. One of the major diseases affecting the Norwegian production of Atlantic salmon (*Salmo salar* L.) is pancreas disease (PD), a disease which results in increased mortality, lower growth rates and reduced fillet quality. The causal agent, salmonid alphavirus (SAV), is an OIE-listed agent and its presence may thereby affect international trade patterns from affected areas. SAV is endemic within the salmon farming areas of Western- and Mid-Norway, while only sporadic outbreaks are seen in Northern-Norway. While previous regulations largely managed to prevent significant spread of SAV to the non-endemic area, the Norwegian government recently introduced a new, nationwide regulation aimed at strengthening the control of SAV. While the new regulation ensures a coherent strategy for the entire country it has not levelled out the between-company differences that are in effect due to company size and geographical positioning of farm sites. As a result, there is significant divergence in incentives related to efficient control of infectious diseases such as PD. This divergence in incentives, their potential consequences and possible mitigating measures will be discussed.

Author(s)

Mona Jansen, Norwegian Veterinary Institute
Considering Economic Efficiency in Ecosystem-Based Management: The Case of Horseshoe Crabs in Delaware Bay

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (3)
03:30 PM - 05:00 PM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract
The welfare gains from incorporating ecosystem considerations into fisheries management are unclear and can vary widely between systems. Additionally, welfare gains depend on how ecosystem considerations are adopted. This paper uses an empirically parameterized bioeconomic model to explore the welfare implications of two definitions of ecosystem-based fisheries management (EBFM). We first define EBFM as a fishery management plan that maximizes the net present value of ecosystem services. We then explore an alternative definition that adds ecosystem considerations to a fishery managed with regulated open access. Our biological model reflects horseshoe crabs in Delaware Bay, which are harvested in a commercial fishery and are ecologically linked to migrating shorebirds populations, e.g. the endangered red knot. We find that introducing ecosystem considerations to a regulated open access fishery generates welfare gains on par with gains from addressing the commons problem even when fishery rents are completely dissipated. Additionally, solving the commons problem within an EBFM approach can provide substantial welfare gains above those from solving the commons problem in a single-species management framework.

Author(s)
Sunny Jardine, University of Washington
Yue Tan, Charles Schwab & Co., Inc. and Charles Schwab Bank
Sustainability in fisheries – adding market value or financial profit?

Abstract

How well a fishery management regime performs is closely related both to vessel performance (i.e. return on investments) and if the species at stake are harvested in sustainable manner. However, ROI do not capture important dimensions of vessel performance. In addition, sustainability also includes social, economic and institutional dimensions. In this paper, we address weaknesses related to the most frequently applied performance measures in fisheries, and propose to add market value and social sustainability when evaluating the performance of fishery management regimes. The short-term costs of meeting such sustainability dimensions might result in weak financial performance. In fisheries, harvesting strategies must often balance costs of harvesting and important market attributes like timing and quality. Some harvest strategies might perform high on financial performance measures – due to high catch per unit effort and low fuel cost. At the same time, they might score low on sustainability measures – due to overfishing or quality based waste, i.e. low market value per kg catch. In this paper, we include the quality of the fish landed at vessel level and macro level as important performance dimensions. We do so in one of the most profitable fisheries in Norway – purse seiners that harvest mackerel. In our study, we address how firm heterogeneity (i.e. technology, capacity and harvest strategies) impact on vessel performance, i.e. market prices achieved. Our findings indicate potential for better performance, i.e. adding more market value to mackerel, among the purse seiners. However, to achieve this, the harvest cost might increase.

Author(s)

Helene Jensen, Nofima
Bent Dreyer
Contemporary Guidance for Stated Preference Valuation of Marine and Coastal Ecosystem Services

Part of
Special Session: Marine Ecosystem Service Valuation
01:30 PM - 03:00 PM

Major Theme
Closed Session: Marine Ecosystem Service Valuation

Abstract

Stated preference (SP) methods such as contingent valuation and choice experiments are often used to estimate values associated with marine and coastal ecosystem services. However, applications do not always apply best practices, leading to questions regarding the validity and relevance of welfare estimates. This presentation outlines contemporary best-practice recommendations for SP studies intended to inform decision-making, grounded in the accumulated body of knowledge from the peer-reviewed literature. The presentation begins with the core guidelines presented in the article “Contemporary Guidance for Stated Preference Studies” (Johnston et al., 2017, Journal of the Association of Environmental and Resource Economists), and then discusses how these guidelines apply and may be adapted to the specific case of marine and coastal ecosystem services. These recommendations consider (a) the use of SP methods to estimate both use and non-use values, (b) the comprehensive SP domain, including both contingent valuation and choice experiments, and (c) a broad spectrum of contemporary applications to marine and coastal ecosystem services. The recommendations focus on major decisions that must be made as part of any SP study. A primary goal is to reduce uncertainty surrounding the use of SP methods to inform decisions, and to assist researchers, practitioners, reviewers, users, and funders to understand best practices when considering designing, implementing, or using the estimates from SP studies.

Author(s)

Robert Johnston, Clark University
Commercial Fishing and Local Economic Multipliers: Evidence from Alaska

Part of
Special Session: Northern fisheries: Adapting to a changing world
08:30 AM - 10:30 AM

Major Theme
Open Session: Northern fisheries: Adapting to a changing world

Abstract

Commercial fishing can provide a source of economic opportunities for coastal communities; however, little is known about how large such eects may be. In particular, there is limited empirical research on what indirect impact commercial fishing may have on local economic activity in other sectors through spillover/multiplier eects. While such spillovers have been the subject of past work in other extractive sectors, econometric estimates of the local multiplier eects of commercial fishing are relatively few (see Roy et al., 2009, for an exception). We econometrically estimate the local multiplier eects of commercial fisheries in Alaskan fishing community economies. Adapting the empirical methodology of Moretti (2010), we estimate the eect of an additional dollar of fishing revenue in a given fishery for communities that have access rights to that fishery, are located nearby the fishery, or have catch landed at a local processor. We dierentiate the eect of access rights, proximity, and landings to determine the relative importance of each of these channels in spurring local economic activity. Further, using a novel state dataset, we are able to dierentiate whether economic gains are accruing to long-term residents or non-resident workers. Despite the substantial size of the Alaskan commercial fishing industry, we find virtually no evidence of local multiplier eects across any of the potential channels for the average Alaskan community. We provide qualitative evidence that this is attributable to a large fraction of out-of-state access ownership and a migratory workforce.

Author(s)

Brett Jordan, University of Alaska Anchorage
Matt Reimer, University of Alaska Anchorage
Understanding Changes and Continuity in Urban Fish Markets – Implications for Food Security

Part of
Managing and Understanding Small-Scale & Developing Country Fisheries
10:30 AM - 12:00 AM

Major Theme
Understanding Small-scale and Developing Country Fisheries

Abstract
Liberalization and globalization have created new opportunities in the fisheries sector at the same time they have increased the integration of small-scale fisheries and subsistence economies into commercial markets in urban spaces of developing countries. New geographies of fish production, marketing, and consumption have evolved that impact access to fish protein that urban populations enjoy. In this paper, we seek to understand the spectrum of retail fish trade in two urban areas of India and how this has evolved over time to service different groups within cities in different ways. Using a commodity (or value) chain analysis that integrates historical analysis and insights from Polyani, Boserup, and political economy, we map the spatial arrangement of fish trade in different urban contexts and theoretically explore how the nuances of change and continuity within fish trade may be explained through technology, transactions relations, and historical dimensions of production and market relations. Chennai and Bangalore are selected as the two urban centers as the former is a port city with fish landings and the latter a land-locked city, dependent on coastal regions for fish supply. We observe that the evolution of urban fish markets is uneven and often maladaptive to the changing composition of urban populations. Our analysis suggests that growth in urban markets for fish caters to the upper income groups while fish markets serving lower income groups have stagnated or declined. Given the increasing level of urban poverty, food insecurity and malnutrition, such development is a concern.

Author(s)
Amalendu Jyotishi, Amrita University
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Do catch shares lead to stewardship? A bioeconomic analysis.

Abstract
Catch shares are being increasingly adopted worldwide to halt overfishing and improve ecosystem outcomes. Rights-based fisheries management generates economic efficiency, and fishers with a financial stake in the fisheries are believed to have the incentive to become ecological stewards. However, the empirical evidence shows no significant impact of catch share adoption on stewardship measures such as use of habitat damaging gears. Based on a wide literature review, including indigenous resource management and modern conservation science, we define stewardship as a measure of ecosystem integrity. Accordingly, we develop a general bioeconomic model that extends the standard property rights model where the market price for transferable quotas equals the optimal shadow value of the resource under catch shares. By modelling the choice of fishing gear, which impacts on ecosystem integrity, as additional control and state variables, respectively, we show analytically how the market price of transferable quotas does not explicitly capture fishing gear effects on ecosystem integrity. Our model highlights the deficiency of catch shares as an ecosystem management tool, motivating an extension to catch share fisheries management such as associated habitat quotas or fishing gear taxes.

Author(s)
Viktoria Kahui, University of Otago
Claire Armstrong, UiT The Arctic University of Norway
Naomi Foley, Socio-Economic Marine Research Unit (SEMRU), NUI Galway
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A detailed Gravity Model Analysis of International and EU Fish Trade

Part of
Seafood Markets and Trade (1)
08:30 AM - 10:30 AM

Major Theme
Seafood Markets and Trade

Abstract
Fish and seafood are among the most traded commodities, and markets will continue to globalize in the coming decades. Climate change as well as rising demand may lead to increasing pressure on fish stocks. Intensifying demand furthermore causes food security pressure in developing countries. Hence, it is of utmost importance to understand the structure and the drivers of global fish trade.

Using bilateral UN Comtrade data for the years 2000 to 2016, we investigate international fish trade on different aggregation levels: To get an overall perspective, we first consider the whole commodity group "Fish and aquatic resources" for all country pairs available. Second, we run the gravity model for subsets of commodities, representing consumption demand. In a third step, we disaggregate further and investigate EU imports of seafood (shrimps and prawns) as well as frozen, whole fish (cod and salmon) from around the world.

To estimate the gravity model we furthermore use information on GDP of exporter and importer from the World Development Indicators (WDI). The usual gravity controls distance, preferential trade agreements, contiguity, common language, and colonial ties account for geographic characteristics and are taken from the Centre d’Études Prospectives et d’Informations Internationales (CEPII).

Author(s)
Katrin Kamin, Kiel University
Julia Bronnmann, University of Kiel
Ecosystem Approach to Quota Management in Fisheries Agreements in West Africa: Illustration by Game Theory Mauritania-European Union

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (3)
03:30 PM - 05:00 PM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract

The overexploitation of many fish stocks across the Mauritanian continental shelf and the degradation of ecosystems and local fishing industries have gradually revealed the limits of fisheries management plans. The approach of the new National Strategy for Responsible Management for Sustainable Development of Fisheries and Maritime Economy 2015-2019 adopted in July 2015 calls for Total Allowable Catch (TAC) and its allocation to individual quota and / or global. However the effectiveness of such regulation is now discussed and game theory seems to be an appropriate tool in the distribution of quotas TAC. To this end, we develop in this paper a theoretical approach of allocating quotas in TAC between Mauritania and the European Union. Inspired by game theory "fish war game" of Levhari and Mirman (1980), this theoretical model is revisited to bring the bio-economic analysis of the process of determining Total Allowable Catch and repair in individual quotas in agreements RIM-EU fishing. The main originality compared to the base model is the inclusion in the utility functions of financial compensation paid by the EU to Mauritania. The model assigns individual quotas strategies to prevent the utility of each country in relation to a given financial compensation, catch trends and thus the optimal level of income by country for a maximum sustainable yield. The results and assumptions of the model are first discussed at the Nash equilibrium, and then examined the impact of cooperation in the allocation of IQ for sustainable fisheries.

Author(s)

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Thomas VALLÉE
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Chasing Malawi fish: The irony of local fish scarcity vs exports

Part of
Seafood Markets and Trade (5)
10:30 AM - 12:00 AM

Major Theme
Seafood Markets and Trade

Abstract

Fish is an important source of dietary animal protein in Malawi (a small land locked country in southern Africa) currently providing about 28% of the country’s animal protein supply. Declined catches coupled with rapid population growth in the country has triggered a sharp increase in the demand for fish. Average per capita annual fish consumption is now estimated at 5.6 kg from the previous 14 kg in the 1970s. Reports indicate as low as 3.6 kg as of 2001 which is still far below the 13-15 kg per capita supply recommended by the World Health Organization.

However, despite the huge demand for fish locally, Malawi fish continues to be exported outside the country although statistics show a gradual decline. Malawi is among the countries in Africa where movement of fish is not highly monitored due to among other reasons, poor trade regulations. Fish export statistics could thus be higher than reported due to poor documentation as a result of increasing informal cross border fish trade. Informal fish exports with neighboring countries such as Zambia, Tanzania, Mozambique and beyond, still remain a challenge. Reports for example, indicate an estimated 8 tons of fish crossing the border informally to Zambia per month through the porous and unguarded routes.

This paper attempts to stimulate a discussion among fisheries, trade and economic experts regarding their understanding of this irony and consequently brainstorming on policy that can effectively curb such developments in the quest of improving availability and consumption of locally produced fish in Malawi.

Author(s)

Fanuel Kapute, Mzuzu University
Will innovation in bluefin tuna aquaculture improve conservation of wild-caught bluefin tuna stocks?

Part of
Special Session: Seafood markets, fishing behavior, & fisheries mgmt.
03:30 PM - 05:00 PM

Major Theme
Closed Session: Seafood markets, fishing behavior, & fisheries mgmt.

Abstract

Scarcity of wild-caught seafood has incentivized innovation and growth in aquaculture, especially for species that compete directly with wild alternatives. In the global tuna industry, the most pronounced scarcity is associated with bluefin tuna species (Atlantic, Pacific, and Southern, which serve similar markets). Supply-side factors including overfishing and governance challenges together with high demand for bluefin as an ultra-premium sushi product have contributed to bluefin scarcity with associated high prices and considerable environmental concerns about the sustainability of the fish stocks. The lucrative bluefin market and limited availability of these tuna from capture fisheries have triggered substantial investment in technologies to farm bluefin tuna. Will technological advances in bluefin tuna farming and market penetration from these operations ultimately alleviate pressure on wild stocks? This paper develops a numerical bioeconomic model of Atlantic bluefin tuna harvest and links the outcomes to developments in the aquaculture industry. We derive a backward-bending supply curve for fish in an age-structured population and show conditions under which technological advances in aquaculture will steer the fishery back to the upward-sloping region of supply.

Author(s)

Martin Smith, Duke University
Rachel Karasik, Duke University
Managing Coastal Zones and Competing Uses in a changing environment: Global Perspective.

Part of
Poster Session
05:00 PM - 07:30 PM

Major Theme
Management Challenges of a Changing Environment

Abstract

Generally speaking, we in a remarkable time where there are political, economic, societal, cultural and technological advancement in the world. For example, let look at management challenges of a changing environment in a coastal zones. There is no single definition of the coastal zone but Jens Sörensen 1998 stated that “…that part of the land most affected by its proximity to the sea and that part of the ocean most affected by its proximity to the land…” In the Coastal zone there are different activities from different types of ecosystems; terrestrial and aquatic ecosystems which includes Diverse food webs, Nursery and feeding ground for many species, high biodiversity, Vulnerable benthic habitats, Tourism, recreation, trading and energy of goods and services, Fisheries and fish farming provides 90% of the world fish catch(see photos). Today, about 40% of humans live within 100 km of a coastline. Over 50% of humans live in cities, 14 of 17 largest cities are coastal; 49.7% of all cities with +500,000 inhabitants. The management of coastal zones resources has difficulty in achieving agreement on urbanization with challenges such as water quality, pollution; and development in Shoreline stabilization, Land reclamation (see photos). But, Fishery management by FAO, 2005 shows 52% of the stocks are fully exploited and an increase in exploited stocks 25% of fish stocks are overexploited. There is a sea of chaos superimposed projection of all activities and infrastructures in the Belgian waters(see photos). Thus, an Integrated Coastal Zone Management (ICZM) tools is needed in addressing activities in coastal zones.

Author(s)

Hoki Kargbo, Environment Solution Consultancy
Determination of Technical Efficiency Using Stochastic Frontier Analysis (FSA): a Case Study on The Java Sea Mini Trawl “Cantrang” Fishery-Indonesia

Part of
Poster Session
05:00 PM - 07:30 PM

Major Theme
Managing Small-scale and Developing Country Fisheries

Abstract

The excessive production rate that occurred in majority of the Indonesian waters such as in the Java Sea had potentially led to over exploited stock and overcapitalization in the fishery. In the Java Sea, about 83% outstanding stock of demersal fish has been utilized according to the stock assessment report in 2016. Since there is no limitation on the number of fleets that allowed to enter the fishery, fishers tend to increase their effort to maximize the catch, which in turn creates inefficient excessive level of exploitation. In 2017, there were 775 mini trawl, or cantrang, vessels that registered in the Port of Tegal and are active in fishing. This fleet accounts for about 80% of the total catch in the port of Tegal, targeting demersal fish with average trip 30 days at sea and 12-20 crews on board per vessel. Since technical efficiency is a requirement for estimating and assessing capacity and capacity utilization, which in turn alters the stock when the capacity utilization changes, then determining the technical efficiency of the Cantrang fishery is essential. This paper is intended to estimate the production frontier and the technical efficiency of cantrang fishery using a Stochastic Frontier Analysis (SFA) methodology. The analysis will use daily time series data of landing catch as an output, while number of crew, day at sea, vessel size (GT), ice, water, and gasoline consumption as inputs, over a twelve-year period from 2006 to 2017.

Author(s)

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Chris Anderson, University of Washington
Incorporating Humans in Integrated Ecosystem Assessments

Part of
Ecosystem-based Management and Integrated Assessments
11:00 AM - 12:30 PM

Major Theme
Ecosystem-based Management and Integrated Assessments

Abstract
Humans are increasingly considered more than simply “part of the ecosystem” by natural scientists and natural resource managers. However, the integration of economic and social sciences into Integrated Ecosystem Assessments (IEAs) is advancing at different rates worldwide. Over the past several years, The U.S. National Oceanic and Atmospheric Administration (NOAA) has made impressive strides toward the inclusion of economic and social science information into IEAs. Yet there are still a number of areas in which economic and social science information would be beneficial to improve stakeholder engagement, define ecosystem goals and objectives, develop indicators of ecosystem status, understand socio-ecological system processes, understand risk and uncertainty, and to evaluate the tradeoffs across different management strategies. This presentation will describe NOAA’s framework for conducting IEAs, provide examples of social science research that have been incorporated into each step of NOAA’s IEA loop throughout the U.S., and describe how economic and other social sciences can be more comprehensively integrated throughout the entire IEA process.

Author(s)
Steve Kasperski, NMFS, Alaska Fisheries Science Center
Declining Economic Diversity of Marine Resources in the Northeast Shelf Large Marine Ecosystem

Part of
Management Challenges of a Changing Environment (2)
04:00 PM - 05:30 PM

Major Theme
Management Challenges of a Changing Environment

Abstract
Fishing operations and fishing dependent communities rely on variable marine ecosystems for income. Increasing ocean temperatures and ecosystem change associated with global climate change will increase ecosystem variability experienced by fishing communities and challenge existing fisheries management institutions. Maintaining or increasing the economic diversity of marine resources has been shown to increase economic resilience and reduce income variability. However, this strategy may be counter to current trends in major fisheries. The Northeast Shelf Large Marine Ecosystem (LME) is responsible for approximately $1.8 billion in landings in 2014, a 28% real increase from thirty years prior. However, the economic diversity of species harvested has declined by 66% since 1985.

We create indices of catch diversity, revenue, and revenue volatility at the regional, port, and vessel scale for 120 fishing communities in the Northeast Shelf LME. At the regional level revenue is positively correlated with revenue volatility, but negatively correlated with catch diversity. At port and vessel scales, Principle Component Analysis (PCA) is utilized at an annual time step across twenty-five years of data to group fishing communities and fishing vessels by the relationship between indices. Analysis indicates that higher vessel level revenue is associated with lower catch diversity and higher revenue volatility at both port and vessel scales and that this relationship is increasing over time. Results describe a fishery that is lucrative, but increasingly vulnerable to ecosystem variability and change.

Author(s)
Brian Kennedy, Gulf of Maine Research Institute
Katherine Mills, Gulf of Maine Research Institute
Brad Franklin, GMRI
Predicting fishery management challenges in a climate changed world.

Part of
Management Challenges of a Changing Environment (2)
04:00 PM - 05:30 PM

Major Theme
Management Challenges of a Changing Environment

Abstract

Predicting the impact of climate change on marine fisheries requires understanding how species distribution is affected by temperature, as well as details of existing management structures that may impede or accelerate the response of fisheries to these changes. Pinsky et al. (2013) found local climate velocity—a simple metric describing the rate and direction that isotherms shift through space—is able to predict the speed and direction of latitude and depth changes of many marine species. These shifts have been significant in many regions; however, fisheries have responded at a rate of only 10-30% of target species. The reasons for this are both technical and regulatory (e.g., the need for longer trips; shifts beyond political boundaries).

Existing research has highlighted the perverse incentives that result from shifting distributions (e.g., overfishing a stock that will soon be unavailable), as well as the strain put on already-tense allocation negotiations. We present a conceptual model as a framework for predicting management challenges based on climate velocity and the regulatory and technical characteristics of local fisheries. The goal is to highlight challenges before they arise and offer managers proactive insights. We also add a third dimension to the ongoing discussion of equity-efficiency tradeoffs associated with the implementation of rights-based management tools: adaptability. We implement the model in a spatially-explicit agent-based modeling environment under a variety of hypothetical management and climate scenarios. In general, we find institutional factors play a mediating role in the link between environmental change and resulting disruption to fisheries.

Author(s)

Chris Kennedy, George Mason University

Steve Scott, The MITRE Corporation
Community-based fisheries management: Increased fish productivity, biodiversity and income in north-east Bangladesh

Part of
Rights-based Fishery Management and Co-management (1)
02:00 PM - 03:30 PM

Major Theme
Rights-based Fishery Management and Co-management

Abstract

North-eastern Bangladesh has extensive floodplains and rivers that support productive open-water fisheries. However, due to over-fishing and weak enforcement of regulations, fish stocks in many waterbodies was depleting. Meanwhile, Bangladesh has pilot-tested community based fisheries management (CBFM) for more than two decades, demonstrated effective approach to reverse these trends, increased production, enhancing bio-diversity and income of fishing communities. More than 300 fisheries community based organizations (CBOs) have been established in north-east Bangladesh. CBFM focuses improved fisheries management through increased compliance with rules and regulations, conflict resolution, improved access to service-providing agencies and creates effective CBO networks.

The current study documents the results from 60 waterbodies in north-eastern Bangladesh since 2008. It examines management performance and resource sustainability across a range of different types of waterbody. A stratified sampling procedure was used to estimate productivity (CPUA), total sale value per hectare, biodiversity (H’) trends, species abundance and site similarities. Estimated production (kg/ha) for year 6 of the intervention was compared to baseline and average prices were estimate to calculate benefit gain by the fishing communities.

The relative frequencies of the upward and downward trends indicated that the CBFM activities have significantly (p

Author(s)

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An analysis of ownership typologies and strategies in French and Belgian fisheries: a case study approach

Part of
Special Session: Financing, Incentive Structures, & Sustainability
10:30 AM - 12:00 AM

Major Theme
Open Session: Financing, Incentive Structures, & Sustainability

Abstract

There is a widespread perception that the EU fishing fleet is owned by a multitude of local, single vessel operations, often family businesses. Evidence suggests, however, that this view is a simplification of a complex reality in which a range of single- and multi-ownership typologies coexist.

Examples to support this claim include acquisitions of EU fishing firms by firms from other Member States or even third (non-EU) countries (i.e., quota hopping), local firms expanding their fleets by investing in peers, and upstream value chain actors acquiring fishing vessels through a strategy of vertical integration. All these strategies have in common that they concentrate production means (vessels and fishing rights) in the hands of an increasingly smaller number of firms. Concentration may impact access to the fishery, alter social relations (e.g., wage labor, employment), and reinforce individual financial incentives that may ultimately conflict with environmental sustainability.

This paper presents a first analysis of ownership typologies, evolution and strategies for two case studies: a mixed fishery in Brittany (France) and the Belgian beam trawl fishery. In both countries, the second hand vessel market is the main mechanism for redistribution of vessels and the fishing rights attached to them (non-tradable quota). A mixed methods approach is adopted in which data on ownership dynamics (national fleet registers) is cross-referenced and supplemented by newly obtained data from interviews with vessel owners and managers. This is the first paper in a PhD study to analyze the drivers behind and consequences of ownership dynamics in European fisheries.

Author(s)

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Olivier Guyader, Ifremer

pascal le floch
Icelandic fish processors taking their operation to the next level with innovation and high-tech approach

Part of
Seafood Markets and Trade (1)
08:30 AM - 10:30 AM

Major Theme
Seafood Markets and Trade

Abstract

Increasing the value creation is constantly the main agenda and objective for the fish processing plants in competitive environment and especially under the restrictions given by the limits of quota in the ITQ system. The paramount objective is to improve economic performance and efficiency of the companies and reach sustainable competitiveness. At the present, this is achieved by adopting innovative digital and automated industrial technologies. In short to take the step into Industry 4 by implementing highest level of automatization by applying robotics, digitalisation, X-ray vision and laser technique and industrial internet in the processing process.

This gives the fish processing sector in Iceland (and other European fish processors) new competitive edge in increased labour cost advantages, shrinking the motivation to move processing to low cost locations as can been seen in development of fish processing in China.

At the present great number of the fish processing plants in Iceland have taken large steps toward applying these advanced technologies to reduce their cost bases, improve quality of the end products, customise their products, building new and improving old customer relationships to speed up all the processes in the value chain to bring the products faster to the customers.

The focus will be on the following:

1. Steps in technical development and improvements in efficiency and productivity in the last 20 years
2. Recent innovation in technical development towards digitalisation and automatization
3. Impacts on economic performance

Author(s)

Olafur Klemensson, Central bank of Iceland
Learning and measurement in optimal fishery management

Part of
Special Session: Session in honor of contributions by James Wilen to marine resource economics (2)
01:30 PM - 03:00 PM

Major Theme
Open Session: Session in honor of contributions by James Wilen to marine resource economics

Abstract

Fishery management involves acquiring and using information about the harvested stock. In many fisheries this is done through a stock assessment, which predicts how management choices will affect future yield and stock abundance. Even when budgetary and technical resources exist to produce a cutting-edge assessment, results are subject to multiple forms of uncertainty. Measurement of the current stock is imperfect (leading to state uncertainty), and the model of stock dynamics includes parameters that must be estimated (leading to parameter uncertainty). From an economic perspective, investment in stock assessment should be weighed against its expected value in terms of improved fishery performance. We introduce a model of fishery management that includes a representation of stock assessment. The fishery manager in our model is uncertain about both the current abundance of the stock and parameters of the equation that governs stock dynamics. The manager chooses how to use fishery-dependent information, invest in fishery-independent stock measurements, and set harvest quota in order to maximize the expected net present value of rents. In the process, the manager takes into account the value of information in the form of either more precise stock abundance estimates or a more accurate growth model. We find that the dynamics of learning and opportunities for policy experimentation in our model differ substantially from simpler cases where either state or parameter uncertainty are considered in isolation. In addition to contributing to the economics of information in fisheries, we expect our findings will be relevant for other wild population management problems.

Author(s)

David Kling, Oregon State University
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Public preferences for natural capital investments that help threatened species: The case of Oregon Coast Coho salmon

Part of
Special Session: Economics of Protected Marine Species
10:30 AM - 12:00 AM

Major Theme
Open Session: Economics of Protected Marine Species

Abstract

The decline of threatened species is associated with habitat loss and degradation. In response, there is significant ongoing investment in natural capital to improve habitat for threatened species. Surprisingly little is known about the general public’s preferences for potential outcomes of these investments, including changes in species’ population levels and the timing of population changes. We provide new insights into public preferences for threatened species population outcomes that are linked to investment in natural capital. Our stated preference choice experiment quantifies the U.S. Pacific Northwest general public’s willingness-to-pay (WTP) for increasing the population of Oregon Coast Coho salmon, a threatened species under the Endangered Species Act (ESA). The experiment focuses on estimating household WTP for improved ESA status, changes in Coho population size, faster population change, and recreational harvest restrictions. Using a random parameters logit model, we find that average household WTP for a faster population increase is between $8 and $38 per year more than a slower population increase (depending on the levels of other outcome variables). Average household WTP for a marginal change in the Coho population is significantly higher at low population levels relative to the same marginal change at higher population levels that have achieved ESA recovery. We also find evidence of highly heterogeneous preferences for relaxing recreational fishing regulations. About 60% of households in our sample would experience disutility if recreational harvest of Coho is increased.

Author(s)
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The Future of the Seafood Industry

Part of
Seafood Markets and Trade (4)
08:30 AM - 10:00 AM

Major Theme
Seafood Markets and Trade

Abstract

Author(s)

Gunnar Knapp, University of Alaska Anchorage
Comparing Salmon Monoculture to Integrated Multi-Trophic Aquaculture (IMTA) with Three Species: a Discounted Cash-Flow Analysis of Aquaculture Operations in Canada

Part of
Special Session: Sustainable management of coastal fisheries and aquaculture (2)
10:30 AM - 12:00 AM

Major Theme
Economics of Aquaculture

Abstract
Integrated Multi-Trophic Aquaculture (IMTA) has been proposed as a sustainable aquaculture technology that can help offset some of the environmental impacts of fed finfish aquaculture. It improves on conventional production by integrating additional species that make use of various waste materials (i.e. faeces and uneaten feed). Improving on previous financial analyses of IMTA, our study presents a more detailed and complete assessment of the financial performance of Atlantic salmon (Salmo salar) monoculture versus IMTA, where the latter operation comprises Atlantic salmon, blue mussel (Mytilus edulis), and kelp (Saccharina latissima). Using discounted cash-flow analysis (DCF), we assess profitability in both cases over a 10-year period in Passamaquoddy Bay, New Brunswick, Canada. We found that the three-species IMTA operation is more profitable than Atlantic salmon monoculture with and without the inclusion of a price premium on the IMTA product. However, adding a 10% price premium on IMTA salmon and mussels resulted in a substantially higher net present value (NPV) for the three-species IMTA operation compared to salmon monoculture. Despite the positive results for IMTA in our study and in other IMTA-related financial analyses, the ongoing uncertainty related to IMTA’s financial and environmental performance, as well as IMTA’s increased technological and managerial complexity, may be barriers to IMTA adoption in Canada. Further, our analysis suggests that Atlantic salmon’s disproportionately large contribution to total aquaculture revenues with IMTA, compared to that of mussels and kelp, may be having a negative influence on the adoption of IMTA in Atlantic Canada’s salmon-dominated aquaculture industry.

Author(s)
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Evaluation of Fisheries Value Chain dynamics; case study of the cod

Part of
Fishery Governance, Policy and Management (4)
08:30 AM - 10:30 AM

Major Theme
Fishery Governance, Policy and Management

Abstract
Research of value chains in fish industries indicates that there is great difference in the dynamic of the value chains. Increasing value creation is constantly the main agenda and objective for the value chains in competitive environment and especially under the restrictions given by the limits of fisheries management system and the structure of the industry. This study aims for analysing the underlying causes for different dynamics and performance of value chain of the cod in Norway, Iceland and Newfoundland. Traditionally those countries have exported their cod products to the same markets in Europe and N-America. This study is part of PrimeFish Horizontal 2020 research project focusing on the competitions of the European fish and aquaculture industry. This part of the study explores the underlying elements that are behind the different dynamics and performance of the value chain of cod in those countries. The study points out differences in processing stage, product mix and ability of the value chains to respond to different markets need. The performance of the value chain differed as in returning profit as well as value creation. The findings indicate that this difference can partly be traced to the different structure of the value chains, highlighting differences in relationships between actors and in trust. The difference in flow of information and knowledge is also an important factor in explaining the dissimilarity as well as different strategic positioning, investment opportunities and fishery policies.

Author(s)

Ogmundur Knutsson, University of Akureyri
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Agency, resilience and global change: the case of small scale fishermen in Côte d’Ivoire coastal zones

Abstract

This article examines the resilience of small-scale fishing communities in coastal areas of Côte d'Ivoire by the concepts of capability and agency, which are two key concepts of the capability approach developed by Amartya Sen (1985). The capability and agency make it possible to understand the problem of well-being at the individual and collective levels. In the case of the fishermen studied, who are mostly foreign migrants, it is important to investigate the modalities of their territorial integration as a factor of resilience. The analysis is based on a vulnerability and governance survey conducted on a representative sample of twelve fishing villages, i.e. 30 interviews with key stakeholders and 124 questionnaires with fishermen. It must be emphasized here that these communities have long been successful in developing a collective agency that has enabled them to generate collective capabilities in the governance of their traditional fishing activities. But fishermen are currently facing the effects of climate change and the increasing disruption caused by illegal and unregulated industrial fishing fleets, and it appears that their current collective agency seems to be failing in the face of those two growing threats. This is signaled by strong feelings of vulnerability among fishing households, as shown by survey data. To adapt and continue to earn a living in Côte d'Ivoire, fishermen will therefore be forced to develop new individual and collective capabilities at different territorial levels. Through our surveys, we identify the extent to which fishermen have assets or constraints to build this new agency.

Author(s)

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Hélène REY-VALETTE, University of Montpellier
Recreational fishing in California’s Central Valley: results of a 2015 study

Abstract
In 2015, baseline expenditure and trip behavior information about angler activity across a 14-county region of California’s Central Valley was collected. The motivation for this study was twofold: to learn about existing recreational fishing levels in the Sacramento River system, and to understand how these levels might change if fishing opportunities in areas above dams also changed. That is, under what conditions might anglers be interested in new fishing opportunities for species such as salmon, if fish passage improvements over dams were to occur? This talk will discuss current highlights from this study including results from a preliminary model developed to estimate the probability of fishing at a particular location as a function of site conditions and angler characteristics.

Author(s)
Rosemary Kosaka, NOAA Fisheries
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Cindy Thomson, NOAA Fisheries
Remaking of invasive species management: The RKC fishery in Norway

Abstract

The importance of land infrastructure for supporting coastal fisheries has long been acknowledged; its role in remote and geographically challenged fishing communities in the Nordic Arctic has visibly impacted community structure and development. This paper explores the Red King Crab (RKC) fishery in Norway and the ways in which its management has been changing the socioeconomic landscape in Northern Finnmark since the beginning of commercial exploitation in the early 2000’s. The RKC in the Barents Sea is an intentionally introduced species that is viewed both as a nuisance and as a valuable economic resource. This induces ambivalent preferences among local stakeholders and decision-makers in Norway. Although the management challenge of invasive species with multiple roles is not new, there has been scant coverage of the underlying bioeconomic trade-offs. Low harvesting costs, uncertain ecosystem losses and ongoing infrastructure investment in onshore landing facilities all shape stakeholders' interests in Norway in favor of a long-term management of the fishery. Simultaneously the political willingness to support local coastal communities and livelihoods in northern Norway provides significant impetus for maintaining a long-term stock, particularly in Eastern Finnmark. The ongoing infrastructure investments favor regional stakeholders over more diffuse and less clearly identified interests in the ecosystem changes induced by the invasive crab.

Author(s)

Melina Kourantidou, University of Southern Denmark
Brooks Kaiser, Southern Denmark University
How do gear, participation, and dealer selection decisions relate to value? A price analysis of the U.S. West Coast Sablefish.

Part of
Interdependency of Fishery Management and Seafood Markets
01:30 PM - 03:00 PM

Major Theme
Interdependency of Fishery Management and Seafood Markets

Abstract

Sablefish is a commercially important species with catch allocated across multiple sectors and gear types on the U.S. West Coast. A flexibility provision in the West Coast Groundfish Trawl Catch Share Program sanctions those with trawl permits to target Sablefish with fixed gear, such as longlines or pots, allowing the total effort by gear-type to be partially determined by market forces. Sablefish prices vary depending on the characteristics of landings and had an interquartile range of $1.58 from 2011-2016. To decipher the dynamics that influence participation choices and gear-switching it is important to understand the characteristics of landings that explain variation in ex-vessel prices. Using a linear mixed model with dealer and vessel-specific random effects, this research explores the influences of gear, grade (size), condition, fishing sector, port group, landing month and year on price per round pound of Sablefish. A second linear mixed model uses weighted average price per trip that incorporates the size-composition of trip landings into the explained variable, to look for possible evidence of high-grading in sectors outside of the Catch Share program. During this presentation the results of these regressions and the role of species composition of catch in the context of the DTS trawl fishery are discussed. Preliminary results will also be shared that utilize the Economic Data Collection Program’s information from first receivers and shorebased processors to explore price as it relates to more detailed dealer characteristics.

Author(s)

Melissa Krigbaum
Co-management – promise of sustainable fisheries in Telangana through stocking of fish seed in all the water bodies

Part of
Poster Session
05:00 PM - 07:30 PM

Major Theme
Rights-based Fishery Management and Co-management

Abstract

In Telangana, water bodies are common resources in which small-scale fisheries could be sustained using community-based co-management only. Co-management of fisheries, broadly defined as the involvement of users in management, in various experimental forms of participation of fishermen in the management process, in advisory roles or through delegation and sharing of power. Fisheries co-management has been revealed as multi-functional, addressing different knowledge and resource management problems, with varying success. Many community-based co-managed fisheries around the world are well managed under limited central government structure, provided communities of fishers are proactively engaged. “Community-based co-management is the only realistic solution for the majority of the world’s fisheries and is an effective way to sustain aquatic resources and the livelihoods of communities depending on them.” In Telangana Fishermen Cooperative Societies are today strong and cohesive organizations that believe that community-based management is the approach needed for the long-term sustainability and profitability of the fishery. To encourage co-management in fisheries to increase fish production in common resources Telangana Government intervened by stocking 5000 millions of fish seed in about 10000 water bodies.

Keywords
Fisheries co-management, Participatory management, Knowledge integration, Adaptive management, Sustainable resource management

Author(s)
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The final cod war

Abstract

Iceland had several disputes with its neighboring countries during the fifties, sixties and seventies over expansions of sovereign waters and control of fishing rights, known as the cod wars. Iceland was successful in securing exclusive fishing rights for its people. However, the problem of overexploitation, which lay at the heart of the disputes, did not disappear with the exclusion of foreign fleets from Icelandic waters. Instead, Icelanders swiftly replaced foreign overcapacity with their own. It took fundamental changes in fisheries policy, joint efforts of scientists and industry - and 40 years, to archive a truly sustainable management of the Icelandic cod stock. This final cod “war” – the civil war – is the story of how long run interests won over short run interests after the introduction of quota management. How industry and scientists came together to develop a harvest rule for cod. And how long it took to convince politicians to follow scientific advice rather than pursuing their own shortsighted political goals. Finally, the paper provides data on the effects abundance has on harvest costs, industry structure and profitability.

Author(s)

Daði Kristofersson, University of Iceland
Economic Connectivity of Fisheries and Leakage: Defining the Policy Scope for Ecosystem Based Fishery Management

Part of
Special Session: Session in honor of contributions by James Wilen to marine resource economics (1)
11:00 AM - 12:30 PM

Major Theme
Open Session: Session in honor of contributions by James Wilen to marine resource economics

Abstract
Until recently, fisheries management policy addressing both biological and socioeconomic objectives has typically been designed and evaluated on a single-fishery basis. The development of Ecosystem Based Fisheries Management (EBFM) frameworks, aimed at accounting for biological connectivity of fish stocks, calls for broadening the scope of evaluation when setting biological management goals. However, there is no corresponding framework to EBFM for characterizing and analyzing economic connectivity. We use network analysis methods and data from the Alaska region to visualize and analyze cross-fishery participation and leakage from single-fishery policies. We identify significant network changes and leakage of policy impacts that coincide with some, but not all, catch share implementations. This suggests that the potential for leakage across fisheries should be factored into the design and evaluation of EBFM policies.

Author(s)
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Justine Huetteman
Harnessing the comparative production economics of ponds and cages for improved aquaculture sector in Uganda

Part of
Economics of Aquaculture (4)
11:00 AM - 12:30 PM

Major Theme
Economics of Aquaculture

Abstract

In Uganda and Sub-Saharan Africa (SSA) in general, pond productivity is low; and as a result the aquaculture sector is characterised by continuous exit of old practitioners and entry of new adopters. In a pond system, Nile tilapia takes about 10-12 months to reach table size (~500g) when fed on a nutritionally complete diet. In cages, a 500 g fish is obtained within 6-7 months; hence, two production cycles are possible per year. However, fingerling production in a pond based system has been more successful than in cages. This is because of the relatively easy technologies required to produce fingerlings in ponds than in cages for Ugandan farmers.

We compared the relative production economics of fingerlings and table size fish. When ponds are used for Nile tilapia spawning, about 3500 fingerlings per m$^3$ are produced every after 21 days. On the contrary, only 8 table-sized fish of ~500 g each (i.e. approx. 4 kg) are harvested per m$^3$ after 10-12 months. Hence, a farmer producing fingerlings (each sold at USD 0.22) earns over USD 700 per m$^3$ as opposed to the one producing table-size fish who earns only USD 11 per m$^3$; and moreover after a long duration and with higher production inputs. We demonstrate that pond facilities are better for fingerling production, but not for table sized fish. Clustering smallholder fish farmers to communally own and manage cages can be more productive, affordable and sustainable in Uganda and Sub-Saharan Africa (SSA) in general.

Author(s)

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Maurice Ssebisubi, ICEIDA
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Productive Efficiency of Culture-based Fisheries Production in Village Irrigation Systems of Sri Lanka

Part of
Economics of Aquaculture (5)
01:30 PM - 03:00 PM

Major Theme
Managing Small-scale and Developing Country Fisheries

Abstract

Despite the growing popularity of culture-based fisheries (CBFs) associated with village irrigation systems (VISs) in Sri Lanka, there is little knowledge about factors that influence productivity levels. To redress this, primary data from 325 fish farming groups in two districts (Kurunegala and Anuradhapura) are used to estimate a stochastic translog production frontier for CBF production. Analysis of these data indicates that technical efficiency in these irrigation systems is substantially lower than in other aquaculture production systems in a number of other Asian countries, suggesting that production can be increased substantially using existing technology. Removing subsidies, improving consultation with extension officials, and improving water user rights are found to be key means for improving efficiency. In particular, productivity could potentially be improved through the introduction of a transferable community quota system for water rights use.

Keywords: Village irrigations systems, culture-based fisheries, stochastic translog production frontier, technical efficiency, productivity.

Author(s)

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Clevo Wison, Queensland University of Technology (QUT)
Projected change in global fisheries revenues under climate change

Part of
Special Session: Global-scale fisheries economics research
08:30 AM - 10:30 AM

Major Theme
Closed Session: Global-scale fisheries economics research

Abstract

Previous studies highlight the winners and losers in fisheries under climate change based on shifts in biomass, species composition and potential catches. Understanding how climate change is likely to alter the fisheries revenues of maritime countries is a crucial next step towards the development of effective socio-economic policy and food sustainability strategies to mitigate and adapt climate change. Particularly, fish prices and cross-oceans connections through distant water fishing operations may largely modify the projected climate change impacts on fisheries revenues. However, these factors have not formally been considered in global studies. Here, using climate-living marine resources simulation models, we show that global fisheries revenues could drop by 35% more than the projected decrease in catches by the 2050s under high CO₂ emission scenarios. Regionally, the projected increases in fish catch in high latitudes may not translate into increases in revenues because of the increasing dominance of low value fish, and the decrease in catches by these countries’ vessels operating in more severely impacted distant waters. Also, we find that developing countries with high fisheries dependency are negatively impacted. Our results suggest the need to conduct full-fledged economic analyses of the potential economic effects of climate change on global marine fisheries.

Author(s)

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Rashid Sumaila
Consumer Preferences for Lionfish Meat in U.S. Virgin Islands

Abstract

Invasive lionfish are changing the Caribbean’s reefs and despite substantial efforts, stakeholders have made little progress in addressing the impacts. For a decade, researchers and policy makers have encouraged the consumption of lionfish meat as an economically sustainable means of curtailing the fish’s proliferation, yet there is little research assessing the economic viability of a consumer market for lionfish meat. Using survey data collected in the United States Virgin Islands, we model latent consumption with a zero-inflated negative binomial regression. With this approach, we estimate two set of parameters, first those explaining the probability of an individual being a non-consumer and second those explaining consumption level given an individual is a consumer. This allows us to better identify consumer perceptions and characteristics that increase both likelihood of participating in the market and potential quantity consumed by participants. Data were collected via personal intercept surveys of 413 tourists and residents in summer 2016. Findings confirm the hypothesized two-stage decision process when confronted with the opportunity to consume lionfish. Statistically significant findings include that safety concerns and low interest in seafood are negatively correlated with being a potential consumer. As lionfish has been mischaracterized as being at higher risk for carrying ciguatera and as poisonous, this likely conflates to reduced participation in the market. Environmental concerns were also positively correlated with the probability of being a consumer. As both safety and environmental concerns are related to individual’s level of knowledge, this implies market participation can be influenced by education campaigns and outreach.

Author(s)

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Climatic events, environmental impacts and farming inefficiency: Evidence from Vietnamese shrimp farming in the Mekong River Area, Vietnam

Abstract

Shrimp farming practices in Vietnam are highly varied, but can be divided into extensive and intensive farming systems, where the latter is more industrialized. The main objective of this paper is to determine impacts on technical efficiency in these two farming systems, with an emphasis on climatic events. Using survey data from 437 white leg shrimp (Litopenaeus vannamei) farms in the Mekong Area, Vietnam, we applied the Cobb-Douglas and Translog stochastic production frontier functions to estimate efficiency for extensive and intensive farming systems in Vietnam. The sample average efficiency for WLS is 68%, with a significantly higher efficiency level in intensive farms. The results indicate large differences in climatic impacts between production systems. We find that drought increases inefficiency for intensive farms, but significantly reduces inefficiency for extensive farms. Saltwater intrusion increases inefficiency in extensive farms, but has no significant impact on intensive farms. Disease occurrence highly increases inefficiency of intensive farms.

Demographic variables did not have any statistically significant impact on efficiency. However, some pond and feed management activities positively impact efficiency. Farms with longer crop durations attained a higher inefficiency. Farms located in areas approved (planned) by the government show substantially greater efficiency for both production systems.

Keywords: Vietnamese shrimp, technical efficiency, stochastic frontier analysis, shrimp production.

Author(s)

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A Coupled Bioeconomic Model of a Regional Economy and an Aquatic Food Web

Abstract

Feedbacks between the ecosystem and the economy are important to consider when measuring impacts from a disturbance but are often missed in representations of the economy and the food web. Moreover, regional general equilibrium models often focus on how humans respond to ecological changes and do not consider that in adapting to changed conditions, humans can further affect the ecosystem. We present a coupled bioeconomic model that integrates the economic and ecological systems into a single model; a computable general equilibrium model of a regional economy is linked with an aquatic food web model. The food web is modeled using the Ecopath with Ecosim (EwE) platform, and multidirectional feedbacks between the ecological and economic systems are included. Our bioeconomic model uniquely represents both recreational and commercial fishing activities, harvest quotas, and fish biomass values in the economic system. We simulated the bioeconomic impacts of a potential Asian carp invasion of Lake Erie’s food web and regional economy. Without including bioeconomic feedbacks, our results suggest that Asian carp could have large ecological impacts, but small economic impacts. However, even if the regional welfare impacts from an invasion are small, projected population levels are overestimated for some species and underestimated for other species when the human feedback is omitted.

Author(s)

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... and Forage in the Ecosystem

Part of
Special Session: Marine Ecosystem Service Valuation
01:30 PM - 03:00 PM

Major Theme
Closed Session: Marine Ecosystem Service Valuation

Abstract

Birds, mammals, and fish eat Atlantic Herring. For the first time, fisheries managers in New England are explicitly considering these, and other, predators when setting harvest control rules for the Atlantic Herring fishery. Based on single-species biological reference points, the herring stock is currently well above MSY levels. However, management of this small, oily fish has been quite contentious; many diverse stakeholder groups have recently pushed for increased regulations and lower quotas in the herring fishery.

As part of the process, stakeholders identified a diverse suite of metrics needed to assess the performance of a candidate harvest control rule. These metrics included body weight of bluefin tuna, productivity of common terns, biomass of spiny dogfish, and stability of revenues in the herring fishery. A simulation model was then constructed to examine the long-run effects of different harvest control rules on herring stocks, three predators, and the herring fishery. Making sense of the deluge of performance metrics is difficult.

Informing this debate is the dream for an applied economist. Bioeconomic theory of predator-prey systems provides a useful framework for thinking about the value of “herring as forage in the ecosystem.” Ecosystem Services Valuation can operationalize this framework. ESV can also simplify the decision-making process by converting diverse model outputs to a standardized unit of measure. Yet minimal, if any, ESV methods were used to inform fisheries managers. We discuss areas where ESV could have been included more prominently and the barriers to truly realizing that dream.

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Rachel Feeney, New England Fishery Management Council
Deirdre Boelke, New England Fishery Management Council
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Sea Scallops: Examining the Demand for Size and Freshness

Part of
Seafood Markets and Trade (3)
01:30 PM - 03:00 PM

Major Theme
Seafood Markets and Trade

Abstract

Hedonic models reveal the marginal implied prices of attributes; these premia represent the intersection of supply and demand for those attributes. Understanding the demand for these attributes is critical for policy analysis that may influence those attributes. While Rosen (1974) proposes a two-step method to recover demand, Kristofersson and Rickertsen (2004, 2007) illustrate a one-step method for estimating demand for these attributes simultaneously with the main hedonic model using a mixed linear model. These methods are applied to twelve years of Atlantic Sea Scallop transactions to recover the demand for two aspects of quality: size and freshness. Freshness can be difficult to measure and trip length often is used as a proxy. In the Northeast US, most scallops are typically shucked on deck and minimal processing occurs after scallops are landed - buyers may repackage, treat with preservatives, or simply resell fresh scallops. This handling may expose meats to high temperatures or sunlight, both of which may degrade product quality. We control for this by constructing various heat exposure metrics from climate reanalysis data. Preliminary results suggest substantial premia for the largest size classes, downward sloping demand for size. We also find evidence of asymmetric cross-size effects: the quantity supplied of large scallops affects the price of smaller scallops, but the quantity supplied of small scallops does not affect the price of large scallops.

Author(s)

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The IWC Bycatch Mitigation Initiative: Analysis, information sharing, and influence

Abstract

The greatest direct threat to marine mammals worldwide is bycatch and entanglement in fishing gear, estimated to take over 650,000 animals per year. In most cases, fishermen have little to no incentive to interact with these species, and indeed, often incur economic losses due to damage to or loss of fishing gear. The International Whaling Commission (IWC) is a 70-year old global organization, originally created for the management of commercial whaling. It is now focused on a number of non-harvesting threats to marine mammals, including underwater noise, ship strikes, and fishery interactions. While the IWC does not directly regulate fishing, it is launching a new, interdisciplinary initiative focused on bycatch mitigation. This presentation gives an overview of the science and strategy behind this IWC Bycatch Mitigation Initiative (BMI), and focuses on two case studies for which bycatch is of particular concern given its population-level impact on the species in question. Through a process of analysis, outreach, information and technology sharing, and persuasion, the IWC will attempt to make a measurable difference in the level and impact of bycatch in particularly challenging fisheries.

Author(s)

Rebecca Lent, International Whaling Commission
Marine Ecosystem Service Values and Valuation in the U.S.

Part of
Special Session: Marine Ecosystem Service Valuation
01:30 PM - 03:00 PM

Major Theme
Closed Session: Marine Ecosystem Service Valuation

Abstract

In the U.S., there is momentum building towards increasing usage of ecosystem-based management (EBM) approaches, which require understanding the multiplicity of ecosystem goods and services and how they affect and are affected by human users of the environment. To assess the trade-offs involved between competing users and components of an ecosystem, which are at the core of an EBM framework, decision-makers often need information on the economic value and preferences users have for ecosystem goods and services. Numerous ecosystem service values provided by marine environments have been measured using stated preference (SP) valuation approaches. In this presentation, we review the literature on U.S. marine ecosystem service values that employ SP methods and evaluate it with respect to a recent best practices guidance to identify weaknesses and strengths of the accumulated studies. Our focus is on U.S. studies for ecosystem service values of most significance to federal fisheries management, and we identify numerous gaps in the literature and challenges to valuing marine ecosystem services, as well as discuss several areas for potential improvement and inquiry.

Author(s)

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Respondent Uncertainty in a Stated Preference Choice Experiment of Alaska Recreational Fishing

Part of
Economics of Recreational Fisheries and Tourism (1)
11:00 AM - 12:30 PM

Major Theme
Economics of Recreational Fisheries and Tourism

Abstract

Discrete choice experiments (CEs) have been increasingly utilized to value recreational fishing opportunities. In these applications, CE questions ask respondents to choose from among multiple fishing trip alternatives that differ in attributes describing the trips. A number of recent studies in the stated preference literature have focused on ways to reduce potential hypothetical bias using information from response certainty follow-up questions that gauge respondents’ confidence in their responses, though most of these have been developed in the context of contingent valuation. In this work, several methods for accounting for response certainty information in the estimation of recreational fishing decisions in CEs are examined, including models that explicitly account for scale differences in responses that allow for unmodeled sources of heterogeneity in responses and that jointly estimate responses to CE questions and response certainty questions. Using data from a recent survey of Alaska anglers, this paper empirically compares the effect these methods have on model parameters and willingness to pay relative to standard approaches. Preliminary results suggest less certain respondents have higher utility variance compared to those who are more certain. Respondents with lower education were also found to be less likely to be certain of their choice responses. And finally, models that jointly estimate certainty and fishing choices were found to statistically preferred, even though there was no statistical significant correlation between the choices.

Author(s)

Dan Lew, NOAA Fisheries/Alaska Fisheries Science Center
Children and Household Purchases of Seafood and Meat in Norway

Part of
Seafood Markets and Trade (3)
01:30 PM - 03:00 PM

Major Theme
Seafood Markets and Trade

Abstract
Despite an understanding among consumers that fish is a healthy food, the recommended intake is on average not achieved in many countries. This paper investigates the effect of children in households to the purchase of fish and meat products, using Norwegian household-level panel data on food purchases from 2004 to 2011. We find that children affects seafood purchases negatively in general. However, the budget share of seafood in most households with children are increasing, and they are shifting their expenditure away from beef and pork products, as the consumption of chicken products also seems to increase. A potential explanation behind this trend is the introduction of convenient seafood products, in particular portion size frozen salmon fillets in 2004.

Author(s)
Kristin Lien
Yuko Onozaka, UiS Business School, University of Stavanger
“Everyone has to make a living” – exploring the attitudes towards fish farming among the locals in a rural area

Part of
Special Session: Sustainable management of coastal fisheries and aquaculture (1)
08:30 AM - 10:00 AM

Major Theme
Open Session: Sustainable management of coastal fisheries and aquaculture

Abstract

National authorities and the aquaculture industry want the Norwegian aquaculture industry to increase. However, local politicians and population do not necessarily support this. We question how aquaculture industry can improve acceptance among the local population in the areas they operate. The paper’s data comes from on a qualitative case study of a local coastal area of Norway that hosts a substantial number of fish farms. The study is part of AquaAccept, an international project funded by the Norwegian Research Council. We conducted interviews with nine different interest- and stakeholder groups, focusing on the role of the aquaculture industry in the community. We found that it was important that the aquaculture activity was sustainable; however, different groups had different definitions of “sustainability”. Additionally, due to several reasons there was a lack of communication between the aquaculture companies and the local community. The industry wanted to inform the locals, but the locals did not trust the industry. It will thus be fruitful to encourage relations of trust and fairness between locals and large international companies operating in the locals’ areas. The paper contributes to nuanced understanding of conflicts between the aquaculture industry and the local stakeholders.

Author(s)

Brita Gjerstad, University of Stavanger
Kristiane Lindland, International research Institute of Stavanger
Anne Vatland Krøvel, International research Institute of Stavanger
Blue growth policies amid market imperfections: Predicting the local economic and environmental impacts of a marine-based stimulus policy in rural Indonesia

Part of
Special Session: Session in honor of contributions by James Wilen to marine resource economics (2)
01:30 PM - 03:00 PM

Major Theme
Open Session: Session in honor of contributions by James Wilen to marine resource economics

Abstract
Coastal and island nations around the world are pursing ‘blue growth’ policies to achieve sustainable development objectives through the management of marine and coastal resources. However, marine-based sustainable development policies are often implemented without addressing underlying causes of overharvest and ecosystem degradation. We use a hybrid bioeconomic local general equilibrium model to simulate the local impacts of one of Indonesia’s proposed marine fisheries policies: provisioning of fishing boats to support offshore fish production. The policy was designed to encourage fishermen to shift their effort into offshore fisheries and out of nearshore fisheries, thereby increasing offshore fish production, alleviating poverty, and reducing fishing pressure in nearshore ecosystems. A model of the local economy and its connection to open access fisheries was parameterized with a unique microeconomic data set and then used to evaluate the boat provisioning policy. We find that the policy will increase offshore fish production and the real income of the households receiving offshore capital. However, the real income of some households will decline, and the marine-based policy will not achieve conservation objectives; economy-wide production in nearshore fish will increase immediately following the boat provision, causing a decline in nearshore fish stock. Finally, we compare the outcomes of this marine-based policy to a similarly-sized stimulus policy targeting agriculture production. We find that under certain market conditions, an agriculture-based policy can achieve marine conservation objectives. This study’s examination of the local economic and biological impacts helps us re-examine marine-based development policies and their ability to achieve sustainable development objectives.

Author(s)
Amanda Lindsay, University of California Davis
James Sanchirico, World Wildlife Fund
Estimating the recreational values of sea trout fishing in Norway

Part of
Poster Session
05:00 PM - 07:30 PM

Major Theme
Economics of Recreational Fisheries and Tourism

Abstract

This paper is to assess recreational values of sea trout fishing and the trade-offs of these values associated with changes in characteristics of trout populations, fishing sites and management issues. Sea trout (Salmo trutta L) is an anadromous salmonid species and sensitive to negative environmental conditions in both freshwater and marine habitats in the coastal areas. Land-use alterations and other human activities are hypothesised to cause changes in individual migration strategies of sea trout and hence influence their movements between estuarine and fjord habitats. Fishing sea trout is a very popular and accessible recreational activity in the near shore coastal areas and in rivers. Recreational fishing, however, has in recent years been more restricted in some parts of Norway due to management actions in response to the declining stocks. A discrete choice experiment is used to estimate marginal values of anglers’ preferences for different attributes related to sea trout stock, fishing and management, and then further assess the trade-offs of these attributes. Preliminary results reveal that only fish appearance attribute is statistically significant. Not surprisingly, Norwegian anglers are not willing to pay for trout that are potentially damaged by sea lice. Anglers’ perceived values of fishing season and access to fishing sites show an inverted U-shaped pattern while fish size is least important predictor. By eliciting anglers’ preferences for different attributes, stakeholders and policy makers become more aware of these trade-offs that can be used to maximize social benefit of management programs and strategies.

Author(s)

YAJIE LIU, Faculty of Biosciences, Fisheries and Economics, University of Tromsø
Social and economic effects of MSC’s ecolabel: piloting a new impact evaluation approach

Part of
Certification of Fisheries and Aquaculture (1)
08:30 AM - 10:00 AM

Major Theme
Certification of Fisheries and Aquaculture

Abstract

The Marine Stewardship Council (MSC) is an international eco-labeling program, designed to drive improvements in fisheries’ environmental sustainability by leveraging market-based incentives. Although certified harvesters are benchmarked against environmental criteria, the process in and of itself introduces changes in market dynamics and has social implications for those involved. Recognizing their duty to transparent reporting of program impacts to stakeholders, the MSC set out to expand their existing monitoring and evaluation program beyond stocks and ecosystems, to also include socio-economic effects (intended or unintended).

To this end, following expert consultation, we developed a semi-structured questionnaire designed for use in interviews with key informants from certified fisheries in any region and of any scale. After reviewing institutional knowledge and literature, the questionnaire focused on three key themes: perceived benefits of certification, changes in relationships between harvesters and supply chain, and changes in harvesters’ conflicts and partnerships with other stakeholders. The approach was tested across three pilot fisheries: South Brittany sardine (France), U.S. East coast albacore tuna, and Portuguese sardine, as well as the canneries representing first point of sale. The results suggest mixed perceptions of the role of MSC in delivering market benefits, or empowering harvesters with respect to canners’ control of market price and capture of (potential) price premium derived from the eco-label. We discuss the practical challenges of designing such a survey instrument, implications for testing assumptions underpinning the organizational theory of change, and the MSC’s plans for leading this research forward.

Author(s)

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Dan Averill, Marine Stewardship Council
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Ashleigh Arton, Marine Stewardship Council
Catherine Longo, Marine Stewardship Council
Dilemmas in managing small-scale fisheries using large-scale management approaches

Part of
Understanding Small-scale and Developing Country Fisheries (1)
11:00 AM - 12:30 PM

Major Theme
Understanding Small-scale and Developing Country Fisheries

Abstract

UNUFTP

Conventional fisheries management approaches used in large-scale fisheries are popular in managing small-scale fisheries. Among the most applied include limiting access, and fishing and gear restrictions. Why is this the case? Does it mean that fisheries management can only be managed by controlling how much is taken and by what means only? This paper argues that these management approaches inadequately considers conditions under which fishing takes place in a small-scale fishery. Using Lake Victoria fisheries, the paper argues that in a multi-species and multi-gear small-scale fisheries, the focus on how much and by what means only leads to a management dilemma. The paper illustrates how small-scale fisheries are a source of livelihood providing not only fish (food), but also serves as an important social security to many people dependent on it. In other words, access to fisheries is a central issue in these fisheries. For this reason, the paper concludes that managing these fisheries needs an approach that will guarantee access to the fish resources. Therefore, continued use of management approaches applicable largely in large-scale industrial fisheries undermines the important roles of small-scale fisheries to millions of small-scale fishers’ dependent on them.

Author(s)

Joseph Luomba, Tanzania Fisheries Research Institute
Paul Onyango, University of Dar es Salaam
Is aquaculture a viable option for reducing fishing pressure in Lake Victoria, Tanzania?

Part of
Managing Small-scale and Developing Country Fisheries (3)
08:30 AM - 10:00 AM

Major Theme
Managing Small-scale and Developing Country Fisheries

Abstract
Fish farming is being promoted around Lake Victoria basin on the Tanzanian side as a viable option for increasing fish production as well as reducing fishing pressure on capture fishery. It is assumed that fishers will exit capture fisheries with investment in aquaculture. Using a repository of five years of data from year 2012 to 2017 from several studies and author’s experience as researchers in the region, we argue that the assumption on reducing fishing pressure may not be achieved. The paper analyses the financial and social feasibility of two most emphasised fish farming methods (pond and cage) to highlight that investment and operating costs are beyond many fishers. In addition, socio-cultural beliefs among many fishers makes it difficult to engage in fishing farming. The paper also shows that many fishers are not accessible to financial institutions from which they can acquire required capital. For this reason, we highlight that exit objective can be realized by organizing fishers into groups and providing them with soft loans favourable to the dynamics in fishery. Moreover, there is need for more education and training to address technical and socio-cultural issues hindering development of aquaculture in the region.

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The effectiveness of 'nudges' on compliance behaviour in recreational fisheries

Abstract

Non-compliance is a tenacious problem in recreational fisheries management and poses a risk to marine conservation and socio-ecological systems. In fisheries management, deterrence-based approaches have traditionally been used to tackle non-compliance. However, enforcement is often limited in recreational fisheries and an alternative approach is needed to improve compliance. In this paper we explore the lessons from behavioural economics and apply nudge theory as the basis of alternative management approaches to boost compliance. Nudge theory argues that through positive reinforcement or indirect suggestions non-forced compliance can be achieved. There is an opportunity to test the effectiveness of nudges on compliance behaviour in recreational fisheries, which as of yet, has not been explored. We test the influence of a nudge based on social norms through an economic laboratory experiment. Our results show that a nudge can increase compliance behaviour by 10%. We find that a nudge was more effective when deterrence is low, but its effects become weaker when deterrence is already high. We find that there is heterogeneity across individuals whether they respond to nudge and that risk preferences and gender are significantly correlated with compliance behaviour. This study suggests that nudges are applicable to recreational fisheries since the scale of the compliance decision is on the individual level, in which behavioural incentives, such as social norms play a large role. We anticipate that nudges may have the potential to complement traditional management and this approach could prove successful as a cost effective compliance tool in the marine environment.

Author(s)

Mary Mackay, Centre for Marine Socioecology

Satoshi Yamazaki, Tasmanian School of Business and Economics
Capabilities, well-being dynamics and holistic value-chain analysis: three approaches for understanding development in small-scale fisheries and aquaculture.

Part of
Understanding Small-scale and Developing Country Fisheries (2)
01:30 PM - 03:00 PM

Major Theme
Understanding Small-scale and Developing Country Fisheries

Abstract
Fisheries and aquaculture in Bolivia have experienced significant growth in recent years and are presenting many development opportunities for local participants. To date, however, very little research has documented if/how participating in these opportunities contributes to observable improvements in well-being, especially among disadvantaged groups. This presentation presents the results from three complementary studies of fisheries and family-based aquaculture in the Amazon region of Bolivia carried out between 2015 and 2018. The first study draws on capabilities and sustainable livelihoods approaches to characterize the impact of microcredit for aquaculture and fishing development at the household level. The second study draws on insights from social well-being and livelihoods approaches to analyze structural and process-oriented features that constrain or contribute to perceived well-being improvements at the household and community level, with a particular focus on different dimensions of access and agency. In the third study, a holistic value chain analysis method, incorporating gender, food security, poverty and environment, was developed to assess the development impact of aquaculture in central Bolivia, comparing experiences of family-based fish farming with other small agricultural producers. Each method led to the discovery of distinct development pathways that may be beneficial to improving outcomes for local participants. The diversity of approaches and results demonstrates the value of going beyond traditional economic metrics and adapting methodologies to on the ground realities so as to uncover drivers of desired development outcomes.

Author(s)
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Mark Flaherty, University of Victoria
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The forest and fish-based economy: understanding the interdependence of 'castaña' harvesting and fishing in Bolivia's Amazon

Part of
Poster Session
05:00 PM - 07:30 PM

Major Theme
Understanding Small-scale and Developing Country Fisheries

Abstract
This paper focuses on rural development issues, linkages and interdependency of fish and forest-based livelihoods in the Amazon. It identifies and analyzes linkages between fishing and forest-based subsistence and income generating activities at community and regional scales, and discusses implications for supporting sustainable development. Case examples from Bolivian Amazon fisheries are presented and discussed.

Author(s)
Alison Macnaughton, University of Victoria
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Well-being and livelihoods dynamics in Amazon communities

Part of
Managing Small-scale and Developing Country Fisheries (3)
08:30 AM - 10:00 AM

Major Theme
Managing Small-scale and Developing Country Fisheries

Abstract
This presentation draws on insights from social well-being and livelihoods approaches, and presents a new framework for analyzing dynamics of well-being in rural communities who fish. The focus is on understanding what structural and process-oriented features constrain or contribute to perceived wellbeing improvements for households and communities, and the role of local conservation initiatives such as natural resource management decisions. Specifically, the study explores the role of agency in wellbeing change, and analyzes multi-dimensional considerations of access and equity in the context of fishing resource use and conservation, associated with wellbeing and wellbeing change.

Author(s)
Alison Macnaughton, University of Victoria
Anthony (Tony) Charles, Saint Mary's University
The importance of the human behaviour fisheries management: Using POSEIDON to test behavioural assumptions

Abstract

Systems with feedback loops, strong heterogeneity, and where decisions unfold over space and time may become complex. Complex systems require numerical and simulated solutions rather than a closed-form and analytic ones. One possible numerical solution is to develop cognitively informed agent-based models (ABMs) where agents act and interact through computationally specified models.

The talk explores eight cognitive decision-making models against observed data: two statistical agents, using real logbook data to simulate behaviours; four simple adaptive agents with no starting information; a random (baseline) and a perfect agent. These are representative of models in fisheries literature, foraging literature, and economics.

We use data from groundfish fisheries on the West Coast of the USA. This is an ideal validation setting as it is data rich and has a diverse management history, which includes spatial and temporal closures, gear restrictions, limits on entry, and most recently, individual fishing quotas. This allows for both calibration (catch from 2011-2014) and validation (predicted catch in 2015). We use biological and fleet data to parameterize the model while we use data on fishing decisions and outcome to calibrate and validate model predictions.

As a model framework, we employ the POSEIDON fisheries model (Bailey et al., in review), which allows for the integration of cognitive models within the same geographical and biological frame. Through the simulations, we show the behavioural assumptions matter greatly for model calibration and validation. In sum, we show the importance of considering the human behavioural dimension when managing fisheries.

Author(s)

Jens Madsen, University of Oxford
Triggering the tragedy: The simulated impacts of goal-oriented fisher behaviour on management interventions

Part of
Special Session: Different approaches and priorities for modeling fisher behavior (1)
08:30 AM - 10:30 AM

Major Theme
Open Session: Different approaches and priorities for modeling fisher behavior

Abstract
To avoid the tragedy of the commons, fisheries management is considered a necessity. Scenario modelling can be an effective tool to assist managers, but its utility depends on how well the model reflects the real world. This requires incorporating biological, economic and behavioural factors, amongst others. Given the complexity of socio-ecological systems, simplifying assumptions are frequently made. For example, fishers are often assumed to be profit maximising. It is known, from anthropology and psychology, that harvesters do not always act in this way. Fishers may have alternative goals such as aiming for a consistent income or a particular income level relative to their peers. Here, an agent-based model, POSEIDON, is used to simulate fisher goals that drive behaviour to understand their impact on fisheries policy outcomes. We examine how goal-oriented behaviours affect harvester’s reactions to alternative management regimes and how this impacts their income and fish biomass. It is found that when harvesters’ goals are easily satisfied, a ‘tragedy of the commons’ is avoidable without the need for management, yet the imposition of a conservative Total Allowable Catch triggers the tragedy. Thus, commons problems are not an inevitability and sophisticated governance institutions or regulations are not always required to manage them. This becomes apparent when goal-oriented behaviours are incorporated into models. Moreover, although fisher goals can be difficult to ascertain, model results suggest that readily-available fisheries data can be used as indicators of fisher behaviour. These can assist adaptive management by better incorporating behaviour into policy evaluation.

Author(s)
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Ernesto Carrella, University of Oxford
Richard Bailey, University of Oxford
Jens Madsen, University of Oxford

Part of
Special Session: Economics of Protected Marine Species
10:30 AM - 12:00 AM

Major Theme
Open Session: Economics of Protected Marine Species

Abstract

Management actions to recover the north Atlantic right whale (NARW), our case study, have been underway for several decades. In 2002 Dynamic and Seasonal Area Management (DAM and SAM) were implemented with a mix of technology standards (i.e. mandated gear requirements) and access restrictions. In 2009 a broad-based gear modification rule replaced DAM and SAM for gillnet, lobster trap and pot fisheries. Despite these measures, as well as others to reduce ship strikes, recent evidence suggests the NARW population is not increasing. To complicate matters, disentangling the effectiveness of these measures from environmental changes is uncertain. We identify strengths and weaknesses of DAMs using multiple criterion factors (biological, economic, social normative and longevity). DAMs are presented in a benefit-cost framework and empirically evaluated within a cost-effectiveness analysis; public and private sector costs of protection and benefits of reducing entanglement risk are compared. DAM policy instrument objectives were avoidance of gear-animal interactions (i.e. complete closures) or minimization (i.e. whale-safe gear). Minimization measures may be susceptible to non-compliance, reducing policy instrument benefits. Scenarios to increase compliance are examined. Previous research on compliance with gear modifications indicated increasing at-sea observer coverage showed higher compliance. We include cost increases for higher observer coverage to compare “avoid” and “minimize” policy objectives of reduced entanglement risk. Using the multiple criterion evaluation and compliance scenarios in a retrospective analysis will assist in identifying critical design features for policy instruments proposed to protect the transboundary right whales.

Author(s)

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Incentive based tools – prospects and challenges in application to migratory fisheries with a high seas component

Part of
Special Session: Incentive based tools for highly migratory and transboundary fisheries
03:30 PM - 05:00 PM

Major Theme
Closed Session: Incentive based tools for highly migratory and transboundary fisheries

Abstract

A World Bank/Global Environmental Facility funded project aims to explore the potential for incentive based tools and third-party financing to improve the performance of highly migratory fisheries with a high seas component (ABNJ fisheries). Under this World Bank project, the World Wildlife Fund (WWF-Inc.) is responsible for the work of a multidisciplinary global think tank. This presentation captures the main themes of the think tank findings based on its deliberations on developing on-the ground projects and assessments of relevant ongoing incentive based programs. The think tank assessed the prospects and challenges for reforming ABNJ fisheries based on the expected benefits and limits of incentives, which depend on the characteristics and enabling conditions of specific contexts. ABNJ fisheries are heterogenous across many dimensions that include: vessel size, catch composition on the high seas versus exclusive economic zones, value chain complexity, current value and potential post transformational value, strength and capacity of governance institutions and other enabling conditions for reform. Thus, risks, expected costs, speed of transformation, scale of investments and returns are variable across this spectrum that presents diverse challenges and opportunities for innovative design. This presentation also serves as an introduction to the session and poses critical questions for the panel discussion.

Author(s)

Vishwanie Maharaj, World Wildlife Fund
Walking the Talk: Women’s Social and Economic Contribution towards
Household and community dynamics in fisheries dependent communities of
Msaka and Kachulu, Malawi.

Part of
Special Session: Bringing Gender Discourse in Fisheries Economics and Trade (2)
04:00 PM - 05:30 PM

Major Theme
Open Session: Bringing Gender Discourse in Fisheries Economics and Trade

Abstract
Value chains are an increasingly popular approach to understanding complex policy challenges in
agricultural development including fisheries. This paper provides a synthesis of findings for a study
that was undertaken to examine the social and economic contributions of women dependent of
fisheries and to examine the contributions they made to household development as a result of
participating in small scale fish value chains in communities’ dependent on fisheries at Kachulu
beach on Lake Chilwa and Msaka beach on Lake Malawi. The study employs a qualitative approach,
with 20 respondents involved in focus group discussions (FGD) and 6 respondents involved in
individual in-depth interviews. The findings indicate that women in communities’ dependent on
fisheries contribute to address hunger and food insecurity; children education, nutrition and
wellbeing of children and household members; and poverty reduction at household level. At the
community level, women have been experiencing changes in their social life and the increased
social cohesion at the community levels. Their participation in the value chains is contributing to
driving the commercialization of economies in communities’ dependent of fisheries. Their
participation has given them the motivation to participate in the Village Savings and Loans which
has also enhanced the cohesion at the community level. From the analysis, it shows that women in
communities’ dependent on fisheries are good partners to social and economic development of
households as well as fishing communities. It is recommended that organizations should provide
basis for assisting and supporting women in fish value chains.

Author(s)
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The Economic Impact of Harmful Algal Blooms on Dungeness Crab

Part of
Special Session: Economic & social impacts of climate change on fisheries and aquaculture (1)
08:30 AM - 10:30 AM

Major Theme
Open Session: Economic & social impacts of climate change on fisheries and aquaculture

Abstract

Perceptions of seafood safety are a known driver of seafood demand and misinformation about seafood safety has generated documented welfare losses in seafood markets. Welfare losses, or avoidance costs, can occur when consumers respond to imperfect information, perceiving a health risk from seafood consumption where one does not exist. Here we explore the empirical evidence for avoidance costs generated by the 2015 harmful algal bloom event on the west coast of North America. During this event, harmful algae produced high levels of domoic acid (a neurotoxin) resulting in fishery closures for commercial Dungeness crab in California, Oregon, and Washington. To estimate a potential avoidance cost, we investigate whether Dungeness crab prices were negatively impacted by the event even after the closures were lifted and the crab was declared safe to eat. We examine price data at the ex-vessel and retail levels along with an index of consumer awareness of the 2015 event. Summarizing our results, we find ex-vessel prices fell by roughly 16% but consumer prices were not impacted. We put forth three competing theories to explain this apparent disconnect and discuss the efficiency and distributional implications of each alternative.

Author(s)

Junwei Mao, University of Washington
Sunny Jardine, University of Washington
Can SRDAM (Regional scheme for the development of marine aquaculture) facilitate the access to new farming sites on French Mediterranean coast?

Part of
Marine Spatial Planning and Multiple Use Management
01:30 PM - 03:00 PM

Major Theme
Marine Spatial Planning and Multiple Use Management

Abstract

In France, the absence of further development of marine fish farming over the last 20 years has been attributed to regulatory constraints, and to the difficult access to new farming sites, due to high competition between different uses in the coastal zone. The Regional schemes for the development of marine aquaculture (SRDAM) were introduced by the French Law on modernisation of agriculture and fisheries (LMAP, 27th July 2010). The goals of SRDAM are to make an inventory of existing aquaculture sites and to identify potential sites suitable for aquaculture, and to conciliate the development of marine aquaculture with other coastal activities. As a tool for spatial planning, they are expected to enhance access to new fish farming sites, in line with the ambitious objectives of the French national strategic plan for the development of sustainable aquaculture. Our study focuses on the three SRDAMs on French Mediterranean coast published in 2015, and was based on desk work and on inquiries with professional representatives, administration and experts. We analysed the process to build the SRDAMs and the frame resulting from the process. Two years after the publication of SRDAMs, no application for new farming sites has been submitted. Other constraints, that we discuss, appear to play a major role against the creation of new farms, in opposition with the initial hypothesis that high competition on space was the main constraint. The SRDAMs constitutes a first step in the on-going process for marine coastal zone spatial planning, in relation to the EU

Author(s)

Catherine Mariojoul, AgroParisTech
National Networking as a strategy to achieve sustainable aquaculture development: the Tilapia Mexico Network (Red Tilapia Mexico)

Part of
Special Session: Sustainable management of coastal fisheries and aquaculture (2)
10:30 AM - 12:00 AM

Major Theme
Open Session: Sustainable management of coastal fisheries and aquaculture

Abstract

Developing sustainable aquaculture is a task that presents important challenges but also opportunities among economic agents. It's not enough that individual firms -public or private- conduct their activities in a sustainable way, but their interaction within a value chain is also necessary to evolve towards the best social, economic and environmental form. Global markets, climate change, diseases, technological advances and national socioeconomic priorities obligate actors within an industry to seek most efficient ways to plan and conduct their activities. Networking at national, regional or global level is one of these possible alternatives. The Tilapia Mexico Network TMN (Red Tilapia Mexico) was established in 2014 following the triple helix model developed by Dr Etzkowitz (1990): government, industry and academy are included, with a fourth element added to this model in the consultants, NGOs and independent expertise. Taking advantage of a manifested interest in 2013 of the World Fish, to start activities in Mexico in aquaculture with a species that allows positive impacts on rural populations, socioeconomics and reduces poverty and hunger, the Network was officially funded in December 2014. Planning and operation of the Network follows Tilapia 2020, a strategic plan for the sustainable tilapia industry development in Mexico. Currently TMN includes more than 10 National Universities and Research Centers, 50 researchers in diverse fields, federal government CONAPESCA, INAPESCA, the National Development Bank FIRA and the National Committee of Tilapia, an organization of almost 2400 micro, small and medium farmers. With multiple research, outreach, public policy advisory and training activities, this paper explains our model and evolution during our first 4 years.

Author(s)

FRANCISCO MARTINEZ CORDERO, RESEARCH CENTER FOR FOOD AND DEVELOPMENT CIAD, A.C.
Scale and Impact of Global Fisheries Support Policies

Part of
Special Session: Global-scale fisheries economics research
08:30 AM - 10:30 AM

Major Theme
Closed Session: Global-scale fisheries economics research

Abstract
The OECD has been collecting information on fisheries policies for many years. The Fisheries Support Estimate (FSE) database represents the latest version of its fisheries policy inventory and classification system. This database contains information on policies in 33 countries (representing about half of global fisheries landings) totalling USD 13 billion in support expenditures. A policy impact model has been developed to use this data to investigate how different types of support can effect fishing effort, stocks, incomes and fleet size. This presentation will explain the economic rationale behind the FSE classification system and present the structure and results of the associated policy impact model. These results consider the relative impacts of policies based on the purchase of fuel, inputs such as fishing gear, vessel construction, fish prices and fisher income.

Author(s)
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By-catch variations in Mukene (Rastrineobola argentea) fishery in Ugandan portion of Lake Victoria: Case of management flaws or climatic variability?

Abstract

Mukene Rastrineobola argentea, is the third most important commercial fish species in Uganda. It contributed US$ 135 million to her economy in 2014. However, for last two decades the catches have declined gradually but with unusual high proportion of by-catch. The variable catch predictably dries at different rates which undermines final product quality, determines market outlets and trade. To verify whether by-catch variability was due to management flaws or climatic variability, a 12-month study of by-catches was undertaken at Kasekulo and Ssenyi landing sites. Monthly primary data from five randomly selected fishing boats at each landing site was collected and secondary data on Mukene catches, size variations and climatic variables between 1996 and 2016 was collated. Results showed that Mukene catches declined by a factor of four in the last three years while their sizes at first maturity reduced from 5 cm to 2.8 cm over 20 year period. Although fisheries management regulations prohibited fishing in the inshore waters, the percentage by-catch from inshore catches was 75% compared to 20% from the offshore catches at both sites. Inability to enforce management regulations led to increased fishing effort and use of illegal gears. Consequently, Mukene catches declined while by-catches increased proportionally. The water temperature increased insignificantly from average of 24°C in 1996 to 26°C in 2016. Similarly, the average pH changed insignificantly from alkaline (7.9) to slightly acidic (6.8). In conclusion, management flaws contributed more to reduced Mukene catches, increased by-catch and reduced size at first maturity than climatic variability.

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ASSESSMENT OF SOCIO-ECONOMIC VALUE OF THE SMALL PELAGIC FISHERY IN MAFIA ISLAND, TANZANIA

Part of
Fishery Governance, Policy and Management (2)
01:30 PM - 03:00 PM

Major Theme
Fishery Governance, Policy and Management

Abstract

"UNUFTP" Small pelagic fish species are important fisheries resources for food and have valuable contribution in employment creation. The overall objective of this study was to assess the socioeconomic value of small pelagic fishery in Mafia Island. The fishery is artisanal and dominated by men. The dependent on the small pelagic fishery include fishers, fish processor, fish traders, fish transporters, fish carriers, boat builders, and net repairers. They all have contribution in the value chain. The main fishing gear for targeting small pelagic are Purse seine and ring nets. The main targeted species are sardine and mackerel. Motorised fishing vessel are mostly used to target sardine while non-motorised target mackerel. Motorised vessels get more catch per day than non-motorised ones but they have high production cost. Large vessels (>10 meter) are characterised by having a high number of crew on board. Fishers using small vessels (<6 meter) are generating more profit to take home than crew in large vessel (>10 meters). The benefit for boat owners is much high than the benefits for crew. Therefore, vessel with low production cost is encouraged to fishers, for more profit generation. In order to insure application of ecosystem approach to fisheries management in the small pelagic fishery, there is the need of capacity building for fishers and other stakeholders on Fisheries Act and Regulations, fish hygiene and good manufacturing practices, resources management, record keeping and savings. This will help to raise awareness of sustainable fisheries, adequate food security and poverty reduction.

Author(s)
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Fish or Flight: The Impact of Transferable Access Rights on Rural Alaskan Salmon Harvesters

Major Theme
Rights-based Fishery Management and Co-management

Abstract
This paper explores how salmon harvesters in rural Alaska responded to the implementation of a limited access management regime that introduced transferable permits in 1975. In the context of a predominantly subsistence economy, the lump-sum payments from salmon permit sales were significant wealth shocks. Using household survey data collected in nine remote Alaskan villages, I estimate the impact of permit sale on the initial permit holders and their descendants. The eligibility rules used to allocate permits allow me to identify the impact of transferability by comparing the original permit holders to their younger siblings and to applicants given non-transferable permits. Sale of the permit by original permit holders makes their descendants more likely to migrate out of the original village and less likely to participate in commercial or subsistence harvest. Other impacts depend on the type of permit and the gender of the initial permit holder. Predominantly allocated to men, the higher value drift net permits were leveraged into an immediate increase in the probability of outmigration but no long run improvements in descendant outcomes. Contrary to the intentions of the permit system, set net permit sales by women diminish the assets and formal employment of the original permit holder, but make their descendants more likely to be formally employed outside the village. The results suggest that a transition to rights-based management of natural resources will have unintended distributional consequences that undermine the sustainability of rural fishing operations. The magnitude of these effects depends on liquidity, gender norms, and labor.

Author(s)
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Availability and usefulness of economic data on impacts of aquaculture for public policy

Abstract

Aquaculture has grown rapidly the latter decades. In addition to food, it brings jobs, income and wealth to many people, but can also impact other industries and actors. Impacts may come through the value chain, through markets for related inputs or products, and via environmental and social impacts. For planning and management purposes the potential impacts of aquaculture, both positive and negative, should be assessed. But the availability of such information varies between countries. Having information in comparable metrics can make trade-offs decisions easier and more consistent, and through that increase efficiency.

In this paper, we assess the availability of information on impacts of marine aquaculture production for the North-Atlantic area (the EU, Norway, Canada and USA), that is in economic metrics. This includes also social and environmental impacts. We map the availability for national and federal or local/regional level. This is then analysed against how aquaculture planning and management is organised in the different countries, and the corresponding needs for information of different types of impacts at different geographical levels.

We identify where availability of economic information is poor, and recommend on economic information on impacts of aquaculture that could be collected in different regions. Our analysis should be useful both for considering what kinds of new economics studies that should be done to improve planning and management of marine aquaculture in different countries and regions, and for making planners and managers aware of already existing information that could be utilised.

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Impact Assessments of Aquaculture in Norwegian Coastal Zone Planning

Part of
Marine Spatial Planning and Multiple Use Management
01:30 PM - 03:00 PM

Major Theme
Marine Spatial Planning and Multiple Use Management

Abstract

Coastal zone planning (CZP) in Norway must since 2015 include impact assessment (IA) of proposed aquaculture areas. There is not a standard method to do IAs in Norway, so various CZP processes have used different methods. For efficiency in the prioritizations and trade-offs made, the IA methods should be harmonized both across proposed aquaculture areas and different CZP processes.

This paper analyses IAs in two intermunicipal CZP processes in Norway. They involved 13 and 5 municipalities, and 109 and 34 aquaculture areas. In the first, 13 municipal planners did the assessments. The other was done by an independent consultant. We analyse if the IAs consider impacts of aquaculture more or less objectively, for impacts onto nature’s diversity, cultural heritage and cultural environment, pollution, and human society. Generally, the knowledge base is dominated by nationally verified data, produced independently of the CZP process. The exception is societal impacts in one of the CZP processes.

Further, we analyse what interests and resources are considered most relevant, highest valued and most impacted if aquaculture should be allowed. Nature’s diversity, particularly wild salmon, landscape, fisheries and employment are the major ones. Lastly, we do a probit analysis of how prioritisation of the proposed aquaculture areas is done. The consultant was highly consistent in using sum consequence as the criterion. The municipal planners were overall less consistent, and extreme impacts mattered more. However, in the municipal councils’ decisions, more of the consultant’s recommendations were overturned than the planners’ recommendations on proposed aquaculture areas.

Author(s)

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Patrick Sørdahl, Nofima
Advancing assessment methods for data-limited fish stocks

Part of
Special Session: Tools for data poor stocks in mixed, small-scale and Indigenous fisheries
08:30 AM - 10:30 AM

Major Theme
Open Session: Tools for data poor stocks in mixed, small-scale and Indigenous fisheries

Abstract

The assessment of data-limited fish stocks is crucial for the sustainable management of marine living resources. Dependent on the scope and type of available data, a range of assessment methods are available, such as catch-only, length-based, or catch and survey-based methods. However, these methods suffer from several shortcomings, such as assuming equilibrium, over-simplifying biological processes and ecological interactions, and lacking quantification of assessment uncertainty. Here, we present several advancements of data-limited stock assessment methods tackling some of these limitations. The s6model and rejuvenated traditional length-based assessment methods allow deriving biological reference levels from one year of length-frequency data while quantifying the assessment uncertainty. The stochastic production model in continuous time (SPiCT) requiring only catch and CPUE time series quantifies differences between seasonal patterns in the fishing mortality and oscillating productivity. The stage-based biomass dynamic model building upon SPiCT resolves biomass dynamics between the juvenile and adult stages, which improves the predictability of future biomass levels. The incorporation of stochastic data-limited methods into management strategy evaluation frameworks reveal appropriate harvest control rules for different stocks and how to account for the assessment uncertainty. The implementation and further development of such methods will contribute to a biological sustainable management of marine living resources, and provide robust platforms for additional quantitative economic analyses of the fisheries exploiting the resources.

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Manageable Risks and the Demand for Food Products: The Case of Oyster

Abstract
Climate change is expected to affect the occurrence of food-borne diseases. While the number of disease incidence is important from medical point of views, the economic impact arising from the change in the demand for food products may also be significant. This impact will crucially depend on whether consumers respond to a risk by decreasing their demand or by coping with the risk itself. The purpose of this paper is to examine how the demand for a food product changes when the risk with the product is manageable for consumers. We focus on the risk of norovirus food poisoning from oysters in the Japanese market. The risk of food poisoning from oyster consumption can be minimized by consumers, as thorough cooking destroys both norovirus. At the same time, there is also a market for oysters to be eaten raw, such as oyster bars. These two types of products generate differential risks associated with norovirus. We used data from 23 prefectures in Japan during 1970 - 2010 to examine how the average price of oysters are affected by the incidence of norovirus. By including the interaction term between the incidence rate and the production share of oysters to be eaten raw, we found that the incidence rate has no effect on the price of oysters in prefectures that specialize in oysters for cooking, while it has significant negative impacts in prefectures that produce oysters to be eaten raw. These results indicate that consumers respond differently to manageable and non-manageable risks.

Author(s)
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Pricing model of Tiger puffer using GMM for Fisheries Management: The case study in Aichi prefecture in Japan

Part of
Interdependency of Fishery Management and Seafood Markets
01:30 PM - 03:00 PM

Major Theme
Interdependency of Fishery Management and Seafood Markets

Abstract
The wild tiger puffer is very expensive in Japan while its price varies across seasons. The both wild and farmed tiger puffers are usually consumed in upscale restaurants for celebration. Especially the wild tiger puffer is treated as a special treat and expensive since only limited/licensed chefs can cook the toxic fish. High price and limited open access drove fishers to overfish, and also caused stock depletion. The wild one is now highly evaluated while the farmed is not. The price of the imported is reflected from the price of domestic tiger puffers. We construct a price model using GMM. The price model uses the price in Aichi market as the dependent variable. Independent variables are the catch data of tiger puffer in Aichi where the tiger puffer is caught the most in Japan, and seasonal/monthly dummies. We also used market data of Haedomari which is the leading market of tiger puffer in southern part of Japan, and imported data as instrument variables. We found that Aichi’s catches in each month were not much reflected from the price of wild tiger puffer in Aichi market because the operation days at sea are strictly limited. Our results suggest that the fishers reduce the catch in the early season and increase the catch in the late will bring them profit.

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Technical efficiency of sea bass producers in Peninsular Malaysia

Part of
Economics of Aquaculture (3)
03:30 PM - 05:00 PM

Major Theme
Economics of Aquaculture

Abstract
The production of sea bass or *Lates calcarifer* in Malaysia has grown rapidly since 2008 after the success of the hatchery industry in producing a large number of seeds in 2007. However, in recent years, the production volumes of seeds by private hatcheries have decreased substantially and the main cause for this has not yet been confirmed. In this regard, several studies suggested that such decline is potentially caused by the prevalence of disease in the sea bass culture. There is still a lack of economic analysis which could verify this issue, particularly to determine how this may affect the viability of this industry. In this study two approaches for estimating technical efficiency are used to examine the structure efficiency in the industry. Factors affecting efficiency are also examined.

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Building resilience of coastal fishing communities to harmful algal blooms

Part of
Special Session: Economic & social impacts of climate change on fisheries and aquaculture (1)
08:30 AM - 10:30 AM

Major Theme
Open Session: Economic & social impacts of climate change on fisheries and aquaculture

Abstract
The ‘blob’ of anomalously warm surface water that persisted in the North Pacific Ocean from 2013-2016 resulted in a massive harmful algal bloom (HAB) of *Pseudo-nitzschia* along the entire U.S. west coast. The bloom produced record-breaking concentrations of domoic acid, a marine neurotoxin, that contaminated seafood and necessitated fisheries harvest closures beginning in May 2015. The subsequent closures were unprecedented in both geographic extent and length. Coastal communities dependent on the lucrative commercial Dungeness crab and popular recreational razor clam fisheries were severely impacted. Here we assess the social, cultural and economic impacts of the 2015 HAB event across 17 fishing communities on the U.S. west coast using primary survey data. The survey instrument, deployed in the summer of 2017, collected data on sociodemographic and economic factors hypothesized to affect a community’s ability to cope with HAB events. Within a community disaster resilience framework, impacts are expected to be influenced by community social vulnerability, dependence on commercial and recreational fisheries, and any immediate adaptive responses. Preliminary analysis of the data indicates that community members in fishing-related occupations experienced greater impacts compared to those in other occupations. Furthermore, individuals who obtain a high proportion of income from Dungeness crab landings or razor clam harvests experienced increased vulnerability. Increased social resilience was associated with higher levels of education and access to alternate job opportunities. As climate change advances and HABs worsen, these results will inform efforts to prepare for HABs, mitigate their impacts, and aid recovery of impacted communities.

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A small sea parasite making big waves: industry consolidation under spatial-dynamic externalities

Abstract

Aquaculture firms operate under outbreaks of transmissible parasites and diseases spreading from farm-to-farm through water. Contamination results in higher mortality, slower growth of biomass, and additional costs for treatments and preventive measures. When adjacent farms are operated by different firms, it can result in failure to coordinate to prevent contamination. Theory suggests that such intra-industry spatial externalities create incentives for producers to take control of neighboring assets through mergers and acquisitions.

This paper investigates if spatial externalities can drive firms’ consolidation. We look at the Norwegian salmon aquaculture industry over a 10 year-period that was characterized by significant consolidation, major parasite outbreaks, and a growing resistance of sea lice to chemical treatments. We use a new dataset including detailed production, environmental, and financial information about every plant and every firm as well as the industry’s history of mergers and acquisitions. We are able to estimate the impact of an externality travelling from one farm to another, and test if the strength and direction of the contamination resulted in increased probability of consolidation. Our identification strategy separates the effect of externalities from other drivers of mergers such as economies of scale.

We find evidences that firms make acquisitions to internalize the parasite externality. Consequently, the presence of an important externality may change an industry’s structure. This suggests existence of policy trade-offs between different market failures such as externalities and market power. These findings also highlight the importance of considering spatial-dynamic externalities for allocation of property rights in the context of aquaculture.

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Consequences of industry consolidation on the control of spatial externalities: The case of Norwegian salmon aquaculture

Part of
Economics of Aquaculture (5)
01:30 PM - 03:00 PM

Major Theme
Economics of Aquaculture

Abstract

Transmissible parasites and diseases constitute major challenges in intensive aquaculture. In the Norwegian salmon farming industry, costs associated with treatment of sea lice are surging, and reached 5bn NOK or 10% of the industry’s total export value in 2015. The Norwegian salmon farming industry experiences a high degree of ownership fragmentation compared to other countries. The large number of players at the national and regional level can create a challenge for coordination in sea lice mitigation, leading to a “Tragedy of the Commons.”

This paper investigates how industrial organization and spatial configuration of firms influence behaviors associated with prevention and treatment of parasites. We use a unique farm-level dataset on Norwegian salmon aquaculture, that provides high-frequency data on production, treatments, and environmental quality. We quantify the strength of the farm-to-farm externality based on historical biomass levels of salmon, count data on sea lice, and the connection between farms through oceanographic currents. We analyze factors that influence treatment type, frequency, and synchrony. Particularly, we examine the degree of consolidation and the spatial configuration of firms within distinct zones of influence with respect to the lice externality.

Preliminary results suggest treatment behaviors differ according to firm characteristics such as size and spatial connectivity of farms. Regional concentration induces firms to alter their behavior to partially ‘internalize’ the parasite externality. Our findings highlight interactions between industrial and environmental policies in the context of aquaculture – interactions that will become even more important as regulators wrestle with both consolidation and spatial intensification in aquaculture systems.

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Towards Sustainable Management of the Blue Swimming Crab Fishery in Indonesia

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (1)
11:00 AM - 12:30 PM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract

Indonesia’s Blue Swimming Crab (BSC) contributed USD 264 million in export in 2015, supporting 65,000 fishers and 130,000 processors. The size limit policy and a nation-wide trawl ban policy for BSC were designated to promote the BSC sustainability. We test the impact of these two policies alone and combined and evaluate the synergistic benefits of managing effort in the fishery versus open access. Using an age-structured bio-economic model with three gears: traps, trawls and gillnets, we examine the impact of the policies on effort redistribution and if these policies are adequate to achieve the goals of the industry (for economic sustainability) and government (for conserving the stock) under open access, where entry to the fishery is unregulated, and constant effort, where fishing effort by sector is maintained at current levels. Under open access, the all gear’s profits will be dissipated and the stock will be reduced to ~50% of the current level for all policy scenarios (size limit, trawl ban, and their combination). Catch becomes increasingly concentrated in the gillnet sector under open access as effort shifts to this cheaper and legal gear, but profits are eroded by increasing entrants in the fishery. These declines in catch, profit, and biomass under open access can be prevented, and even reversed, under constant effort. We show that there is huge potential for trap and gillnet fishers to increase their catches when fishing effort is regulated. Controlling total effort is the only way to simultaneously achieve benefits for BSC profitability and stock.

Author(s)

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Finding the right spot: recreational sea anglers location choice in the UK

Abstract

This paper is developing a location choice model for the UK sea anglers based on a random utility model and data from the diary panel for the year 2016-17 (http://www.seaangling.org). We differentiate in this study between shore and boat anglers to allow for difference between these groups, in addition to applying a mixed logit approach which accounts for preference heterogeneity between the individual sea anglers. Alternative sites to choose from are taken from the diary as well as the website ‘British Sea Fishing’ (http://britishseafishing.co.uk) which recommends places for sea angling in the UK as well as describes the catch the angler can expect on this site. Hence, expected catch and site characteristics of these sites are public knowledge and not based on private experience. However, each angler has his/her own experience in 2016 which creates the expectations for the catch in 2017. Based on this mixed approach to create expectation with regards to catch, we calculated a travel cost model. First results show that the size and variation in the expected catch rather than targeting a specific species plays a significant role for sea anglers location choice. None of the amenities describing the congestions effect had a significant impact on the location choice, however, stationarity in the choice is a major driver for the location choice besides catch heterogeneity and size. The analysis of the impact of changes in regulations is still ongoing.

Author(s)

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The Role of Game Theory in Fisheries Economics: From Non-existent to Indispensible

Part of Special Session: Game theory and fisheries mgmt.
03:30 PM - 05:00 PM

Major Theme
Open Session: Game theory and fisheries mgmt.

Abstract
This paper is designed to “set the stage” for the Special Session on Game Theory and Fisheries. It traces the origins of the application of game theory to fisheries economics, noting that, for the first quarter of a century after the publication of H. Scott Gordon’s 1954 seminal article, the role of game theory in fisheries economics was all but non-existent. The coming of the EEZ regime, and the emergence of the internationally shared fish stock problem, forced the hands of fisheries economists compelling them to bring game theory to bear, since strategic interaction between and among fishing states sharing the aforementioned stocks lay at the heart of the problem. That problem became increasingly complex over the ensuing decades requiring, in turn, the application of increasingly sophisticated game theoretic models. The question now concerns the relevance of game theory to the management of intra-EEZ fishery resources. The paper argues that game theory is in fact highly relevant, but that the application of game theory to the management of intra-EEZ fishery resources lags far, far behind the application of game theory to international fisheries. The paper goes on to explore this “new frontier”, introducing and discussing such concepts as double level cooperation.

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Commercial Fishing Vessel Safety in the Northeastern U.S. Multispecies (Groundfish) Fishery: does catch share management make a difference?

Part of
Special Session: Effects of fisheries mgmt. on risk-taking & safety
11:00 AM - 12:30 PM

Major Theme
Closed Session: Effects of fisheries mgmt. on risk-taking & safety

Abstract

Safety outcomes are one measure of the performance of a commercial fishery. Catch share management, which allocates fishing quota to individual vessels or entities, may reduce economic incentives to engage in risky behavior in the “race to fish”. The Multispecies Fishery in the Northeast region of U.S. is considered the one of the region’s most dangerous commercial fisheries. Catch share management was implemented in a portion of the fishery in 2010. This study presents a direct measure for risk-taking behavior and vessel safety, using the Northeast Multispecies Fishery as a case study. The objectives of this work are to allow for empirical comparison across federally managed commercial fisheries within a region and throughout the U.S., and to identify factors that may contribute to sustained risk-taking behavior, regardless of management approach.

Author(s)

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Modeling Recreational Fishing Response to Weather

Part of
Economics of Recreational Fisheries and Tourism (3)
03:30 PM - 05:00 PM

Major Theme
Economics of Recreational Fisheries and Tourism

Abstract
Predictive models of recreational fishing behavior are of value to resource managers, project planners and agencies conducting Natural Resource Damage Assessments. Modeling baseline behavior of count data is one way analysts can estimate the value of systematic changes due to access projects, losses of infrastructure, temporary closures or site quality changes. This work explores relative performance of baseline models of recreational fishing count data and responsiveness to weather and water temperature variables. Results include the relative performance of extreme vs. mean temperatures as well as various temporal specifications for precipitation. Generally, cross-validation shows improved performance for parsimony over the in-sample model-fit performance of more complicated models.

Author(s)
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A risk-return prioritisation tool for global shipping inspections

Part of
Marine Spatial Planning and Multiple Use Management
01:30 PM - 03:00 PM

Major Theme
Marine Spatial Planning and Multiple Use Management

Abstract

The spread of invasive species continues to provide significant challenges to those government biosecurity agencies charged with protecting a country’s borders. In an increasingly connected world, these invasive species are potentially able to spread further and more rapidly. Human mediated pathways such as ships are the most obvious ways in which invasive species can be spread. Biosecurity inspections of incoming ships is one means for reducing the risk of invasion through international shipping. However, the number of arriving ships requiring inspections is increasing while the budgets of the inspection agencies are limited. Using machine learning tools, we developed a tool that will analyse the pathways for incoming ships and predict the chance the ship could be carrying invasive species. The tool is combined with queuing theory from operations research and economics to determine the optimal allocation of inspection resources. This strategy is likely to deliver significant benefits in terms of reduced overall costs of inspections to the Department of Agriculture and the wider shipping industry. In this paper, we present estimates of the benefits and costs of the strategy and discuss the implications, and further work required to deploy the tool.

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Estimating the technical efficiency and impacts of a virus disease outbreak in the Abalone Fishery in Victoria, Australia

Part of
Poster Session
05:00 PM - 07:30 PM

Major Theme
Fishery Governance, Policy and Management

Abstract

The Abalone Fishery is one of Victoria's most valuable commercial fisheries and almost all of the catch is exported to international markets, predominately in Asia. An outbreak of a virus called the Abalone Viral Ganglioneuritis (AVG) decimated as much as one third of Australia’s abalone, starting in 2005. However, there has been little economic analysis of the commercial abalone fishery in Victoria. This study examines technical efficiency in the Victorian Abalone Fishery with an input-oriented data envelopment analysis (DEA) using panel data for the period from 1978/79 to 2009/2010. The influence of factors affecting technical efficiency is analysed using a Tobit regression model of DEA-derived scores. Such factors include inputs (such as number of fishers, time spent fishing), dummy variables for fishing zones, disease outbreak and a time trend. The results show an increase in technical efficiency, with a decline in capacity utilisation across the three fishing zones. We discuss these results and their management implications.

Author(s)

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Aquaculture production in Asia–Vulnerability and Resilience towards Climate Change impacts

Part of
Management Challenges of a Changing Environment (1)
02:00 PM - 03:30 PM

Major Theme
Management Challenges of a Changing Environment

Abstract
The world aquaculture sector plays an important role in global food supply. Climate change consequences may affect aquaculture production either directly or indirectly through environmental impacts, farming areas, feed availability and market impacts. Asia is by far the world’s largest aquaculture producing region. This study focuses on fresh and brackish water aquaculture, especially carp, tilapia, and shrimp production, in selected Asian countries including Sri Lanka. An evaluation of resilience and vulnerability of farmed species and farming systems towards possible impacts of climate change is provided. Data on production in terms of quantity and value, environmental conditions and tolerable capacities for species, and types of farming systems practiced in selected countries have been collected by literature surveys. Expert judgement is used to assess sensitivity and adaption capacity of species. The Shannon-Wiener diversity index has been employed as a measure of fish farming diversity in a country. The results show that resilience and vulnerability towards climate change impacts depend on the climate zone of the aquaculture production, species characteristics, farming techniques, and availability of adaptive strategies. Most of carp, tilapia and shrimp species have the potential of adapting to a warmer climate. Carp and tilapia productions are vulnerable to seawater intrusion during coastal flooding. Reduced fishmeal supply may constrain shrimp production if it occurs in future. Diversified fish farming in the Asian countries could adopt to climate change impacts by modifying farming systems, technology and infrastructure facilities in the future.

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Socio-economic and sustainability consequences of the decline of large fish species in the Ugandan large lakes

Part of
Managing Small-scale and Developing Country Fisheries (1)
02:00 PM - 03:30 PM

Major Theme
Managing Small-scale and Developing Country Fisheries

Abstract

The large lakes (Victoria, Albert, Kyoga, George, and Edward), covering 75% of Uganda’s surface area under contribute up to 90% of the capture based fisheries production. Until the late 2000s, the commercial fisheries in these lakes was largely based on species that grow to large sizes (> 20 cm) including; *Lates niloticus*, *Oreochromis niloticus*, *Protopterus aethiopicus*, Bagrus Dockmak, and *Clarias gariepinus*, constituting >80% of the landed annual catches. Analysis of fish catch statistics (2005-2016) from these lakes revealed a sweeping shift in the commercial species composition from dominance of the large to the small size species. On lakes Victoria and Kyoga, *Rastrineobola argentea* dominates (40-60%) the catch while *Brycinus nurse* and *Mesobola bredoi* constitute 80% of the Lake Albert total catch. The small haplochromine cichlids account for 90% of the fish biomass in lakes Edward and George. Despite the dominance, the economic value of the small size fishes is still insignificant.

Key words: Selective fishing, Stock collapse, value addition, Marketing

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Do FAD Fisheries Management for Artisanal FAD Tuna Fisheries in Indonesia Could be ESTABLISHED?

Part of
Fishery Governance, Policy and Management (1)
11:00 AM - 12:30 PM

Major Theme
Fishery Governance, Policy and Management

Abstract
“UNUFTP”Artisanal FAD Tuna Fishery is the main contributor of Tuna Catches in Indonesian Tuna industries. It plays as the major source of tuna for industry input and consumed fish. Most of the Tuna fishery associated with FAD (Fish Aggregating Devices) in Indonesia is categorized as artisanal in which more than 75% of the tuna fishing fleet are under 10 GT size. Recently, FAD utilization as additional fishing gear has become major issues in Indonesia such as space competition and users’ conflict. Three major gears related with FAD are pole and line, purse seine, hand and troll line. They usually were associated with deep sea FAD. FAD capital can cost up to USD 1,880 depending the rope lengths. We find that FAD fisheries in these areas are profitable but there are some indications of over investment and uncontrolled increase of FAD number. The next concern is the ecological issue related to the juvenile catch. Government of Indonesia took some actions to manage FAD fisheries. Two FAD Regulations was enacted to manage the use of FAD in the fishing operation. Both regulations require details technical specification and strict conditions before the government grants the license. However, none of the FAD was registered until to date and the regulations remain as PAPER POLICIES and not yet fully implemented. We find that efforts in socialization and enforcement of the ministerial decree are very weak and lacking. Tuna FAD management for artisanal fisheries is still a big challenge in Indonesia but it cannot be ignored.

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Opinions and Experiences of Australian Recreational Fishers with No-take Marine Reserves

Part of
Spatial Management and Marine Protected Areas
03:30 PM - 05:00 PM

Major Theme
Spatial Management and Marine Protected Areas

Abstract

No-take marine reserves are a contentious policy in Australia, particularly for some recreational and commercial fishers who fear loss of access to historic fishing grounds. However, it is unclear whether negative perceptions about reserves are widespread amongst recreational fishers, and whether these perceptions change over time. We surveyed recreational fishers in ten Australian marine parks to determine levels of support and beliefs about the benefits and costs of no-take marine reserves. We apply a ‘space-for-time’ approach to explore whether support is higher in older reserves. Our results suggest that most recreational fishers who fish in established marine parks are supportive of the no-take marine reserves. On average (across marine parks) 63.3% of fishers support the no-take marine reserves in their marine park, and 17.8% are opposed. Further, we find that, for an average fisher and marine park, recreational fishers’ support for no-take marine reserves grows over time as fishers gain experience and adjust to the marine reserves; the proportion of supporters is nearly 30% higher in marine parks that have been established for 15 years compared to newly established parks.

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A Semi-Parametric Health Production Function for The Asian Ocean Continent Oceans

Part of
Poster Session
05:00 PM - 07:30 PM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract
The development of a health production function based on human and community health models for the oceans surrounding the Asian continent using Ocean Health Index (OHI) for 2013 was executed. The semi-parametric regression equation was employed to determine the factors that influence ocean health. Data from the Ocean Health Statistics for 36 Asian countries, data from the Human Development Index (HDI) and United Nations environmental data base were employed. Model results show that the semi-parametric equation produced good results with $R^2$ of 99.8. All variables in the regression model had anticipated signs and were significant at $\alpha=0.05$. Livelihoods and Economies, Biodiversity, and Carbon Storage had the highest elasticities. Livelihoods and Economies had an elasticity of 0.15 which means that a 10 % increase in Livelihoods and Economies resulted in a 15 % increase in OHI. A 10 percent change in Biodiversity resulted in a 14 percent increase in OHI. Artisanal fishing, Coastal Protection, Natural Products and Clean Water also had major impacts on OHI. HDI and GNI/capita positively influenced ocean health. The paper is the first to produce measurements of elasticities that show importance of livelihoods, economies, biodiversity, artisanal fishing, carbon storage, the human development index (HDI) and GNI on the ocean health of the Asian continent. The study is essential to policy makers worldwide in decision making on human activity and responsible fishing on ocean health. Livelihoods and artisanal fishing can be manipulated and regulated to influence ocean health and socio-economic conditions of coastal communities.

Author(s)
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Abstract

Past annual abundance of Spanish mackerel landings in Nha Trang Bay from February to September has been decreasing remarkably. This phenomenon may be due to changes in Sea Surface Temperature (SST) associated with recent climate changes. Variations in annual landings of Spanish mackerel based on Bich Hai set-net fishery located in Nha Trang Bay were compared with variations in SST from Nha Trang Meteorological Center in Vietnam during the period 1996-2015. The study used a simple linear regression model, to assess the relationship between variations in annual average SST and landings of Spanish mackerel. The study examined the relationship between SST variations on three mackerel sizes, small size (less than 2.0kg), medium size (from 2.0kg – 4.0kg) and large size (higher than 4.0kg). Results showed that annual SST variations were negatively correlated with annual landings of Spanish mackerel ($r = -0.681; p = 0.001$). The three mackerel sizes in catch had significant links with changes in annual SST in the past 20 years. For small mackerel size, its proportion in catch had a positive relationship with inter-annual average SST ($r = 0.458; p = 0.021$). By contrast, the pattern of both medium and large mackerel size showed negative relationship with SST indices during a selected period with the same coefficients of $r = -0.413$ and $p=0.035$. While a single nation may be unable to reverse the trend of increases in SST, decision makers may consider resource conservation practices to retard the reduction of landings of Spanish mackerel.

Author(s)

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Ocean Health Production Functions Using Tobit and Rank Regression Models

Abstract

Ocean health is a major concern for coastal communities dependent on the ocean for their livelihood. Recent changes in ocean health force researchers to examine the factors that influence the decline in ocean health. The paper developed production functions using the Global Ocean Health Index (OHI) for 2014 and UN environmental and climatic databases. The study used a two-stage regression model to determine factors that influence OHI. The use of accurate and relevant methods such as the Tobit model and/or rank-based regression helped improve the reliability of the statistical coefficients by uncovering nonlinear covariate effects and improving the performance of the decision models. We employed Ocean Health Statistics for 151 countries plus data from the Human Development Index (HDI) of 2014. Model results showed for the Tobit model, the variable biodiversity had a major effect on ocean health and contributed succinctly to the variation in OHI. Other goals that affect OHI are livelihoods and economies, sense of place, clean water, and artisanal fisheries. The rank regression model showed HDI and Marine Protected Areas (MPAs) significantly influenced OHI. HDI is positively related to OHI: countries with high HDI, like many European countries and the US, also have high OHI. Policy makers should note that biodiversity and MPA increases may have the greatest effect on OHI, and its improvement may be within the reach of even the poorest country.

Key words: Ocean, Health, Tobit, Rank, Regression.

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Shrimp Farmers Willingness to Pay for Insurance Coverage in Vietnam

Government of Vietnam (GOV) decided in 2011 to implement an aquaculture insurance scheme starting with a heavily subsidized pilot insurance program during the period 2011-2013. After the completion of the three-year pilot scheme, the intention of GOV was to allow the private sector to run the insurance. The overall objectives of this paper are to evaluate the farmers’ willingness to participate in an aquaculture insurance program and their willingness to pay for aquaculture insurance as a disaster adaptive strategy. About 300 shrimp producing households in Ben Tre and Tra Vinh provinces were interviewed where the pilot project was launched in 2011. A structured questionnaire was prepared to interview 150 households that participated in the pilot aquaculture insurance program and 150 that did not participate.

Most of the farmers (70%) are willing to participate in an insurance program and are willing to pay an average of 1,000,000 VND or $50.00 per ha for cost coverage for up to 80 days. About 90% of those who are willing to pay did not want the insurance to cover a period for not more than 80 days. The tobit model show that farmers willingness to pay for insurance coverage is positively influenced by the age of the farmer, experience, and his/ her levels of investment in the shrimp business. Farmers are unwilling to pay for insurance to cover death from climatic conditions. The information received indicated that farmers are willing to cover losses from death from diseases but not from climatic causes.

Author(s)

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Production Efficiency of Atlantic Salmon Farming in Key European Countries

Part of
Economics of Aquaculture (6)
03:30 PM - 05:00 PM

Major Theme
Economics of Aquaculture

Abstract
The objective of this research is to examine and understand the economic performance of Atlantic salmon farmed in Norway and Scotland, the first and third ranked salmon producing countries in the world. The research applies the Data Envelopment Analysis (DEA) to decompose productivity into changes in scale efficiency and technical efficiency. The data on Norway salmon covers the period 2006-2015 and includes observations on operating revenue, employment costs, material costs, current assets, fixed assets and shareholders’ funds for 30 Norwegian firms. The data on salmon aquaculture in the UK covers eight firms observed during the period 2008-2015. Information of UK salmon is available on operating revenue, current assets, fixed assets, current liabilities and the number of employees. We found that Norwegian salmon firms have achieved performance efficiently over the last decade. At least a third of the companies have been in the frontier line of productivity. Salmon firms in Norway enjoyed a technical efficiency, under the assumption of variable-returns-to-scale, which averaged 0.947 and a scale efficiency of 0.949. Norwegian salmon companies could operate on the frontier to reduce their fixed assets by 15.3%, shareholders’ funds by 13.4%, current assets by approximately 9%, employment costs by 8.3%, and material costs by 5.6%. Similarly, salmon firms in the UK enjoyed a technical efficiency of 0.962 and scale efficiency of 0.933. UK salmon firms could, on average, by operating on the frontier reduce their current assets by 5.2%, fixed assets by 11.7%, current liabilities by 14% and number of employees by 8%.

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World Price Transmission for Differentiated Products: The Case of Shrimp in the U.S. Market

Part of
Seafood Markets and Trade (1)
08:30 AM - 10:30 AM

Major Theme
Seafood Markets and Trade

Abstract

The traditional approach to testing the law of one price is modified to allow for product differentiation. Applying the modified framework to the U.S. market for shrimp, the pass-through elasticity of the import price into the domestic price was found to be less than one, as predicted by theory when products are differentiated by place of production. Among the supply and demand shifters included in the model, the most important variables to affect the domestic price are exchange rates and the price of diesel fuel. The pass-through elasticities for diesel fuel (0.38) and exchange rates (0.55) are almost as large as for import price (0.60). This suggests changes in exchange rates and fuel prices are not to be overlooked as important drivers of the domestic price. The U.S. market for shrimp is highly efficient, with 70% of disequilibrium caused by a demand or supply shock “corrected” within one month.

Author(s)

Ly Nguyen, Auburn University
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ANALYSING UNCERTAINTIES IN SOCIO-ECONOMIC ASSESSMENTS OF SEAFOOD PRODUCTION UNDER CLIMATE CHANGE

Abstract

Socio-economic analysis of seafood production is important for the conservation of aquatic ecosystems and the management of fisheries and aquaculture activities. Understanding how the livelihoods of people, dependent on the exploitation of aquatic resources, are affected by various changes is essential for decision making. The two main seafood production sectors, fisheries and aquaculture are fundamentally different. Whilst fishing is an extremely uncertain and complex system that operates in an ecological context where constant interactions between biology, ecology, climate, economics and sociology take place (FAO, 2017), aquaculture normally takes place in a considerably more controlled and contained production setting within the ecosystem. However, climate change will likely impact both sectors in various ways.

This study presents how uncertainty is considered within the socio-economic assessments of two important economic activities in the Northeast Atlantic, one the salmon aquaculture operation in countries such as Norway, Scotland and the Faroe Islands and the pelagic fisheries in EU, Norwegian, Faroese and Icelandic waters. A novel approach in our assessment is the consideration of the uncertainties of input factors as consequences of climate change, resource abundance, technology, operators’ behaviour, market conditions, harvesting efficiency, governance policy, and socio-economic status of communities. Data collected by individual surveys and secondary sources are described as statistic distributions that are used for Monte Carlo simulations. Our simulation models enable researchers to predict the likelihoods of occurrence of socio-economic outcomes, and the contributions and sensitiveness of input variables to the profitability of seafood production and the gross value added to the economy.

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Comparison of Economic Performance of Pangasius Catfish and Seabass-Seabream Production Firm

Part of
Economics of Aquaculture (6)
03:30 PM - 05:00 PM

Major Theme
Economics of Aquaculture

Abstract

This research is to determine the economic performance of the Pangasius farmed in Vietnam and seabass-seabream farmed in Mediterranean countries based on Data Envelopment Analysis (DEA), which is used to decompose productivity into changes in scale efficiency and technical efficiency.

Data for 20 pangasius producers and 13 production companies of seabass and seabream during the period of 2009-2014 are available for the analysis. The result shows pangasius firms have performed at a low technical efficiency. Under the assumption of variable-return-to-scale (VRS), we found that the average technical efficiency (TE) for pangasius amounted to only 0.677, implying that the Vietnamese pangasius firms included in this study could have reduced inputs by 32.3% while maintaining the same level of output. In general, Vietnamese pangasius firms operated far below the efficiency frontier. This farming could gain an efficiency of 14.5% on average by taking better advantage of the existing economies of scale. On the other hand, technical and scale efficiency of seabass and seabream firms are low and have not improved much in recent years. The technical efficiency scores under CRS averaged only 0.429, indicating that seabass and seabream firms could have reduced inputs by 57.1% while maintaining the same level of output. Calculated scale efficiency is 0.605, implying that firms could, on average, reduce input by almost 40% by taking better advantage of their economy of scale opportunities. Interestingly, no firm in the sample was found to be operating at the scale optimal level.

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European Seafood Production under Climate Change: Assessing Economic and Social Consequences

Part of
Special Session: Economic & social impacts of climate change on fisheries and aquaculture (1)
08:30 AM - 10:30 AM

Major Theme
Open Session: Economic & social impacts of climate change on fisheries and aquaculture

Abstract

Climate change has been observed to have a significant impact on the distribution of aquatic species and productivity of aquaculture systems across the globe. This affects the level of food production, the livelihoods of communities that depend on fisheries and aquaculture, and the future sustainability of these sectors. As in all other parts of the world, climate change will have inequitable and diverse impacts on economic growth across Europe, creating winners and losers.

The European H2020 project ClimeFish investigates the impacts of climate change in aquatic food production at the European and regional scale, for the three main production sectors: marine fisheries, lakes and ponds and marine aquaculture. ClimeFish has developed a process for conducting socio-economic impact assessment by first identifying the effect(s) of climate change on the biological properties of both fish and aquaculture species, and secondly assessing the socio-economic impacts based on these biological forecasts, collecting additional socio-economic data and feedback from relevant stakeholders.

Here, we provide an overview of the methods and work conducted in seven different case studies will be provided, focusing on both opportunities and threats within the three sectors and geographical locations around Europe as well as a European wide analysis. Challenges related to the data collection and analysis, as well as potential ways of overcoming them, are discussed.

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GLOBAL VALUE CHAIN AND FOOD SAFETY AND QUALITY STANDARDS - A CASE OF VIETNAM PANGASIOUS EXPORTS

Part of
Certification of Fisheries and Aquaculture (2)
10:30 AM - 12:00 AM

Major Theme
Certification of Fisheries and Aquaculture

Abstract

Increased food safety and quality standards in developed countries have effectuated significant changes in the structure and modus operandi of the value chain (VC) of Vietnamese pangasius exports. Employing global value chain theory, the author examines the changing structure and governance in the VC of pangasius and ways to organize the pangasius industry to increase its competitiveness. The author interviewed 41 processors, and 91 farmers to study actor relationships, behaviors and nature of governance along the pangasius VC. The value chain of pangasius is composed of suppliers - producers - collectors (cooperatives) - processors - distributors - consumers, in which most of the producers are small and independent. The survey results show that VietGAP producers sold 93.1% of their products to processors, 3.5% to cooperatives and 3.4% to collectors. The pangasius export VC in Vietnam is buyer-driven. About 87.5% of the enterprises are of large scale with average of 11 years of experience in pangasius exportation. The governance of pangasius VC shifts from market to relation or captive and hierarchy structure. The changes in VC governance reflect the development and maturity of the pangasius industry. On this basis, the study draws some suggestions for policy makers: (1) Improvement in the linkages between processing enterprises and households to improve quality and at the same time reduce farmers risks; and (2) Restructuring pangasius exporting and processing enterprises to improve pangasius standards and image in the international market to advance sales and competitiveness.

Keywords: Global value chain, governance, quality standard, food safety.

Author(s)

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MACRO-ECONOMIC AND MICRO ISSUES FACING VIETNAMESE PANGASIIUS INDUSTRY

Part of
Economics of Aquaculture (1)
11:00 AM - 12:30 PM

Major Theme
Economics of Aquaculture

Abstract

Vietnamese pangasius has achieved global status as a highly competitive whitefish as exports to Europe, US, Asian and Latin American countries have grown at a rapid pace. Accelerated growth rates have met with a number of challenges potentially capable and convertible into opportunities to foster further industrial progress and expansion. This study uses secondary data and an intensive literature search to examine economic and market issues facing the pangasius industry in the EU market. The paper employs descriptive statistical and multivariate times series regression analyses to evaluate micro and macroeconomic variables influencing pangasius exports. High interest rates, fluctuating exchange rates, access to credit, lack of capital acquisition by small farmers, and product risks are key economic issues confronting the industry. Product quality and standards, product image and rejection pose financial pressure on farmers, processors and exporters. The paper suggests that at the domestic level farmers can organize alongside vertical integration to improve quality and supply consistency. The industry may employ a combination of vertical and mixed product differentiation for quality control and market share expansion in the EU white fish market. Policy formulation may assist producers, processors and exporters to enhance their global stature in the EU fish market.

Key Words: Pangasius, Microeconomic, Macroeconomic, White Fish Market, Vietnam.

Author(s)

TRAM ANH NGUYEN, NHA TRANG UNIVERSITY
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Challenges in Implementing Stock Assessment, Economic Fishery Analysis, and Risk Assessment for Sustainable Management Strategies of Data Poor Stocks

Part of
Special Session: Tools for data poor stocks in mixed, small-scale and Indigenous fisheries
08:30 AM - 10:30 AM

Major Theme
Open Session: Tools for data poor stocks in mixed, small-scale and Indigenous fisheries

Abstract

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A series of session stakeholder presentations will address the current status, challenges, needs and future perspectives for implementation of management and ecological / economic assessment of data poor fish stocks and fisheries in management advice. This covers methods, simulation models and management strategy evaluation (MSE) tools to conduct assessment and evaluate economic efficiency and risks in exploiting data poor stocks caught in mixed, small scale, and indigenous fisheries. Focus is on accessibility of models and their development to ensure widespread and open access availability, user-friendly model operation, and efficient widespread adoption and implementation of those by scientists, stakeholders, and managers. Additional focus is on the data requirements for those models. The presentations will also address ways to link economic assessments, risk assessment and MSE with biological (ecological) assessment of stock status according to sustainable harvest levels in those data limited situations and systems to provide robust assessment and advice – and maybe even integrated ecological-economic advice? Invited stakeholder representatives from fishing industry, fisheries management, fisheries advice (ICES) and fisheries biological and economic science will present their perspectives and views on the above challenges.

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Economic impacts of food-borne illness outbreaks on small-scale aquaculture: a case study of oysters and norovirus in Hammersley Inlet, Puget Sound

Part of
Poster Session
05:00 PM - 07:30 PM

Major Theme
Economics of Aquaculture

Abstract

Food-borne illness outbreaks that implicate shellfish from a particular area can have significant economic impacts on aquaculture operations, including but not limited to direct recall costs, lost sales, and lasting brand damage. Especially where shellfish farming is the dominant livelihood, these impacts can have important multiplier effects on the surrounding community. This poster focuses on the experience of shellfish growers in Hammersley Inlet in Puget Sound. One of the most important shellfish growing areas in the state of Washington, Hammersley Inlet was implicated in two large oyster-transmitted norovirus outbreaks in 2014 and 2017. These outbreaks led to recalls, destruction of product and long-term growing parcel closures while the Washington State Department of Health investigated potential pollution sources. In winter 2018, a survey instrument was used to collect data from Hammersley Inlet shellfish growers regarding the direct impacts of these outbreaks on their businesses, the perceived multiplier impacts on the rest of their community, and their adaptability in the face of continuing issues with water quality and viral pathogens in the area. This research highlights the need to consider economic vulnerability of shellfish-dependent communities when making decisions to protect public health, the benefit of helping small-scale growers diversify their growing areas, and the importance of thoughtful shoreline development in the face of increasing development pressure.

Author(s)

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ANALYSIS OF POWER IN THE CO-MANAGEMENT ARRANGEMENT IN MALAWI: EXPERIENCES FROM MBENJI ISLAND

Part of
Managing Small-scale and Developing Country Fisheries (1)
02:00 PM - 03:30 PM

Major Theme
Managing Small-scale and Developing Country Fisheries

Abstract

"UNU FTP"

In this article I analyse a community-based small scale fisheries management (now becoming a co-management arrangement) for Mbenji Island located in the central part of Lake Malawi through the lenses of the concept of power. The analysis is at the local level where majority of the important actors operate. The actors include traditional chiefs, Department of Fisheries and fishing communities through the Beach Village Committees. The analysis, which is based on decentralisation and power frameworks, shows that there is unequal power distribution between these different actors, often resulting in the marginalization of the fishers themselves. While the Department of Fisheries and Beach Village Committees draw their powers from the current fisheries policy and legislative frameworks, the traditional chiefs remain influential through their inherited customary powers and appointments made through their chiefs’ legislative framework. Over the past years, however, there has been a shift from the culturally based fisheries management to a co-management reform whereby the traditional leaders are now advancing their own political, economic, or institutional agendas. The traditional leader exercises more authority over management of the fisheries resources with limited accountability and low participation of the fishers. While there is a need to safeguard the cultural heritage in managing the small scale fisheries and the need to promote co-management within the context of rights based fisheries, focus should also be on the participation of the fishers and accountability of the traditional leaders for advancement of the institutional and resource resilience.

Author(s)

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Credit Market Development and Resource Extraction: Evidence from Global Fisheries

Abstract

The rapid expansion of credit markets has improved the economic opportunities of the rural poor but may have also contributed to the decline of global common pool resources. This article evaluates the impact of credit market development on resource extraction using a dynamic model with property rights uncertainty over resources and new data on catches, stock sizes and property rights security of 8,600 fisheries. The theory predicts that credit market development reduces harvesting costs and induces more resource extraction if property rights are insecure. In contrast, if property rights are secure the effect of credit market development on discount rates can lead to more conservative resource extraction. The empirical findings that credit market development increases fishing effort under insecure property rights but weakly reduces fishing effort under secure property rights support the theoretical predictions. The results suggest that strengthening property rights over resources could reverse the negative impact of financial development on resource conservation.

Author(s)

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U.S. West Coast fishing communities and climate vulnerability in an ecosystem-based management context

Part of
Ecosystem-based Management and Integrated Assessments
11:00 AM - 12:30 PM

Major Theme
Ecosystem-based Management and Integrated Assessments

Abstract

As changes in climate and corresponding ocean shifts threaten U.S. fisheries with uncertain change, West Coast marine scientists and fishery management institutions have newly emphasized ecosystem-based analysis and management. The development of the West Coast-specific California Current Integrated Ecosystem Assessment (CCIEA) has accordingly allowed for economic analyses and the social science on human communities to be included in this holistic endeavor, generating enhanced collaborations between applied socioeconomic and biophysical scientists. These collaborations are beneficial, but challenges emerge within aspects of the integrated approach to ecosystem-based management including, for example, a natural science emphasis on frequent monitoring of ecosystem indicators. Alongside temporal limitations on available socioeconomic data and other data constraints that sometimes preclude frequent monitoring, distinct social science methodologies require new thinking on collaborations and socio-ecological ecosystem modeling efforts. One potentially productive avenue for collaboration involves the linkage of climate vulnerability evaluations for marine species with evaluations of both community socioeconomic vulnerability and community involvement in fishing. Northwest Fisheries Science Center (NWFSC) social scientists have developed indices of community socioeconomic vulnerability and general community-level engagement with and dependence on commercial and recreational fishing. These fishing indices are additionally modified to enable those involved in integrated ecosystem assessments to consider species and fishery-specific dependence indices by community, pairing these measures with climate vulnerability assessments for associated fish species. Such linkages allow for integrated metrics of climate-oriented exposure and vulnerability for a range of people, places and marine species, and the work presented here demonstrates the results and utility of this approach.

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Applying the decision support tool FishPath to guide the establishment of a fisheries management system in Indonesia

Part of
Special Session: Tools for data poor stocks in mixed, small-scale and Indigenous fisheries
08:30 AM - 10:30 AM

Major Theme
Open Session: Tools for data poor stocks in mixed, small-scale and Indigenous fisheries

Abstract

When data are insufficient to assess fish stocks using conventional techniques, there are a growing number of options for collecting data, estimating stock status, and translating measures of stock status into management action. The FishPath application is a user-friendly web-based decision support tool that brings together a broad collection of these techniques. Using FishPath, the concepts of data collection/monitoring, stock assessment and management control rules can be considered collectively to draft complete harvest/management strategies. It was specifically created to demonstrate which of a variety of options may be possible for monitoring, applying stock assessments and identifying control rules for data-limited fisheries. Each section has roughly 40-50 questions and provides detailed analytics for exploring assumptions in the many available options. It also underscores where uncertainty should be explored and how future improvements can lead to adaptive management. We demonstrate this tool as applied to data-limited fisheries in Indonesia. Both tactical and strategic decisions are made more transparent and tenable, while the vast possibilities to manage a fishery are made explicit and achievable. The tool is applicable to any fishery, and can provide guidance and hope when confronting the vast challenge of establishing management systems in resource limited fisheries.

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Predicting the impacts of recreational fishing by modeling angler incentives and bioeconomic dynamics: an update

Part of
Special Session: Different approaches and priorities for modeling fisher behavior (2)
11:00 AM - 12:30 PM

Major Theme
Open Session: Different approaches and priorities for modeling fisher behavior

Abstract

Much of fisheries analysis attempts to predict the impact of management alternatives on fisheries. Our predictive capacity remains especially poorly developed for recreational fishing regulations. Unlike industrialized commercial fisheries, where timely data collection and individual quotas often make it possible to adjust regulations in-season, recreational regulations are usually indirect and data are slow to be collected and compiled. We are developing a bioeconomic model to predict how changes in regulation will affect the impacts of recreational fishing. Our model quantifies angler preferences, models stock dynamics, and explores various regulatory options. It predicts fishing effort over time as a function of these model characteristics and translates that effort into predicted levels of catches and discards. The model is still in development but will be demonstrated and some initial questions will be explored.

Author(s)

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Leif Anderson, Northwest Fisheries Science Center, NOAA Fisheries
Melanie Harsch
«Big Fish»: Valuation of the world’s largest salmon farming companies

Abstract
The recent five years have seen a nearly tenfold increase the salmon stock price index at the Oslo Stock Exchange. This paper tries to shed some light on the reasons why this substantial stock price appreciation has occurred. The primary aim is to ascertain if the market valuation of salmon farming companies can be explained by rational factors, or there is an element of irrational exuberance behind current all-time high salmon stock prices. In particular, we examine the impact of both fundamental and operational value drivers. Using a sample of salmon stocks listed at the Oslo Stock Exchange during 2006-2016, we investigate whether the valuations, measured by the price-to-book ratio, is associated with fundamental information such as profitability, leverage, cost of capital, and dividends. The results suggest that a structural shift has occurred, leading to a stronger association between fundamentals and market valuations after 2012, suggesting that at least some of the stock price increase is linked to fundamental factors.

Author(s)

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Baard Misund
Establishing a market for future contracts in the Norwegian first-hand trade of wild-caught fish

Part of Seafood Markets and Trade (1)
08:30 AM - 10:30 AM

Major Theme
Seafood Markets and Trade

Abstract
The first-hand market for wild-caught fish in Norway is subject to much uncertainty for both buyers and sellers. Factors such as changing quotas, seasonal variations in availability of important species, and sudden changes in market conditions creates instability in volumes and prices both on the demand and supply side. For fishermen, processors and wholesalers, this makes production planning, business growth and market building challenging at best. One possible tool for reducing uncertainty in this market is the establishment of a commodity exchange that allows for trading future contracts on fish deliveries. Such a contract market would give fishermen more stability and predictability in future income, and processors would experience more stable margins on production. Further, a more stable first-hand market would enable wholesalers to reach new customers in segments where predictability of supply is a necessity.

Through a literature study we identify a series of success-criteria for establishing a contract market in the first-hand trade of wild caught fish. Considering these criteria, we analyze chosen segments of the Norwegian first-hand market to check if these segments are suitable for the introduction of future contracts.

At present, no such contract markets exist in the trade of wild-caught fish, neither in Norway or other parts of the world. Our study therefore gives new insight into a so far unexplored area of the first-hand trade of seafood.

Author(s)
Thomas Nyrud, Nofima
ENHANCING THE VALUE OF SMALL FISH SPECIES FOR FOOD AND NUTRITION SECURITY THROUGH IMPROVED DRYING AND PACKAGING

Part of
Managing Small-scale and Developing Country Fisheries (1)
02:00 PM - 03:30 PM

Major Theme
Seafood Markets and Trade

Abstract
ENHANCING THE VALUE OF SMALL FISH SPECIES FOR FOOD AND NUTRITION SECURITY THROUGH IMPROVED DRYING AND PACKAGING

Cyprian Odoli\textsuperscript{a}, Tumi Tomasson\textsuperscript{b}, Sigurjon Arason\textsuperscript{c}

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Abstract
Drying is affordable preservation method used where poorly developed logistics limit marketing of fresh fish. In Eastern Africa dried Rastrineobola argentea (Dagaa) is an important source of low cost stable dietary protein. The fishery is characterized by high post-harvest losses and products are often of low quality, restricting the sales to low income groups shopping in open-air markets. This study aimed at improving the quality of dried small fish and determines the marketing potential of improved dried Dagaa and industrially dried capelin as new products where traditionally dried small fish are commonly found. The influence of drying and packaging methods on lipid degradation, sensory properties and microbial quality of products during storage was assessed, as well as the marketing potential of dagaa and capelin dried under more hygienic conditions. Drying under controlled conditions improved quality, and when atmospheric oxygen was excluded by vacuum packaging, dried fish became more stable during storage with less lipid degradation, less rancid odor and lower counts of microbes. The products obtained high acceptability ratings, indicating there is market potential for improved dried dagaa and capelin among consumers of traditional dried small fish. The results from this study show that well processed and could contribute to food and nutrition security.

Keywords: Dagaa, capelin, drying, quality, acceptability

Author(s)

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Non-Cooperative Decision of Fishery Amounts in Integrated Markets: Generalized Version

Part of
Rights-based Fishery Management and Co-management (1)
02:00 PM - 03:30 PM

Major Theme
Rights-based Fishery Management and Co-management

Abstract

Using theoretical trade model of general equilibrium, the paper consider non-cooperative decision of interior solutions of fishery amounts and resource price under integrated market price as constraints. The paper proved non-existence of interior solutions equilibrium under the conditions with very generalized robustness in not only stationary equilibrium but also transition process. The result can be applied as non-justification of distribution of non-tradeable fishing quota to each country. ICCAT and many RFMO tends to introduce distribution of (at least across the border) non-tradeable fishing quotas to each country, although many countries tends to introduce individual tradeable quota under domestic markets. This paper suggests the importance of making not only intra-national but also international fishing quota markets like international carbon dioxide markets.

Author(s)

Takeshi OGAWA, School of Economics, Senshu University
On the Regulatory Problem of Limiting Growth When Production is Highly Profitable: The Case of Norwegian Salmon Farming

Abstract

It is sometimes desirable to temporarily limit growth in order to deal with some emerging environmental problem. When production is highly profitable, this tends to conflict with private incentives creating a fertile ground for unintended policy effects. In this paper, we argue that the specific policy of limiting growth by restricting participation is likely to aggravate negative externalities, create perverse rent transfer effects and escalate costs of production. To grow output and capitalize on the temporary rent, productive efforts of incumbent producers will shift towards the intensive margin of growth. We refer to this as “race to raise” behavior in the market. We highlight this mechanism and its consequences by looking at the case of salmon farming in Norway. Public concerns over negative environmental effects of salmon farming in Norway has led to a stop in the issuance of new production licences. This has occurred as the price of salmon has been abnormally high, resulting in a regulatory rent on privileged incumbent license owners. We provide empirical support within a theoretical framework that the policy has shifted efforts among Norwegian farmers towards increased stocking density as the main decision variable to continue to grow output. This correlates with escalating production costs and aggravated negative environmental effects.

Author(s)

Atle Oglend, University of Stavanger
Estimating long-run and short-run price flexibilities for fish landed in the Northeast United States: A cointegration approach

Abstract

Without an understanding of fish demand, managers have minimal information about the effects of changes in harvest on consumers and producers, crippling managers’ ability to design policy that produces “greatest overall benefit to the Nation.” Yet little is known about demand for fish in the Northeast United States. We employ a cointegration approach to investigate the long- and short-run price flexibilities for 15 fish species landed the Northeast US using monthly data from 1980-2017 on landings and value data (NMFS), disposable personal income (Federal Reserve), and beef prices (BLS). The Pesaran, Shin, and Smith (2001) Bounds test finds evidence that long-run cointegrating relationship exists between these fish prices and landings, income, and beef prices. The estimated long- and short-run elasticities show that the own price flexibility of demand for the selected fish species is in most cases elastic, which suggest that fish prices will be mostly influenced by changes in personal income in both the long and short run. The estimated long-run income flexibilities indicate that most of the fish species are luxury goods, suggesting that the demand for these species is insensitive to income fluctuations. Whiting is a notable exception. A substantial difference between the long- and short-run own-quantity flexibilities exists for these species in the Northeast United States. The cross-price effect of beef on the consumption of the selected fish species indicates evidence of complementarity in several of the cases in the long run.

Author(s)

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Adaptive, mitigation and coping strategies to climate variability among fish farmers in Rainforest and Savannah zones in Nigeria: a means of adapting to changing ecosystem

Part of
Management Challenges of a Changing Environment (1)
02:00 PM - 03:30 PM

Major Theme
Management Challenges of a Changing Environment

Abstract

The study presents empirical findings on the adaptive, mitigation and coping strategies to climate variability among the fish farmers in two Agro ecological zones: Rainforest (Ibadan) and Savannah (Abuja) as a means of adapting to changing ecosystem. The study utilised primary data collected between March 2016 and April 2017 using a simple random sampling technique. Data were collected using structured questionnaire administered to 112 fish farmers in Ibadan and 70 fish farmers in Abuja. Data collected include the socio-economic parameters, information on coping and adaptive strategies employed and their vulnerability. Data were analysed using descriptive statistics, chi square, Multinomial Logistic Regression analysis $\alpha= 0.05$, Vulnerability index. The result shows that the male gender was higher in both rainforest and savannah zones (67, 70%), mean age (44, 37.2 years), Majority had tertiary education (77.5, 75.4%) with household size of 4-5 in both zones. Exposure to climate variability (87.9, 94%), while flooding, increased disease outbreak, reduced growth rate, low hatchability / poor fry/ fingerling survival rate were noticeable effects on fish farming. Adaptive strategies employed in both zones include daily water temperature check, change in management practices, loan from cooperative, good inlet and outlet, adjustment in stocking and harvesting period. In rainforest zone, age, household size and income were significant and positively correlated with adaptive measures to reduce climate change impact. However, none of the variables was significant in the savannah zone. The Vulnerability index was 0.527. Efforts should be geared towards the use of better and more effective adaptive strategies

Author(s)

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Sustainability road maps as a mechanism towards Marine Stewardship Council certification in African fisheries

Part of
Special Session: Barriers to fisheries markets and trade in the developing world
10:30 AM - 12:00 AM

Major Theme
Open Session: Barriers to fisheries markets and trade in the developing world

Abstract
Certification is increasingly employed as a multi-stakeholder initiative to promote sustainability and access markets. Despite the importance of fisheries in Africa, the number of certified fisheries is low. Some of the reasons include poor fisheries management, limited data and impact of fishing activity on resources, leaving fisheries unable to access markets where buyers demand sustainability. To address this challenge some developing country fisheries employ an approach that involves using the MSC certification standard and process as a collaborative framework for gap analysis, action planning, progress tracking and ultimately improvement. These initiatives involve outlining roadmaps towards certification. Specific roles and responsibilities are identified and commitments secured from partners to implement components of the roadmap. These roadmaps provide a structured framework that allow focus of efforts on specific activities. Progress towards the desired endpoint can be tracked and measured over time. Some of the reported benefits of this approach include clarity of objectives in designing activities to improve sustainability; consolidation of stakeholder efforts; participatory stakeholder engagement; ability to attract additional resources and investment to support improvement in fisheries and ultimately improved environmental performance. This paper discusses the uptake of pre-MSC certification improvement initiatives in Africa. It outlines outcomes and progress being made towards certification in these multi-stakeholder improvement projects. It highlights the successes and challenges observed in the implementation of this approach in African fisheries. The paper concludes that pre-MSC certification improvement projects can play a significant role in regional efforts to improve sustainability and profitability of fisheries in Africa.

Author(s)
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Slipping Millions: A Case study of Tanzania’s Informal Cross Border Fish Trade in the Eastern Africa Trade Corridor

Part of
Special Session: Barriers to fisheries markets and trade in the developing world
10:30 AM - 12:00 AM

Major Theme
Seafood Markets and Trade

Abstract
This paper argues that there is a significant informal fish trade in Eastern and Southern Africa Trade Corridor (Tanzania/Zambia Border-Tunduma and Tanzania/Kenya – Sirare/Isebania). The consequences of selling in informal channels are varied including governments losing revenue needed for social and economic development and loss of revenues by individual traders due to higher transaction costs. However, there is limited documented evidence to confirm this. Two studies undertaken at the Uganda/Kenya and Tanzania/Zambia borders were motivated by the urge to fill this knowledge gap. The studies represent trade in the Eastern and partly southern Corridors. A sample size of traders 117 (Tunduma-Informal, and 60 Sirare informal) participated in the study. Data was collected using a structured questionnaire. For sensitive information undercover methods were employed. The findings showed that governments were losing revenue to the tune of about US$200,000 per annum. Tax evasion and delays at the border post were some of the challenges leading traders to opt for informal routes. These results imply that there is need to encourage traders to join association to bulk their trade as well as secure better services from the Government. Awareness raising about the existence of one border post among traders is important to encourage them participate in formal trade. Policy intervention is required in promoting formal trade at border points to reduce informal trade. Further studies are needed of the other border post to gather more evidence, especially in terms of gender.

Author(s)
Paul Onyango, University of Dar es Salaam
Fish Output and Food Security under Risk Management Strategies Among Women Aquaculture Farmers in Ondo State, Nigeria.

Part of
Poster Session
05:00 PM - 07:30 PM

Major Theme
Managing Small-scale and Developing Country Fisheries

Abstract

Aquaculture faces series of risks considering its complexity in terms of species, environments and systems. There are many studies on risk management strategies used by aquaculture farmers but there is scarcity of studies that relate risk management strategies, fish output and food security together especially among women being the most vulnerable group. Hence, this study examined the impact of risk management strategies adoption on fish output and food security among women aquaculture farmers in Ondo State, Nigeria. Multistage sampling procedure was used to select 90 respondents. In order to account for selection bias from both observable and unobservable factors, an endogenous switching regression model was employed to estimate the impact of risk management strategies adoption on fish output being a continuous outcome. Also, a recursive bivariate probit model was used to estimate the impact of risk management strategies adoption on food security being a dummy outcome. The empirical findings revealed that farmer’s age, household size, education, non-farm income, pond system, quantity of feed, credit constraint, and risk attitude significantly influenced risk management strategies adoption. Moreover, adoption of risk management strategies increased fish output and reduced food insecurity among women aquaculture farmers. In conclusion, adoption of risk management strategies is capable of enhancing fish output and reducing food insecurity. Therefore, development agents should encourage women aquaculture farmers to adopt risk management strategies in order to have increased fish output and reduced food insecurity which can help in bridging the fish supply-demand gap and reducing their level of vulnerability.

Keywords: Risk, food security

Author(s)

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Impact of Credit Constraints on Aquaculture Production and Risk Exposure in Ondo State, Nigeria: Endogenous Switching Regression Model Approach.

Part of Economics of Aquaculture (1)
11:00 AM - 12:30 PM

Major Theme
Economics of Aquaculture

Abstract

The issue of credit constraints cannot be underestimated in aquaculture production as it influences output through the amount and combination of inputs used. Despite the fact that there are studies on credit constraints, there is scarcity of studies on the impact of credit constraints on aquaculture production and risk exposure with the consideration of observable and unobservable factors especially in Nigeria. Hence, this study examined the impact of credit constraints on aquaculture production and risk exposure in Ondo State, Nigeria. Multistage sampling procedure was used to select 180 fish farmers. In order to account for selection bias due to both observable and unobservable factors, Endogenous Switching Regression Model was used to analyse data from 170 respondents that gave adequate information. The empirical findings revealed that being non-credit constrained increased fish output and reduced downside risk exposure (probability of output failure). The results also showed that sample selection bias could have occurred while estimating the impact of credit constraints on the outcomes without accounting for observable and unobservable factors. Furthermore, farmer’s age, household size, education, non-farm income, pond system, quantity of feed and risk attitude significantly influenced credit status. Fish farmers who were credit constrained had lower output and higher downside risk exposure, while those who were not credit constrained had higher output and lower downside risk exposure than a random fish farmer from the sample. Therefore, policy makers who intend to increase fish production and reduce output failure in order to bridge the supply-demand gap need to reduce credit constraints.

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We have never been global

Part of
Special Session: Global-scale fisheries economics research
08:30 AM - 10:30 AM

Major Theme
Closed Session: Global-scale fisheries economics research

Abstract

Fisheries economics has recently earned a seat at the global fisheries governance table, with everything from subsidies, to high seas fisheries, to Indigenous rights, food security, and human rights now being open for global assessment. The papers in which these studies are housed are in high impact journals, are highly cited, and tend to get great media coverage, constituting the narratives of ‘global oceans’. While we agree that many fisheries economics issues are salient and, thus lend themselves to assessments above and beyond firm or national economics, we argue that we should be thinking of these things in an international/world wide context, piecing local, national, and regional cases together, rather than starting global. Part of the rationale for this is that decision-makers and journalists look at global maps of economics outputs and pick their part of the world to scrutinize, wondering what the global model means for their bay or port. Additionally, the rationale may reproduce unintended political elision that reinforces the discursive parameters of economic risks and social uncertainty without fields of reality. We introduce a perspective from political ecology, encouraging researchers and practitioners to develop critical perspectives on the global economics bandwagon, suggesting that it’s important to understand context-specific characteristics of the social and economic determinants that impact livelihoods, communities, industrial sectors, national policies, and historical contexts. We argue that this perspective can help us to move towards ‘implementation science’, whereby insights from fisheries economics can more easily be translated into policy change.

Author(s)

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Wilf Swartz
Corporate sustainability in the wild seafood industry: from commitment to action

Part of Certification of Fisheries and Aquaculture (2)
10:30 AM - 12:00 AM

Major Theme Certification of Fisheries and Aquaculture

Abstract

Corporate sustainability in the seafood industry is on the rise. Because of increasing public awareness and NGO campaigns, seafood buyers such as wholesalers, brand owners, retailers and hotel and restaurant chains have made various commitments to improve the sustainability of their wild seafood products. As a result of this, many seafood companies whether involved in fishing, processing and/or importing have developed their own corporate sustainability programs in order to meet those buyers’ sourcing requirements. Our study reviewed the corporate websites of the 20 largest seafood companies that deal with wild seafood products. Our results analysed whether corporate sustainability efforts vary in scope and strategy depending on companies’ characteristics (e.g. size, supply chain position). In terms of scope, corporate sustainability programs vary in terms of which environmental (e.g. climate change, sustainable fishing) and social (e.g. labour practices, community engagement) issues they aim to address. With regards to corporate sustainability strategies, these vary from supply chain control such as sourcing policies and certification, to direct implementation of improvements such as Fishery Improvement Projects (FIPs). Additional strategies include forming alliances and partnerships with other companies, NGOs and scientists, as well as working with government(s) on developing sustainable fisheries regulations. The strengths and weaknesses of wild seafood corporate sustainability programs are discussed with regards to their credibility and contribution to improved environment and social seafood sustainability.

Author(s)

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The Full Value Assessment of Small Scale Fisheries in Hawaii

Abstract
The full value of small scale fisheries often reflects a composite of multiple dimensions such as economic, dietary, and cultural. This presentation illustrates an assessment of Hawaii small scale fisheries from these three perspectives. This is a comprehensive study that assesses the social and economic characteristics of the Hawaii small boat fisheries using vessel level data. Data were collected through a cost-earnings survey of Hawaii small boats conducted in 2014, which was comprised of 1,796 small boat and seamount fishermen. This study shows that fishermen have distinct motivations, fishing and operational characteristics, market participation, and, therefore, variations in economic performance.

Author(s)
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In pursuit of achieving MEY in multi species, multi metier fisheries

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (8)
08:30 AM - 10:00 AM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract
Australian Commonwealth fisheries management has a key objective of maximising the net economic return from the fishery resource. This is interpreted as achieving maximum economic yield (MEY). For multispecies fisheries, MEY is considered to be the level of effort, catch and biomass that maximised economic profits over the fishery as a whole. This can be estimated using bioeconomic models of the fishery. However, transitioning from an existing fishery to an “optimal” fishery is complex, particularly if recovery times to achieve optimal biomass levels for some species is long, and fishers are able to respond to short term incentives through changing their fishing practices. In this paper, we develop a bioeconomic model of an Australian multi-species multi-metier fishery and assess the ability of different harvest control rules to achieve fishery wide MEY. Two approaches to estimate MEY are undertaken: a static equilibrium approach and a dynamic approach. We find that, for this fishery, even with a dynamic estimate of MEY, the time to achieve MEY far exceeds a realistic management time frame. Fishers responding to short term incentives also do not necessarily adjust in the “optimal” direction. Reducing the number of species subject to harvest control rules also proved beneficial – a case of over-management being counterproductive. The key conclusion is that operational definitions of “MEY” are likely to be substantially different from what is currently being considered in the theoretical economics literature.

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Satoshi Yamazaki, Tasmanian School of Business and Economics
Tom Kompas, University of Melbourne
ITQs in Australia: the good, the bad and the ugly

Part of
Rights-based Fishery Management and Co-management (2)
04:00 PM - 05:30 PM

Major Theme
Rights-based Fishery Management and Co-management

Abstract

Australia currently has around 45 different fisheries at both State and Commonwealth level managed through individual transferable quotas (ITQs). These range from single species fisheries to complex multi-gear, multi-species fisheries. While in many of these fisheries ITQ management is considered a success, in others the expected economic benefits have not materialised. In this study, we conduct a review of the experiences of managers and fishers across a range of ITQ fisheries to determine what they perceive as the main factors affecting the success or otherwise of ITQ management. We also examine how perceptions of “success” vary between the different stakeholder groups. The results of the analysis provide insights as to how better ITQ systems can be developed in the future.

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The value of local seafood for coastal tourism

Abstract
The food tourism industry has had significant growth in recent years with food becoming an important part of the tourist’s holiday experience. The intrigue of consuming local food stems from the tourist’s desire to fully experience their holiday region, by recreating local food experiences. The aim of this study is to capture the importance of consuming local seafood as part of the domestic tourist’s trip to the Queensland coast. Using a travel cost model, this study examines how far tourists are willing to travel and spend on local seafood as part of their trip, to recreate the authentic local seafood/coastal experience. The study also examines whether individual characteristics influence food decisions. Through understanding the preferences of tourists for local seafood, the results of this study could assist the food tourism industry in Queensland (and elsewhere) to enhance the tourist experience, thus potentially increasing tourism in the area. The study also sheds light on the potential management of the local fishing industry to sustain food tourism.

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Common exploitation of interdependent renewable resources under asymmetry of information

Part of
Special Session: Game theory and fisheries mgmt.
03:30 PM - 05:00 PM

Major Theme
Open Session: Game theory and fisheries mgmt.

Abstract

We analyze a contractual management among two or more players over interdependent renewable resources, where one of them is a commercially extracted common public good and another is a public bad without market value. The resources are interdependent: If the concentration of y exceeds an uncertain critical threshold level, it leads to a loss (substantial or complete) of public good. Examples of such situations cover a vast range of situations in renewable resources, e.g. sheries and forestry related to invasive species and parasites, or ecosystem services on different levels, that are vulnerable continuous chemical pollution overgrowth of hazardous species population. Complete information related to extraction of public good is available. The public bad extraction and effect is related to uncertainties. First, the threshold level after which 'public good' stock is damaged is uncertain, but it is known that it is continuously distributed. Secondly, the exact magnitude of negative effect is also uncertain but its distribution is common knowledge. Finally, the individual costs of the of management/ extraction of 'public bad' resource are private information: each player knows only her own costs, and distribution over the costs of others. We show that possibility of substantial damage positively affects incentives of the players to coordinate actions towards joint management. The success of the cooperation is dependend on the magnitude of the negative impact rather than the uncertainty of the threshold. Moreover, contractual ineciency caused by adverse selection can be overcome if the probability of loosing entire public good is substantially high.

Author(s)

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Integration of small scale fish farmers and processing industry in developing countries: Case study of aquaculture value chain in Brazil

Part of
Economics of Aquaculture (4)
11:00 AM - 12:30 PM

Major Theme
Economics of Aquaculture

Abstract
Most of fish farmed by small scale producers in developing countries is sold directly to local markets without passing through a processing industry. Besides problems related to sanitary requirements, this situation highlights the low added value retained by fish farmers. In Brazil, the integration between small scale fish farmers and processing industry is restricted to few cooperatives, mainly at southern region. Despite many fish processing plants are operating in different regions of the country, the majority of producers doesn’t access these industries. This lack of integration results in many problems as: (a) low quality of fish due to absence of sanitary control; (b) great informality; (c) impossibility to access supermarket due to lack of sanitary requirements; (d) low added value. The present work is based on the case study of the aquaculture in the state of Tocantins, northern Brazil, by using the approach of Global Value Chain (GVC). The methodology consists in a qualitative process based on face-to-face interviews with value chain agents. The analysis and triangulation of data relies on the GCV approach, especially concerning the governance between the value chain agents. This situation has reinforced the emergence of new governance structures lead by the processing plants, which are increasing their own production and implementing contracts of supplying with large producers. It results in more vertical governances with a power control in industry hands. This governance enables the industry to obtain the margins that used to remains with fish farmers and middlemen in the case of informal market.

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The gender division of labor in fish processing in Lake Chapala. A source of bargaining power

Part of
Special Session: Bringing Gender Discourse in Fisheries Economics and Trade (1)
02:00 PM - 03:30 PM

Major Theme
Open Session: Bringing Gender Discourse in Fisheries Economics and Trade

Abstract
Lake Chapala’s fisheries have been the support of an important economic activity for hundreds of years. At the end of the XIX century, in addition to the fishers, the processing industry employed hundreds of families in the drying and salting of fish. The later introduction of carpe and tilapia forced a change in the market structure, including the processing-value-adding-activities. Currently, filleting-fish is a successful growing industry, which employs mostly women from the communities around the lake.

This paper aims to identify the factors influencing the division of labor in fish-processing and the determinants of bargaining power for women. Fieldwork was carried out in three communities riparian to Lake Chapala (Jamay, Petatán, LaPalma), during 2015-2017, using a survey strategy based on questionnaires and formal and informal interviews to obtain qualitative and quantitative data.

Results: fish-processing as a labor market opportunity for women is a source of bargaining power, is flexible in working hours, and a constant and reliable source of income, unlike fishing. In Petatán, fish-processing is a women’s dominated activity, highly valued, with the largest average income, complementary to household. Jamay has male(20%) and female(80%) fish-processors, fish-processing is their only source of income, and is considered an activity for single mothers (35%) or those who cannot get better jobs. In both communities, married women’s contribution to household income depends on their husband daily earnings ranging between 25-75%. In LaPalma, fish-processing is a male-dominated activity, where women do not dare to work among the young fileting workers, who are breadwinners.

Author(s)
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Ungovernable systems: The strength of informal institutions in the sea cucumber fishery in Yucatan, Mexico

Part of
Fishery Governance, Policy and Management (6)
01:30 PM - 03:00 PM

Major Theme
Fishery Governance, Policy and Management

Abstract

In Yucatan, Mexico, the sea cucumber fishery started informally in 2000, with a low-intermittent fishing effort. The first permits were given in 2006 and in 2010 prices, buyers’ interest and the fishing effort substantially augmented, being followed by illegal fishing-fishers and traders, creating informal fishing-trade channels and severe social and biological concerns. This paper aims to give account of the emergence and dynamics of the informal institutions which seem to currently dominate this fishery. To what extent rules and regulations are not being respected and are affecting fish resources and coastal communities. We use qualitative and quantitative methodologies considering formal and informal interviews applied to key actors, a questioner applied to fishers and an estimation of the degree of compliance from three of the main management measures. Socio-biological negative impacts were identified in Yucatan’s coastal communities and its fisheries. Foreign buyers and local middlemen exert high pressure on fishers to exceed the quota and catch the highest possible volumes enhancing the fisheries decline. This and the growing economic interest gave place to develop strong informal institutions supporting illegal fishing and informal trade. Low levels of compliance of the main management measures allowed illegal fishers from other states to enter in other fisheries (grouper, octopus and lobster). Social problems emerged or intensify: divers decompressions or death, alcoholism, drug consumption and prostitution. Women have been particularly affected, either because they have become widows or the arrival of young sexual workers is causing families breakdowns.

Author(s)

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Case Studies on the Transition to Catch Share Management in Three Fisheries

Part of
Special Session: Effects of fisheries mgmt. on risk-taking & safety
11:00 AM - 12:30 PM

Major Theme
Closed Session: Effects of fisheries mgmt. on risk-taking & safety

Abstract

This presentation describes the impact of transitions to catch share management on risk-taking among commercial fishermen in three fisheries. Catch share management has been associated with a decline in the speed and intensity of fishing activities and longer fishing seasons. This is expected to improve safety in fisheries. Using wind speed to proxy risk, we find evidence of safer trip decisions post catch shares transition in the Gulf of Mexico Red Snapper (2007) and Grouper-Tilefish (2010) fisheries, as well as the Northeast Atlantic Sea Scallop fishery (2010), although there are many management details and fishery-specific circumstances that influence trip decisions.

Author(s)

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Impacts of disease in shrimp aquaculture on U.S. capture fishery prices

Abstract

Shrimp is the most traded seafood in the world, and aquaculture now contributes more to global shrimp production than capture fishing. Since the 1970s, the shrimp culture industry has grown rapidly due to falling production costs despite large losses to disease outbreaks. Previous research confirms that farmed and wild shrimp are substitutes and shrimp markets around the world are integrated. Integration suggests supply shocks in farmed shrimp could be transmitted to wild-caught shrimp through prices. We seek to determine if prices of wild shrimp in the U.S. Gulf of Mexico fishery reflect supply shocks in aquaculture attributed to acute disease epidemics. Analysis relies on U.S. farmed shrimp import data between 1990 and 2016 from Ecuador, Thailand, Indonesia as well as wild-caught Gulf of Mexico brown shrimp. We test country-level price indices for cointegration and use structural break tests to determine if significant price changes coincide with the timing of disease crises. Results indicate that disease appears to offer some temporary price benefits to U.S wild shrimp, but technical innovations in shrimp aquaculture appear to have been a more important factor in the price determination process. We further characterize the shrimp market by testing if disease outbreaks correspond with changes in relative prices of large and small shrimp. While prices of larger shrimp do not appear to grow more relative to prices of small shrimp during times of disease, they do appear to fall more than prices smaller shrimp when developments in disease resistance took place in the early 2000s.

Author(s)

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Effects of “The Blob” on profitability in the West Coast Pacific whiting fishery

Abstract

The Pacific whiting fishery is one of the most economically important fisheries on the West Coast of the United States, with around $50 million in annual landings. In general, the fishery is highly profitable. “The Blob”, or the large mass of warm water in the Northeastern Pacific Ocean, was first detected in 2013 and persisted through mid-2016. It was the “largest marine heatwave ever recorded”. The Blob has been associated with low primary productivity, an unprecedented toxic algal bloom that caused the largest-ever closure of the Dungeness crab fishery, unusual sea bird, whale, and sea lion mortality events, and warm-water species being detected in the northern California Current region. These anomalous ocean conditions had large and unexpected effect on the West Coast Pacific whiting fishery as well. This paper evaluates the socioeconomic impacts that The Blob had on the Pacific whiting fishery in 2014 and, primarily, 2015. Vessel-level profitability was between 41% and 76% lower than in 2015. We explore the drivers of this decline. Attainment of the TAC by each sector was extremely low in 2015; attainment is normally near 100% in the Pacific whiting fishery. CPUE was between 75% and 84% lower than normal in the second half of 2015, leading to higher search costs and leading to some vessels to stop fishing completely (the number of hauls by the at-sea mothership sector was 55% lower than normal in 2015). We quantify the effects of each factor on annual profitability and economic stability.

Author(s)

Lisa Pfeiffer
Towards a Meta-Analysis of the Effects of Catch Share Management on Risk-Taking in Commercial Fisheries

Part of
Special Session: Effects of fisheries mgmt. on risk-taking & safety
11:00 AM - 12:30 PM

Major Theme
Closed Session: Effects of fisheries mgmt. on risk-taking & safety

Abstract

When fisheries management creates the incentive to “race for fish”, a fishing season can be reduced to only a few days and involve around-the-clock fishing in life-threatening weather conditions. Catch shares management, or the individual allocation of tradeable fishing quota, can improve safety by reducing economic incentives to fish as rapidly as possible. This presentation will discuss the modeling framework and established research that will serve as the basis for a series of case studies and a meta-analysis. The framework relies on identifying behavior that is "risky", and modeling the effects that the policy has on risk-taking. In this case, we use the propensity to fish in poor weather conditions as a proxy for risk. One published case study shows that catch shares reduced fishing in poor weather by 79%.

Author(s)

Lisa Pfeiffer
Direct and indirect subsidies- Help or hurt? A study from Vietnamese fisheries

Part of
Managing Small-scale and Developing Country Fisheries (3)
08:30 AM - 10:00 AM

Major Theme
Managing Small-scale and Developing Country Fisheries

Abstract
Effectiveness of fisheries subsidy programs has been a matter of debate for decades. Even though subsidies may cause negative consequences for the marine resources, it is still used in many countries because of other benefits. This study evaluates impacts of the direct and indirect subsidy programs that have been applied in Vietnamese fisheries. Fuel subsidies and credit subsidies, that are representative for direct and indirect subsidy programs, are considered in this study. We employ the propensity score matching and instrumental variable methods for empirical analysis. The results will be examined theoretically by a bioeconomic model, considering sustainability of the fisheries. We expect that a short-term indirect subsidy program supporting some management policies are better than direct programs in terms of rent creation and stock conservation. In addition, the former can help balance resource uses geographically and create economic incentives of resource utilization in unexploited/rarely exploited areas.

Keywords: fisheries, subsidies, bioeconomic model, Vietnam

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Economic Analysis of Adaptation to Climate Change: The Hungarian and Vietnamese aquaculture farming

Part of
Special Session: Economic & social impacts of climate change on fisheries and aquaculture (2)
11:00 AM - 12:30 PM

Major Theme
Open Session: Economic & social impacts of climate change on fisheries and aquaculture

Abstract

The paper analyzes the effects of climate change on the choices of adaptation strategies and the linkages between the choices and the projected economic outcomes of aquaculture farmers. Two types of adaptation options are studied: within-system adaptations (e.g., adjusting crop rotation, feeding rate, etc.) and between-system adaptations (e.g., switching to a new crop species). In the analysis, we employ propensity score matching method in two steps: First, focus is on the effects of climate change on the current farming system; Second, we study the effects of adapting that system to perform better under a changed climate. Carp farming in Hungary and shrimp and prawn farming in Vietnam are used as empirical cases. We use detailed farm-level socioeconomic data, climate data, and natural capital data. These elements are combined to simulate both the effects of climate change and the economic impacts of adaptive responses of aquaculture farmers. The temperature projections for the 2020-2055 time period are based on the RCP4.5 and RCP8.5 scenarios of the 5th IPCC Assessment Report (2014).

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The impact of transferable fishing quotas on cost, price and season length

Part of
Special Session: Seafood markets, fishing behavior, & fisheries mgmt.
03:30 PM - 05:00 PM

Major Theme
Closed Session: Seafood markets, fishing behavior, & fisheries mgmt.

Abstract
The introduction of transferable fishing quotas provides incentives for reducing costs (or increasing productivity), expanding the length of the harvest season and increasing prices of the harvested product. To what extent each of these three main effects will be present when management system is changed in a specific fishery depends on characteristics of the fishery as well as the markets and supply chains served. This paper uses a difference-in-differences approach to investigate the impact on all three effects of a regulatory change that introduced transferability and strengthened rights for a group of coastal vessels in the Norwegian whitefish fisheries. The results indicate that the regulatory change extended the fishing season and reduced costs. However, there was no evidence of higher prices.

Author(s)
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A Study and Forecast on the Contribution of Industrial Structure of Fishery to Economic Growth of Fishery of China

Part of
Poster Session
05:00 PM - 07:30 PM

Major Theme
Fishery Governance, Policy and Management

Abstract
With regression analysis and component data prediction model, this paper analyzes the contribution of industrial structure of fishery to its economic growth and forecast the direction of fishery development. The result shows that output value of primary, secondary and tertiary industry of fishery will increase by 0.17%, 0.43% and 0.35% respectively if every of these three industries increases by 1%. The result of forecasting is that proportions of secondary and tertiary industry of fishery will increase and equal to that of primary industry. At last, the paper puts forward some measures to promote the growth of fishery, including the development of tertiary industry, such as recreational fishery, etc.

Author(s)
Ying PING
Lingrong Zhao
An Enquiry into the Development Path of New Forms of Recreational Marine Fishery of China under the Background of Internet+

Part of
Economics of Recreational Fisheries and Tourism (3)
03:30 PM - 05:00 PM

Major Theme
Economics of Recreational Fisheries and Tourism

Abstract
Recreational marine fishery is crucial for marine economy and the transformation of traditional fishery. In recent years, it runs into development bottleneck and traditional forms need to change. The paper defines the concept of new forms of recreational marine fishery. Based on the “Smiling Curve” theory, the development path of new forms of recreational marine fishery should aim at high value-added service and brand economy. Based on the centralization and dissemination function of internet and its characters of immediaey, interactivity, convenience, it is believed Internet+ new forms of recreational fishery could realize brand economy and improve service system.

Author(s)
Ying PING
Trade-off between value of landings and discard impact

Abstract
Industries extracting natural resources are confronted with a trade-off between maximizing their income and limiting their impact on the ecosystem they exploit. Commercial fisheries produce negative impact via their pressure on the seabed and the additional mortality from discarding. One approach to limit the discarding impact is to introduce discard bans. The introduction of the Landing Obligation in the European Union is an example of this, and European fishers are currently under increased pressure to limit their unwanted catches which would previously have been discarded.

Recent access to high resolution fishing data from sea-packing vessels has been made available to us from voluntary fishers in Denmark. The data contain size specific information at the haul level which makes it possible to calculate the expected value of the landings. Additionally, several of the vessels have discard data from a Remote Electronic Monitoring trial available to us too. Coupling these datasets we investigate the potential linkage between the value of landings compared with the discard impact generated by the fishing activities. Identifying discard hotspots and highlighting areas which generate high or low value to the fishers may detect scenarios where suboptimal decision making can be leveraged to optimize spatial selectivity and limit unwanted catches.

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Collective Catch Quotas and Ex-Vessel Price Determination in the Chilean Artisanal Austral Hake Fishery

Part of
Rights-based Fishery Management and Co-management (1)
02:00 PM - 03:30 PM

Major Theme
Rights-based Fishery Management and Co-management

Abstract

This paper analyses evidence about fishermen collectively organized bargaining over ex-vessel prices with a monopsony-like buying sector. Government allocation of collective catch quotas to fishermen organizations triggered the voluntary formation of cooperative fishermen’s bargaining associations, while a highly concentrated processing sector started behaving as a countervailing monopsony. This drove ex-vessel price determination into a sort of region-specific bilateral monopoly price bargaining. We estimate an empirical model of regional ex-vessel price determination, taking advantage of between-region and time regulatory differences to identify the differential effects on ex-vessel prices. The hypothesis tested is that the allocation of catch rights to fishermen organizations improved fishermen’s bargaining position when selling their fresh-chilled (perishable) catch. Our results support the tested hypothesis at only one of the regions studied. This region is precisely where fishermen were able to achieve more stable and better organized fishermen associations to deal with the price bargaining issue.

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Interdisciplinary knowledge for sustainable aquaculture and integrated management of the coastal area

Part of
Special Session: Sustainable management of coastal fisheries and aquaculture (1)
08:30 AM - 10:00 AM

Major Theme
Open Session: Sustainable management of coastal fisheries and aquaculture

Abstract

The sustainable use of coastal zones and the ecosystem services they provide is dependent on a complex and adaptive knowledge base: the state of the environment, existing and developing anthropogenic activities, local economic and cultural contexts, local climate change, demographic trends, socio-political contexts, and economic pressures. In addition, active and meaningful participation of stakeholders and citizens is essential for an effective decision-making process.

In this presentation, the current trends for integrated management of marine resources and the latest results of an ongoing project, “AquaAccept – Developing novel socio-environmental indicators and management tools for a sustainable aquaculture”, will be presented.

The main objective of the AquaAccept project is to explore what are considered to be acceptable impacts from aquaculture in coastal areas in an interdisciplinary context. Existing and novel environmental indicators for aquaculture impacts are assessed, and attitudes towards the aquaculture industry as well as the interaction between various marine activities in Norway and Ireland are explored. These interdisciplinary data are input into a GIS-based decision support tool (SEAGRID) created to help stakeholders and decision makers address conflicts between aquaculture and other marine activities and to contribute to an integrated and holistic management approach of coastal areas.

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Sea Cucumbers In a Pickle: The Economic Geography of the Serial Depletion of Sea Cucumbers

Abstract

Serial exploitation comprises a pattern of the human exploitation of wild harvest fisheries where previously untapped species or locations come under exploitation over both space and time. Unless managed sustainably, serial exploitation can lead to serial depletion of local fisheries, thereby adversely affecting ecosystems, economies, and communities. Invertebrates, especially echinoderms such as sea cucumbers, are subject to serial exploitation occurring now on a global scale. In coastal Maine, the fishery for the orange-footed sea cucumber (Cucumaria frondosa) is just one local example in a pattern of the global serial depletion of sea cucumbers by species, size, and location. Using empirical models, we find that the serial depletion of sea cucumbers is consistent with variability in the global mean price for sea cucumbers. When local fisheries are depleted, price tends to rise; a rising price signals previously unexploited fisheries to begin supplying the market. This cycle repeats itself, spreading from the regional to the global scale.

We also use models to explore the potential of appropriate conservation and management measures to curb the problem of serial depletion. However, the prospects for mitigating this problem are not promising. One recent case involves proposed federal legislation concerning the inspection of international movements of sea cucumber products, which was introduced to benefit the local seafood processing industry in Maine. Contrary to the bill’s stated intentions, the enactment of such a policy could exacerbate the serial exploitation of sea cucumbers, including those from Maine’s C. frondosa fishery.

Author(s)

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Can Native Species Compete with Valuable Exotics? Measuring Willingness to Pay for Recreational Fishing in Lake Michigan

Part of
Economics of Recreational Fisheries and Tourism (1)
11:00 AM - 12:30 PM

Major Theme
Economics of Recreational Fisheries and Tourism

Abstract
Lake Michigan is the only Great Lake that supports an economically viable salmonid population, but a collapse may be on the horizon. Biomass of Chinook Salmon, the most popular sportfish in the region, decreased by 70 percent between 2013 and 2015. The decline is thought to be irreversible. Managers must decide whether to allocate scarce resources to forestall further declines in Chinook Salmon—an exotic species—or support native species such as Lake Trout and Walleye that are more resilient to current environmental conditions. Predicting the economic impacts of either strategy requires an understanding of the relationship between species composition and fishing behaviors. We estimate discrete choice models to predict the tradeoffs recreational anglers make among fishing trip attributes. We then use these estimates to calculate the non-market benefits associated with different fishing trip configurations. We find that despite recent reductions in success rates, Chinook Salmon remain the most valuable species in the lake, generating about $34 million in value annually. Extirpation of the species likely would cause large economic losses. If all current salmon fishing trips instead targeted Lake Trout, the most-similar substitute biologically, economic value would decrease by 80 percent. Substituting Walleye, the second-most popular sportfish after Chinook Salmon, would lead to economic gains in theory; however, Walleye populations are geographically concentrated and inaccessible to many anglers. Although preserving Chinook Salmon may be at odds with the rehabilitation of native species from an ecological perspective, preventing further declines is strongly preferred by the current mix of anglers.

Author(s)
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A Structural Econometric Model of Location Choice in a Multispecies Catch Share Fishery

Part of
Special Session: Different approaches and priorities for modeling fisher behavior (2)
11:00 AM - 12:30 PM

Major Theme
Open Session: Different approaches and priorities for modeling fisher behavior

Abstract

The dominant statistical method for modeling the spatiotemporal behavior of fishermen is the random utility maximization model (RUM), which assumes that individual fishermen choose from a set of discrete fishing sites in order to maximize their contemporaneous expected utility. While the prevailing RUM approach has been useful for examining the spatiotemporal behavioral effects of fishery regulations in derby fisheries, it is not sufficient for prediction in multispecies fisheries with some form of catch-share management structure because it does not incorporate dynamic decision-making regarding quota usage over a season. Fishermen pursue fishing strategies throughout the year to balance their multispecies catch with their portfolio of quota; thus, their expected utility at any given time is a function of the dynamic opportunity cost of using quota today instead of later in the season. We extend the prevailing modeling approach to a multispecies catch share fishery context by embedding a structural model of dynamic quota usage within the standard RUM model. We estimate the model using a nested fixed-point maximum likelihood algorithm, in which an ‘inner’ fixed point algorithm computes rational expectations equilibrium prices for quota leases, and an ‘outer’ algorithm feeds on this solution and maximizes the likelihood with respect to the remaining choice parameters. We illustrate our modeling approach through a Monte Carlo analysis and compare our approach to the standard RUM model. We show that our approach has superior predictive capabilities than the standard RUM model, particularly for predicting out of sample for historically unobserved quota allocations.

Author(s)

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Predicting the economic impacts of a West Coast salmon troll ocean fishery closure

Part of
Special Session: Different approaches and priorities for modeling fisher behavior (1)
08:30 AM - 10:30 AM

Major Theme
Open Session: Different approaches and priorities for modeling fisher behavior

Abstract

The ocean salmon fishery on the US West Coast has faced periodic closures of varying extents in order to protect vulnerable runs. These closures can have serious consequences for fishers and fishing communities, and have necessitated the release of millions of dollars of federal disaster aid. The 2017 ocean Chinook troll fishery (the major salmon ocean fishery) was closed between southern Oregon and northern California to protect the Klamath River fall Chinook, which is forecast to return in low numbers. We use a model of vessel fishing choices in combination with an established input-output model to estimate the potential economic impact of this closure on fishers and fishing communities. We find that this closure of the ocean fishery is predicted to result in a loss of $5.8-$8.9 million in income, $12.8-$19.6 million in sales, and 200-330 jobs. These estimates are only a partial estimate of the economic impacts of the 2017 salmon regulations, as they do not fully account for the effects of the limited season outside of the closed ocean area or the effects on other salmon fisheries (e.g. the gillnet and recreational fisheries). The impacts are not distributed evenly in space, with the largest relative losses occurring in the Coos Bay, Brookings, and Eureka regions. This information may be useful as policymakers consider mitigating economic losses in the fishery and associated communities. Early estimates of economic impacts of fishery closures may also enable quicker determination of the need and extent of disaster assistance and a more timely response.

Author(s)

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Measuring Health Outcomes in Fishing Industry Participants and Fishing Communities Using the Behavioral Risk Factor Surveillance Survey (BRFSS)

Abstract
The status of fishing industry participants and fishing communities is an increasingly important consideration in marine ecosystem models and in fisheries management. Metrics that reliably measure economic, health, and other dimensions of human well-being are required to analyze the impacts of changes in marine ecosystems and policy. To date, most such metrics rely on economic and demographic data regularly collected at the community level (such as US Census data) or in-depth, expensive social surveys that are administered infrequently. In this paper we use response-level data from an annual public health survey to investigate health outcomes for participants in the fishing industry and residents of fishing communities in Washington state.

The Behavioral Risk Factor Surveillance Survey (BRFSS) is a national public health survey conducted by the U.S. Centers for Disease Control and Prevention. It is the largest longitudinal survey in the world and includes questions on occupation, area of residence, and recreational activities. The survey responses therefore allow us to compare outcomes for fishing industry participants and fishing communities to the general population. In particular, we focus in this paper on comparing general health status, health care access, and injuries in a sample of 84 respondents identified as participating in the commercial fishing industry to the wider population of coastal counties and Washington state. These data remain largely unexplored in fisheries management and we discuss our results in the context of the data’s potential for use in social indicators and social impact assessment in fisheries management.

Author(s)
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Regulation effects on costs in the Norwegian aquaculture sector: A Bayesian approach

Abstract

Since 2005, the costs of farming a salmon in Norway have increased steeply raising concerns about the competitiveness of the sector. The rise in costs coincides with the introduction of the Maximum Total Biomass regulation (MTB) creating a polemic debate in both academia and the industry on whether the regulation is to blame for the cost inflation. This paper analyses the impact of the MTB regime on production costs in the Norwegian salmon aquaculture industry. By using a panel data of salmon firms during the period 2005-2014 we aim to evaluate how costs changes can be attributable to input prices, scale economies, technical change, and – of key concern - the regulatory regime. Specifically, we study if the effect of regulation varies by firm size and by region as these variables are important determinants of productivity.

A Bayesian approach on a system of costs and inputs share equations is used to allow for flexible specification while maintaining the regularity conditions imposed by economic theory. Empirically, the Bayesian approach makes it possible to analyze and simulate the effects of any variable along any point of the estimated cost function, which is an advantage when studying heterogeneous firm sizes. Our estimates allow us to evaluate to which extent the regulation regime has an influence on industry concentration and its possible effects on productivity. Therefore, they are a useful aid for future studies regarding the welfare effects of policy measures in the industry.

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Economic, social and institutional objectives - the other side of the coin in a multiuse marine environment

Abstract

In the European Union (EU), marine resource management policies and legislation include not only environmental objectives but also a broad range of explicitly stated economic, social and institutional (ESI) goals, objectives and priorities. Although the environmental objectives often guide scientific assessments, the ESI objectives are often the primary drivers of political decisions. During a workshop we analysed primary EU documents related to North Sea management to start defining the spectrum of ESI objectives and indicators for this region and to develop a more general framework. The implications of ESI objectives in legislative texts and policies are not always clear, and interpretations are likely to change depending on personal or institutional viewpoints. For example, there may be trade-offs expressed between avoiding risk to fish populations and maximizing employment, but there are no clear guidelines for weighing these objectives. The objectives can be categorized, although there is a lot of flexibility in how this may be done and many approaches to this categorization. Therefore, ESI objectives need to be refined in collaboration with policy makers and stakeholders to operationalize them. In addition, spatial scales and time frames matter, information about the time in setting the objective as well as a stated end date of achieving this objective need to be taken into account when evaluating trade-offs. We will present the developed framework of ESI objectives derived from policy documents with a first refinement by government representatives. We will also discuss challenges and possible tools for visualizing the landscape of objectives with stakeholders.

Author(s)

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Implication of the financial performance of open-access industrial fishing fleets off South Brazil and the subsidies policy.

Part of
Poster Session
05:00 PM - 07:30 PM

Major Theme
Fishery Governance, Policy and Management

Abstract

A multi-fleet approach to assess costs and revenues is detailed together with a comparative analysis. The effects of fuel subsidy policies on profitability will be further evaluated among fleets. The unprecedented local set of field survey data generated revealed that fuel consumption, fish price, and catch volume were the main factors affecting profitability. Annual economic returns were positive for all the fleets. Longliners showed the highest profit margin (29%), while single-bottom-trawlers, close to unviability, showed the lowest (0.9%). Overall, subsidies resulted innocuous in increasing profits, and may be masking the economic reality of the fishing fleets. Specific policy advice and management strategies aiming to protect both economic performance and natural resources are highlighted, including the importance of economic data collection and cost-benefit analysis to increase efficiency.

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Patrícia Abdallah
More Tuna Isn't Always Better! What Happens to Tuna Prices When Global Bluefin Supply Spikes

Part of
Interdependency of Fishery Management and Seafood Markets
01:30 PM - 03:00 PM

Major Theme
Interdependency of Fishery Management and Seafood Markets

Abstract

What is the impact of the recent spike in Eastern Atlantic and Mediterranean bluefin tuna catch on the global price of bluefin and its substitutes? Will boosting the eastern bluefin quota even further benefit the fishing industry? And who stands to win and lose from supply increases? Using a novel data set from the Japanese Tsukiji fish auction market, a general synthetic inverse demand system is estimated to identify the impact of overall landings on bluefin tuna prices. When these price changes are considered through the lens of who gets what, however, the overall policy interpretation can change significantly.

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Dale Squires
The Impact of the Leatherback Turtle Conservation Area Closure on Swordfish Productivity: A Difference-in-Differences application

Part of
Fishery Governance, Policy and Management (3)
03:30 PM - 05:00 PM

Major Theme
Fishery Governance, Policy and Management

Abstract
Fishery management actions focused on the conservation of non-target species may impact the productivity of fisheries in terms of target species. This article studies California’s drift gillnet swordfish (Xiphias gladius) fishery and investigates the impact of a recent regulatory measure aimed to protect leatherback turtles. A parametric approach is used for the primal characterization of the production technology in the California drift gillnet swordfish fishery. The production model is subsequently framed in the context of the difference-in-differences estimator to investigate the effect of the introduction of a regulatory time-area closure on the fishery. The parametric approach also allowing to control for fishing behaviors, equipment characteristics, stock abundance, and climate effects. Estimation results suggest the regulation has a statistically significant negative impact on swordfish productivity.

Author(s)
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Charter Fishing in Hawaii: A multiregional analysis of the economic linkages and contributions within and outside Hawaii

Part of
Economics of Recreational Fisheries and Tourism (1)
11:00 AM - 12:30 PM

Major Theme
Economics of Recreational Fisheries and Tourism

Abstract

This study develops several single- and multi-regional input-output models in IMPLAN using the annual expenditure data from a 2012 survey of charter fishing operations in the state of Hawaii. The survey reached out to 207 charter vessel operators, with a response rate of 36%, and collected demographic, trip, catch, and economic information across islands and vessel sizes. We build four separate models; one for each Hawaiian county, and link them with the secondary regions to observe the economic effects occurring outside the regions of interest, including the mainland west coast (Oregon, California, and Washington) and the rest of the United States (excluding Hawaii and the west coast). The multi-regional approach allows us to observe spillover effects (effects occurring in the secondary regions in response to a change in demand in the study region) and feedback effects (effects occurring in the study region as a result of secondary regions purchasing input from that region to produce the output necessary to meet the change in demand brought on by the study region). The results from this multi-regional method are not only more informative and broad reaching, but also more robust as the total state economic contributions (the summation of economic effects from each region) are generated with the multipliers from each respective region rather than aggregated state averages. Further, we are able to observe the inter-industry activity between Hawaiian counties by linking the rest of Hawaii to each regional county model.

Author(s)

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Developing a Bioeconomic Model to Assess the Impact of Genomics on Coho Salmon Recreational Fisheries in British Columbia

Part of
Economics of Recreational Fisheries and Tourism (1)
11:00 AM - 12:30 PM

Major Theme
Economics of Recreational Fisheries and Tourism

Abstract

Coho salmon (*Oncorhynchus kisutch*) were once a thriving species in Southern British Columbia, providing cultural, economic and ecological benefits to First Nations and coastal communities. Nonetheless, with Coho salmon abundance starting to dwindle dramatically in the 1990s, the Department of Fisheries and Oceans (DFO) decided to implement radical conservation measures aimed at protecting wild Coho. While virtually no catch were being reported by commercial fleets after the closure of directed commercial fisheries in 1998, the recreational Coho salmon fishery saw its landings decrease by more than 60%, threatening the quality of fishing experiences sought after by both resident and non-resident anglers. Nowadays, although recreational fishing accounts for more than 50% of total Coho salmon landings in British Columbia, the once lucrative angling industry is increasing its dependence on hatcheries. Despite high levels of introductions into the wild, hatchery-produced Coho exhibit strikingly low marine survival rates. Such a situation prompted new scientific approaches that employ genomic technologies for identifying genetically distinct Coho populations, as well as beneficial traits associated with fitness and resilience, among others. In offering an economic perspective on the capacity of genomic management tools to both enhance hatchery production of Coho salmon and revive wild stocks, this paper aims to assess the socioeconomic impacts of such technology adoption on the recreational fishing sector in British Columbia. Combining stock-recruitment predictions with economic indicators proper to Coho, a bioeconomic model is used to investigate three different scenarios, showing promising signs of Coho recovery and greater socioeconomic prospects for anglers.

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EVALUATING THE ECONOMIC FEASIBILITY OF PIGFISH (Orthopristis chrysoptera) AQUACULTURE FOR THE TEXAS BAITFISH MARKET

Part of
Poster Session
05:00 PM - 07:30 PM

Major Theme
Economics of Aquaculture

Abstract
The live marine baitfish market presents unique opportunities and challenges for aquaculture producers. Along the U.S. Gulf Coast wholesale prices for live marine baitfish are generally quite high. In Texas, live marine baitfishes often sell for $8-15 per pound whole fish. However, market size is relatively small; between 2013 and 2016 the entire Texas live marine baitfish market averaged approximately $5 million wholesale. In addition, the need to supply energetic fish to bait shops and stands limits the geographic market a single site producer can access. In this research, we examine the economic feasibility of small scale pigfish (Orthopristis chrysoptera) aquaculture as a secondary product for Texas aquaculture producers (red drum and shrimp). Pigfish are a popular and high-valued live bait choice and the market is currently supplied solely by capture fisheries.

The analysis evaluates both production costs and market demand for baitfish in Texas. The production analysis incorporates the results of research on spawning conducted at the University of Texas Marine Science Institute, research on growout of pigfish in fertilized ponds conducted at the Texas Parks and Wildlife Department Marine Development Center, and production and cost data provided by Texas commercial red drum producers. A survey of Texas bait shops was conducted to evaluate market demand for live marine baitfish. Research results indicate that Texas marine aquaculture firms could profitably add small scale pigfish aquaculture to their current operations with a relatively small capital investment.

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**Evaluating the Impact of Individual Fishing Quota Management on Vessel Technical Efficiency in the Gulf of Mexico Grouper-Tilefish Commercial Fishery**

Part of

**Rights-based Fishery Management and Co-management (2)**

04:00 PM - 05:30 PM

**Major Theme**
Rights-based Fishery Management and Co-management

**Abstract**

This research examines the impact of the Grouper-Tilefish Individual Fishing Quota (GT-IFQ) program on the technical efficiency (TE) of the Gulf of Mexico GT commercial fishing fleet. Employing a parametric stochastic distance frontier framework we find that the GT-IFQ improved the TE of both the vertical line and bottom longline sectors for most GT-IFQ share categories although the estimated improvements were of relatively small magnitude. Efficiency gains came primarily from two sources: 1) less efficient harvesters exiting the fishery, and 2) vessel-specific efficiency gains of the remaining vessels from increased harvest flexibility. We found that pre-IFQ vessel-level TE scores were higher for those vessels that remained in the fishery after introduction of the GT-IFQ than those vessels that exited the fishery. Additionally, the study estimated that vessels which stayed in the fishery had higher TE scores in the period after implementation of the GT-IFQ than before.

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Co-developing marine ecosystem valuation approaches to inform decisions

Part of
Special Session: Marine Ecosystem Service Valuation
01:30 PM - 03:00 PM

Major Theme
Closed Session: Marine Ecosystem Service Valuation

Abstract

The central challenge of the 21st century is to develop economic, social, and governance systems capable of achieving sustainable levels of population and consumption while securing the life-support systems underpinning human well-being. Essential to meeting this challenge is the incorporation of natural capital and the ecosystem services it provides into decision-making. Coastal ecosystems provide important benefits to people, including habitat for species targeted by fisheries, opportunities for tourism and recreation, and protection from sea level rise and storms. Awareness of human dependence on nature is at an all-time high, the science of ecosystem services is rapidly advancing, and talk of natural capital is now common from governments to corporate boardrooms. However, successful implementation is still in early stages. In this talk I illustrate paths through which ecosystem service information is changing decision-making, highlighting common components: (i) developing solid evidence linking decisions to impacts on natural capital and ecosystem services, and then to human well-being; (ii) working closely with leaders in government, business, and civil society to develop the knowledge, tools, and practices necessary to integrate natural capital and ecosystem services into everyday decision-making; and (iii) reforming institutions to change policy and practices to better align private short-term goals with societal long-term goals. I will present examples from the United States and beyond. These cases illustrate how decision makers can benefit from identifying communities and locations at the greatest risk, and highlight effect management strategies for reducing vulnerabilities and harmonizing human development and biodiversity objectives.

Author(s)

Mary Ruckelshaus, Natural Capital Project at Stanford
Coupling commercial fisheries and survey data: a practical solution to boost the amount of information in data-poor context

Part of
Special Session: Tools for data poor stocks in mixed, small-scale and Indigenous fisheries
08:30 AM - 10:30 AM

Major Theme
Open Session: Tools for data poor stocks in mixed, small-scale and Indigenous fisheries

Abstract

Quantitative fish stock assessment methods have become increasingly complex. However, the quality of available data may still restrict their applicability, being a particular concern in data-poor situations and where management decisions rely on either commercial fisheries or scientific survey data. In this study we address this issue by proposing a flexible statistical tool that can compare and integrate both datasets simultaneously, and hence boost the amount of information. Because of different sampling designs and procedures, distinct levels of biases arise between datatypes (e.g., different spatio-temporal coverages and size spectra of fish), which are accounted for in our model framework. The model is developed in Template Model Builder, alternatively applied to (i) commercial data, (ii) survey data and (iii) commercial coupled to survey data, and tested on cod, plaice and sprat stocks in the western Baltic Sea (2005-2016). We found that each data type supplied different, yet complementary, information on the species spatio-temporal dynamics. Though the overall spatial pattern in both datatypes showed similar trends, the variability was clearly higher when evaluating the datasets separately, while the coupled dataset was the most informative one. This confirms that the predictive modelling was greatly improved by joining the datasets and will likely enhance future stock evaluation and management advice in both data-poor and data-rich contexts. Moreover, our benchmark tool represents a valuable solution for supporting a robust bio-economic management of fisheries, and enhances the picture we have in data-poor context with spatial and temporal scales that really matters to fisheries policy makers.

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On the Tension between Maximum Sustainable and Economic Yield When There are Opportunity Costs to Fishing

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (6)
01:30 PM - 03:00 PM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract
A primary objective of fishery management is profit maximization, accomplished by managing externalities associated with catching fish, while acknowledging that some margins of fishing fall beyond regulatory bounds. Regulation often does not address the larger economy of which the fishery is a part, focusing instead on the cost--benefit structure of a particular fishery and creating a potential tension between the objectives of a resource manager and what is preferred from an economy-wide perspective. To gauge the benefits of recognizing linkages between the fishery and the macroeconomy, optimal harvest patterns targeted by a profit-maximizing resource manager are compared to what is socially optimal in a two-sector, dynamic general-equilibrium model that features opportunity costs to fishing. Maximum economic yield delivers profits to the fishery, but maximum sustainable yield can deliver greater economy-wide surplus. This tension might explain why real-life fisheries are often managed at MSY as opposed to MEY.

Author(s)
Rich Ryan, University of Michigan
The influence of climate variabilities on fisheries management performance – A Northeast Atlantic pelagic fisheries case study

Part of
Special Session: Economic & social impacts of climate change on fisheries and aquaculture (1)
08:30 AM - 10:30 AM

Major Theme
Open Session: Economic & social impacts of climate change on fisheries and aquaculture

Abstract

Increasing interest exists in understanding how climate variabilities will influence natural resources, consequently impacting fishing behaviour and fleet economics. The question how distribution changes of highly migratory species, induced by ocean warming, will affect key fishing opportunities will be addresses by applying an integrative optimization and simulation bio-economic model, FishRent. The model includes the economics of multiple fleet segments, the impact of fishing on stock development and the spatio-temporal interplay of fleet segments and fish stocks. Besides, it integrates possible effort redistribution as well as accounting for the fact that ecological and economic conditions will determine fishing effort. The model considers that management regulations itself may alter profitability, hence also subsequent effort decisions by fleet segments, in turn affecting the commercial fish stock. By applying this model to the Northeast Atlantic mackerel and North Sea herring fishery, current management plans and two alternative scenarios will be tested: The “World Market”-Scenario will focus on a rather unsustainable exploitation, whereas the “Global Sustainability”-Scenario places emphasis on sustainable fisheries by integrating management measures such as MPA’s. All scenarios will be combined with both significantly increasing (RCP 8.5) and low-level (RCP 4.5) CO2-emissions, simultaneously considering the increasing north-westerly spawning and feeding distribution of Northeast Atlantic mackerel and poor post yolk-sac larvae survival of North Sea herring due to potential mismatches of spawning time and plankton blooms. As the fleet economics of both European and Non-European countries are affected, IIFET represents a perfect opportunity to introduce and discuss further aspects of this case study.

Author(s)

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Adjustments to recent changes in the ecosystem around Iceland - The case of the Icelandic pelagic fisheries

Part of
Management Challenges of a Changing Environment (2)
04:00 PM - 05:30 PM

Major Theme
Management Challenges of a Changing Environment

Abstract

The highest catches in Icelandic waters consist of few but abundant pelagic species. Historically the herring fishery was the only pelagic fishery in Icelandic waters. The herring stocks collapsed late 1960s and only then the pelagic fishery turned to capelin, previously virtually unfished. This fishery rapidly grew to around 1 million tons annually, in some years more than the combined catch of all other species in the Icelandic waters. The pelagic fisheries are characterized by great fluctuations, as the stock sizes and migration routes of these species can change quite rapidly. Their distribution is usually not related to bottom topography (except for spawning sites) but based on ocean temperature and the availability of zooplankton as food. The pelagic fisheries are consequently spread over a wider area. Resent changes in the ecosystem around Iceland have carried valuable pelagic species such as mackerel to the EEZ, while other cold-water species such as capelin have declined. Their distributional changes, along with technological changes, have altered the Icelandic pelagic industry substantially. Pelagic companies have adjusted to these changes; as number of vessels and fishmeal factories have been scrapped. Those negative effects are felt in several fishing villages, where the pelagic industry used to be source of employment for part of the year. At the same time, positive effects have followed by increased processing directly for human consumption, while raw material landed to the fishmeal industry has declined. The driver and impacts associated to these changes will be examined.

Author(s)
Hordur Saevaldsson, University of Akureyri
Economic adaption of Icelandic stern trawlers to reduced TAC and technological changes

Abstract

The focus of this study is the development of the Icelandic trawler fleet and the drivers behind the changes. The first stern trawlers began operation in 1970, five years later there were 58 fishing in the EEZ and in 1982 their number reached above 100. Excess capacity and overcapitalization characterized the demersal fisheries in the 1970s and 1980s, with the fishing effort increasing sharply. In 1984, Iceland implemented a system with partly individual transferable quotas (IQs) and in 1990 a uniform system of ITQs covering almost all fisheries. The past three decades the demersal sector has faced a reduction in total available catch (TAC). Therefore, the industry had to rationalize the fishing fleet and increase efficiency. These adjustments were not centralized by authorities, they were mostly left to the companies. The industry has in many ways adapted well. Part of the fleet was converted to freezer trawler in 1980s and 1990s. The ITQ system allowed the majority of ITQs to be almost freely transferable, which led to consolidation of fishing rights. Number of trawlers and companies have decreased almost constantly since 1995. Simultaneously, the industry focus has turned from catch quantity to value maximization aiming on product quality, making the industry more profitable. Since 2012, many of the stern trawlers have been renovated, but now the focus is again on delivering fresh fish instead of frozen at sea. The drivers behind these changes will be examined and related to status of fish stocks, markets and technological changes.

Author(s)

Hordur Saevaldsson, University of Akureyri
Ex-vessel price formation of fish species with low and irregular harvests

Part of
Seafood Markets and Trade (5)
10:30 AM - 12:00 AM

Major Theme
Seafood Markets and Trade

Abstract

In this paper, we report a case where the demand for a fish appears to be increasing with its price. Our focus is the ex-vessel price of John dory *Zeus faber Linnaeus* in Mie prefecture, Japan. We use daily data across 13 ports during the period April 20th – August 31, 2014.

The supply in these markets are likely to be nearly price inelastic. First, most of the harvests of John dory during this period come from set nets. Fishermen do not know what’s in their set nets beforehand, and once they pull in their nets, they have to sell their harvests. This limits their ability to respond to market prices. Second, our data comes from small ex-vessel markets, where the supply is limited to harvests from nearby marine areas. This limits the possibility that the supply in these markets responds to prices through fishermen’s choice of landing locations. Finally, our data is daily data. This limits the possibility that fishermen change their harvest in response to prices by changing their fishing practices or investing in new technologies.

If supply is price inelastic, the equilibrium price and quantity should follow a downward sloping demand curve. However, we find that the relationship between price and quantity in these markets are upward sloping. This relationship remains in our regression analysis after controlling for the quality of the harvests, the national price, prices of substitute goods, and climate conditions. We argue that our results are likely to be an indication of imperfect competition among buyers.

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Fishermen’s effort allocations in multi-species fisheries

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (4)
08:30 AM - 10:30 AM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract
The management of multi-species fisheries is challenging, as each fishery shares linkages through exposure to common environmental shocks as well as the movement of fishermen across the seascape. In this paper, we analyze fishermen’s supply decisions in a multispecies context, with a focus on fishermen’s switching decisions across fisheries, and their entry/exit decisions from the entire fishery.

Our dataset includes >5 million observations of every vessel in state and federal fisheries off the West coast of the United States during 2000-2016. We describe the characteristics of vessels that engage in multiple fisheries and the popular combinations of fisheries that these vessels engage in. We then examine how traditional economic factors such as fish prices and estimated abundance affect effort allocations. The effort allocations, however, may be affected by non-pecuniary psychological and social factors such as social identity or utility from fishing itself. To consider this possibility, we take advantage of the long time dimension of our dataset and uncover the productivity of each vessel using fixed effect production models. This approach allows us to test if fishermen’s decisions are consistent with the predictions of standard theory. For example, we expect that the least efficient vessels will likely exit first in response to a negative environmental shock. However, if some fishers are strongly motivated by non-pecuniary incentives, our approach allows us to identify these fishers. We will correlate our findings with an extensive social survey of fishermen to understand the relative role of pecuniary and non-pecuniary factors in fishery supply behavior.

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Mapping the value chain of shark and octopus’ fisheries in the southeast of Mexico: Incentives in fishing market trends and challenges

Part of
Seafood Markets and Trade (2)
11:00 AM - 12:30 PM

Major Theme
Seafood Markets and Trade

Abstract
Given the high pressure in fishing resources, the interest of going beyond the resources and understanding market trends, market barriers, and fisheries value-chain inequities, has increased in the last decade. This knowledge is necessary to improve those chains and to promote better financial returns for fishers and market participants, in the search of sustainable fisheries. We present the analysis of vale chain of sharks and octopus fisheries, which face different challenges. The former show signs of decline in catches and the risk of exploitation of potential endangered species as prices of some products reach very high value in legal and illegal markets. In the case of octopus, international markets offer an opportunity for producers, but they have to comply with certifications that few can do. To learn about the distribution of benefits from the trade of these resources and how the benefits might differ among traded species, we mapped the value chain of the octopus and shark fisheries in the southeast of Mexico and analyse the relationships among nodes and actors involved directly on the extraction and trade processes. Few product presentations, mislabel of products, and lack of traceability were common problems observed in both case; traceability is lost at an early stage of the value chain. Internationally traded seafood seem to be playing an increasing role in moving towards the improvement of fisheries sustainability and governance in one side (octopus case), but is an incentive to increase fishing pressure on resources like sharks (fins). We discuss the problems and

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Understanding adaptive strategies of fishermen operating in a small-scale fleet: the case of the Yucatan fisheries in Mexico

Abstract

In Yucatan, Mexico, a small-scale fleet, integrated by 4,400 boats, captures multiple demersal species using a diversity of gears; it contributes with half of total fishing production of the state. Despite its contribution, there is limited knowledge about the dynamics of operations of this fleet, to define appropriated management schemes. In the present study, the flexibility of the fleet to the rotation of different fishing methods was analyzed. To do so, detailed information of 1,926 fishing trips, recorded in 11 fishing communities of Yucatán between 2013 and 2016 was analyzed. This information was provided by fishermen interviewed at their arrival at deck after their journey; data includes area and depth of operation, fishing gear(s) employed, price of the species caught, and operation costs disaggregated by input. The catch composition by species was also recorded. Multivariate statistical techniques (SIMPER, hierarchical cluster analysis, and nonmetric multidimensional scaling analysis), were used to define target species and fishing operations with similar characteristics (métiers). Records, show that 35 species were caught by this fleet, but ten species dominated the six identified métiers. An analysis of variance, showed differences between métiers in volume, value of the capture and catch per unit of effort, with grouper dominating in four of the métiers. The results show that adaptive strategies of fishermen include rotation of fishing methods and target species throughout the year. This patterns, can change in time and space in the area where the fleet operates. Management implications are discussed based on the results.

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Assessing demand/supply drivers in augmenting fish consumption in Kerala, India

Abstract

Kerala, the southernmost state of India is the largest fish consumer with an average per capita annual consumption of about 27 kg which is thrice the national average. With the improved socioeconomic status and increasing purchasing power of Keralites, offlate the growth rate in prices surpassed the growth in production/landings leading to huge fish demand-supply gap leading to concerns on availability, affordability and accessibility across the state. The present study assessed the major attributes affecting fish demand across 360 consumer households which included price, quality, nutrition, species, taste and preference, substitutes, persuasion, tradition, availability and accessibility. In addition the pertinent drivers for the fish supply was assessed which included arrivals from other states and exports from state. The fish arrivals indicated that more than 60 per cent of the current fish demand is met through arrivals from other states. The price analysis of the export baskets indicated – paradox of exports -the domestic prices were higher than the export prices. The preference indices for the different fish species were computed and it was found that mackerel is most preferred fish followed by sardine and others. The high value species registered better price stability due to better marketing efficiency. The retail prices were found independent over local landings/production indicating the well-defined fish market information system. The study highlights inevitable governmental role in curbing demand-supply mismatch in domestic market. The study attempted an e-marketing intervention with the development of a Fish Market Price Information (FMPIS) system for

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Athira N R
Coastal vulnerability assessment, adaptation and mitigation opportunities in climate hotspots in Kerala, India

Part of
Management Challenges of a Changing Environment (2)
04:00 PM - 05:30 PM

Major Theme
Management Challenges of a Changing Environment

Abstract

Climate change has multi-dimensional impacts on environmental, fisheries, social, economic and development drivers and it necessitates governments in developing appropriate mitigation and adaptation plans. Climate change hot spots –are ‘live labs’ where climate change impacts and its manifestations are observed “first”. The South west India has been recognised as one among the twenty four hot spot regions identified globally. The study assessed the coastal vulnerability of over 800 coastal households using 198 attributes – exposure (36), sensitivity (37) and adaptive capacity (125) across climate hotspots for the two identified marine hotspots, viz, Elamkunnapuzha and Poonthura /Beemapally panchayats in Kerala, India. The results revealed that majority of the fisher households in both the villages were highly vulnerable to climate change with vulnerability of Poonthura (2.85) higher than Elankunnapuzha (2.80).

In addition, the individual household vulnerability indices were calculated and were classified into low, moderate, high and very high with geo-spatial distribution and mapped using Open domain Quantum GIS (QGIS). The study assessed the Alternative Livelihood Options (ALOs) in determining the adaptation and mitigation plan. The alternative livelihood option identified included daily wages jobs, small scale industries, service sector, aquaculture enterprises, value addition and entrepreneurships. More than 69.52% of the households required alternative livelihood option supports along with training needs. The study suggests the need for bottom up planning process with Local Self Government (LSG) leads. The study developed multi stakeholders platform Climate Resilient Village Adaptation and Mitigation Plans (CReVAMP) aimed at sensitising and improving the resilience of community towards climate change.

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Gauging fisher women empowerment through non- fisheries enterprises and group activities through Society for Assistance to Fisherwomen ( SAF) ,Kerala, India

Part of
Management Challenges of a Changing Environment (1)
02:00 PM - 03:30 PM

Major Theme
Management Challenges of a Changing Environment

Abstract

Women empowerment, an active multidimensional process enabled the women in accessing greater autonomy in decision making, ability to plan their lives. In Kerala women play an important role in the fisheries sector due to their involvement in fishery related activities. Even though women engage in wide range of activities in fisheries, their crucial role always remains unacknowledged.

Diversified non- fisheries enterprises and group activities are implemented in Kerala through Society for Fisherwomen ( SAF) for facilitating and handholding the fisherwomen to engage in gainful self-employment for their economic and social emancipation and thereby providing assistance for their livelihoods by expertise in business development skill, resource utilisation, performance improvement, networking and marketing. The present study gauges the empowerment levels of more than 400 fisherwomen involved in these groups across two time periods viz., prior to joining the society and the current status. In addition the perception of the leader- follower, group cohesiveness and future requirements for these groups was also pointed out in the study. The results indicated that economic independences and their ability in decision making is steadily increasing through their efficient performance in working in groups with improved empowerment. The Pearson correlation strengthens the relationship between the leader- followers and identified that they have been accepted as good leaders in society. The study also established the pivotal role of these non-fisher enterprise groups in achieving the goals of empowering fisherwomen and developing sustainable and commercially viable business models.

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Is the Sri Lankan ecotourism industry threatened by climate change? A case study of Rekawa coastal wetland using contingent visitation approach

Abstract

Lagoon fisheries in Rekawa coastal wetland in Southern Sri Lanka have been declining. However, an alternative to compensate the loss of fish yield income are ecotourism activities such as canoeing, bird watching, and mangrove visits around the lagoon. Since ecotourism includes nature-based recreation, it can be influenced by climate change. In line with climate change predictions of the Intergovernmental Panel on Climate Change (IPCC), ecotourism in the Sri Lankan coastal zone is highly vulnerable to changes in climatic conditions. This study investigates intended visitation behaviour of tourists to Rekawa coastal wetland under anticipated climate change scenarios developed with reference to IPCC 2025 and 2050 predictions. An interview-based contingent visitation survey was conducted with 365 foreign and national tourists to estimate the effects of climate change on future visitation. Referring to the two IPCC scenarios, we composed a climate change induced environmental index, based on 2 direct and 3 indirect climatic factors. The results show a significant decline in number of trips under both climate change scenarios by, 43 % and 53 % respectively. However, the difference between estimated reductions in visitation in the two scenarios is not statistically significant. Foreign tourists are less likely to change their visitation under the predicted climate scenarios than local tourists. Men are less likely to reduce future visits to Rekawa than women. Young people are also less likely to reduce future visits. In conclusion, the future of ecotourism at Rekawa is at risk, if adaptation measures are not taken to reduce climate change impacts.

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Adapt or lose: how to manage the socioeconomic impact of climate change in the Spanish aquaculture, the case of blue mussel

Abstract

In the context of the ecosystem approach for aquaculture, the climate change is gaining relevance because its direct effects on the primary productivity but also for its indirect effects on the livelihoods of the communities related. In this paper, we propose a stepwise framework to improve the understanding of these effects in a community dependent on mussel cultivation (i.e. aquaculture) and how it supports the decision-making of management and production strategies. Climate change affects flesh yield and harvesting time of mussels as well as the occurrence of harmful algal blooms, which impact on their output. These effects have a direct influence on the mussel sector but also on the stakeholders who provide inputs to this aquaculture sector (backward) as well as to those who use mussels as an input for their production (forward). These spill over effects can be traced and estimated on the basis of the input-output analysis but also involving the stakeholders related. The preliminary results show how this analytical framework provides an accurate assessment of the socioeconomic impacts caused by the climate change by considering the backward and forward effects simultaneously. The proposed framework improves the decision-making process, in particular its capacity to anticipate the effects of climate change by comparing in advance different scenarios. Therefore, the sectors and communities are able to react and propose adaptation and mitigation strategies in a participatory way, enhancing more holistic and sustainable management systems.

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Implementing the ecosystem approach, a method to identify and quantify the socioeconomic effects of fisheries management

Abstract
In the context of the ecosystem-based approach for fisheries management, there is a recognized need for methods and tools to facilitate the decision making and balance the socioeconomic and environmental aspects of sustainability. The goal of this presentation consists of providing an assessment tool of the possible socioeconomic impacts arising from the variation in the fishing opportunities linked to different management scenarios (e.g. total allowable catches, efforts of different fishing gears or multi-species stock advises). This new methodology has been tested in one of the most important fishing region of Europe, Galicia (NW Spain). It permits to assess the socioeconomic impacts on sectors directly subject to the management measures (or exogenous supply shocks) as well as the other related sectors; in particular, those that provide inputs to fishing activity (backward effects) as well as those who use seafood as an input for their production (forward effects). The results show that this method can prove itself to be a very useful management tool. On the one hand, it provides more accurate estimations of the possible socioeconomic impacts of several management scenarios and, on the other hand, it gives detailed information on the sectoral and spatial distribution of the socioeconomic impacts. As a consequence, this method has the capacity to provide support for a better decision making to the fishery regulators and other decision-makers by ex ante assessing and comparing different management scenarios, and therefore facilitating the implementation of more holistic management frameworks.

Author(s)

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The creation of shared value by exploiting synergies of marketing and management tools in seafood sector

Part of
Seafood Markets and Trade (1)
08:30 AM - 10:30 AM

Major Theme
Seafood Markets and Trade

Abstract

The concept of shared value has been defined as those policies and operating practices that enhance the competitiveness of a company while simultaneously advancing the economic and social conditions in the communities in which it operates. This concept has guided a coordinated process of stakeholders’ engagement to consolidate the economic sustainability and competitiveness of European fisheries and aquaculture sectors through the PrimeFish project. This approach, framed in the social innovation, states that the creative use and combination of resources can pursue opportunities to catalyse social change and address social needs and challenges. In particular, the strengthening of competitiveness has been addressed through innovative choices and configurations by four key ways: reconceiving products and markets; redefining productivity in the value chain (e.g. energy use and logistics, resource use, distribution, labour productivity, location); enabling local cluster development; and better understanding of the socio-economic realm. For this purpose, the PrimeFish project grouped several industrial organizations from sectors of catching fisheries, aquaculture, processors, trade and retailers of seafood who actively participate as an advisory board, communicating their interest and needs, and receiving the science and technology developed for evolving from the corporate social responsibility to the creation of shared value. The conclusions of PrimeFish contribute to the strengthening of seafood markets by several combinations of value proposals and thereby trigger positive feedback loops on the performance of the seafood markets and support the decision making of the stakeholders related.

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The PrimeFish Project or how to create shared value in seafood sector by combining the competitiveness and the decision-making

Abstract

The PrimeFish project aims to improve the economic sustainability of the European fisheries and aquaculture sectors under the perspective of the sectorial participation. This project has received funding from the European Union’s Horizon 2020 Research and Innovation programme. PrimeFish engages a large Industry Reference Group (IRG) that facilitates the access to data on specific cases and provides feedback on the outcomes. The innovative concept of shared value guides the relations with IRG and other relevant stakeholders. The PrimeFish project gathers data from individual production companies, industry and sales organisations, consumers and public sources covering fisheries, mainly cod and herring, but also aquaculture with salmon, trout, seabass and seabream. Specifically, the research will focus on enhancing the competitiveness and economic performance of companies including price development, supply chain relations and successful product innovation. In addition, the consumer behaviour and market trends are also included. As one of its main results, the project will offer a web-based interactive toolkit to support the decision making through the following features; (i) Success and failure stories; (ii) Competitive position analyser; (iii) Price development predictor; (iv) Value chain analyser; (v) Growth risk analyser (based on boom and bust cycles); (vi) Product success check. Through these outcomes, PrimeFish will back industrial stakeholders and decision-makers in the management of seafood production and innovation, and the comprehension of market dynamics. Therefore, the competitiveness of seafood companies will be enhanced while simultaneously advancing the economic and social conditions in the communities in which they operate.

Author(s)

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Quantifying and Comparing Fisher Decision-making Strategies Before and After the Deepwater Horizon Oil Spill

Part of
Special Session: Different approaches and priorities for modeling fisher behavior (1)
08:30 AM - 10:30 AM

Major Theme
Open Session: Different approaches and priorities for modeling fisher behavior

Abstract

The Gulf of Mexico (GOM) is characterized by fishery resources which spatially and temporally overlap in different ways with several important non-fishing uses including oil and gas production, shipping, tourism, habitat for endangered species, and economic support for coastal communities. Given this overlap, the Deepwater Horizon Oil Spill affected fishing activity and led to unintended consequences to the fishery. Vessels that target reef fish endured large scale spatial closures of oil contaminated waters to protect human health, public mistrust in GOM seafood quality, and in some cases, repurposing of their vessel to assist with clean-up efforts. Understanding the spatial distribution of fishing activity is important for assessment and management because data provided by fishing vessels are used in assessments to infer fish population abundance. When, where, and how a commercial vessel fishes determines the temporal and spatial placement of the data they are mandated to report. This study quantifies how the effects of the Deepwater Horizon Oil Spill may have affected daily fishing vessel decisions about participation, site choice, and trip termination using discrete choice models. Preliminary results thus far suggest that after the oil spill, fishers altered some of the factors they consider when making site choice and participation decisions, including windspeed, fish price, and fuel price.

Author(s)

Steven Saul, Arizona State University
Questionnaires, discrete choice models, and agent-based models of fisher behavior: what can we learn from each?

Part of
Special Session: Different approaches and priorities for modeling fisher behavior (1)
08:30 AM - 10:30 AM

Major Theme
Open Session: Different approaches and priorities for modeling fisher behavior

Abstract

Understanding and quantifying the behavior of fishers is important given the role human behavior plays in fish population dynamics and fisheries management. Various quantitative and qualitative methods have been used to collect information on the behavior of fishers. This study discusses the benefits and drawbacks of three of these methods: questionnaires, discrete choice models, and agent-based models. Each approach has its own benefits, challenges, and set of limitations. Questionnaires provide the analyst the opportunity to tailor their inquiry to specific behavioral components they are interested in understanding, however can be difficult to implement due to time spent away at sea by fishers and willingness to participate. Discrete choice models in fisheries are typically fit to revealed preference panel data generated using fisher logbook data. These models provide the ability to quantify how individuals made different decisions in the past based on spatial and temporal state information (i.e. windspeed, fuel price, fish price, vessel size, habitat, etc.). Drawbacks to discrete choice models include that you can only understand the factors that might affect fisher behavior for which you have data. Agent-based simulation models provide a bottom-up structure through which you represent the individual behaviors of each fisher explicitly represented in the model, and let the simulated vessels interact with a biological layer (either agent-based or not). The interactions and higher-level patterns that occur in agent-based models can help scientists understand how the dynamics of fishers, fish populations, and regulatory structures interact.

Author(s)

Steven Saul, Arizona State University
USING A BAYESIAN BELIEF NETWORK TO ASSESS INTERACTIONS AMONGST SOCIAL OBJECTIVES OF A FISHERY

Part of
Special Session: Modelling social-ecological systems
03:30 PM - 05:00 PM

Major Theme
Open Session: Modelling social-ecological systems

Abstract
Social objectives of fishing exist at multiple levels – the individual fisher, the fishing sector, the coastal community and wider society. Managing fisheries for social objectives means understanding the trade-offs amongst these different levels, and how they impact upon the broader socio-ecological system. A Bayesian Belief Network approach has been used to explore the tension amongst social objectives, as management organisations at different levels (e.g. state vs federal) prioritise particular social objectives (and not others). To what degree can social objectives at different jurisdictional levels be achieved, what are the interactions amongst the social objectives and environmental and economic objectives, and what outcomes can be expected from different management priorities? A test of this work with the NSW Rock Lobster fishery in Australia will be described, revealing lessons relevant to ecosystem-based management and polycentric institutional governance.

Author(s)
Carla Sbrocchi, University of Technology Sydney
Beth Fulton, CSIRO
Kate Barclay, University of Technology Sydney
New-institutional analysis of ecosystem restoration: a transaction cost paradox

Abstract

Transaction costs are critical to understand decision-making surrounding ecosystem restoration projects employed to preserve biodiversity and protected resource habitats. The Transaction Cost Economics (TCE) focuses on the study of the alternative forms of organizations and their relative transaction costs. As transaction costs are difficult to assess, TCE analyzes arbitration between organizational forms (basically between market and hierarchies) based on observable characteristics of transactions. The higher the uncertainty around the transaction and the investment “specificity” (associated to the level of replicability of the investment), the higher the transaction costs. Our problem is that specificity and uncertainty are strong when we consider biodiversity-related investments. Thus, actors are left with two options. On one hand, biodiversity is associated to high specificity and uncertainty that should imply hierarchical coordination and high transaction costs. On the other hand, partners want to decrease transaction cost by preferring market coordination, but this involves modifying the characteristics of transaction and decreasing its complexity.

The objective of our presentation is (1) to study how transaction costs are structured in restoration projects (their sources, their repartition among partners, etc.), and (2) how they can weigh on the quality of restoration projects or on the decision whereas to restore or not. In order to do so we establish an interdisciplinary framework to implement a transaction cost analysis based on an ecological diagnosis and apply it to different case studies of marine-related ecosystem restoration.

Author(s)

Pierre Scemama, IFREMER
Tuna Loins & Private Parts

Part of
Special Session: Next generation RFMO governance: Climate change, allocations, and privatization, oh my!
03:30 PM - 05:00 PM

Major Theme
Open Session: Next generation RFMO governance: Climate change, allocations, and privatization, oh my!

Abstract
Regional fisheries management organizations (RFMOs) are the primary bodies responsible for the management and governance of highly migratory tunas. Yet, the performance and success of these organizations has been questioned as many stocks have been—and remain—depleted under their watch, and concerns around high levels of bycatch and weak enforcement of fishing regulations are increasingly prevalent. In an effort to create alternative models for improving fishing practices, the last decade has seen an increase in the emergence of private governance initiatives, such as eco-certifications (e.g., Marine Stewardship Council; MSC) and industry-NGO partnerships, like the International Seafood Sustainability Foundation (ISSF). Sixteen tuna fisheries are currently certified by the Marine Stewardship Council (MSC) with an additional seven under assessment. These new private governance models suggest that regional tuna fisheries governance is increasingly operating within a multifaceted governance framework of public and private regulations, standards, and stakeholders, each of which operates at differing spatial scales and with its own set of objectives. But how and where do these public and private models intersect? My work analyses the relationship of multiple private organizations with RFMOs by assessing the influence they try to assert through formal public letters to RFMOs. I compare the discourse and advocacy in these letters over a decade by extracting keywords and overarching messages. Understanding how these interactions have evolved provides insight into the incentives, tactics, and limitations of private actors on public policy.

Author(s)
Laurenne Schiller, Dalhousie University
Perfect is the enemy of good – when more accurate stock assessments are less valuable for management

Part of
Fishery Governance, Policy and Management (5)
11:00 AM - 12:30 PM

Major Theme
Fishery Governance, Policy and Management

Abstract

Fisheries management is data-intensive and relies on a high quality of information. The general assumption is that more accurate information will translate into better management. Within European fisheries, total allowable catches (TACs) have been a main management instrument since the 1970s. In practice, setting a TAC happens in two stages. First, the International Council of the Exploration of the Sea (ICES) gives scientific advice regarding the size of a TAC. Second, the European Union (EU), who manages the stocks, decides on the actual TACs and divides it over member countries. The role of ICES is to provide the scientifically best information for policy makers. Hence, advice areas are frequently revised if new biological information regarding stock location and genetic composition is available. In contrast, the management areas are fairly stable over time. Using a sequential decision model we show that while a revision of advice area in response to such new information leads to more accurate stock assessments, a potential mismatch with the management area can lead to less valuable information and less informed decisions.

Author(s)

Esther Schuch, Environmental Economics and Natural Resources Group, Wageningen University
How the imbalance in subsidies distribution affect the economic viability of small-scale fisheries

Part of
Special Session: Global-scale fisheries economics research
08:30 AM - 10:30 AM

Major Theme
Closed Session: Global-scale fisheries economics research

Abstract

We present a bottom-up analysis of the proportion of global marine fisheries subsidies to small-scale fisheries (SSF). Using existing data, we split the reported national subsidy amounts into the fraction that goes to small- compared to large-scale fishing sectors. Results reveal a major imbalance in subsidy distribution, with SSF receiving only about 16% of the total global fisheries subsidy amount of $35 billion in 2009. In other terms, a fisher engaged in large-scale fisheries receives 4 times more subsidies than their small-scale counterpart. Almost 90% of capacity-enhancing subsidies, which are known to exacerbate overfishing go to large-scale fisheries, thus increasing the unfair competitive advantage that large-scale fisheries already have. The developmental, economic and social consequences of this inequity at a global scale impair the economic viability of the already vulnerable small-scale fishing sector. Conclusions indicate that taxpayers' money should be used to support sustainable fishing practices and in turn ocean conservation, and not to foster the degradation of marine ecosystems, often a result of capacity-enhancing subsidies. We argue that reducing capacity-enhancing subsidies will have minimal negative effects on SSF communities since they receive very little of these subsidies to begin with. Instead, it will help correct the existing inequality, enhance SSF economic viability, and promote global fisheries sustainability.

Author(s)

Anna Schuhbauer
Rashid Sumailla
Title: Integrating the Sustainable Development Goals into RFMO Allocations of Fishing Rights

Part of
Special Session: Next generation RFMO governance: Climate change, allocations, and privatization, oh my!
03:30 PM - 05:00 PM

Major Theme
Open Session: Next generation RFMO governance: Climate change, allocations, and privatization, oh my!

Abstract

In September 2015, the UN released its new sustainable development goals (SDG), which includes the target: “By 2030, increase the economic benefits to Small Island developing States and least developed countries from the sustainable use of marine resources.” This represents one of many endeavors to increase resource equity in a context of global environmental change and widening resource disparities. Here we explore recent developments in transboundary fisheries allocation in the context of the sustainable development goals and concerns to avoid a disproportionate burden of conservation on small island development States. We summarize recent developments regarding allocation in transboundary RFMOs, and situate these changes within the broader arc of developed-developing state discourse and fisheries resource negotiations. We then focus on the Western and Central Pacific Ocean, which is home to the world’s most productive tuna fisheries, most of which lie inside the exclusive economic zones (EEZs) of the region’s small island developing States (SIDS). Using the new Western and Central Pacific Fisheries Commission (WCPFC) tropical tuna conservation measure as a case study, we explore the synergies and tradeoffs between different allocation approaches and their implications for conservation, sovereignty, and equity both currently and in a context of global environmental change.

Author(s)

Katherine Seto, Australia National Centre for Ocean Resources and Security (ANCORS), Univeristy of Wollongong

Quentin Hanich
Measuring Economic Contributions of Alaska Saltwater Recreational Charter Fishing Using Sample Weighted and Data Imputed Survey Data in a SAM Model

Part of
Economics of Recreational Fisheries and Tourism (2)
01:30 PM - 03:00 PM

Major Theme
Economics of Recreational Fisheries and Tourism

Abstract

Input-output (IO) models are frequently used to generate estimates of the economic impacts resulting from a policy change or an external shock, but rarely are confidence intervals around estimates calculated. Failing to account for the variance in economic impacts precludes formal statistical testing. We describe a simulation-based approach for calculating confidence intervals of economic impact estimates within a social accounting matrix (SAM) model, which is an extension of an IO model, in a case with inputs calculated from survey data with missing data. The data are adjusted to account for two types of missing data--item and unit non-response. The application involves estimating the contribution of the saltwater recreational charter fishing industry to the economy of Southern Alaska in several years (2011-2013 and 2015). Point estimates of the economic contribution under different labor income leakage assumptions are produced, and confidence bounds for these estimates are calculated that reflect the variation inherent in the inputs for the SAM model. Tests are then conducted to assess statistical differences in the estimates across the years and labor leakage assumptions. Of the years studied, the total output (sales) from the Alaska saltwater charter fishing industry in Alaska were found to be (statistically) largest in 2011 (about $275 million) and lowest in the next year, 2012, (about $173 million). The total output increased in 2013 and again in 2015. These total output estimates were statistically different, and the trends were qualitatively invariant to assumptions about labor income leakage.

Author(s)

Dan Lew, NOAA Fisheries/Alaska Fisheries Science Center

Chang Seung, NOAA Fisheries
Ergonomics Evaluation of Occupational Workload of Women in Fish Trade

Part of
Special Session: Bringing Gender Discourse in Fisheries Economics and Trade (1)
02:00 PM - 03:30 PM

Major Theme
Open Session: Bringing Gender Discourse in Fisheries Economics and Trade

Abstract

In the fisheries sector, participation of women is seen in preharvest, harvest and post harvest activities. However, studies on quantification of work done by women in fish trade are few. Realising the need to have research with strong methodological approach in order to scientifically establish women’s involvement in fish trade in terms of time as well as physiological workloads, a study was done with the objective of performing ergonomics evaluation of occupational workload of women involved in fish trade. Heart rate and rate of perceived exertion were used as the criterion for evaluation of physical demands of women's work. Study was done on women in organised and unorganised sectors in Maharashtra and West Bengal which are two important states with reference to fisheries in India. Occupational workload of women in fresh fish marketing, fish drying, aquaculture and fish/shrimp peeling/cleaning was studied. Study revealed that work of women involved in fisheries trade was ‘moderately heavy’ to heavy and women reported occupational injuries. Workload of women who are involved in peeling in organised sector and unorganised sector could be classified as ‘light’ but work was highly repetitive leading to repetitive strain injuries. There is an urgent need that profits generated by the sector reach women in an equitable manner and gender discourse is mainstreamed in fisheries trade. Participatory ergonomics interventions like scientifically designed rest breaks, ergonomically designed workstations and appropriate medical facilities are suggested so as to improve the work conditions of women.

Author(s)

Arpita Sharma, ICAR-Central Institute of Fisheries Education
Micro Formation Mechanism of Aquatic-product Supply Chain Quality Risks in China

Abstract

For a long time, because of the lack of efficient logistics process, China agricultural postpartum loss are serious, and frequent food safety accidents occur. The formation of Aquatic-product Supply Chain Quality Risks (ASCQR thereafter) is influenced by multiple factors, and how to identify and analyze becomes a hot topic of increasing concern among the Chinese fisheries industries and academics. The study defines the concept of ASCQR as the effect on the quality goal realization due to uncertainty of aquatic products supply chain, and then proposes ASCQR connotation and extension. The high complexity of the supply chain structure and the uncertainty of the external environment in the supply chain determine the existence of ASCQR. ASCQR is characterized by dynamism, complexity, conductivity, and social magnification. Based on TPB theory and from the perspective of microscopic viewpoint, the study identifies internal formation mechanism, discusses risk behavioral attitude, subjective norm, the relationship between cognitive behavior control and risk behavior intention and behavior intention in the impact of risk behavior in the process of mediation. We design related scale, collect data, building risk behavioral intention completely intermediary and partial mediation structural equation model, on the basis of confirmatory factor analysis on various dimensions such as risk behavior attitude, empirical results confirms the partial mediation effects exist in the transmission path from behavioral intention to risk behavior.

Author(s)

Xin Shen, Shanghai Ocean University, China
The Interactive Relationship between Logistics performance and Aquaculture Economy in China Based on the Time Series Data from 1995 to 2016

Part of
Economics of Aquaculture (2)
01:30 PM - 03:00 PM

Major Theme
Economics of Aquaculture

Abstract

Based on the time series data from 1995 to 2016, the study mainly analyzes the interactive relationship between Logistics performance and aquaculture economic development in China with the method of co-integration analysis and error correction model. We also discuss impact factors on the development of aquaculture economy such as aquaculture capital investment and aquaculture technology. The results show that the level of logistics performance has significant positive influence on aquaculture economy. Logistics performance is the granger reason of the development level of aquaculture economy. The short-term fluctuations of logistics performance have little effect on the development level of aquaculture economy, but its long-term fluctuations have more influence. Aquaculture capital investment and aquaculture technology has a positive influence on the development level of aquaculture economy, and the output elasticity of aquaculture technology is greater than the output elasticity of aquaculture capital investment.

Author(s)

Xin Shen, Shanghai Ocean University, China
On the Optimality of a Fishery Moratorium

Abstract

Imposing an outright moratorium that prohibits any catch whatsoever is a standard management strategy for overharvested fisheries. While completely closing the fishery may best facilitate stock recovery, such a policy can be particularly costly for communities dependent on fish consumption for sustenance, or on fishing and fishing-related industries for income and economic well-being. In this paper, we develop a dynamic fishery model to evaluate the optimality of a harvest moratorium when costs to labor and capital are taken into consideration. We first solve our model analytically, drawing parallels between the optimal Faustmann-Wicksell forest rotation and an optimal fishery moratorium with compensation. Subsequently, we apply our model to a numerical case study of the ongoing moratorium instituted on the Northern Atlantic cod fishery off the Canadian province of Newfoundland and Labrador beginning in 1992. Under our model and baseline bioeconomic parameter assumptions calibrated to fishery conditions in 1992, we find that the cod moratorium is economically inefficient: the costs of making annual unemployment relief payments significantly outweigh the benefits of increased revenues from greater sustainable post-moratorium harvests. However, the cod moratorium may become optimal if (i) the intrinsic growth rate of the Northern cod stock is sufficiently high, (ii) the anticipated future net dockside price of cod is sufficiently high, or (iii) the social discount rate is sufficiently low. Conversely, the initial stock level and the marginal cost of capital depreciation have little and no effect on the net present value of the cod moratorium.

Author(s)

Brian Shin, Cornell University
Jon Conrad, Cornell University
C.-Y. Cynthia Lin Lawell, Cornell University
Frameworks for Implementing Ecosystem-Based Management (EBM): NOAA's Integrated Ecosystem Assessment (IEA) and Large Marine Ecosystem (LME) programs

Abstract

The National Oceanic and Atmospheric Administration (NOAA) executes a number of activities that support a more holistic way of studying and managing marine resources, namely an ecosystem-based approach to management (EBM). This presentation will provide an overview of NOAA’s Integrated Ecosystem Assessment (IEA) program as well as Large Marine Ecosystem (LME) program.

NOAA’s IEA program is implementing an approach to support EBM in socio-ecological systems (https://www.integratedecosystemassessment.noaa.gov/index.html). The approach provides a common iterative, adaptive, and scalable science-based framework to support marine resource decision-making in an ecosystem context. The approach includes identifying priority societal and ecological goals and objectives or targets, assessing the status and trends of the components of the ecosystem, analyzes the risk to those components, evaluates the likely future state of the system and ecological and social-economic outcomes and trade-offs of alternative management scenarios to inform management decisions, and monitoring and evaluation after management action is taken.

The LME approach, originally designed by NOAA and adopted by the Global Environment Facility in 1991 as the marine component of their International Waters focal area, provides a framework that, through cooperative international projects, guides developing countries’ actions towards sustainability and recovery of marine ecosystems and their transboundary resources. Recently, a project called “LME:LEARN” was initiated providing the community with a platform for knowledge sharing to support capacity building for improved global ecosystem-based science and governance of LMEs (http://marine.iwlearn.net/). One of the products is guidance for a tiered process for economic valuation of ecosystem services. A brief description will be shared.

Author(s)

Rebecca Shuford, NOAA
Abstract

The U.S. Atlantic pelagic longline fleet pursues highly migratory species (e.g., swordfish, tunas, and sharks) over an extensive range in the Atlantic, Gulf of Mexico, and Caribbean Sea. Because of the fleet’s diverse range and vessel characteristics, fuel can be a major component of vessel operating costs and can make estimating fishing trip costs of the fleet difficult. A two part model was developed for this fleet to estimate fishing trip operating costs. Specifically, to address the importance of fuel and geographic range in trip costs, trip fuel consumption is modeled separately from other trip costs and fuel price is exogenous to the model. Trip fuel consumption was modeled as a function of trip distance, trip length, vessel length, vessel horsepower, and hull composition. Non-fuel costs were modeled as a function of trip length, crew size, target catch, geographic location, vessel characteristics, and inflation. A log-log regression was used to model both these functions using data from a random sampling of 20 percent of the fleet that are required to report economic information along with their fishing logbook submissions. This two part cost model is flexible enough to allow trip cost estimates even with changing fuel costs, fishing locations, and inflation.

Author(s)

George Silva, NOAA Fisheries
**Carp land - Region-marketing and fish farm economics in Europe**

Part of
*Economics of Aquaculture (3)*
*03:30 PM - 05:00 PM*

**Major Theme**
Economics of Aquaculture

**Abstract**
European carp farmers face many challenges in our days. Changed consumer habits, droughts, fish loss through birds endanger their profitability. Our study have selected two European carp regions as case study: The Aischgrund in Germany and Barycz Valley in Poland. Since the new millennium, opinion leaders have introduced initiatives to increase the tourist attractiveness of the regions. To explore the essence of these region-marketing concepts stakeholders were interviewed. Further, focus groups with carp farmers defined typical farms to compare the costs and profitability of carp enterprises and explore the potential impact of region-marketing effects. Our results show, that the single grow-out and sale of fresh carp is hardly profitable. At the same time there are only limited adaptation strategies for the farmers to improve their profitability. Small scale carp farms do not profit from region-marketing effects yet. Future transfer payments could honor their ecosystem and cultural services to maintain the peasant carp farming and thus the unique pond landscape. In case of medium sized carp farms region-marketing seems to be a good strategy to enhance direct marketing opportunities and enhance new income sources via diversification. Large carp farms could indirectly benefit from region-marketing, which could improve the recognition of their products on national level.

**Author(s)**
Tobias Lasner, Thuenen-Institute for Fisheries Ecology
Adam Mytlewski
Myriam Nourry
Marcin Rakowski
Martin Oberle
Sarah Simons
Investigating consequences of Brexit for demersal mixed fisheries in the North Sea

Part of
Fishery Governance, Policy and Management (1)
11:00 AM - 12:30 PM

Major Theme
Fishery Governance, Policy and Management

Abstract
Although the formal process of Brexit has started, there is high uncertainty about Brexit’s impacts on the future of demersal mixed fisheries in the North Sea. As migratory demersal stocks (e.g. cod, haddock, hake and saithe) traverse the zones of various countries, one challenging issue is to agree on how catch shares and management responsibilities of fish stocks will be allocated between the United Kingdom and the European Union after Brexit. Depending on the agreed scheme, fishers may need to adjust and change their fishing behavior in response to economic and management incentives, which in turn will lead to different fishery outcomes. This study uses a bio-economic simulation and optimization model that considers responses of fishers to management schemes including fleet economics, the impact of fishing on stock development and their spatio-temporal interplay. The model is used to explore how three different negotiation strategies in combination with species seasonal movements affect levels of catch, discards, net profit of individual fleet segments, and stock development in that fishery. Costs and benefits are assessed under a soft (unchanged access to British waters and current quota distribution key), a moderate (no access to British waters and current quota distribution key) and a hard Brexit scenario, where EU vessels are excluded from British waters and quota distribution is based on the zonal attachment principle (distribute quota based on how much of a fish stock resides in a country’s zone).

Author(s)
Sarah Simons
Equitable allocation in RFMOs: Can theory be put into practice?

Abstract

The five Tuna - Regional Fisheries Management Organisations (RFMOs) established under the 1995 UN Fish Stocks Agreement have either established or have an ongoing process of establishing allocation of fishery resources to member states. These allocations are often based on catch history, aspirations of developing states, and regulatory compliance, yet equity for coastal developing nations has risen to the top of priorities in recent years. The developing and least developed nations have not historically shared much interest in the development of their fishery, prior to the delimitation of Exclusive Economic Zone (EEZ). These countries therefore often do not have a catch history and furthermore, fish caught in their EEZ are attributed to developed fishing nations. Additionally, the allocations for these developing nations are reduced based on their compliance level as they are unable to cope with the increase in management measures in RFMOs. In this talk, a framework for a fair and equitable allocation approach is discussed. Such an approach has to account for several factors, which include member dependency level (social, economic and cultural), development aspirations, the development status, etc. While it is a norm in current environmental agreements to have a ‘polluter-pay principle’, while in fisheries, those who have caused overexploitation are rewarded with future allocations. This and other theories could help RFMOs reposition the allocation argument. Solutions to putting theory into practice, through informal processes such as Kobe Process (joint tuna RFMO process to harmonize their activities) and formal processes within the United Nations framework, are discussed.

Author(s)

Hussain Sinan, Dalhousie University
Megan Bailey, Dalhousie University
A co-viability analysis of multi-objective harvest strategies for Queensland’s East Coast Otter Trawl Fishery

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (1)
11:00 AM - 12:30 PM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract

Fisheries are increasingly being managed according to principles of Ecological Sustainable Development (ESD), which require the balancing and integration of economic, environmental and social objectives to achieve the triple bottom line (TBL). ESD is undoubtedly a worthy aim, however on its own, ESD provides limited practical guidance and structure to the process of achieving the TBL. At the same time, harvest strategies (HSs) - which specify a particular response to a set of indicators - are being promoted as desirable ways to operationally manage the fishery (i.e. determine catch or effort levels) as they reduce the potential for individuals or groups to unduly influence management decision making. While HSs have primarily focused on biological, and in some cases economic outcomes, they offer an effective fisheries management tool with the ability to integrate the multiple dimensions of fisheries management into a formal and structured framework for fisheries management decision making. This study addresses this deficiency by (1) developing an integrated bioeconomic model (BEM) for the Queensland East Coast Otter Trawl Fishery (ECOTF), which captures both the fleet and population dynamics of the different sectors, and (2) integrating the BEM into a multi-criteria decision-making framework using both multi-objective programming and viability analysis techniques. This analytical framework is used to evaluate TBL management objectives by addressing the following questions: What is an optimal harvest pathway to deliver TBL outcomes? Can this be achieved through HSs? Which HSs deliver viable TBL outcomes and how do these compare to optimal pathways?

Author(s)
Stewart Sinclair
Sean Pascoe, CSIRO Oceans and Atmosphere
Louisa Coglan
Returning to profitability: Biological and economic consequences of alternative south Pacific albacore stock recovery trajectories

Abstract

South Pacific albacore is a species of primary importance in the longline fishery of a number of Small Island Developing States in the Western and Central Pacific Ocean. Despite the fact that the stock is assessed as not being subject to overfishing, nor overfished, economic returns have declined significantly over the past decade. This has led to calls for management intervention. Given stated biological and economic objectives for the fishery, members of the Pacific Islands Forum Fisheries Agency proposed an interim stock target reference point (TRP) to the Western and Central Pacific Fisheries Commission that imply a larger stock size, higher catch rates and a more profitable fishery. The purpose of this study is to examine the biological and economic consequences along the trajectories of two distinct longline effort reduction regimes that achieve the proposed TRP within 20 years. These are a one-off effort reduction implemented immediately, and a phased reduction under which effort is reduced by a fixed percent each year. The results will be discussed in the light of wider Pacific Island objectives for fishery production and fleet profitability.

Author(s)

Maggie Skirtun, Forum Fisheries Agency
Graham Pilling, SPC
Chris Reid
John Hampton, SPC
Target Reference Points and MEY in the Western and Central Pacific Purse Seine Fishery

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (8)
08:30 AM - 10:00 AM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract
The purse seine fishery that falls within the Western and Central Pacific Fisheries Commission Convention Area (WCPFC-CA) is one of the world’s most valuable fisheries with the value of catch averaging ($US3.3 billion between 2012 and 2016). In 2015 the WCPFC agreed to an interim target reference point (TRP) for skipjack (50%SB\(F=0\)) the dominant species in the purse seine fishery catch. In 2016 the WPCFC accepted a suggested initial list of performance indicators for tropical purse-seine fisheries for the purpose of the evaluation of harvest control rules. A number of economic measures, including “Maximising economic yield from the fishery”, were part of this list. This study examines the potential economic performance of the purse seine fishery under the nominated skipjack TRP and other skipjack stock levels using a regional bioeconomic model of the fishery. Influences on economic performance, at both a given level of stock and between different stock levels, of fluctuations in prices and costs, price responses to changes in catch levels and catch rates responses to changes in stock levels are examined.

Author(s)
Maggie Skirtun, Forum Fisheries Agency
Chris Reid
Graham Pilling, SPC
John Hampton, SPC
Carola Kirchner
OVERVIEW OF SMALL SCALE FISHERIES DATA COLLECTION IN TANZANIA

Part of
Understanding Small-scale and Developing Country Fisheries (1)
11:00 AM - 12:30 PM

Major Theme
Understanding Small-scale and Developing Country Fisheries

Abstract
In developing countries, small scale or artisanal fisheries catch data-collection systems, are not performing satisfactorily. This is due to the systems not giving out what is needed for assessing the appropriate fisheries, policy and management decisions, tracking the trends of exploitation of fishery resources and the overall performance of existing fisheries management measures. It is, therefore, essential for the management agencies that the most appropriate and accurate information for management of the fishery resources be continuously collected, processed, analyzed and provided in a timely manner. In fisheries, reliable and accurate information is crucial because only well informed decision makers can make good decisions on fisheries resource exploitation. The complex multi-species, multi-gear tropical fisheries in developing countries, including Tanzania, are poorly understood thus characterising the landings from these fisheries is often impossible using conventional approaches. The data collection in this particular cases are not reliable, inaccurate and takes long time to be reported as such they can-not be used in policy and planning, budgeting and management measures. Struggle for better data collection system, started from total enumeration, followed with sampling by space and time with gear as a primary sampling unit then shifted to boat as a sampling unit. Currently, mobile data collection system is introduced with boat and gear combination as a primary sampling unit. The system provides tangible result that is accurate, reliable, timely and efficient in reporting. This paper therefore, provide case study on Tanzanian data collection system to current situation of using mobile system which shows efficiency

Author(s)
FATMA SOBO, Fisheries Development Division
A simulation study of trade-offs between irrigated agricultural production and endangered fish habitat: a case study of the Sacramento River.

Part of
Special Session: Cross-sectoral marine and coastal management: addressing conflicts between species, user groups, jurisdictions, and legal mandates
08:30 AM - 10:00 AM

Major Theme
Closed Session: Cross-sectoral marine and coastal management: addressing conflicts between species, user groups, jurisdictions, and legal mandates

Abstract
We present a case study where scarce freshwater must be allocated between agricultural production and ecosystem services. Over the last century, large state and federal water projects were developed in the Sacramento River watershed to divert water to irrigation and municipal users. These water project facilities and operations have fundamentally altered the quantity, quality, and timing of water flow through the ecosystem and several salmon species that spawn and rear in the Sacramento River are now listed under the Endangered Species Act. In recent decades, attempts have been made to manage water supply to meet temperature and flow thresholds for juvenile salmon. At the same time, California’s highly productive agriculture industry depends on irrigation water from the river and farmers have faced restrictions due to ecological concerns.

We describe progress on an integrated model of hydrology, fish population dynamics, and agricultural production. We model ecological (status of an endangered species, Sacramento River winter-run Chinook salmon) and economic (agricultural production) outcomes as a function of water releases from reservoirs and diversions by irrigators. Our empirical methods are similar to a Management Strategy Evaluation (MSE), a simulation exercise that is becoming an increasingly important way of evaluating alternative fishery management options. We perform long-run simulations using multiple combinations of water management alternatives to generate a range of ecological and agricultural economic outcomes. Our analytical framework and results consider tradeoffs between multiple sectors (agriculture, fisheries, water) and highlight the role of uncertainty and natural variation in decision-making.

Author(s)
Cameron Speir
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Port-level Consolidation Following Implementation of a Catch Share Program: Spatial Disproportionality in US West Coast Groundfish Landings

Part of
Rights-based Fishery Management and Co-management (4)
10:30 AM - 12:00 AM

Major Theme
Rights-based Fishery Management and Co-management

Abstract

This study examines changes in the geographic distribution of landings in a fishery after implementation of a catch share program. Consolidation of fishing activity among ports, such that fewer coastal fishing communities participate, is frequently cited as a potential (negative) effect of catch shares. This consolidation can have wider community-level economic and social impacts because of upstream and downstream linkages between industries related to fish harvesting. A more limited spatial distribution of landings, and associated fishing infrastructure, may also reduce the resilience of the fishing industry to changes in species distribution and market demand.

We evaluate the observed geographic distribution of revenue across ports in the United States west coast groundfish fishery over 22 years. The time series of data includes 17 years before and 5 years after implementation of catch shares in 2011. The time period of analysis allows us to evaluate any observed changes relative to any pre-existing trends in port-level consolidation. We calculate disproportionality measures (Theil, Gini, Relative Mean Deviation) and Local Indicators of Spatial Association (LISA) from the regional science and geography literatures to describe the spatial patterns of landings and to formally test for changes before and after program implementation. Preliminary results indicate that the fishery did consolidate among ports after the implementation of catch shares. However, the changes in geographic distribution appear to be indistinguishable from pre-existing trends in pattern of landings in this fishery, which had been contracting geographically at relatively constant rate for the 17 year period preceding the policy change.

Author(s)

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Beyond biomass: valuing genetic diversity in natural resource management

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (2)
01:30 PM - 03:00 PM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract
Strategies for increasing production of goods from working and natural systems have raised concerns that the diversity of species on which these services depend may be eroding. This loss of natural capital threatens to homogenize global food supplies and compromise the stability of human welfare. We assess the trade-off between artificial augmentation of biomass and degradation of biodiversity underlying a populations' ability to adapt to shocks. Our application involves the augmentation of wild stocks of Central Valley Chinook salmon in California. Hatchery practices that may be leading to homogenization of the stocks in this system have generated warnings that genetic erosion may cause a loss of the 'portfolio effect'. Furthermore, the value of this loss is not accounted for in decision-making. Loss of the portfolio effect is expected to leave stocks poorly equipped to weather shocks to their survivorship, leading to decline and greater variability in population levels. We construct an integrated bioeconomic model of biomass and genetic diversity. Our results show how practices that homogenize natural systems can still generate positive economic returns in the fishery. However, such a system can become only weakly sustainable---the substitution of more physical capital and labor for natural capital must be maintained for gains to persist. Artificial augmentation also weakens the capacity for adaptation should this investment cease and can cause substantial loss of population wildness. We also introduce an optimization method novel to resource economics---forward dynamic programming---to solve the model without simplifying restrictions imposed previously.

Author(s)
Michael Springborn, UC Davis
Use it or lose it: A bioeconomic model of utilization rules in an ITQ fishery

Part of
Rights-based Fishery Management and Co-management (1)
02:00 PM - 03:30 PM

Major Theme
Rights-based Fishery Management and Co-management

Abstract
In cap and trade systems and other constructed markets, the cap is required to discourage overutilization of the resource or excess pollution, while the trading is intended to facilitate cost-effectiveness of meeting the cap. However, quota underutilization can also be a concern, and regulators sometimes add rules to discourage it. We develop a dynamic structural model to analyze a use-it-or-lose-it rule that is part of a rights-based fishery management program. Fishing vessels, facing biological and economic uncertainty in each fishing season, decide whether to forego a portion of their quota temporarily or risk falling short of minimum harvests and losing some of their quota permanently. We treat the decision to maintain quota as an option value and model the decision as an optimal stopping problem. The structural model will then be estimated with empirical government and survey data from the hake fishery ITQ program in Argentina. We apply the model to the hake fishery ITQ program in Argentina. In 2010, Argentina established ITQs for four commercially important and export-oriented fisheries: Argentine hake, Patagonian grenadier, Patagonian toothfish, and southern blue whiting. Argentina experimented with new ITQ design components to achieve non-efficiency objectives, such as the implementation of social reserves in the hake fishery and a use-it-or-lose-it penalty for insufficient use of quota to foment equitable distribution and maximum utilization of quotas. The theoretical and empirical results will inform a broader debate on rights-based management configurations and methodologies to evaluate the social, economic, and ecological outcomes of specific policy design elements.

Author(s)
Stephanie Stefanski, Duke University
Martin Smith, Duke University
A retrospective bioeconomic assessment of Florida’s commercial reef fisheries

Abstract
The Florida reef ecosystem is a highly valuable resource managed by multiple federal and state agencies with many stakeholders. Over half of the $75 million annual dockside value of finfish landings in Florida is comprised of snappers and groupers, but this resource is threatened by overfishing. Current management strategies include annual catch limits, spatial closures, seasonal closures, size limits, limited-entry, and catch shares. To investigate the performance of rebuilding strategies for a number of snapper-grouper species, we developed an age-structured, multi-fleet bioeconomic model. First, sustainability status was estimated via a length-based assessment, and observed total catch validated the simulated age-structured production model. After estimating seafood demand as a function of domestic landings, imports, disposable income, and management regimes, we estimated fleet costs as a function of effort, vessel characteristics, and permit type. Building on the above relationships, we conducted a retrospective analysis that examined the bioeconomic consequences of past management actions relative to a suite of rebuilding policies. Simulated policies focused on adjusting minimum size limits to maximize yield-per-recruit and were ranked based on economic output. The larger simulated fish stocks were associated with lower costs for the same amount of revenue (higher catch-per-unit-effort), a more stable resource, and larger long-term monetary gains. Our retrospective analysis estimates forgone economic surpluses from non-aggressive rebuilding actions and provides alternative strategies for future management.

Author(s)
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More markets, less planning: A new approach to fisheries regulation

Abstract

An important policy achievement of fisheries economics has been its influence on getting ITQs on the agenda as a viable instrument for fisheries policy. With this instrument, the yearly restrictions on TACs have to be set by a regulating authority. Ideally, from the fisheries economics perspective, these restrictions should be set such as to maximize the present value of economic surplus from the fishery. Given the clearly asymmetric information between fishers and regulators or scientists in terms of costs and revenues, substantial uncertainties arise in this step of planning. Economic theory shows that markets can be a powerful instrument to reveal missing information. The ITQ instrument uses this approach to efficiently allocate the TAC, but still requires full economic on private cost structures for determining the efficient level of TACs.

In this paper, we study how more sophisticated market-based instruments can be used to fully reveal all economically relevant information for fisheries regulation, such that the regulator only needs to collect biological information about resource population dynamics.

To this end, we propose a market mechanism that extracts this private information via the demand of fishers for access to a share of the resource stock. We model the fish resource as a spatially dispersing, ‘well-mixed’ population. In addition to an ITQ system, fishermen buy exclusive access to a spatially defined patch for harvesting the resource. We show that the market equilibrium price paths for individual quotas and resource access rights contain all economic information necessary to set the efficient path of TACs.

Author(s)

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Preach water while drinking wine? Time preferences of fishery managers and implications for management

Part of
Fishery Governance, Policy and Management (2)
01:30 PM - 03:00 PM

Major Theme
Fishery Governance, Policy and Management

Abstract
Fishermen are often advised to be more patient and limit catches now, in order to increase stock size and catches in the future. Such scientific advice is usually based on the maximum sustainable yield (MSY) objective. This biological criterion is often consistent with economic interests at low discount rates. The aim of this paper is to check if fishery managers are as patient as they advise fishermen to be. To answer this question, we performed a field experiment with 474 members of the ICES community, which is the major scientific advice-giving organization in North-Atlantic fisheries. Using an online questionnaire, we performed a simple economic experiment to reveal the time-preferences (i.e. interest rates) of scientists.

Variability in stated time-preferences was high, with interest rates ranging from zero to >50%. More than 40% of the ICES community opted for interest rates >10%. We apply the observed interest rates in age-structured bio-economic models of two important cod fisheries and find that the long-term optimal spawning stock biomass is drastically lower than in the MSY base case for interest rates >10%. It seems that there is some evidence of preaching water while drinking wine in the fisheries management sector.

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A Bootstrap Analysis of Fishery Operation under Protected Species Hard Caps

Abstract

Conservation impacts on protected sea turtles and marine mammals are a longstanding concern in U.S. swordfish fisheries, including the Hawaii shallow-set longline (SSLL) fishery and the west coast drift-gillnet (DGN) fishery. Observer records for these fisheries document a history of rare-event interactions with large cetaceans and endangered sea turtles.

Since 2001, leatherback and loggerhead sea turtle interactions in the SSLL fishery have been limited by hard caps, or common-pool limits on the numbers of observed interactions which may occur before the fishery shuts down for the remainder of a season. More recently, in September 2016, the Pacific Fishery Management Council adopted hard caps to strictly limit annual DGN fishery interactions with a range of protected species including fin whale, humpback whale, sperm whale, leatherback turtle, loggerhead turtle, olive ridley turtle, green turtle, short-fin pilot whale, and bottlenose dolphin.

Hard caps create a tradeoff between protected species conservation and potential fishery production. Caps set low enough to make closure early in the season a likely event may result in lost fishing effort and quasirents. Uncertainty over closure timing increases the risk to fishing livelihoods.

A bootstrap analysis has been developed to simulate the conservation and economic effects of hard caps on DGN fishery operation. Observer, logbook and landings databases and cost-and-earnings survey data are used to calibrate the analysis. Results suggest a substantial loss of economic viability with limited conservation benefits may occur if caps are set at levels which are likely to trigger early season closure.

Author(s)

Stephen Stohs, Southwest Fisheries Science Center
What economic and environmental values are important to the local residents? A case study of Kuliatan Marine Sanctuary in the Philippines

Part of
Poster Session
05:00 PM - 07:30 PM

Major Theme
Ecosystem-based Management and Integrated Assessments

Abstract

The ‘value’ of key ecosystem services is an important component in resource management and plays a role in monetizing impacts of policies on ‘utility.’ The past decades have seen the rapid development of economic valuation on ecosystem services, looking at both static and dynamic models, at one or multiple products, or at relations between sectors/products. Recently, non-standard techniques that directly measure ‘utility’ such as the subjective well-being, are gaining popularity as complementary (or even substitute) approaches because they are not prone to strategic behavior/hypothetical bias, on inability to pay, or on individuals’ inability to predict truthfully and rationally answer the willingness to pay question. This subjective well-being research is a part of a larger research project on understanding the value which local residents place on marine protected areas (MPAs). This presentation presents literature review and cognitive mapping exercises that address the question, ‘what values of MPAs are important to the local residents?’ Participants included fifty individuals from various sectors and who resides near Kuliatan Marine Sanctuary. Residents believe that the sanctuary is a place where plants and animals interact with each other with minimal disruption and place where one can experience activities under the water. In contrast, regulatory services (e.g. climate change and shoreline protection) and other cultural values (e.g. a place for research) are seen to be least important. Clearly, residents felt that environmental values are more important than market-related ‘values’ such as income and livelihood.

Author(s)

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Elaine Grace Fernandez, University of the Philippines Visayas
Rodelio Subade, University of the Philippines Visayas
Towards Capturing Marine Recreation Values: Integrated Economic Valuation for Sustainability of Taklong Island National Marine Reserve, Philippines

Part of
Economics of Recreational Fisheries and Tourism (2)
01:30 PM - 03:00 PM

Major Theme
Economics of Recreational Fisheries and Tourism

Abstract

This paper examines integrated economic valuation (IEV) as a strategy in realizing conservation sustainability in Taklong Island National Marine Reserve, Philippines. IEV involves measurement of coastal ecosystem services’ (CES) economic values, capture of such economic values through users’ fees and other instruments, and utilizing captured economic values through conservation financing (Subade 2013; Georgioo et al, 1997; TEEB 2010).

A major reason for the continuous depletion of environmental resources (like coastal ecosystems and their services) is often the failure to account adequately for their non-market values in decision-making that concerns resources uses that affects them. Many coastal resources or ecosystems are complex and multi-functional and hence it is not obvious how the myriad ecosystem services provided by them affect human welfare. Since many of the benefits or values of such resources are not bought and sold in the market, they are often ignored in private and public decisions. Economic valuation can assist in providing a means for measuring and comparing the various benefits of environmental resources. It serves as a powerful tool to aid and improve the wise use and management of such resources (Subade, 2007; Barbier et al, 1997)

As part of bigger study, this study assessed recreation values that can be derived from stream of visitors to TINMR. A big portion (90%) of the respondents were willing to give monetary contributions for TINMR. Average entrance fees they would give was 51.42 pesos per person that could possibly cover a big part of conservation costs and support local conservation efforts

Author(s)
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Fisheries Sustainability Insurance Fund as a tool to protect vulnerable fishers in fluctuating pelagic fisheries

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (5)
11:00 AM - 12:30 PM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract

Pelagic fish stocks are subject to fluctuations that are driven by climate change, overfishing and changes in market conditions. The fluctuating nature of pelagic fisheries creates uncertainties in fishers’ income, thereby adversely affecting their livelihoods. The aim of this contribution is to reduce the risk and vulnerability fishers face by developing a pay-in-pay-out Sustainability Insurance Fund for fluctuating pelagic fisheries. We build an ecological-economic model and use it to investigate the feasibility of creating a Sustainability Insurance Fund that would be funded through a levy charged to the industry in good years, and/or contributions from government and/or private entities such as foundations and non-governmental organizations. A Sustainable Insurance Fund could therefore provide a source of short-term income to affected fishers in years of severe poor pelagic fish catches. The fund would thus address the possible economic shortcomings created by severe events, and thus reduce the motivation of the government to continue allowing excessively risky fishing levels when the stock falls below the target reference level necessary to support sustainability.

Author(s)

Isaac Jonas, University of British Columbia
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Rashid Sumailla
IUU carding systems for fisheries sustainability?

Part of
Special Session: Financing, Incentive Structures, & Sustainability
10:30 AM - 12:00 AM

Major Theme
Open Session: Financing, Incentive Structures, & Sustainability

Abstract

Illegal, unreported, and unregulated fishing is a significant problem facing fisheries worldwide, with a significant impact on sustainability of fish stocks and the socioeconomic benefits derived from fisheries. Thus, several measures have been proposed to tackle illegal, unreported, and unregulated fishing, many of which are derived from the basic economic insight that people engage in illegal fishing because it pays economically to do so. One obvious way to reduce the benefits from illegal, unreported, and unregulated fishing is to dry up the market for the fish they catch. This is exactly what EU Regulation 1005/2008 seeks to achieve by stipulating that the EU will issue warnings, known as a "yellow card" to countries that perform poorly in the effort to end illegal, unreported, and unregulated fishing. Failure to show improvement in their IUU fishing elimination effort means that they will be banned from exporting seafood to the EU. Here, we explore the efficacy of this policy. First, I quantify the potential economic risk facing fish exporting countries to the EU should they be red carded and therefore loose access to the EU market. The analysis is then extended to include assumed carding policies by the United States and Japanese, two other very important fish markets. The goal being to find out the extent to which the implementation of a similar red carding system by these two important seafood markets would strengthen the efficacy of such a system to motivate action by countries to combat illegal, unreported, and unregulated fishing.

Author(s)

Rashid Sumaila
The cost-effective analysis of Penaeus vannamei farming in China

Part of
Economics of Aquaculture (2)
01:30 PM - 03:00 PM

Major Theme
Economics of Aquaculture

Abstract
Since 1980’s, there began large-scale shrimp farming and achieved success in China. The chief farmed species is penaeus chinensis. During 1988-1992, the farmed output of shrimp is keeping around 0.2 million tons, which ranked first in the world. During 1993-1997, the shrimp farming was affected by world-popular white pot syndrome so that the aggregate output dropped dramatically. During 1998-2003, the government cultivated the shrimp farming as competitive industry and replaced penaeus chinensis with Penaeus vannamei. In 2000, the farmed output reached the highest historically, which was 0.36 million tons. From then on, with the development from ponds farming to higer-place ponds farming, mulch ponds farming and industrial farming, the disease was controlled effectively. There evidenced the increment of farmed species and farmed area, which enlarged from the south to the north. The aggregate output of farmed shrimp increased year by year. In 2016, it got to 3.3 million tons. According to the survey data in Shandong, Guangdong and Jiangsu provinces, the paper compared the cost structure among different farming styles, conduct break even analysis and sensitivity analysis of different farming styles. Based on the analysis, some inferences were made. First, variable cost shares higher percentage than the fixed cost in the total cost. Second, the structure of fixed cost differed among different style, while the structure of variable cost is similar. Third, the break-even price is lower than the market price. In the end, the paper put forward some countermeasures to improve the farming earning.

Author(s)
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Passenger Port Efficiency for Inter-Islands Transportation in Maritime Country of Indonesia (A Case Study for Tanjung Emas, Semarang)

Part of

Marine Spatial Planning and Multiple Use Management
01:30 PM - 03:00 PM

Major Theme
Marine Spatial Planning and Multiple Use Management

Abstract

Tanjung Emas is the name of Semarang port harbor which lies in the capital city of Central Java province. It has facilities of passenger and cargo terminals. Tanjung Emas is the gate for Central Java with highly densited in population. The mother route of boat passanger embarked/disembarked from Tanjung Emas are mainly to Sampit and Pontianak in Borneo. During the festive day about 16 to 17 thousands passangers were travelling.

The scope of this study is mainly concern to analyze the efficiency of port for passanger. The problem encountered in field was many people maynot able to purchase the air ticket due to out of the range of their affordability. Therefore, no other choice to travel for inter-island except with sea transportation. Focus group discussions with the competence stakeholders and primary survey were carried out to collect the information associated with port efficiency. Non-parametrics approach for efficiency was employed to analyse the inputs-and-output ratio. Stakeholders analysis was also be invoked to enrich the analysis. In-depth interviewed with the competent of informants were also carried out to collect the data.

As of now, the inter-island passanger boats are limited in number and services. While, the potential pasangers are numerous due to a progressive inter-regional growth and development. The results suggest that the inefficiency for several factors inputs such as ticket office, information technology (IT) system for ticketing, dock facilities, etc are indeed need to be improved accordingly and benchmarking with other ports are highly recommended

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Consumer’s consciousness to seafood produced in affected area of the 2011 earthquake and its chronological change

Part of
Seafood Markets and Trade (2)
11:00 AM - 12:30 PM

Major Theme
Seafood Markets and Trade

Abstract

The magnitude 9.2 earthquake and tsunami hit Northeast Japan, triggering the Fukushima Daiichi Nuclear Power Plant accident in 2011. Subsequently, price reductions of coho salmon (*Onchorhynchus kisutch*) aquacultured in Miyagi (Miyagi salmon) were observed in Japanese consumer markets in 2012. From interviews of producers, we found one of the potential factors contributing to these price changes include weaker consumer confidence in food safety after the nuclear power plant accident. This study focuses on the factor through consumer surveys on post-disaster perceptions toward Miyagi salmon. We conducted online surveys in 2012 and in 2015 of consumers in Tokyo and Osaka prefectures. By using Structural Equation Modeling (SEM) on the 2012 survey results, we found that concerns about the radioactivity of Miyagi salmon had a negative influence on purchase intent. The desire to make a contribution to reconstruction had the largest positive influence on purchase intent in both areas. The result of SEM on the 2015 survey results showed that concern about the radioactivity still had a negative influence and desire to make a contribution to reconstruction still had a positive influence on purchase intent, but the degree of each was reduced in Osaka compared to 2012 survey results. While in 2012 consumers showed their distinctive willingness to purchase the fishery products for the purpose of contribution to reconstruction in both areas, our results indicate that, as the time passes, marketing and promotion efforts should emphasize not only the positive contribution to reconstruction but also the overall quality of the product.

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Balancing goods and bads: A Bayesian analysis of fishery regulatory decisions

Abstract

This paper examines the regulatory decision problem facing fishery managers tasked with balancing desirable fish catch with undesirable bycatch. I approach the problem using Bayesian decision analysis. I first estimate a model of production, accounting for the fishery’s joint production of desirable and undesirable outputs. I then use the estimated model parameters to evaluate the expected utility maximization problem facing fishery regulators. The primary limitation to evaluating this problem is that bycatch is not priced in society. To address this, I develop an innovative method that uncovers the implicit price of bycatch assuming observed regulations were set optimally. I then apply this method to evaluate full set of possible regulatory decisions, providing a guide for regulators to make optimal decisions conditional on the value of bycatch. I fit the model to panel data from Hawaii’s longline fishery collected for 204 vessels operating between 2004 and 2013. Results indicate observed sea turtle regulations from 2004-2009 imply large social values for sea turtle bycatch, in the range of $5.1 million per leatherback, and $4.9 million per loggerhead caught. These implied social values provide critical information to guide decision-makers toward setting optimal fishery regulations that maximize net social value.

Author(s)

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Examining QS Transfer Decisions in the Pacific Halibut and Sablefish IFQ Fisheries

Part of
Rights-based Fishery Management and Co-management (3)
08:30 AM - 10:00 AM

Major Theme
Rights-based Fishery Management and Co-management

Abstract

The Pacific Halibut and Sablefish IFQ Program was implemented over 20 years ago and includes a number of provisions intended to protect rural Alaska communities from the potentially adverse impacts of a catch share program. Despite these provisions, there has been a migration of quota shares out of some rural Alaska communities, and there are concerns about the implications of this migration for fisheries access and the long-term health of these communities. This study involves developing and estimating a reduced form model of quota transfers among individual buyers and sellers to explore the extent to which community factors have contributed to quota share transfer decisions in the IFQ fisheries while accounting for other individual factors like initial allocations and overall quota share holdings. Furthermore, we examine how consolidation has affected quota share transfer networks over time and whether this may be impacting access opportunities. The results of this study can be applied to other settings where long-term access for rural fishing communities is a concern.

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Family resilience and women’s participation in Alaska’s changing fisheries

Part of
Special Session: Bringing Gender Discourse in Fisheries Economics and Trade (2)
04:00 PM - 05:30 PM

Major Theme
Open Session: Bringing Gender Discourse in Fisheries Economics and Trade

Abstract
The intersection of social gender norms and commercial fisheries often occurs within fishing families. This study presents preliminary results of research examining fishing family dynamics and responses to management changes in Alaska’s fisheries, utilizing a mixed-methods approach of focus group workshops and panel data analysis. In a landscape of a perceived evolution of gender norms towards greater female ownership of fishing vessels and permits, fishing participants in Alaska still note differential impacts within fishing families on men and women from having children and changing regulatory regimes. This study explores fishing family adaptations and women’s participation under changing fishing conditions in Alaska.

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Identifying discrepancies in registrations within the supply chain - a study from the cod fisheries in Norway

Part of
Fishery Governance, Policy and Management (1)
11:00 AM - 12:30 PM

Major Theme
Fishery Governance, Policy and Management

Abstract

Seafood is one of the most valuable and highly traded commodities worldwide, and thus highly susceptible to fraud. The Norwegian fisheries sector is subject to a wealth of regulatory requirements ensuring an environmentally and economically sound fishery. Nonetheless, studies have shown that there exists a, at times significant, discrepancy between imports/landings and exports/domestic consumption. Parts of this gap can probably be explained by intentional acts of fraud, such as landings of illegal, unreported and unregulated (IUU) fish. However, as both the production process and the supply chain is highly complex, portions of the gap might also be attributed to non-fraud related issues, such as gaps in the regulatory framework, inaccurate reporting, production process errors, human error, or other unintentional factors. By combining a documentary study of the regulatory framework with a material flow analysis (MFA) and an in-depth case study, we map and analyse the Norwegian cod fishery supply chain to identify possible sources of discrepancies and inconsistencies. We estimate the scope of the discrepancy within the Norwegian cod fisheries, highlight weak points within the supply chain, and identify weaknesses within the regulatory framework regarding product registrations. The study shows that a combination of the different methods is valuable in understanding the complexity of the different recordings. By combining the methods, it is possible to test whether identified records are comparable or not, while contextual knowledge is useful in adjusting the analysis by identifying sources of discrepancies.

Acknowledgement: This work was conducted in the framework of the EU Project FoodIntegrity.

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Lost opportunities from artisanal fisheries: the case of illegal fishing on Lake Victoria, East

Major Theme
Managing Small-scale and Developing Country Fisheries

Abstract

Lake Victoria supports the World’s largest freshwater fishery that contributes to livelihoods of about 30 million people in the three East African countries that share the lake (Uganda 43%, Kenya 6%, and Tanzania 51%). Illegal fishing due to inappropriate fishing practices, poor enforcement of fishery regulations and limited investment by regional governments into the enforcement, threatens the resilience and sustainability of Lake Victoria fisheries. Understanding the extent and magnitude of loss due to illegal fishing practices provides a strong basis for regional governments and other development agencies to support efforts to curb illegal fishing practices and ultimately sustain fisheries and dependent livelihoods. Analyzing ad hoc lake-wide catch data, the amount and value of illegal catch on Lake Victoria for two commercial fish species (Nile tilapia and Nile perch) as well as the loss incurred by not allowing the fish to attain appropriate sizes was evaluated. Results indicated > 50% of the catch as illegal undersized fish and incredible economic opportunities lost if the fish were to be left to grow to the minimum harvest sizes (22 and 50 cm TL for Nile tilapia and Nile perch respectively). Models fitted to the catch data suggest the two species could sustainably be harvested if all illegal gears were eliminated in the fishery. Simulations indicate other African Great lakes suffer similar consequences and are getting closer to growth overfishing. This study underscores the need of countries with artisanal open access fishing systems to support efforts to curb illegal unregulated and unrecorded fishing.

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Hillary Mrosso, TAFIRI
Robert Kayanda, LVFO
Global ex-vessel fish price database and recent applications

Part of
Special Session: Global-scale fisheries economics research
08:30 AM - 10:30 AM

Major Theme
Closed Session: Global-scale fisheries economics research

Abstract
Ex-vessel fish prices are prices received by fishers at the first point of sale. These prices are important as they provide the basis for estimating the value of fisheries landings and lead to subsequent economic analyses of fisheries. Here, we describe a significant area of improvement to previously constructed ex-vessel fish price databases. While each species is expected to be priced differently, separate prices for different fisheries end products of the same species have not been considered. We estimate prices separately for catches of species destined for different purposes: direct human consumption, reduction to fishmeal and fish oil, and other non-human consumption purposes. Our results show that estimates of prices and landed values from previous databases were substantially overestimated, especially in countries with large reduction fisheries. For example, Peru has one of the largest reduction fisheries and we estimated total annual landed values in 2010 to be 38% lower than with estimates that fail to separate prices based on end products. Updates of global ex-vessel price databases improve economic evaluations of global fisheries and contribute to fisheries science and management. Finally, we discuss recent applications of the database and its implications for global and regional fisheries.

Author(s)
Travis Tai
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Economic Performance of Harvest Control Rules Under Changing Conditions

Abstract
Regional fisheries management councils in the United States use a variety of harvest control rules to determine the acceptable biological catch in a fishery. The rules are used to translate the uncertainty from the stock assessment to the achievement of a given level of probability of overfishing to set the annual quota. A management strategy evaluation was used to simulate the performance of several harvest control rules for summer flounder that varied in the selection of the probability of overfishing based on the estimate of spawning stock biomass. Under stable conditions, each of the rules tested performed similarly with little difference in harvests, spawning stock biomass, or frequency of overfishing. However, in a changing environment where recruitment might be poor, natural mortality may be high, or biomass is overestimated, control rules that decrease the probability of overfishing when stocks are low perform better, biologically. In this study we will compare the economic welfare performance of the harvest control rules based on estimates of commercial fishing net revenues and consumer surplus, and compensating variation in the recreational fishery.

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Co-management engineering in small-scale fisheries through action research

Part of
Managing Small-scale and Developing Country Fisheries (2)
04:00 PM - 05:30 PM

Major Theme
Managing Small-scale and Developing Country Fisheries

Abstract
As complex socio-ecological systems, small-scale fisheries require a collaborative and problem-solving approach to governance based on a context-based vision of sustainability issues. Building upon research on adaptive experimentation, adaptive co-management and social learning, we investigated the dynamics of co-management performance in small-scale fisheries across different contexts and spatial and temporal scales through action research. In nine case studies in the South Pacific, new co-management institutions were intentionally set up from 2008 to 2016 through fishery policy intervention to address over-exploitation problems of sea cucumber resources. In order to quantitatively and empirically assess change in governance within and between cases, we developed a multidimensional analytical framework of governance performance. Eleven criteria were defined and scored using secondary data derived from the institutional diagnostic of cases throughout the research period. Results showed that 10 out of 11 criteria were positively impacted by the intervention. Specific score and criteria combinations characterized three typical institutional contexts observed throughout the fishery co-management process across cases. Four typical trajectories of governance performance were observed suggesting that the impacts of the intervention on the adaptive and resilience capacity of the governance system greatly varied across cases. Our multi-scale, adaptive experimentation exemplified how policy intervention in small-scale fisheries may take the local social arena into account as a dependent factor. This empirical study shows that action research is a promising way for both understanding the dynamics of cooperation and actively contributing to the development and sustainability of co-management regimes in small-scale fisheries.

Author(s)
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Olivier Thebaud, IFREMER
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Assessing the value of coral reefs in the face of climate change: the evidence from Nha Trang Bay, Vietnam

Part of
Special Session: Economic & social impacts of climate change on fisheries and aquaculture (1)
08:30 AM - 10:30 AM

Major Theme
Open Session: Economic & social impacts of climate change on fisheries and aquaculture

Abstract

Coral reef ecosystems provide many important services to society. Their importance is not only proved by their beauty, but also because they provide food and livelihood for millions of people in communities around the world, especially in developing countries. This paper evaluates the economic value of coral ecosystems and potential impacts of climate change and socioeconomic activities on the loss of coral reefs in Nha Trang Bay, Vietnam. Economic valuation approaches and bioeconomic modelling are applied to combine socioeconomic data and projections of coral reef coverage based on the quantitative scenarios of sea surface temperature and fishing activity to articulate the potential economic consequences of future change in the coral reef. The loss in economic value of coral under climate change and fishing effort scenarios is estimated which ranges from US$2.57 to US$28.6 million annually. This result is useful for policy makers to draw conclusions for climate policy, biodiversity conservation, sustainable development, and priorities for further work.

Author(s)

Quach Thi Khanh Ngoc, Nha Trang University
Enforcement and Corruption in Management of Marine Protected Areas

Abstract

Marine protected areas (MPAs) are important for biodiversity conservation and can provide the benefits for current and future generations. Management effectiveness is a key factor to achieve outcomes of MPAs. However, success is related to the enforcement implemented. Corruption is one of the main issues impacting and weakening enforcement. This article provides the perspective for control the corruption to get the benefit from conservation from MPAs. The corruption is considered in two cases, ex-ante and ex-post bribery. The individual agent behavior is examined to investigate how individual agent chooses the optimal legal and illegal harvest and the avoidance effort for enforcement from government. The condition for the enforcer’s decision to accept the bribe is also examined. The maximization of social welfare is analyzed to find out the optimal enforcement for illegal harvesting, the optimal MPA size and the optimal wage for enforcers that help the government achieve the objective to maximize biodiversity conservation and benefits for stakeholders. The results from the study show that corruption affects the natural resources in such a way that it can make the marginal cost of illegal harvest of an individual agent decrease which, in turn, leads to an increase in the illegal harvesting effort. The social planner would put more effort to avoid the ex-ante bribery since it can lead to the degradation of natural resource due to the absence of monitoring.

Author(s)

Quach Thi Khanh Ngoc, Nha Trang University

Claire Armstrong, UiT The Arctic University of Norway
Analysis of Consumers Preference and Willingness To Pay For Smoked Fish In Ondo State Nigeria

Part of
Economics of Aquaculture (4)
11:00 AM - 12:30 PM

Major Theme
Economics of Aquaculture

Abstract

There is an ongoing campaign for protein intake in Nigeria to combat widespread protein calorie malnutrition. One way this can be achieved is increased consumption of various fish forms. This study considered the preference of the respondents for smoked fish and examines the factors influencing the willingness of the respondents to pay for smoked fish in the study area. The study area is Ondo State, Nigeria. A multi-stage sampling technique was used to select 120 respondents for the study. Descriptive statistics, tobit regression model and binary logistic model were used to analyze the data. The study revealed that majority (65%) of the respondents fell within the economically active age (18 years and 60 years). 95% of the respondents are aware of smoked fish in the study area. The result of the Tobit regression analysis revealed that income of the respondents (0.075) was positively significant at 1% and 85% of the respondents were willing to pay the set price of ₦600 to ₦1,000 ($1.67 to 2.78) for 0.5kg of smoked fish in the study area. The binary logit regression analysis revealed that the willingness to pay for smoked fish is influenced by price of the smoked fish. The study revealed that the major constraint affecting the consumers’ willingness to pay for smoked fish in the study area was inadequate supply. The study recommends that efforts should be made to encourage the wide spread distribution and availability of smoked fish in the study area.

Author(s)
OLANIRAN THOMPSON, Department of Agricultural and Resource Economics, Federal University of Technology, Akure, Nigeria
Assessing The Climate Change Risk Management Strategies Among The Aquaculture Fish Farmers In Southwest Nigeria

Part of
Economics of Aquaculture (1)
11:00 AM - 12:30 PM

Major Theme
Economics of Aquaculture

Abstract

Nigeria’s domestic supply of fishery products falls short of the demand; however, there is a growing aquaculture industry that has come to the rescue in filling the gap between supply and demand. Most of the aquaculture fish farmers are prone to the risk of climate change, since weather and extreme events have become more unpredictable. This study assessed the climate change risk management strategies among the aquaculture fish farmers in southwest Nigeria. Multi-stage sampling technique was used to select 180 aquaculture fish farmers in the study area. Descriptive statistics, likert scale, net profit and multinomial logit model were used to analyze the data. The results revealed that 81.3% of the respondents were within the active productive age in the study area. The study revealed that all the respondents were aware that climate is changing and the most observable climate variable according to the respondents is unpredictable rainfall (72%). Table size fish production was profitable with net profit of 1,057,500 Naira per annum ($2897.26). The commonly used adaptation strategy by the aquaculture fish farmers in the area was use of concrete pond/fiber tank (78%) The result of the multinomial logit model revealed that farm income influences the adoption of flood control/provision of water outlet by 19.22% and provision of alternative water supply (Borehole) by 45.11%. The study recommends that government at all levels should provide credit facilities at a single digit interest rate to mitigate the effects of climate change on aquaculture fish farmers in the study area.

Author(s)

OLANIRAN THOMPSON, Department of Agricultural and Resource Economics, Federal University of Technology, Akure, Nigeria
Combinatorial auctions for fishery quotas

Part of
Rights-based Fishery Management and Co-management (1)
02:00 PM - 03:30 PM

Major Theme
Rights-based Fishery Management and Co-management

Abstract
Markets for individual tradeable fishing quota are evolving and maturing in many countries throughout the world. Synergies in spatial and temporal packages of fishing quotas have yet to be explored and exploited. The relative performance of simultaneous multi-round and combinatorial auctions has been well documented and explored in a number of environments including the allocation of spectrum rights by the US Federal Communications Commission, aircraft take-off and landing slots, as well as pollution emissions allowances. It is therefore timely and policy relevant to explore the relative performance of simultaneous and combinatorial fishery quota markets in controlled experimental environments. This presentation reports the results of a series of economic experiments exploring the relative merits of these alternative fishing quota markets. The results provide important insights into the future development of individual tradeable fishing quotas.

Author(s)
John Tisdell, University of Tasmania
Fishery co-management and spatial coordination: fishery self-governance alleviates crowding inefficiency

Part of
Rights-based Fishery Management and Co-management (2)
04:00 PM - 05:30 PM

Major Theme
Rights-based Fishery Management and Co-management

Abstract

Previous studies point out that heterogeneous biological productivity across fishing grounds results in inefficient effort allocation due to crowding at the beginning of the fishing season. Can fishermen alleviate this problem via self-governance? We studied spiny lobster fishery in Japan operating under TURF and unique two-part management schemes. In first half of the season, when crowding inefficiency can be the greatest, this fishery operates as a group, i.e., full spatial fishing effort coordination, and share the total revenue equally among the fishermen. In second half of the season the fishermen switch to individual-based regulated open access (ROA) operation. The two schemes operate within its designated and mutually-exclusive fishing zones, and the area of group operation zone has gradually expanded over the years by taking ROA zones away. This raises several questions: how were ‘converted’ fishing grounds chosen, and how did fishermen agree to it? By examining a unique dataset of individual vessels’ harvest volume and locations from 1991 to 1997 (i.e. prior to the introduction of the current regime), we found that fishing grounds that had yielded a higher share of the catch at the beginning of each season were significantly more likely to be later designated as part of the group operation zone. Furthermore, semi-structured interviews to all fishermen in the fishery indicated that group operation helped foster shared understanding of the ecological conditions of the fishing grounds. We argue that this contributed to Pareto-improving spatial fishing effort coordination in this fishery.

Author(s)
Kanae Tokunaga
Hiroe Ishihara
Hirotsugu Uchida, University of Rhode Island
Russian IUU Regulation and Snow Crab Fisheries in the Northwestern Pacific: Hidden Effects of Relative Cost Change

Part of
Special Session: Northern fisheries: Adapting to a changing world
08:30 AM - 10:30 AM

Major Theme
Open Session: Northern fisheries: Adapting to a changing world

Abstract
Snow crab (Chionoecetes opilio) is one of the commercially most important crab species in Japan, and its fishing activities take place in the 36°N - 45°N latitude range. There are four stocks within Japanese exclusive economic zones, of which the two largest stocks are shared with Russia and South Korea. Japan also serves as an important market for snow crab and imports from both of these countries. In particular, Japan imports a large amount from Russia, with 5-year average annual imports of snow crab amounting to 16,617 metric ton. This study investigates the linkages between foreign fisheries management and domestic fishing activities when both the stock and market are shared. In particular, we examine the impacts of Russian IUU fisheries regulation on Japanese snow crab fishing activities by using Japanese trade statistics and landing statistics from major domestic ports. There are two possible outcomes. First, Russian crabs being substitutes to domestically caught crabs, more stringent IUU regulation in Russia increases the ex-vessel prices at Japanese domestic ports. Second, more stringent IUU regulation increases the cost of production for Russian fleets, which creates a favorable condition, and thus, higher catch for Japanese fleets that share the stock with Russia. Therefore, the real resource conservation effect of the Russian IUU regulation may be smaller than it appears in the trade statistics.

Author(s)
Kanae Tokunaga
Brooks Kaiser, Southern Denmark University
Masashi Yamamoto, University of Toyama
Managing an Ecosystem without Managing a Fishery: The Use of Exempted Fishing Permits in the Southeastern U.S. Lionfish Fishery

Part of
Fishery Governance, Policy and Management (5)
11:00 AM - 12:30 PM

Major Theme
Fishery Governance, Policy and Management

Abstract

Lionfish are an invasive species within the context of marine fisheries in the Southeastern U.S. They are prolific reproducers that feed on juvenile snappers and groupers, and thus have the capacity to reduce populations of snapper and grouper species that are overfished, subject to overfishing, and/or are highly valued by commercial and recreational fishermen. Lionfish were initially harvested incidentally, mostly by lobster and stone crab traps. But as landings increased, markets have developed and given rise to a directed commercial fishery mostly prosecuted by spear and diving gear. Fisheries managers want to significantly reduce the lionfish population and expand the directed fishery beyond spear and diving harvesting methods because the effort they can exert is very limited. However, because species subject to management under the Magnuson-Stevens Act must be managed to avoid an overfished status and overfishing, creating a federal management plan for lionfish is not consistent with the objective of significantly reducing the lionfish population. Therefore, managers are considering whether to issue exempted fishing permits to test traps for the purpose of targeting lionfish and determine if a directed trap fishery is feasible and desirable. The creation of a directed trap fishery would be expected to economically benefit trap fishermen, but also raises concerns because fish traps have been prohibited in the Southeast for several reasons (e.g., direct interactions with other fisheries, “ghost” traps that can damage habitat, incidental harvest of species targeted in other fisheries, and interactions with threatened and endangered species).

Author(s)

Michael Travis, NOAA Fisheries
Game theory applications to Baltic Sea Multispecies and Multi-fleet fisheries under climate variability

Part of
Special Session: Game theory and fisheries mgmt.
03:30 PM - 05:00 PM

Major Theme
Open Session: Game theory and fisheries mgmt.

Abstract

Game theory applications to Baltic Sea Multispecies and Multi-fleet fisheries under climate variability

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Game theory has been an effective tool to generate solutions for decision making in shared fisheries. In the Baltic Sea, Baltic cod, herring and sprat fisheries are the backbone of the Baltic Sea fisheries that is under threat of climate change. Applications of game theory based on a food web model have not been studied before and the present study aims to fill this gap in the literature. In this study, we combine dynamic interacting multispecies ecosystem model called BALMAR with cooperative and non-cooperative approaches. Second, the study focuses on the effects of climate variability on the biological, harvest and economic output of the cooperative and the non-cooperative models by examining two temperature and salinity scenarios in addition to the base scenario without climate change. Third, the study analyses the stability of the cooperation and the non-cooperation behaviours and how they have been impacted by the change in climatic variables, temperature and salinity. Lastly, our study assesses the economic sensitivity of the models by different discount rates, cost and price parameters. Our findings would be useful in decision making processes of Baltic fisheries management under future climate change.

Keywords: Baltic Cod, Herring, Sprat, Baltic Sea, Bio-economic modelling, Game Theory, Climate change, Food Web Model.

Author(s)

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Marko Lindroos, University of Helsinki

Martin Lindegren
Social and Economic Impact of Inland Recreational Fisheries in the Three Biggest Dam Lakes of Turkey: Atatürk, Keban and Karakaya

Part of
Poster Session
05:00 PM - 07:30 PM

Major Theme
Economics of Recreational Fisheries and Tourism

Abstract
This study analyzed the impact, added value and the social characteristic of the main Recreational fisheries (RF) modalities in three dam lakes of Turkey (Atatürk, Keban, Karakaya). The main contribution of this study is to provide deep insights on social and economic characteristics of inland RF in Turkey. 243 fishers were contacted via on-site face-to-face interviews. The sampling was carried out from June 2016 to April 2017. The research sites were included Elazig, Malatya, Gaziantep, Şanlıurfa, Adıyaman and Tunceli provinces. We conclude that the RF in those areas cannot be classified exclusively as a leisure activity considering the magnitude of recreational fisheries as an economic activity and, these findings will be used to enhance the management of recreational fisheries in these and other dam lakes in Turkey.

Author(s)
Sezgin TUNCA
Tuncay Ateşşahin
Vahdet Ünal
LAND BASED FARMING OF SALMON - ECONOMIC ANALYSIS

Part of
Special Session: Sustainable management of coastal fisheries and aquaculture (2)
10:30 AM - 12:00 AM

Major Theme
Economics of Aquaculture

Abstract

ECONOMIC ANALYSES OF LAND BASED FARMING OF SALMON

Trond Bjorndal*, SNF Centre for Applied Research at NHH and NTNU Norwegian University of Science and Technology
Amalie Tusvik, NTNU Norwegian University of Science and Technology

Salmon farming has been one of the fastest growing industries in Norway for more than three decades. Recently, the environmental sustainability of the industry has been questioned, mainly for two reasons. First, the incidence of sea lice has increased tremendously, causing diseases and very high treatment costs. Second, escaped salmon mix with wild salmon with undesirable genetic effects. The Norwegian government has decided to limit production expansion unless control over the sea lice situation is improved. Consequently, interest in alternative production technologies and new ways of growth has increased.

This paper presents economic analyses of an alternative mode of production that represent a potential way for the industry to grow without new licenses or increased maximum allowable biomass (MAB) – namely land based production. Land based farms separate the fish from the environment, thus limiting the ecological risk with respect to waste, contaminants or genetic interference from escapees. Land based farms are currently being developed in several countries including Norway, Denmark, Poland, Canada and the USA.

The project presents economic analyses and compares the cost of production per kg of salmon in land based versus traditional sea cage aquaculture. If the new systems are competitive, production may be developed closer to main consumer markets, and the industry and competitive structure may become different than it is today.

Author(s)

Trond Bjorndal, SNF Centre for Applied Research
Amalie Tusvik, NTNU
GLOBALIZATION OF SEAFOOD MARKETS – ANALYZING MARKET INTEGRATION BY DEVIATIONS FROM COMMON PRICES

Part of
Seafood Markets and Trade (4)
08:30 AM - 10:00 AM

Major Theme
Seafood Markets and Trade

Abstract

Aquaculture has boosted global trade and led to increasing commodification of many seafood products. Along with other developments such as lower transportation cost, improved freezing technology and growth of supermarkets this has induced stronger competition among seafood producers globally (Anderson, Asche and Tveteras, 2010). This is documented in a growing body of studies that estimates competition among wild-caught and farmed seafood products, and for different kinds of fish species. Tveteras et al. 2012 discuss markets interactions between fisheries and aquaculture on a more aggregate level using the FAO Fish Price Index. 

We have access to over 9000 price series from white fish, salmon, freshwater fish, tuna and pelagic species based on seafood imports to EU, Japan and USA. To tests market integration and delineation among species and products for such a large number of price series we create a common price for each main species groups. We then investigate the degree of integration by how analyzing the deviations of the individual price series from the the common prices. The results show increasing market integration over the data period spanning from 1992 to 2016 and that there seems to be a price convergence across species groups.

Author(s)

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Frank Asche, University of Florida
James Anderson, University of Florida
Ursula Landazuri, University of Stavanger
Kristin Lien
FPIs and fishery comanagement: drilling down on collective fishery management

Part of
Special Session: The Fishery Performance Indicators: Lessons learned
11:00 AM - 12:30 PM

Major Theme
Closed Session: The Fishery Performance Indicators: Lessons learned

Abstract

In the FPI framework, input indicators are those attributes expected to influence the outcomes of fishery management. One subset of those indicators is comanagement, measured by 11 input scores spread over four dimensions (collective action, participation, community, and gender). After applying FPIs to 13 Japanese coastal fisheries that varied in fishing method, targeted species-type, fishermen’s group characteristics, and performance outcomes, we found that comanagement scores did not vary significantly across these cases. This implies that comanagement does not affect the outcomes in these fisheries, but other studies and field observations suggest otherwise. Based on FPI case studies from Japan and elsewhere combined with on-the-ground knowledge of these fisheries and the theories of Olson, Ostrom, and Buchanan on collective action, we explore the development of an FPI add-on module to assess comanagement attributes. How to score and interpret dimensions such as the quality of co-managing organization, commitment to self-governance, rules that alter race-to-fish incentive, and consensus and common knowledge among the group members will be discussed.

Author(s)

Hirosugu Uchida, University of Rhode Island
Kanae Tokunaga
Michael De Alessi, University of Washington
Quantifying economic benefit accrued by revenue sharing and fishing effort coordination: the case of spiny lobster fishery in Japan

Part of
Special Session: Session in honor of contributions by James Wilen to marine resource economics (2)
01:30 PM - 03:00 PM

Abstract
This study investigates the effects of coordinated fishing effort coupled with so-called revenue sharing or pooling arrangement on the economic performance of the fishery. Previous studies suggest that coordinated fishing effort can potentially increase the economic efficiency of fisheries and generate resource rents, and that revenue sharing is one of several methods that supports such coordination effort. However, these studies are mostly anecdotal and qualitative; quantitative study on how much benefits it can bring is almost nonexistent to date. Our study site is a spiny lobster fishery in western Japan, which currently implements effort coordination and revenue sharing during the first half of its fishing season. We obtained a unique and detailed fishery data from pre-implementation years (1991-96) and post-implementation years (2011-16). The data contain individual vessel’s daily harvest volume and value by market size category. These detailed data in fine resolution will allow us to construct the counterfactual landing volume and value for 2011-16 to be compared against the predicted landing volume and value with the current management system. Preliminary results suggest positive economic benefits potentially exist, arising primarily from more profitable composition of market size categories of lobsters caught with group fishing, and controlling the total landing to avoid market flooding.

Author(s)
Hirotsugu Uchida, University of Rhode Island
Kanae Tokunaga
3 years in the landing obligation in Europe: Where do we stand, what have we learnt?

Part of
Fishery Governance, Policy and Management (6)
01:30 PM - 03:00 PM

Major Theme
Fishery Governance, Policy and Management

Abstract

The landing obligation in Europe has been in place since January 1st 2015. Experiences gained so far point out that a number of institutional initiatives have been launched, but in practice little has changed regarding discard reduction and use of discards ashore.

In parallel, the wide-ranging EU research project H2020 DiscardLess has been conducting analyses on several aspects of the discard issue, from ecosystem modelling to social and economic impact assessment, from technical and tactical discard avoidance to innovation needs for bringing everything ashore, from stakeholders’ perceptions to governance changes, from incentives to control. Our results suggest that while the short-term economic impact on fisheries is real, there are benefits in the medium- and long-term to reduce discards, and the ecosystem effects of this are limited. There are many ways by which discards can be reduced without jeopardising the fisheries’ economic profitability.

On behalf of the project and all its participants, I will present the most up-to-date status of where we stand and what we know and on challenges and solutions for reducing discards in European fisheries.

Author(s)

Clara Ulrich, DTU Aqua
Mixed-fisheries management plans in Europe: Can we formulate a simple bioeconomic advice on a complex reality?

Abstract

The recognition of the complex biological and economic interactions occurring in mixed-demersal fisheries have long underpinned the development of fleets- and fisheries-based models and data collection in European fisheries. More recently, mixed-fisheries management plans are being designed and implemented in the frame of the EU Common Fishery Policy. The central element of these plans is the option to depart from the single-stock MSY-based scientific advice for setting Total Allowable Catches, provided that there is scientific evidence of “choke species” effects that can lead to an early closure of an entire fishery. Single-stocks’ Fmsy upper and lower ranges have been defined, that would maintain high yields and low risks while providing some flexibility to cope with inter-annual fluctuations of the various stocks.

These complex developments raise multiple questions, but providing simple answers and robust scientific advice to these is not straightforward. In 2018, important milestones are being reached, which see the culmination and the mutualisation of parallel scientific initiatives, developed in different national and pan-european bodies such as ICES and STECF. An operational process is developed, bringing together ecological and bioeconomic models in a flexible framework. Outcomes are summarised in a combined scientific advice accounting for the risks of choke effects, analysing alternative catch options and suggesting TACs that would be meaningful trade-offs between economic and ecological constraints.

This presentation will highlight the main features and outcomes of this complex process, reflecting also on the challenges and opportunities of accounting for mixed-fisheries aspects instead of single-stock approach.

Author(s)

Clara Ulrich, DTU Aqua
Ralf Doering, Thuenen-Institute of Sea Fisheries
Youen Vermard, Ifremer
Raul Prellezo, AZTI
The development of the Icelandic fleet since 1950

Part of
Special Session: Northern fisheries: Adapting to a changing world
08:30 AM - 10:30 AM

Major Theme
Open Session: Northern fisheries: Adapting to a changing world

Abstract
The aim of this research is to identify the effort of the Icelandic fishing fleet since 1950 with focus on the cod fishing fleet in Icelandic fishing grounds. Various historical records and citizen research in Iceland provide unique information and do allow for the total reconstruction of the decked vessel fleet to individual vessels from 1950.

We show how composition of the fleet changed and the fleet grew in volume (GRT) and engine power (KW) until around 2000 but has shrunk since then. The total number of vessels has been similar during this period but the composition of the fleet has changed considerably. In the 1950’s the fishing fleet was composed of 44 large, mostly steam powered, sidewinder trawlers and about 600 medium to small multipurpose vessels mostly built from timber and targeting both cod and herring. Currently the fleet is composed of almost the same number of large stern trawlers, 25 large vessels fishing pelagic species and 700 smaller vessels primarily fishing groundfish and invertebrates. The small groundfish boats are now dominated by small and powerful synthetic fibre boats. The fleet sections have therefore specialized.

We also construct the nominal fishing effort in Kilowatt-days for the total fleet and focus especially on changes in the cod fishing sector. This is compared to the global trend. Along with analysis of available statistics (numbers, GRT, KW and days at sea) we systematically map changes in fishing gear, technology and management that potentially affect the fishing effort.

Author(s)
Hreidar Valfysson, University of Akureyri
Risk Assessment of the Northeast Multispecies (Groundfish) Fishery and Implications for Management

Part of
Special Session: Effects of fisheries mgmt. on risk-taking & safety
11:00 AM - 12:30 PM

Major Theme
Closed Session: Effects of fisheries mgmt. on risk-taking & safety

Abstract

Commercial fishing has historically been one of the most dangerous occupations in the United States, despite the development of regulatory and voluntary initiatives aimed at making it safer. There are a multitude of environmental, physical, regulatory, and social factors that contribute to fishermen’s level of safety at sea; these risk factors can vary across fisheries or across groups within the same fishery. For example, variables such as water temperature, vessel size, or timing and location of fishing activity can all affect the risks that commercial fishermen are exposed to. One way to identify the major safety hazards and trends in a fishery is to conduct a risk assessment of that fishery.

Here, we apply guidance published by the National Marine Fisheries Service (NMFS) in 2015 to complete a risk assessment for the limited access northeast multispecies (groundfish) fishery. By compiling data on fleet characteristics, fishing behavior, and fishing vessel safety incidents, this research aims to (1) identify major safety hazards facing limited access groundfish fishermen, and (2) determine whether certain sub-groups within the fishery tend to be exposed to more risk than others. Additional information gathered through informational interviews with industry experts is used to further develop these analyses. Our findings may be used by fishery managers and regulators to inform the development of management alternatives for the groundfish fishery. The trends and hazards identified through this risk assessment may also help fishermen, managers, and safety professionals develop tools or programs to reduce risk and improve safety at sea.

Author(s)

Maria Vasta, Integrated Statistics, in support of NOAA
Douglas Christel, Greater Atlantic Regional Fisheries Office
Kathryn Connelly, Northeast Fisheries Science Center
Distributional performance analysis in a TURF managed small-scale lobster fishery

Abstract

The distributional performance has been recognized as an important aspect in the successful management of fisheries, hence the need for their evaluation. Nevertheless, this aspect has not been sufficiently assessed in TURF fisheries. Therefore, the aim of this work is to present the distributional performance analysis of the TURF managed small scale spiny lobster (Panulirus argus) fishery of Punta Allen, Mexico. The local fishing cooperative members were granted exclusive access to individual fishing grounds where artificial shelters are deployed. By providing refuge to lobsters, these bottom devices reduce predation and facilitate lobster harvesting using hand nets by free diving. Inequality metrics (Lorenz curve and Gini index G) were applied to fishing income indicators (revenues, quasi-profits of the variable costs, profits, and resource rent) achieved by fishers in seven lobster fishing seasons (2007-2014). Additionally, a comparative analysis of resource rent achieved by individual fishing grounds owners of different age groups was performed. Finally, the Punta Allen lobster fishery inequality was compared with other fisheries with reported Gini indexes. The G index of the fishing revenues showed low values (0.387±0.017) and a stable trend in the seven lobster seasons analyzed. Although the G index of the resource rent among campo owners had the highest value (0.490), there were no statistically significant differences in the resource rent earned by age groups of individual fishing grounds owners. This study showed that the lobster fishery of Punta Allen presented lower inequality values than other fisheries and intergenerational equity among current lobster fishers.

Author(s)

Raúl Villanueva, Universidad Marista de Mérida
Juan Carlos Seijo, Marist University of Merida
Maren Headley
Fishery Reform Funding Strategies for Highly Migratory Fisheries

Part of
Special Session: Incentive based tools for highly migratory and transboundary fisheries
03:30 PM - 05:00 PM

Major Theme
Closed Session: Incentive based tools for highly migratory and transboundary fisheries

Abstract

Global tuna stocks are under threat from fishing and other activities. Fishery stakeholders are exploring alternatives to improve the performance and long-term strength of a range of fisheries with highly migratory tuna stocks, including consideration of strategies for funding and financing the cost of the reform and improvements required. While much fanfare has accompanied the use of private capital as a funding source to support reform efforts, only a very small amount of private investment has been deployed to-date, primarily focused on quota based fisheries in developed countries, with some investment deployed in coastal and near-shore fisheries in developing countries. The use of private investment to support highly migratory stocks and management improvements is especially complicated by the cross-jurisdictional complexities and management risks present in such fisheries. Kelly Wachowicz, an active sustainable fisheries investor and project developer, explores specific innovative solution strategies that overcome barriers present in highly migratory fisheries and may enable private capital to flow to tuna fishery reform initiatives and activities. Such strategies could include a philanthropic prize award for co-investment with private capital, support for project development businesses and organizations to ready projects for private investment, and strategies to offer credit enhancement to promising investment prospects.

Author(s)
Kelly Wachowicz, Catchinvest
Which is more preferred, MSC or ASC ecolabeled seafood?

Abstract

Sustainable seafood certification schemes have been predominant in the world seafood markets. One of the biggest certification is Marine Stewardship Council (MSC), and as of 2016, 12 percent of the global marine wild seafood is certified by MSC certification. Also, Aquaculture Stewardship Council (ASC) has been getting popularity in farmed products. A growing body of literature exist in consumer preference research in MSC, and ASC. However, we do not know which ecolabel is more preferred to seafood consumers. In order to answer the question, we conduct a choice experiment to estimate willingness-to-pay (WTP) for MSC and ASC certified seafood among the Japanese seafood consumers. 3,000 seafood consumers are recruited in Japan using the web-survey since Japan is one of the world largest seafood consuming countries. The choice experiment is designed for oyster products with four attributes (price, label, origin, product type, size). We select oysters because oysters are able to be certified by both MSC and ASC programs. We run conditional logit model and mixed logit model to estimate the WTP for the oysters. The mixed logit model shows the better model statistics in estimation. The result shows that MSC ecolabel has 16% of price premium while ASC ecolabel has 15%. The result suggests that MSC and ASC certifications are equivalently valuable among Japanese seafood consumers.

Author(s)

Hiroki WAKAMATSU
Tsutom MIYATA
Examining public support for international agreement on tuna management and conservation

Part of
Governance and Management of High Seas and Straddling Stock Fisheries
01:30 PM - 03:00 PM

Major Theme
Governance and Management of High Seas and Straddling Stock Fisheries

Abstract

Many tuna stocks are being depleted, and the bluefin tuna stock is of particular concern, having been designated endangered or severely overexploited. Japan’s actions are pivotal in protecting bluefin tuna stocks, as it catches and consumes high volumes for sushi/sashimi. However, efforts by the Japanese government to conserve these valuable stocks have been limited, or even counterproductive, as the government currently represents the interests of the domestic fishing industry. In this study, we revealed public preferences, which can affect the position of the Japanese government in the long run, by quantifying the extent to which support could be generated among the public with changes in specific features of the international agreement over the conservation and management of tuna resources. Using choice experiment that focused on the catch limits, target species, and parties responsible for the expenses of monitoring, we found that a fishery closure was the least likely scenario to inspire public support for tuna conservation. Japanese citizens favoured a prompt management response to overfishing of tuna fisheries beginning immediately when the exploitation of the stocks reaches an unsustainable level. Protecting Atlantic/Pacific bluefin tuna, compared to other tuna species, is a top priority for Japanese citizens. These results indicate that although the current movement towards conserving bluefin tuna is publicly supported, conservation actions should have been initiated early enough to avoid a drastic catch reduction before the stock is overfished or the population becomes endangered.

Author(s)

Mihoko Wakamatsu

Shunsuke Managi
Oregon Sea Grant—Bringing Science to Bear to Address Coastal and Marine Issues

Abstract

Oregon Sea Grant is a catalyst that promotes discovery, understanding and resilience for Oregon coastal communities and ecosystem. We apply the best available science to timely and important ocean and coastal issues, and engage with coastal stakeholders to help them reach informed decisions. Oregon Sea Grant has been continually effective and productive since its inception in 1968, constantly adapting to meet local, regional, and national needs. The program focuses on four areas: ecological, social, and economic aspects of coastal development; adaptation to acute and chronic coastal hazards; human and natural dimensions of coastal and marine fisheries; and cultural beliefs, learning, and valuation of coastal and marine issues. These four areas guide our investments in competitive research, engagement with local communities, student opportunities, and informal education. Oregon Sea Grant has been investing in continued understanding of the mechanisms and impacts of ocean acidification, focusing initially on shellfish, and expanding into other commercially important species such as Dungeness crab and pink shrimp. Oregon Sea Grant addresses earthquake and tsunami hazards through community workshops, business consultations, publications, and media appearances, which has brought a new level of understanding to communities about hazards and resilience. Our student scholar opportunities include working closely with state agencies and Oregon’s state legislature on natural resources policy. Oregon Sea Grant leads the Oregon Coast STEM Hub, serving school districts and communities along the entire Oregon coast and involving numerous state and federal agencies, educational institutes, non-profits, businesses and industry partners. This diverse portfolio engages communities, scientists, managers, and decision-makers in using science to address critical issues facing Oregon’s coastal communities, economies, and ecosystems.

Author(s)

Shelby Walker, Oregon Sea Grant
A COST BENEFIT ANALYSIS OF THE FISH FARMING ENTERPRISE PRODUCTIVITY PROGRAM IN KENYA

Part of
Economics of Aquaculture (2)
01:30 PM - 03:00 PM

Major Theme
Economics of Aquaculture

Abstract

The study contains a cost benefit analysis of the aquaculture development component of the Fish Farming Enterprise Productivity Program (FFEPP) undertaken for Meru County in Kenya. It focuses on the implementation of the FFEPP undertaken from 2009 up to 2013 and evaluates its benefits and costs against the opportunity cost of agricultural land for the beneficiaries of the project. In the authors' estimation, the aquaculture development project has a net present value of KSh 59.6 million during its 15 year lifespan. With some extra costs at the end of each 15 year period, the lifespan can be extended to infinity and the net present value increased to KSh 197.9 million. Besides these direct benefits which translate to improved livelihoods for locals, there are further indirect economic benefits for the whole region. These results indicate that the project can generate greater benefits for the community and the region; adequately compensating them for the opportunity forgone on their agricultural land used for the project. The project appears to be fulfilling all the intended governmental objectives in terms of providing food security and increasing production significantly. The sensitivity analysis shows that the NPV of the FFEPP project is highly sensitive to the market price of fish, the cost of feeds, the size of pond production, the prices of fingerlings, the discount rate and the drop-out rate of farmers respectively

Author(s)

MOSES WAMBUA, WORLD FISHERIES UNIVERSITY PILOT PROGRAM, PU KYONG NATIONAL UNIVERSITY
Strategic Adaption on Climate Shock in Malleable Employment of Fishing Community by E – Skill Inventory: A Case of Southern Coast of Sri Lanka

Part of
Poster Session
05:00 PM - 07:30 PM

Major Theme
Understanding Small-scale and Developing Country Fisheries

Abstract

Changes of weather pattern and unpredictable occurrence of storms, rough sea and cyclone conditions have become a greater complication for fishing community in southern coast of Sri Lanka. Impacts of climate change on the sector and its implications for the socio-economics of the coastal and riparian communities are difficult to ignore (Mohammed & Uraguchi,2013) Climatic differences created peak and off season for the fishing community in marine. The study was based on Kudawella, where consist of long tradition of fishing & economical & social hotspot of fisheries in southern coast. The study aims to investigate the responses of fishermen and women on climate shocks; storms, cyclones and unpredictable rainfall patterns & strategic intervention for mitigate the risks. Primary and secondary data were collected. mainly interviewer administered questionnaires and focus group discussions. The study identified that people who do nothing in off season cause to create social unrest. Only limited number of people with strong social bonds were able to manage the disaster burden. During a shock condition relying on past savings cause debt trap due to less current productivity. Strategic intervention by Decision support system with built skill inventory identified to mitigate the employment malleability. Further, it can be developed as an E-Employment bazaar where create a common platform, link potential employers and fishing community. Registered fishing community members will categorize under different skill levels which creates potential employment opportunities for both men and women. Development of E-Employment bazaar on mobile platform tend

Author(s)

Tharaka Weddagala, Sabaragamuwa University of Sri Lanka
Ruwini Basnayake, Sabaragamuwa University of Sri Lanka
Achini De Silva, Sabaragamuwa University
Spatial temporal fishing technologies: Specification and estimation

Part of
Special Session: Different approaches and priorities for modeling fisher behavior (1)
08:30 AM - 10:30 AM

Major Theme
Open Session: Different approaches and priorities for modeling fisher behavior

Abstract
Data generating processes for trip-level commercial fishing data feature endogenous targeting of individual fish species and spatially, temporally varying stock conditions that are unobserved by the researcher but partially observed by fishermen. We present a model and identification strategy to address serious challenges that arise in this setting for obtaining consistent estimates of the structural properties of fishing technologies. Our estimation strategy exploits (1) the timing and information available to fishermen when factor inputs and output targeting decisions are made, and (2) exogenous, natural variation in stock abundance at the trip-level spatial scale. In a first stage, estimation methods used by stock assessment scientists are adopted to account for endogenous fishing power and spatially-temporally varying abundance. Parameters of our multiple-species (trip-level) cost function are then estimated through a decomposition of costs into an endogenous targeting component and a component that varies exogenously due to random fluctuations in the marine environment. Nonparametric series estimation methods are used to control for endogenous targeting and unobserved multiple-species abundance. An application to the Gulf of Mexico commercial reef fish fishery is presented to illustrate the model. The approach solves an identification problem that pervades previous empirical analysis of fishing technologies and offers a new tool for managing spatial-temporal fishing.

Author(s)
Quinn Weninger, Iowa State University
Larry Perruso, NOAA SEFSC
Helle Bunzel, Iowa State University
Investigating the Profitability of the Northeast Multispecies (Groundfish) Fleet in Response to a Modified Sector Management Program

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (4)
08:30 AM - 10:30 AM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract
For decades, the northeast multispecies (groundfish) fishery has experienced declining stock levels and decreases in the number of vessels that target this resource. In response to biologic and socioeconomic concerns, Amendment 16 of the Groundfish Fishery Management Plan was implemented in 2010, shifting the management of the fishery away from traditional input controls, such as days-at-sea restrictions, towards a catch share system known as “sector management.” Catch share studies suggest that this management approach can increase a fishery’s economic efficiency, economic productivity, and community wellbeing, while simultaneously promoting the rebuilding of stocks. However, when the program was enacted, concerns were raised that sector management would increase consolidation of profits and increase economic inequality in the fishery. Nearly ten years after the program’s implementation, this paper explores the economic impacts of the catch share program on the groundfish fishery. Specifically, this assessment includes an examination of groundfish fleet profitability profiles in relation to fish stocks and market trends. Profitability profiles are examined at the vessel and vessel-affiliation level to further investigate how consolidation may be impacting the fishery. The analysis also includes updated econometric modeling techniques used for profitability estimation in a data limited system, including vessel trip cost modeling which controls for selection bias, incorporating multi-year vessel fixed cost data, and evaluating trip-level revenue. Investigating the changes in groundfish fleet profitability at the vessel and affiliation level illuminates the achievements and shortfalls of the sector management program while addressing the concerns of those who are most impacted by management changes.

Author(s)
Samantha Werner, National Oceanic and Atmospheric Administration Affiliate | Integrated Statistics
Team Inspections in the Common Pool Resource Management when Corruption is Present

Part of
Managing Small-scale and Developing Country Fisheries (2)
04:00 PM - 05:30 PM

Major Theme
Managing Small-scale and Developing Country Fisheries

Abstract

Interviews conducted in developing countries have exposed severe inspector corruption in the management of common-pool resources. Many believe that severe corruption on the part of inspectors hampers the management of common-pool resources in developing countries, contributing in particular to widespread illegal logging and fishing. In this paper, we examine a simple intervention that may mitigate the effects of such corruption in the common case where (i) regulations restrict harvest quantities rather than harvest effort or equipment, (ii) inspectors are bribed to turn a blind eye to over-harvesting, and (iii) harvesting is subject to congestion externalities. We show that in this case, rather than sending out inspectors individually to each inspect a small number of harvesters simultaneously, sending them out as a team to inspect a larger number of harvesters sequentially may be welfare enhancing. The intuition is that, as the ratio of fishermen to inspectors increases, inspectors internalize more of the congestion externalities between the fishermen they inspect, since those externalities ultimately reduce their own "catch" of bribes. Numerical simulations calibrated to data on fisheries indicate that the resulting welfare improvement can be significant.

Author(s)
Chenyang Xu
Mapping Activity, Access and Control profile in Small Scale Ornamental Fish Production Units in Maharashtra, India Using Harvard Analysis Framework

Part of
Understanding Small-scale and Developing Country Fisheries (1)
11:00 AM - 12:30 PM

Major Theme
Understanding Small-scale and Developing Country Fisheries

Abstract

Ornamental fisheries is an emerging business which has vast opportunity for growth. In India, Maharashtra state had a scheme called as Rainbow Revolution which was started to encourage breeding and export of ornamental fishes. This study was conducted to map activity, access and control profile of men and women involved in ornamental fish production system using Harvard Analysis Framework. Out of 305 ornamental production units under rainbow revolution scheme, 110 units were studied. Study of activity profile revealed that men were involved in construction of ornamental fish production unit, observation and checking fish health, checking water parameters, live food culture, marketing, upkeep and maintenance. Their participation in this business on an average was 8 hours/day. Women’s involvement was in fish feeding, cleaning of tanks, siphoning, feed preparation and marketing with participation of average 4 hours/day. There was overlap in few activities. Men had higher access and control on resources like land, farm, machine, equipment and finances. Mann-Whitney U test revealed statistically significant difference between men and women’s access and control on resources. Influencing factors to take up this business were community norms, prevailing social hierarchy, demographic factors and access to special training. Study has revealed that in addition to family and house responsibilities, women spend 4 hours/day on this business. Still, they have less access and control on resources because of existing power relations with which we conclude that complexities in community cannot be ignored and men and women cannot be treated as homogeneous categories when designing policy interventions.

Keywords: ornamental fish, Maharashtra, gender, Harvard Analysis Framework

Author(s)

BHARAT YADAV, ICAR-Central Institute of Fisheries Education

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Value of pearl: a consumer study in Japanese market

Abstract

Pearls are unique fishery products. Their aquaculture production facilities are located in the sea, and their rafts are visible from the land. At the same time, the final products are used as jewelry. The value of pearls thus could include those of jewelry as well as anthropocentric value (namely, gift from the ocean or nature’s benefit to the people). To identify peoples’ evaluations on these values, an online survey targeted for 1,000 persons in Japan was conducted from 27 November to 1 December 2017. Diamond is used as a control material that lacks the value of ocean’s benefit to the people. Respondents were asked to describe pearl and diamond using their own words. The texts obtained from respondents were analyzed using text-mining methods. The results indicated that the respondents frequently used the terms “luxury”, “beauty”, “accessory” to explain both diamonds and pearls. The terms “shellfish”, “Mikimoto”, “Ise-Bay”, and “ceremonial occasions” were frequently used in explaining pearls. For diamonds, the terms “South Africa”, “engagement”, and “hard” were frequently used. Our interpretation is that, while diamonds and pearls both represent relational values arising from peoples’ inclination to keep good social relations with others in ceremonial occasions, a distinctive value of pearl was also identified that represents peoples’ awareness of the benefit from the ocean. Valuation of the nature’s benefit to the people has been discussed in various occasions such as meetings of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), and these results contribute to advance these discussions.

Author(s)

Nobuyuki Yagi, The University of Tokyo
Are there efficiency gains through production switching in a declining small-scale mixed fishery?: evidence from Japan

Abstract
Adjusting the composition of species in production (i.e., production mix) by participating in multiple fisheries is a common strategy adopted by fishers to mitigate income fluctuations due to intertemporal variation in the productivity and distribution of fish stocks. However, the effects of such strategies on individuals’ economic performance in mixed fisheries are not well understood. In this paper, we examine how fishers’ catch, revenue and efficiency are affected when they are forced to switch their production mix in response to a depletion of one of the important species in a fishery, Japan. Individual efficiency scores and switching effects on the efficiency are examined based on DEA and difference in differences estimates, respectively. We find that a depletion of one of the most important stocks in the fishery forced fishers to either exit from the fishery entirely or reweigh their production mix across wild-captured and farmed species. The adjustment in production mix helped maintain revenue from fishing for the remaining fishers. Our results further show that the revenue and allocative efficiency significantly decreased for those who newly entered the production of depleting species, but the allocative efficiency increased for those who exited from such production. Increases in the volume of fish production and fishing revenue are particularly high for those who switched their production to farmed species. At the same time, however, the allocative efficiency for these fishers decreased and those who terminated the production of farmed species had an increase in revenue and allocative efficiency.

Author(s)
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Stock collapse, economic profit and equity in a fishery with cyclic environmental fluctuations

Part of
Economic, Bioeconomic and Ecological-Economic Modeling (4)
08:30 AM - 10:30 AM

Major Theme
Economic, Bioeconomic and Ecological-Economic Modeling

Abstract

The importance of small-pelagic species in marine ecosystems and their economic contribution to coastal communities are increasingly recognised by many fishery managers. However, the management of small pelagic species faces many challenges due to environmental factors that periodically impact on recruitment of the species. Delayed responses in management to these fluctuations can amplify the effects of fishing and may even result in collapse of the stock. In this paper, we examine the effectiveness of directly controlling fishing mortality and fishery closure as a means to manage a cyclically fluctuating fish stock. We develop an age-structured bioeconomic model that incorporates cyclic fluctuations in recruitment. The model is parameterised using data from the Japanese sardine Pacific stock (Sardinops melanostictus) fishery which has twice experienced the collapse of the stock since 1900. Results show that duration of the stock collapse period is mostly determined by the extent of environmental fluctuations, while the effects of such fluctuations on the fishery are heightened by the cumulative impact of fishing on the age-structure of the population. Our results further show that the closure of nursery grounds decreases the duration of the stock collapse period, but this is achieved at the expense of the decline in the overall profit of the fishery and intertemporal equality of benefits from the fishery. By contrast, a direct control of fishing mortality results in a shorter collapse period and more equal distribution of fishery benefits over time, but with less overall fishery

Author(s)
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Where does the premium go? The heterogeneous distribution of a price premium for seafood eco-labels

Part of
Certification of Fisheries and Aquaculture (1)
08:30 AM - 10:00 AM

Major Theme
Certification of Fisheries and Aquaculture

Abstract

There is a growing economic literature on the joint provision of private and public goods. Eco-labels have received wide attention as a tool that can both increase consumer welfare and provide conservation incentives to producers through a price premium. While the literature has consistently measured positive consumer willingness to pay for environmental product attributes, the existence of producer incentives from eco-labels is unclear. Here we explore evidence of a price premium for producers of sustainable seafood. We empirically test for a price premium at two stages in the seafood supply chain for up to 8 species and 3 product types. Our results help to shed light on the distribution of benefits from seafood certification across the supply chain and the economic drivers of that distribution.

Author(s)

Lingxiao Yan, University of Delaware
A Comparative Analysis of Fishing Behavior Under Catch Share and Regulated Limited Access Regimes: Golden Tilefish in the Gulf and South Atlantic

Part of
Special Session: Session in honor of contributions by James Wilen to marine resource economics (2)
01:30 PM - 03:00 PM

Major Theme
Open Session: Session in honor of contributions by James Wilen to marine resource economics

Abstract
A significant focus of Wilen’s scholarship is the role of management regimes in influencing fishing behavior. After being an early advocate of embracing complexity when modeling fisher behavior in management (Wilen, 1979), he continued encouraging researchers to carefully consider dynamics such as property rights when creating regulatory regimes (Wilen, 2000). In 2006, Wilen noted that fisheries sciences and fisheries economists have been talking at cross-purposes for fifty years, and challenged researchers to focus on “getting institutions right” by focusing on how institutions can “encourage individuals to make good choices rather than ... attempt to regulate or control bad behavior.” (Wilen, 2006: 546).

We address this challenge by taking advantage of a natural experiment in US fisheries management. We assess the performance of the Golden Tilefish (Lopholatilus chamaeleonticeps) management under two different regimes: the limited access system used by the South Atlantic Fishery Management Council and the ITQ system used by the neighboring Gulf of Mexico Fishery Management Council. The management regimes are substantively different in these two regimes, while the underlying social and ecological characteristics of the systems are similar. Thus, a comparative analysis of these regimes focusing on a variety of social and economic performance measures provides an opportunity to systematically analyze the impact of two contrasting institutional arrangements, furthering the development of our understanding of how institutions can best encourage positive fisher decision-making.

Author(s)
Tracy Yandle, Emory University
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Estimation and Analysis of Technical Efficiency of Aquaculture in China

Abstract

Based on stochastic frontier analysis, this paper estimates the technical efficiency of aquaculture in 29 provinces and cities in China from 2007 to 2015. Based on this, the output elasticity of each input factor and the influencing factors of technical efficiency are analyzed. The results show that the whole of aquaculture in China is in the stage of diminishing returns to scale in 2007-2015, but the sum of the elasticity of the three input elements increased year by year. The average technical efficiency of aquaculture was 0.6871. Although there was fluctuation, the whole showed an upward trend. There were big differences in technical efficiency among different regions. The processing rate of aquatic products, net export of aquatic products, per capita aquaculture area and the number of technical extension agencies have significant impacts on technical efficiency.

Author(s)

Wei YANG, Shanghai Ocean University
Guangzhu WAN
Study on the Different Effects of the Industrial Structure Adjustment of Fishery on the Fishermen’s Income and Income Gap in Different Provinces of China

Part of
Fishery Governance, Policy and Management (6)
01:30 PM - 03:00 PM

Major Theme
Fishery Governance, Policy and Management

Abstract

Increasing fishermen’s income and narrowing the income gap are two of the main objectives of the Government of China. Based on the panel data from 2004 to 2015 of thirteen fishery-developed provinces in China, this paper empirically analyzes the impact of the industrial structure adjustment of fishery on the fishermen’s income and income gap. The result shows that:

1. Industrial structure transformation of fishery from primary to secondary industry helps to increase the level of fishermen’s income and narrow the income gap. Deepening of openness widens the gap.
2. Both industrial structure transformation of fishery from primary to secondary industry and openness in Eastern China can cause fishermen’s income and income gap to increase and narrow respectively, while industrial structure transformation of fishery from secondary to tertiary industry in these provinces widens the gap.
3. Industrial structure transformation of fishery from secondary to tertiary industry in Middle and Western China can increase the income and narrow the gap, while the transformation from primary to secondary industry widens the gap and openness could lead to the increase of income.

Both transformation and openness help to increase income per capita. However, their function on eliminating income disparity is ambiguous. Therefore, it is advisable to adjust industrial structure of fishery accordingly.

Author(s)
Wei YANG, Shanghai Ocean University
The Impact of TBT on Dual Margin of China's Aquatic Exports: an Analysis Based on the Exports to Japan, USA and South Korea

Abstract

This paper uses the six-encoded export data of aquatic products from 2002 to 2014, to measure the binary marginal of China's aquatic products exports. On this basis, the paper makes a quantitative assessment of the TBT impact and obtains the following conclusions: Firstly, in recent years, the total growth of China's export of aquatic products was mainly due to extensive margin, but intensive margin also play an important role in aquatic products export; secondly, TBT have a significant inhibitory effect on China's total export of aquatic products at the perspective of intensive margin. Thirdly, economic development, Aquatic production efficiency, Index of economic freedom and international shock also have different degrees of impact on the export of aquatic products. Faced with the complicated technical barriers to trade of different of countries, our government, export enterprises and industry associations must strengthen cooperation and take all positive measures to change the unfavorable situation of aquatic products exports.

Author(s)

Wei YANG, Shanghai Ocean University
Do Conventional Bio-economic Equilibrium Models Employed in Catch and Effort Analysis Satisfy the Required Time Series Properties?

Part of
Managing Small-scale and Developing Country Fisheries (2)
04:00 PM - 05:30 PM

Major Theme
Managing Small-scale and Developing Country Fisheries

Abstract

Although the conventional bio-economic equilibrium models are widely used in catch and effort analysis in developing countries, they frequently face criticism from biological perspectives. Besides this biological reproach, these models have rarely been tested to find out whether they satisfy the required time series properties and regression conditions. Thus, the main purpose of this empirical paper is to investigate whether these conventional bio-economic models achieve the required properties and conditions. In the context of small-scale fisheries of Oman, the paper uses catch and effort data for five commercially important demersal species over the period 1992-2016. The empirical approaches employed are the unit root test and cointegration regression techniques advocated by the econometric time series literature. The results of the unit root tests for individual series reveal that catch and effort were integrated of order one [i.e. I(1)] which satisfies the initial condition to investigate the cointegrating relationships between catch and effort. The results indicated that the catch and effort are cointegrated. The estimated parameters were then used to generate MSY estimates for each individual species under the conventional bio-economic equilibrium models. Furthermore, the paper relaxed the equilibrium assumption and generated MSY estimates to make a comparison between the two sets of results.

Author(s)

Jaynab Yousuf, Sultan Qaboos University

Shekar Bose, Sultan Qaboos University
ALTERNATIVE HARVEST CONTROL RULES FOR MULTI-FLEET AND MULTI-SPECIES TUNA FISHERIES UNDER DATA-POOR CONDITIONS IN EASTERN INDONESIA

Part of
Special Session: Tools for data poor stocks in mixed, small-scale and Indigenous fisheries
08:30 AM - 10:30 AM

Major Theme
Open Session: Tools for data poor stocks in mixed, small-scale and Indigenous fisheries

Abstract

Indonesian tuna fisheries are complex due to variation in the scale of fleet in the fisheries, their multi-species nature and problems with data collection. Moreover, like many developing-country fisheries, their management needs to take into account many other goals besides rents maximization, such as the distribution of rents and the stability of income and employment. This study evaluate the performance of alternative management procedures by means of a stochastic bio-economic model integrating the characteristics of three different scales of fishing, two tuna species, and partly unobserved catch. We focus on skipjack and yellowfin tuna fisheries in the eastern Indonesia in small-scale fleet, medium-scale fleet, and large-scale fleet of tuna fisheries. We combine the dynamics of an age-structured production model and the economic performance of fishing activity. We use reference points of catch per unit effort (CPUE) as representative of relative abundance to update the total number of allowable fishing effort next year. We discuss the performance of the management procedures with respect to aggregate rents, distribution of rents, and stability of fishing effort.

Author(s)

Shinta Yuniarta, Bogor Agricultural University
Rolf Groeneveld, WUR Social Science Group
Paul van Zwieten, WUR Aquaculture and Fisheries Group
A Study of Chinese Consumers’ Preference for Sustainably Farmed Seafood Using Experimental Auctions

Part of
Seafood Markets and Trade (4)
08:30 AM - 10:00 AM

Major Theme
Seafood Markets and Trade

Abstract
This study investigates the impact of information on private and public benefits of sustainably farmed seafood on Chinese consumers’ demand for these products using a sealed-bid, second-price experimental auction. Specifically, we auctioned farmed shrimp from Ecuador (import) and China (domestic), both with and without sustainability certification; these constitute the “basic” information. We then inject information treatments, i.e., public and private benefits of sustainably farmed seafood, during the experiment and observe how auction bids change. Public benefit is primarily the environmental benefits, while private benefits are food quality and safety. In addition to estimating consumers’ willingness to pay (WTP) under different information treatments, we decompose consumers’ WTP into a set of attributes of interest by eliciting consumers’ perceptions on the quality, safety, and eco-friendliness of auctioned farmed seafood. We found that providing public benefit information increases WTP for certified seafood products, whether the product is domestic or imported, and domestically certified products were affected more by the information than imported certified products. Private information increased WTP also and most of that was associated with food safety. When public information was provided on top of private information, the overall WTP did not change but shifted the source of WTP from food quality and safety to eco-friendliness. These results provide insightful information to seafood industry to formulate better sustainable seafood marketing strategies, and also for resource managers to make more effective policies.

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